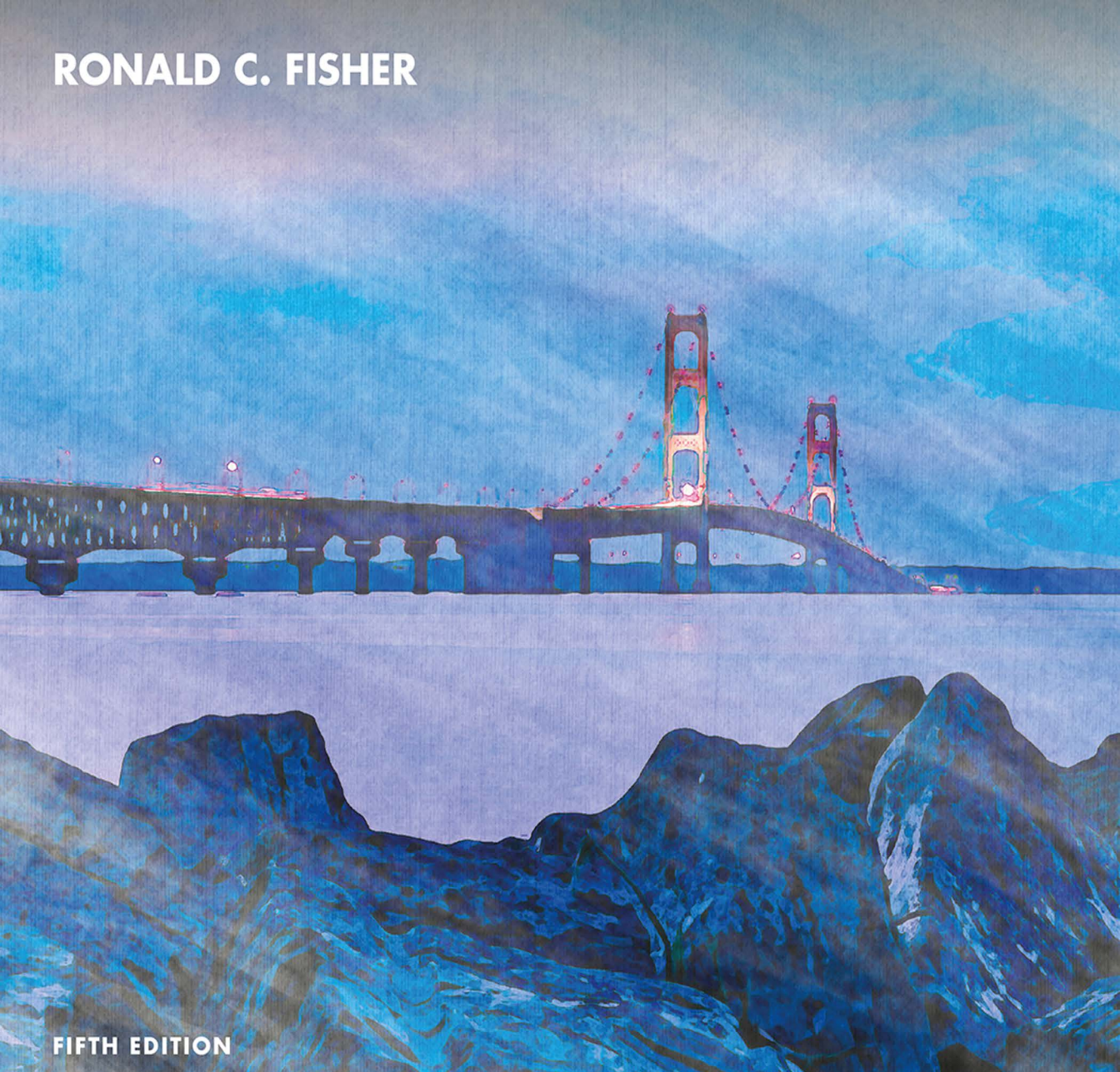
RONALD C. FISHER



FIFTH EDITION

STATE AND LOCAL PUBLIC FINANCE

ROUTLEDGE

State and Local Public Finance

State and Local Public Finance provides a comprehensive and sophisticated analysis of state and local government public finance practices and issues, using the basic tools of economics. This fifth edition maintains its focus on key local services such as education, health care, and transportation and brings in new coverage of land use and housing, applications from behavioral economics, and more international comparisons.

This textbook provides an examination and analysis of public finance practices and problems in a federal fiscal system, focusing on the fiscal behavior and policies of state and local governments. Modern economic theory is applied to examine the way key institutions are used to produce and finance services and to provide evaluation of alternative policies.

This stalwart text will continue to be invaluable reading for those who study public finance, local government finance, urban economics, public policy, and public administration.

Ronald C. Fisher is Professor of Economics at Michigan State University, where he specializes in the finance of state and local governments and intergovernmental fiscal relations.

State and Local Public Finance

Fifth Edition

Ronald C. Fisher

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

Cover image: Getty Images

Fifth edition published 2023
by Routledge
4 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

and by Routledge
605 Third Avenue, New York, NY 10158

Routledge is an imprint of the Taylor & Francis Group, an informa business

First edition published by Scott, Foresman and Co., Inc. 1989

Fourth edition published by Routledge 2016

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data
Names: Fisher, Ronald C., author.
Title: State and local public finance / Ronald C. Fisher.
Description: Fifth Edition. | New York, NY : Routledge, 2023. | Revised edition of the author's State and local public finance, 2016. | Includes bibliographical references and index.
Subjects: LCSH: Finance, Public—United States—States. | Local finance—United States. | State-local relations—United States. | Intergovernmental fiscal relations—United States.
Classification: LCC HJ275 .F5593 2023 (print) | LCC HJ275 (ebook) | DDC 336/.01373—dc23/eng/20220728
LC record available at https://lccn.loc.gov/2022025321
LC ebook record available at https://lccn.loc.gov/2022025322

ISBN: 978-0-367-46724-1 (hbk)
ISBN: 978-0-367-46723-4 (pbk)
ISBN: 978-1-003-03064-5 (ebk)

DOI: 10.4324/9781003030645

Typeset in Bembo
by Apex CoVantage, LLC

To
Liam, Penelope, & Rowan and Finnegan & Henry, my family's next generation beneficiaries of state-local services

Contents

Preface ix
Acknowledgements xi

PART I
Introduction 1

1 Why study state and local government finance? 3
2 Microeconomic analysis: market efficiency and market failure 25

PART II
Public choice and fiscal federalism 45

3 Demand for state and local government goods and services 47
4 Public choice without mobility: voting 68
5 Public choice through mobility 87
6 Organization of subnational government 104

PART III
Provision of state and local goods and services 121

7 Supply of state and local goods and services 123
8 Pricing of government goods: user charges 154
9 Intergovernmental grants 181
10 Capital investment, borrowing, and debt 209

PART IV
Revenue for state and local governments 239

11 Principles of tax analysis 241

12 The property tax 261

13 Sales and excise taxes 302

14 Individual income taxes 331

15 Business taxes 357

16 Revenue from government monopoly and regulation 379

PART V
Applications and policy analysis 407

17 Education 409

18 Transportation 450

19 Health and welfare 482

20 Economic development 515

Bibliography 551
Index 577

Preface

State and Local Public Finance provides an examination and analysis of public finance practices and problems in a federal fiscal system, focusing on the behavior and policies of state and local governments. It presents detailed descriptions of significant institutions where appropriate; it applies modern economic theory to the way these institutions are used to produce and finance services; and it provides evaluation of alternative policies. Although the emphasis is on US institutions and issues, much of the economic analysis applies generally to any nation's fiscal policy, especially those with a federal system.

In the first edition, it seemed necessary to justify why a book devoted to state and local government was necessary. With a global trend toward decentralization, an increased role for state governments in the US, and concern about education, health, transportation, and economic development often leading the news, the importance of state-local government now seems obvious. Still, the argument from that first edition bears repeating for any remaining skeptics.

A book devoted solely to state and local government fiscal issues continues to be appropriate for at least three reasons. First, the subnational government sector is a substantial component of the US economy, employing one in seven of all workers and spending that accounts for about 15 percent of gross domestic product. Second, of all services provided through the public sector, those provided by state and local governments – education, transportation, health and welfare, public safety, sanitation, recreation – are the most familiar to individuals and have the greatest effect on day-to-day life. Third, the information and knowledge available about state-local policy issues continues to grow and evolve.

The book is intended to be ideal for students who are studying public finance or public policy and have some knowledge of economic principles. The text provides complete coverage for courses specializing in state and local government. For one-semester or yearlong courses on public finance or public policy in general, two approaches are possible: the book may be used to supplement a general text, or it may become the basis for the course, with the general theory illustrated by state-local examples. For instance, the general equilibrium analysis of capital taxes can be illustrated just as well – and perhaps more interestingly – by the property tax as by the corporate income tax. The book may also be of interest to students studying political science, public administration, journalism, or prelaw; to students in master's degree programs in public policy analysis, public administration, or planning; and to government officials and applied economists in government and consulting. Additionally, graduate students in economics may also find the book useful as both a survey of and reference to the economics literature on state-local finance issues.

Structure of the fifth edition

This new edition retains what users identified as positive features in the past. Relatively sophisticated economic and policy analysis is presented, albeit using basic tools. Complicated

and controversial economic and political issues are examined using institutional knowledge and basic economic concepts. Readers are expected to have knowledge of basic microeconomics at the introductory level, but they do not have to know the theoretical tools usually associated with intermediate-level microeconomics. (In the few cases where these techniques add to the understanding of the material, they are presented in appendices.) It is important that students learn economists' conclusions and rationale, even if they do not have a detailed understanding of the underlying theory or the econometrics from which those conclusions were derived. The intent of *State and Local Public Finance* remains to represent fairly the thinking of economists about state-local issues.

This new edition incorporates several changes. The *Headlines* and *Applications* sections have been updated or changed as appropriate to reflect the most current and interesting policy issues affecting state and local governments, including the effects of the COVID-19 pandemic, federal economic assistance in light of the pandemic, the infrastructure investment gap, changes in the tax treatment of internet purchases, housing market changes and the effect on property taxes, the implications of demographic changes, changes in state finance of schools, revision of state income taxes and progressivity, changes in automobile technology and the implications for transportation financing, and the expansion of sports gambling, among many others.

A new *Data availability* section has been added at the start of each chapter identifying the data readily available for that topic and the key sources. This permits a reader to access data relevant to that reader easily and also allows a reduction in the amount of descriptive (especially time-sensitive) data presented in tables and charts. Individuals can use the sources to access the most recent information.

The fifth edition sees a modest reorganization of chapters and topics. The chapter concerning budgeting and fiscal outcomes and the one about production and costs have been combined into one, focusing on the supply of state-local goods and services. The two chapters covering property tax in prior editions have been combined into a single chapter (similar to other topics in the book). The *International Comparisons* have been expanded and enhanced. Citations to important books and papers in the literature regarding state and local government finance and policy have been updated so that the volume might remain a relatively comprehensive reference source.

Part I continues to present an overview of the state-local sector, discussion of the economic role of subnational governments, and a review of the microeconomic reasons for government provision in general. The basic fiscal institutions and core economic theory are presented in Parts II through V. Following discussion of the interplay between the structure of subnational governments and their fiscal role in Part II, the provision of services in Part III – including the roles of costs, user charges, grants, and borrowing – are examined before analysis of the various state-local taxes in Part IV. These core chapters can be covered in any order using cross-references to material in other chapters. In Part V, the institutional information and economic analyses from the core sections are applied to four key policy issues. Each chapter includes both discussion questions and a list of relevant additional readings.

Many students at Michigan State University and elsewhere – undergraduates and graduate students alike – have contributed to this project in many ways. Their questions, comments, and suggestions have contributed to both my knowledge of state-local finance and my understanding of how important economic concepts can be illustrated and conveyed in interesting and effective ways.

Acknowledgements

I have been fortunate in my career in having a number of influential and inspiring teachers, mentors, and colleagues. Walter Adams, Byron Brown, Daniel Saks, and Milton Taylor at Michigan State University and Vernon Henderson and Allen Feldman at Brown University were instrumental in introducing economics to me and showing me how it could profitably be employed in understanding public sector issues. John Shannon of the Advisory Commission on Intergovernmental Relations helped me in the early years of my career to learn how to bridge the gap between theory and policy, and Robert A. Bowman, while State Treasurer of Michigan, gave me the opportunity later to practice what I had learned. For more than 20 years, I have enjoyed and benefited from a research partnership with Robert Wassmer.

This and prior editions have benefited greatly from the careful, detailed, and helpful comments, criticisms, and suggestions of many users and reviewers. For their valued assistance, I owe special gratitude and appreciation to:

John E. Anderson *University of Nebraska*
John H. Beck *Gonzaga University*
Jeff E. Biddle *Michigan State University*
R. Bruce Billings *University of Arizona*
William T. Bogart *York College of Pennsylvania*
Kenneth D. Boyer *Michigan State University*
Byron W. Brown *Michigan State University*
Jeffrey I. Chapman *Arizona State University*
Dennis C. Coates *University of Maryland – Baltimore County*
Susan Crosby *Hagan School of Business, Iona College*
Robert B. Fischer *California State University, Chico*
William A. Fischel *Dartmouth College*
William F. Fox *University of Tennessee*
Wayland D. Gardner *Western Michigan University*
Gerald S. Goldstein *Office of the Superintendent of Financial Institutions, Canada*
Beth Honadle *University of Cincinnati*
Larry E. Huckins *Baruch College*
Oded Izraeli *Oakland University*
Craig Johnson *Indiana University*
Dudley Johnson *Kibble & Prentice*
Stephen E. Lile *Western Kentucky University*
William A. McEachern *University of Connecticut*
Sharon B. Megdal *University of Arizona*
Peter Mieszkowski *Rice University*
Pamela Moomau *Joint Committee on Taxation*

Edward V. Murphy *Southwest Texas State University*
Dick Netzer *New York University*
Donald J. Reeb *State University of New York, Albany*
Timothy Ryan *University of New Orleans*
Rexford E. Santerre *University of Connecticut*
Daniel B. Suits *Michigan State University*
Charles Wagoner *Delta State University*
Robert A. Wassmer *California State University, Sacramento*
William White *Cornell University*
Douglas Wills *Sweet Briar College*
Michael J. Wolkoff *University of Rochester*
Paula Worthington *University of Chicago*
James H. Wycoff *State University of New York, Albany*
John Yinger *Syracuse University*
Kurt Zorn *Indiana University*

Many people at Routledge and Taylor & Francis deserve thanks and appreciation for the production of this fifth edition. Emily Kindleysides and Natalie Tomlinson served as gracious, helpful, and encouraging editors. In addition to encouraging me to take on the daunting task of a new edition at my advanced age and collecting helpful reviews, they kindly accommodated some unanticipated changes in plans and schedule. Comments and suggestions by a set of anonymous reviewers were valuable for restructuring parts of the book. Lisa Lavelle, Chloe James, and especially Helena Parkinson all served as helpful and informative editorial assistants, guiding the book to publication. Ramachandran Vijayaraghavan and his production team at Apex CoVantage India were helpful and efficient in making an attractive book appear in a timely manner. Each of these people deserves your appreciation as you use this new fifth edition.

Ronald C. Fisher

Part I

Introduction

Every person is affected by state and local government fiscal policies. We attend public schools; travel on streets, highways, buses, and subways; receive clean water and dispose of dirty water; have our trash collected; enjoy the security of police and fire protection; use public hospitals or have health-care costs paid; vacation at parks and public beaches; and support the less fortunate with services and income maintenance, and we pay for these services. We pay property, income, and sales taxes; excise taxes on a variety of commodities such as alcohol, tobacco, and gasoline; and a number of different user fees and charges, and we buy lottery tickets and bet on sporting events. All this encompasses state and local government finance. In this book, we will do more than reiterate personal experience, however. The goal is to combine knowledge of the institutional details of fiscal policy with an analytical framework so that policy issues can be better understood.

Chapter 1 provides a general overall view of important institutional characteristics. How large is the state and local government sector, and how has that size changed? What is the role of state and local governments compared to the federal government? What services do state and local governments provide, and how are those services financed? How are state and local governments organized? How representative is your experience of the way it is done in your state and community?

In this book, the facts are analyzed using standard economics methods, which are presented in Chapter 2. What is the economic role of government generally, and where do state and local governments fit in? What is meant by equity and efficiency, the traditional criteria for evaluating economic policy? What economic tools can state and local governments use to carry out their economic responsibilities in an equitable and efficient manner? From the general overview in this introductory section, the book proceeds to specific analysis of separate pieces of state and local finance and then returns, at the end, to more general analysis of broad policy issues.

DOI: 10.4324/9781003030645-1

1 Why study state and local government finance?

Headlines

A 2013 national survey conducted by the Pew Research Center illustrates the remarkable degree to which the public continues to appreciate state and local governments.[1] A substantial majority of respondents indicated a favorable view of local governments (63 percent) and state governments (57 percent). In contrast, only 28 percent expressed a favorable view of the federal government.

A 2016 Gallup poll reported that 55 percent of respondents favored concentration of power at the state government level, compared to 37 percent preferring a concentration of power at the federal level.[2]

These results are consistent with a long survey series begun by the US Advisory Commission on Intergovernmental Relations.[3] Respondents were asked, "From which level of government do you feel you get the most for your money?" Local and state governments drew the highest number of responses, consistently outdrawing the federal government beginning in the 1980s.

Data availability

The Governments Division of the US Census Bureau is the major source of data about the revenue and expenditures of state and local governments. These data are reported annually in several different reports. State and local government tax collections are reported quarterly (www.census.gov/programs-surveys/qtax/data/tables.html). Separately, all state and local government finances (www.census.gov/programs-surveys/gov-finances/data/datasets.html) also are reported, but with a year or two lag. As noted throughout the book, you may access these data directly from the census or by using the valuable and easy-to-use census data tabulation utility maintained by the Urban Institute (https://state-local-finance-data.taxpolicycenter.org//pages.cfm).

The Census of Governments is conducted by the Census Bureau every five years in the years ending in "2" and "7" and includes detailed information about government structure, organization, and finances for all levels of state and local government in the US. The Census of Governments information is available at www.census.gov/programs-surveys/cog.html.

Data about the financial status of state and local governments also is available from the US Bureau of Economic Analysis, which is the federal government agency

DOI: 10.4324/9781003030645-2

responsible for measuring macroeconomic data. Although the accounting rules are different from those of the Census Bureau, the BEA reports data about current receipts, current expenditures, net savings, and other macroeconomic measures for state and local governments on a quarterly basis (https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=3&isuri=1&1921=survey&1903=86).

Data about state-local government employment are reported by two organizations. The US Bureau of Labor Statistics (www.bls.gov/) reports national employment data monthly based on a survey of employers. Employment by industry, including state and local government separately, is in Table B-1, "Employees on nonfarm payrolls by industry sector and selected industry detail." The Census Bureau in the annual Survey of Public Employment & Payroll (www.census.gov/programs-surveys/apes.html) reports employment for both state and local governments by state and by function.

Fiscal, budgeting, and management data comparing many different countries are reported in the OECD report *Government at a Glance* (www.oecd.org/gov/government-at-a-glance-22214399.htm).

The economic issues involved in the financing of state-local governments deserve and demand separate attention for four primary reasons: (1) the state-local government sector is a substantial part of the US economy, with spending representing about 15 percent of gross domestic product (GDP) and comprising nearly half of total government domestic expenditure; (2) the major services provided by state and local governments – education, transportation, social services, and public safety – are those that most affect residents on a day-to-day basis; (3) state and local government practices, experiments, and policies often form the basis for subsequent programs or policy changes by the US federal government or by governments in other countries; and (4) because of the *diversity* of state-local governments and the ease of *mobility* among them, the analysis of many economic issues is substantially different in the state and local government sector than in the federal government.

The special and essential nature of state and local governments in the U.S. is noted by the White House[4] in a description of U.S. government as follows: "Most Americans have more daily contact with their state and local governments than with the federal government. Police departments, libraries, and schools – not to mention driver's licenses and parking tickets – usually fall under the oversight of state and local governments. Each state has its own written constitution, and these documents are often far more elaborate than their federal counterpart."

The importance of **diversity** and **mobility** for state-local government finance cannot be overemphasized. As you will learn in this book, tremendous diversity exists both in the structure of subnational government in different states and in the magnitude and mix of revenues and expenditures. It can be very misleading to talk about "the services" provided by states, counties, cities, or local governments in general because there is no single structure. Similarly, even among governments that have responsibility for the same services, the quantity and quality of service provided often differs substantially. There is also great variety in the ways in which subnational governments finance those services – that is, on which sources of revenue to rely. Indeed, this diversity is the essence of a federal, as opposed to unitary, system of government.

The ease of mobility among these diverse subnational governments, however, is what causes the diversity to have economic implications. Diversity is largely uninteresting without mobility, and mobility is unimportant without the choice diversity creates. The notion of mobility here is not only physical mobility (the location of residences or businesses among

different jurisdictions) but also economic mobility (the choice of where to consume or invest). In many cases, individuals can independently select the location of residence, work, investment, and consumption. Many individuals live in one city, work in another, and shop at stores or a shopping mall in still another locality or online. In some cases, these activities cross state as well as local government boundaries. For instance, when individuals save through bank accounts or mutual funds, their money is invested in all kinds of projects located in many different states and localities and even different countries. This economic mobility coupled with the choice provided by the diversity of subnational governments is largely the topic of this book.

Structure of subnational government

The structure of government in the United States is illustrated in Figure 1.1, which depicts the three main layers of government – federal, state, and local. In 2017 there were about 89,550 different state and local governments in the United States, each with independent functional responsibilities and revenue sources. Besides the fifty states, these included about 39,050 general-purpose local governments (counties, municipalities, and townships) and about 50,400 special-purpose local governments (school and other special districts).[5] Note that the states, which existed first, established the federal government and retained specific authority in the US Constitution. Indeed, the Tenth Amendment to the US Constitution states, "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people." Local

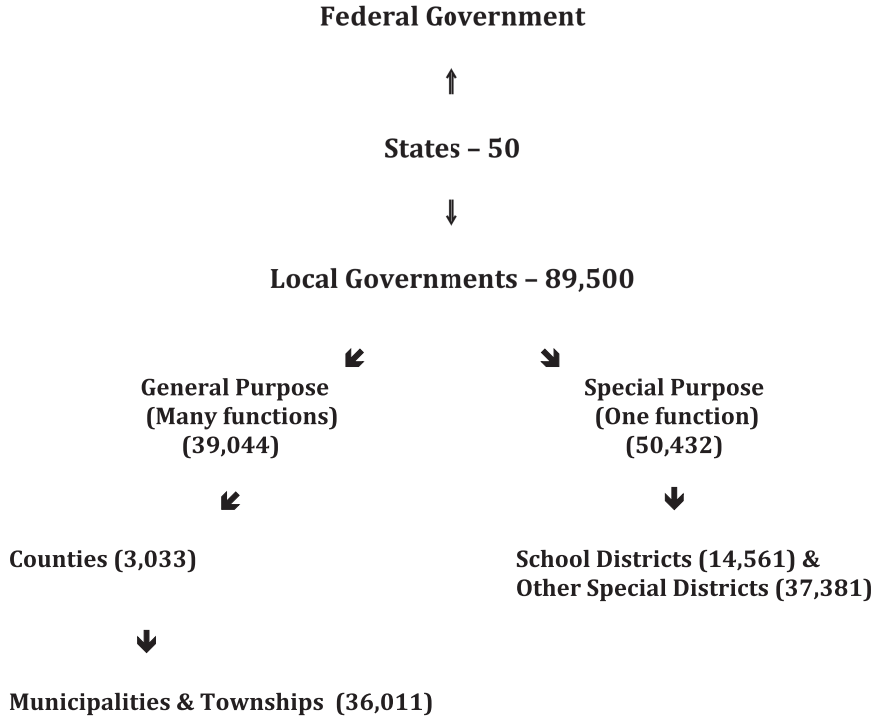


Figure 1.1 Governmental structure of the United States

Source: US Census Bureau

governments, on the other hand, are entirely legal, political, and fiscal creations of the state governments, which is partly why there is such variation in local government structure.

The boundaries of many local jurisdictions overlap, so any specific individual will be a member or resident of at least two subnational governments (a state and a locality) and more likely a resident of four or more (state, county, municipality or township, and at least one special district), each with separate officials and separate taxes and services. The complicated relationship among local jurisdictions is illustrated in Figure 1.2, which depicts the cities, townships, and school districts for one county (of 83) in Michigan. Residents of the area covered by the map are part of (that is, elect officials of, pay taxes to, and receive services from) the state of Michigan and Ingham County (shown as the shaded rectangle). Within the county, fine solid black lines identify cities (East Lansing, Lansing, Mason, Williamston, etc.). Townships are shown as the regular square-shaped areas (marked by dotted lines) that cover the entire county, with township names printed in italics. School districts

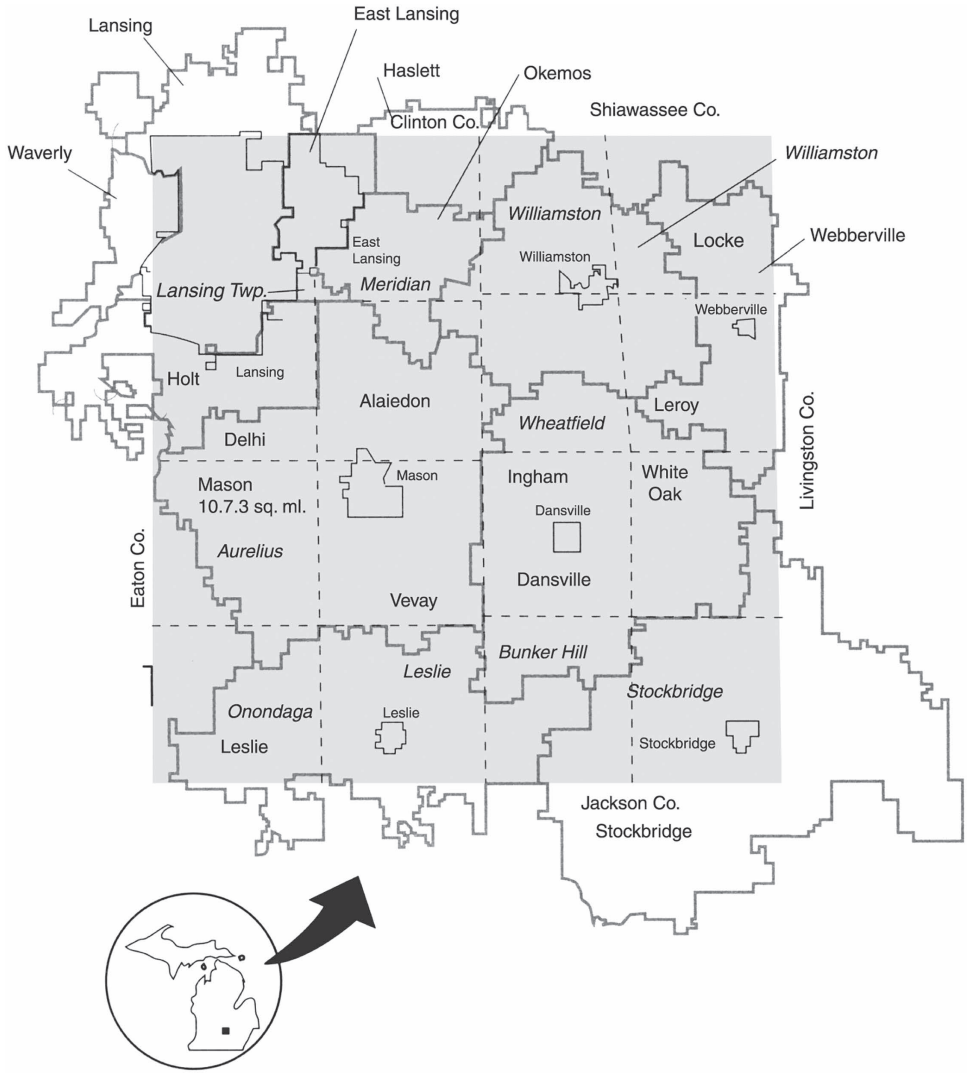


Figure 1.2 Overlapping local government boundaries – Ingham County

(the large, irregularly shaped areas shown by gray lines) cross city, township, and even county boundaries. As an illustration, residents of the Williamston school district, for instance, also could reside in Williamston City or Williamston, Locke, Leroy, Wheatfield, Alaiedon, or Meridian Townships. Thus, residents in this area are members of at least four state and local jurisdictions.

The division of responsibility among these different types or levels of subnational government varies substantially by state or region. In Maryland, for example, counties are the dominant form of local government, collecting about 80 percent of local own-source revenue and making about 80 percent of all local government expenditures. At the opposite end of the spectrum, counties have no fiscal role in Connecticut, where local government services are provided primarily by 179 separate and nonoverlapping "towns." Michigan represents a more common or typical structure where counties are subdivided into municipalities and townships, and a number of special districts, including school districts, are superimposed on the overall structure, which Figure 1.2 depicts. Even where structure is similar, size is not. There are 2,726 municipalities and townships in Illinois, but only 1,530 in New York, although the two states are about the same area, and New York has a larger population.

Fiscal roles also differ. In some states, such as Alaska, Arkansas, Delaware, Hawaii, New Mexico, and Vermont, local governments play a relatively limited role with the state government being dominant. In others, such as Colorado, Florida, New York, and Texas, local governments account for the majority of state-local expenditures. The division of responsibility within the local sector also varies by state.

Fiscal characteristics of the subnational public sector

Size and growth

In 2020 state and local governments spent nearly $2,300 billion collected from their own sources (that is, excluding spending financed by federal aid), which represented 11 percent of GDP, as measured by the US Bureau of Economic Analysis for the national income accounts (see Table 1.1). If spending financed by federal grants is included, state and local government final expenditures are $3,176 billion and represent 15 percent of GDP. Comparing the state-local sector to the federal government based on spending from its own sources, state and local governments collected and spent about 33 percent of the federal government amount. If comparison is limited to spending for domestic programs by all levels of government, state-local governments were responsible for spending about 40 percent of the total.

Table 1.1 The relative size of federal and state-local government, 2020

Type of expenditure	*Federal government*		*State and local government*	
	Amount (billions)	*Percentage of GDP*	*Amount (billions)*	*Percentage of GDP*
Expenditures from own sources	$6,920.1	33.1%	$2,295.7	11.0%
Expenditures after grants	5,988.2	28.6	3,176.2	15.2
Domestic expenditures, own sources	5,559.7	26.6	2,295.7	11.0
Domestic expenditures after grants	4,627.8	22.1	3,176.2	15.2

Source: Department of Commerce, Bureau of Economic Analysis

Note: Domestic expenditures include nondefense purchases, transfer payments to persons and governments, and net subsidies of government enterprises.

The US Census Bureau also reports data about the magnitude of state and local government spending, and the census measure differs from that reported by the BEA for the national income accounts. The census measure includes some businesslike activities (utilities, public transit, and so on), state-local employee retirement systems, and insurance for workers (unemployment and worker's compensation) that the BEA excludes and classifies elsewhere. Therefore, the census measure is a broader and more inclusive of measure of all the activities of state and local governments. State and local government total expenditure as reported by the Census Bureau for 2019 was $3,968 billion, which represents 18.5 percent of GDP and 21 percent of personal income received by residents.

State and local governments are major employers, with almost 20 million workers in 2019. As depicted in Figure 1.3, state and local governments account for more than 15 percent of total employment in the nation and more than 87 percent of all government employees, a share that has been increasing over time. That means that state and local governments employ about one of every seven workers in the nation, with local schools accounting for 40 percent of that number. State and local governments employment more workers than the leisure and hospitality industry (restaurants, hotels, theatres, and other entertainment), retail sellers, and health care, among others.

Another interesting way to evaluate the magnitude of state-local economic activity is to think of the states as business firms – taking in revenue and producing services – and compare the states based on general revenue to the largest corporations based on sales revenue. Government in all the states is large enough to be part of the Fortune 500 list of largest firms, 15 states are among the 50 largest (by revenue) of these entities, and California is second largest, exceeded only by Walmart. By any of these measures, the state-local government

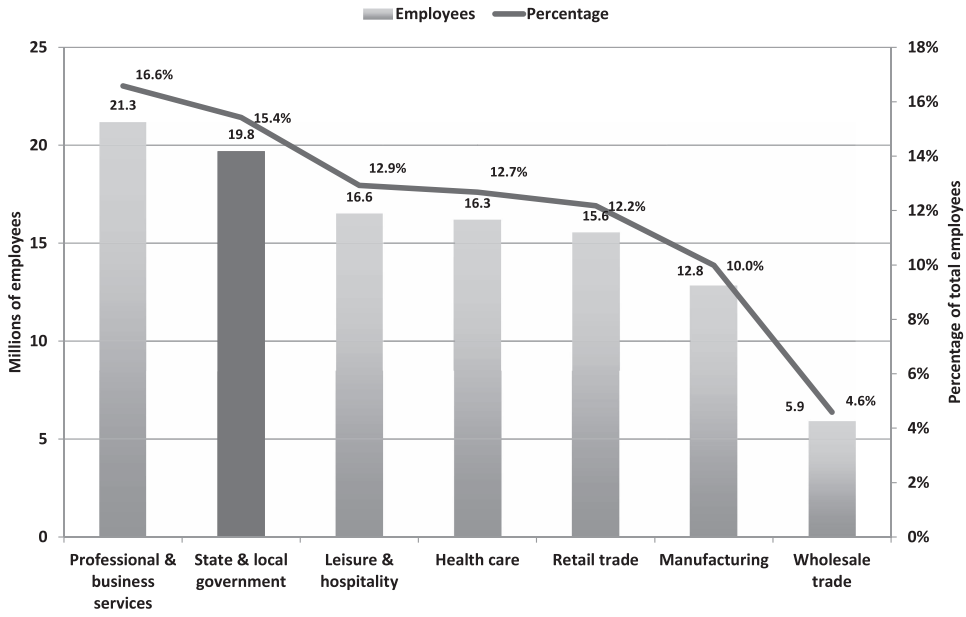


Figure 1.3 State-local government employment compared, 2019

Source: US Bureau of Labor Statistics

sector is both an important component of the US economy and a very large fraction of the entire government sector.

In addition, state and local governments are substantial buyers of goods and services from private businesses. By one estimate, the state governments and various local governments nationally spend as much as $2 trillion each year purchasing goods from private businesses. When the state or a county repairs a road or bridge and when a school district builds new schools, private contractors are hired to do the work. Governments buy computers, furniture, vehicles, and other equipment from private business. Medicaid pays for services from doctors and nurses, hospitals, and pharmacies. These governments also purchase materials and supplies – including fuel, electricity and natural gas, books, paper, software, chemicals (salt for the roads in winter, for example), and so on.

The current substantial relative size of the subnational government sector arose initially from a roughly 25-year period of sustained rapid growth between 1950 and 1975. Using National Income Accounts data, state-local expenditures grew from about 6 percent of GDP in 1950 to about 12 percent in 1975, implying that state-local spending grew at roughly twice the rate of the national economy. Using US Census data, the growth of total state-local government expenditures (either including or excluding spending financed by grants) relative to personal income and in real per capita dollars is depicted in Figures 1.4 and 1.5. In 1952 total state-local spending from all sources represented slightly more than 11 percent of personal income, but by 1975 state-local spending had grown to about 20 percent of income. Even excluding federal grants, state-local spending from own-source revenues increased from about 10 percent of income in 1952 to about 17 percent in 1975. A similar pattern of growth is shown by real per capita dollars, indicating that state-local spending also increased faster than population growth and prices during this period. Not surprisingly, the

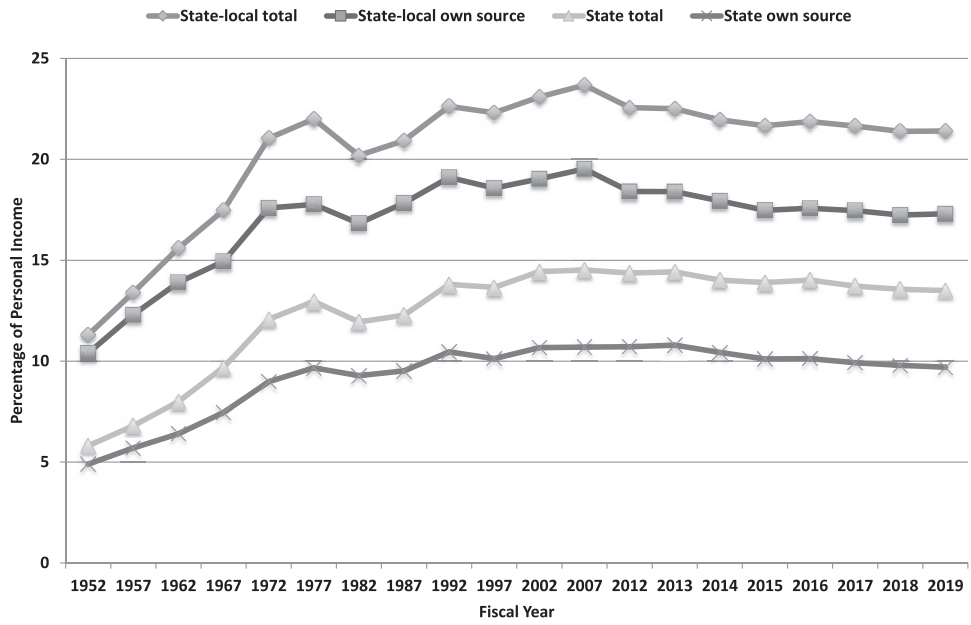


Figure 1.4 State-local expenditures as a percentage of personal income

Source: US Census Bureau

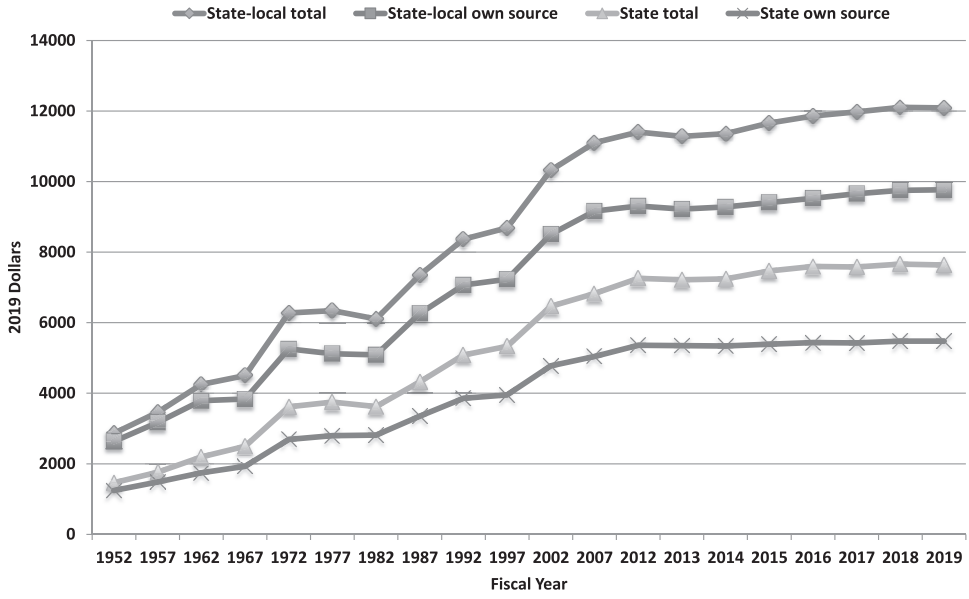


Figure 1.5 State-local expenditure real per capita (in 2019 dollars)
Source: US Census Bureau

pattern of growth in spending by state governments alone parallels the pattern for the entire state-local sector rather closely.

The relative growth of the state-local sector in this period is usually attributed to three factors. First, income increased rather substantially in these years, causing an increase in demand for many different types of goods and services, some of which were provided largely by subnational governments. Second, growth in population and change in the composition of the population (especially the postwar baby boom) also led to an increase in demand for state-local services (especially education). Third, substantial increases in labor productivity and manufacturing wages during this period created pressures to increase the wages of state and local employees as well. This caused an increase in the relative cost of providing those services. In essence, spending rose faster than the economy grew because the population to be served (especially children) was rising relatively fast, because the costs of providing state-local services were rising faster than average, and because consumers were demanding new or improved services from subnational governments.

The state-local government sector experienced relative fiscal stability from the late 1970s until the Great Recession in 2007. State-local spending continued to grow modestly relative to personal income and then stabilized after 2002, remaining between 20 and 24 percent of personal income. A similar slowdown in the growth of state-local government real per capita spending beginning in the latter 1970s is shown in Figure 1.5. State-local government spending continued to increase faster than the combination of population growth and inflation until about 2002, remaining essentially constant until the Great Recession. After the Great Recession, state-local spending declined relative to personal income, whereas real per capita spending has remained essentially constant. Not surprisingly, the change in spending by state governments alone parallels the pattern for the entire state-local sector rather closely.

The slowdown in the relative growth of state and local government during the last quarter of the twentieth century can be attributed to a reversal of those factors that had been operating previously. Income did not grow as fast, and demand for educational services lessened as the baby boomers completed school and delayed starting their own families. State-local government costs, especially wages, did not increase relatively as fast as previously, in part due to slower growth of private productivity. Federal grants to state-local governments did not grow anywhere near as fast as in the previous period. It has been suggested also that the slowdown resulted from a change in the preferences of consumers for government services, as reflected by the coordinated opposition to state-local taxes in the late 1970s and 1980s – what has been called the "tax revolt," a change in the political environment that seems to have persisted.

The growth in state-local spending that continued was influenced by several factors – including increasing health-care costs, growth in the number of elderly people and school-age children, public safety issues (including corrections and efforts to prevent terrorism), and services that state-local governments are mandated to provide by the national government. For example, Gramlich (1991) suggests that the increased state-local spending in the 1980s was explained mainly by three factors – rising costs of producing services (especially for health care), increased demand for services (particularly due to more prisons and a growing prison population, as well as an increase in the number of school children), and a small effect from new federal government requirements for state-local spending, all factors that continued through the 1990s.

The Great Recession, which began formally in December 2007, and the financial market crisis that preceded it had dramatic fiscal effects for state and local governments unprecedented in at least the previous 30 years. Although the recession ended officially in June 2009, the effects of the recession on state-local finances extended beyond the formal recession period. Although the detailed effects of and responses to the recession are discussed in Chapter 7, aggregate effects are obvious in Figures 1.4 and 1.5. State-local spending (relative to both income and population) declined in fiscal year 2008 (when the recession started) and subsequently increased to peak levels in 2009 and 2010. The Great Recession "blip" in relative state-local spending shown in the figures partly reflects the effect of federal government stimulus funds provided to state and local governments. However, the pattern shown may overstate the actual change in spending because income is reduced and price changes dampened during a recession, which themselves contribute to expenditure rising as a fraction of GDP and in real terms.

Expenditure categories

Two categories – education (33 percent) and welfare (22 percent, which includes Medicaid) – account for more than half of state-local general spending, as shown in Figure 1.6. (According to the US Census definition, general expenditure includes all expenditures except those for government utilities, liquor stores, and employee retirement funds.) All other single categories represent no more than 10 percent of aggregate spending, including health and hospitals (10 percent), highways (6 percent), government administration (5 percent), and police protection (4 percent). The "government administration" category at 5 percent is noteworthy, as it is sometimes argued that state-local fiscal problems could be eliminated just by cutting government "overhead" and reducing the number of officials, a claim that seems dubious given its low share of the total budget. The substantial growth in the public welfare category primarily reflects the growth of Medicaid, as discussed in Chapter 19.

The distribution of spending by category for state-local governments together masks important differences between states and local governments. Although the largest category of general expenditure for state governments is grants to local governments, much of that is

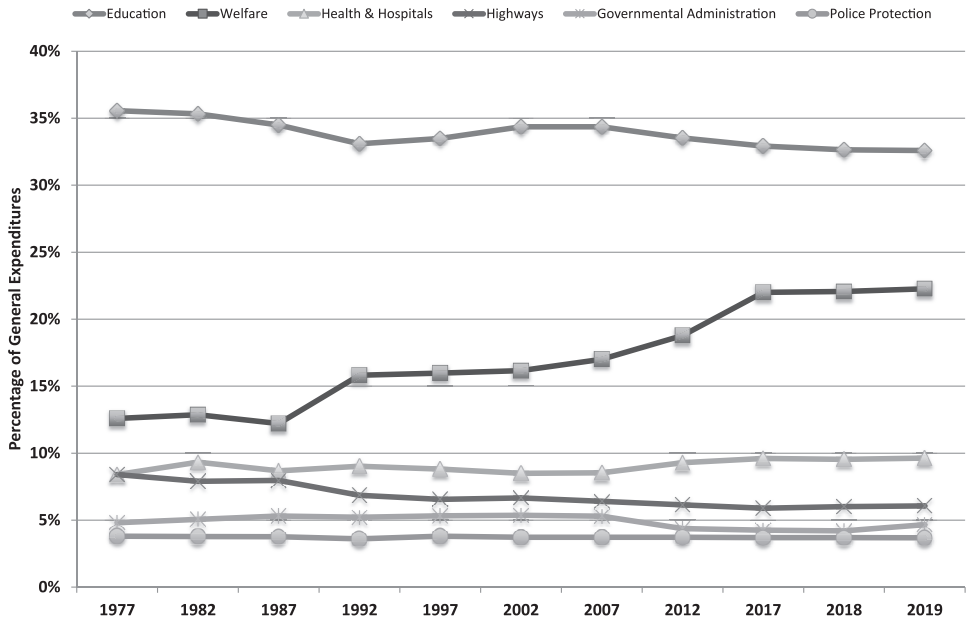


Figure 1.6 Distribution of state-local general expenditures
Source: US Census Bureau

to support local schools. Consequently, education (including higher education spending and state grants for schools) is by far the largest category of spending for both states and localities. State governments also spend a relatively large fraction of their expenditures on welfare (Medicaid), transportation, and health and hospital services. The other major expenditure categories for local governments are environment and housing, public safety, health and hospitals, and transportation.

Revenue sources

Five major sources comprise the great bulk of state-local government revenue: federal aid (providing about 22 percent of general revenue), sales and excise taxes (19 percent), property tax (17 percent), charges and fees (17 percent), and income taxes (13 percent of revenue), as depicted in Figure 1.7.

In contrast, the predominant source of revenue for the federal government is income taxes, including the personal and corporate income taxes and the Social Security payroll tax. For the 20 years from the late 1980s until the Great Recession, state-local governments together had a relatively stable and balanced revenue structure. The effect of the Great Recession on revenue shares is apparent, with federal aid increasing as a result of federal government macroeconomic stimulus. Federal aid continued to increase as a result of Medicaid expansion. Two continuing long-run trends are the falling relative importance of sales taxes and rising importance of charges.

The typical or average state government revenue structure differs substantially from those of local governments. In 2019, state governments got 31 percent of general revenue from the

federal government, with sales taxes (about 23 percent) and income taxes (about 21 percent from individual and corporate taxes) the largest own sources. The two dominant sources of general revenue for local governments are state grants (about 31 percent) and property taxes (30 percent). From another perspective, grants from both the federal and state government provide about 34 percent of local government general revenue. Of course, these are averages; substantial differences exist among both states and different types of local governments.

Diversity of subnational governments

This aggregate perspective of the state-local sector can be deceiving, as individual states or localities typically differ from the mythical "average" state or locality. Indeed, as noted, fiscal diversity is a fundamental and essential characteristic of federal systems. Accordingly, some comparison of the fiscal choices in different states is shown by the data in Tables 1.2 and 1.3. Because of the different sizes and characteristics of the states, it is necessary to standardize the data. The most common ways of standardizing are to compare the data in per capita terms (per person) or as a percentage of income. If one state has higher per capita expenditures than another or expenditures take a larger fraction of income in one state than another, does that mean services are greater in the one state than the other? Not necessarily.

The rationale for per capita comparisons is that it may require more expenditure and revenue to provide equal services to a large population than to a smaller one. The degree to which that is true for different state-local services is not clear, however. If the production of state-local services exhibits **constant returns to scale** – that is, if the average cost of providing a unit of service to one consumer is constant – then total cost will increase proportionately to population. Equal per capita amounts are then consistent with equal services,

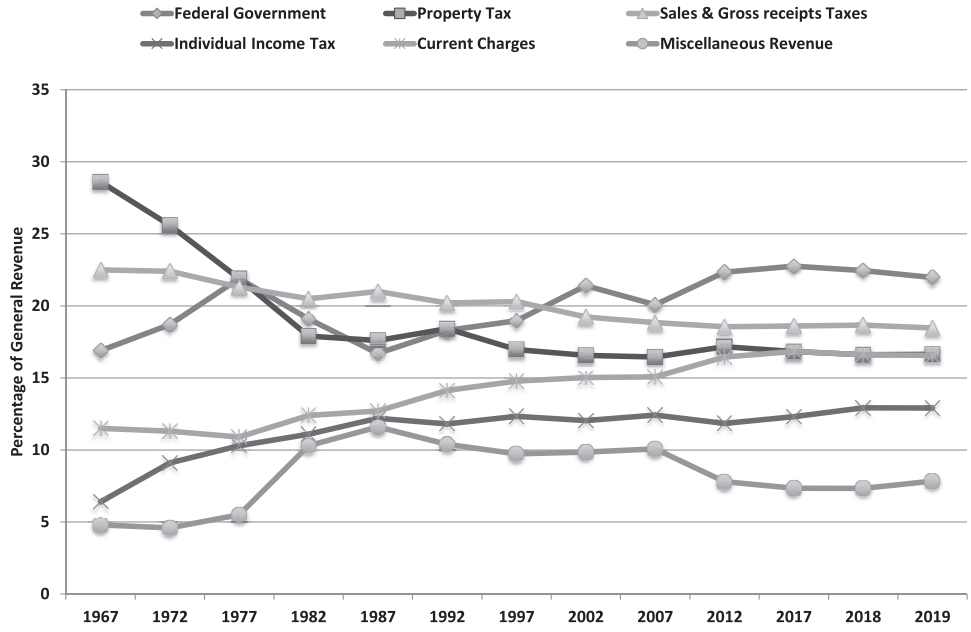


Figure 1.7 Distribution of state-local general revenue

Source: US Census Bureau

if all other factors are the same between the jurisdictions being compared. On the other hand, if the production of services exhibits **increasing returns to scale**, which means that cost per person falls as the number of people served rises, then equal services are consistent with lower per capita expenditures in the larger jurisdictions, all else the same.

A similar analysis applies to interjurisdictional comparisons based on the fraction of income taken by state-local expenditures and revenues. One would expect that two states, one rich and one poor, would have the same percentage of their income going to government services only if the income elasticity of demand for those government services is one – that is, if demand for service increases proportionately with income. If not – if demand for state-local services increases slower or faster than income – then equal percentages of income going to state-local expenditures are not expected (again assuming that factors other than income are the same between the jurisdictions being compared).

In general, differences in state-local expenditures or revenues among states may arise because of (1) different decisions about what services to provide through the public sector as opposed to the private sector; (2) differences in input prices (especially labor); (3) differences in environment such as area, population density, or weather, which affect the cost of producing services; and (4) differences in demand for services from either population, income, or taste differences. Standardization in per capita terms may offset only the population effects, and standardization by state income level offsets only the income effect on demand. As a result, extreme caution is necessary in making interstate fiscal comparisons. A higher level of revenues and expenditures in one state may mean there are more services in that state, may reflect higher production costs in that state, or simply may mean that residents of that state have decided to provide some service (hospitals, for instance) through the government rather than privately.

Expenditures

To illustrate the differences in state and local expenditure among the states for one year (2019), some comparisons are shown in Table 1.2. State-local governments spent an average of $12,089 per person or about 21 percent of personal income. The two states with highest total expenditure per person are Alaska ($20,500) and New York ($19,375). The two states with lowest total expenditure per person are Idaho ($8,558) and Georgia ($8,689). The median spending states are Kansas ($10,922) and Louisiana ($10,951). Obviously, the range is quite large. A similar large range exists in the fraction of income taken by state-local expenditures, from 32.6 percent in Alaska and 28.8 percent in New Mexico to 15.7 percent in Connecticut and 15.4 percent in New Hampshire.

Although a general correspondence exists between the rankings of states by per capita spending and spending as a percentage of income, some important differences are apparent.

Table 1.2 State and local government expenditure variation by state, 2019

Level	*State-local expenditure per capita*	*State-local expenditure as a percentage of personal income*	*State government share of state-local direct expenditure*
US total	$12,089	21.4%	53.3%
High	Alaska, $20,500	Alaska, 32.6%	Hawaii, 74.6%
	New York, $19,375	New Mexico, 28.8%	Delaware, 68.8%
Median	Kansas, $10,922;	Arkansas, 21.4%;	Michigan, 52.6%;
	Louisiana, $10,951	Montana, 21.2%	Ohio, 52.5%
	Georgia, $8,689	Connecticut, 15.7%	New York, 41.2%
Low	Idaho, $8,558	New Hampshire, 15.4%	Nebraska, 36.2%

Source: US Census Bureau, Census of Governments, *State and Local Government Finances, 2019*

Table 1.3 State and local government revenue variation, by state, 2019

Level	*State-local revenue per capita*	*Share from taxes*	*Share from federal grants*	*Share from charges*
US total	$12,411	45.7%	18.7%	14.1%
High	New York, $20,084	Connecticut, 58.9%	Montana, 29.2%	South Carolina, 24.2%
	Alaska, $18,919	New Jersey, 58.4%	Louisiana, 29.1%	Utah, 22.9%
Median	Ohio, $11,162	California, 43.4%	Wisconsin, 19.5%	West Virginia, 14.3%
	Montana, $11,133	Ohio, 42.8%	Maryland, 19.3%	Arkansas, 13.6%
	Idaho, $9,173	Wyoming, 33.6%	Kansas, 13.9%	New York, 8.7%
Low	Georgia, $9,134	Alaska, 27.0%	Virginia, 13.5%	Connecticut, 7.3%

Source: US Bureau of the Census, *State and Local Government Finances, 2019*

For example, per capita spending in New Mexico is about at the national average, but spending relative to income is high because per capita income in the state is below the national average. New Jersey is an opposite case. Per capita spending in New Jersey is also about at the national average, but spending relative to income is low because per capita income in New Jersey is relatively high.[6]

The last column of Table 1.2 shows the fraction of state-local direct expenditures made by the state government, which is a measure of the degree of fiscal centralization. In addition to Hawaii and Delaware, shown in the table, state governments have a dominant fiscal role in such states as West Virginia, Kentucky, Alaska, and New Mexico. Other states where local governments tend to dominate fiscal spending include Tennessee, Florida, Nevada, and Georgia.

Reader project

The comparisons in Table 1.2 are merely intended to illustrate the magnitude of fiscal diversity in the US rather than show the case for every state. But you can investigate where your state fits in the distribution. Go to the census data tabulation utility maintained by the Urban Institute (https://state-local-finance-data.taxpolicycenter.org//pages.cfm) and use the facility to report per capita expenditure in your state and state direct expenditure as a fraction of total state-local expenditure. Then think about why spending in your state may be relatively high or low and what might explain the degree of centralization in your state.

Revenues

Diversity also exists in state-local revenue systems, which are summarized in Table 1.3. Per capita revenue for one year (2019) is shown in the first data column. The relative state rankings based on per capita revenue are, not surprisingly, generally similar to the relative state positions based on expenditures. A regional pattern shows relatively low revenues in the Southeast and substantial variation within most other regions. It is important to note that these data refer to revenue collections, not burdens. To the extent that states collect revenue from nonresidents (severance taxes, some sales taxes, some business taxes, and property taxes on nonresident property owners), they do not represent a burden on residents. In those cases, standardizing by the resident population or income does not provide a very accurate picture.

Substantial diversity in the mix of revenue sources also exists, as suggested by the data in the last columns of Table 1.3. States have independent authority to select a tax and user charge structure, and thus there is no "typical" revenue mix among states. The relative

importance of federal aid as a revenue source is determined by the rules of the federal grant programs and especially Medicaid (Chapter 19). Because the federal share for Medicaid is inversely related to income, many of the states that rely on federal aid the most are lower-income states. In addition to the two shown in Table 1.3, Kentucky, West Virginia, Mississippi, and Arkansas have high reliance on federal grants.

Within the tax category, there is also substantial variation in which taxes are used. For instance, nine states have no income taxes (see Chapter 14), and four do not use general sales taxes (Chapter 13). Thus, the general sales and individual income tax shares are zero in those cases. Property taxes (Chapter 12) are relied on more than average in most of the New England states and less than average in the Southeastern states. General sales taxes tend to be relied on more in the Southeast and Southwest, individual income taxes tend to be used to a relatively small degree in the Southwestern states, and the use of user charges is relatively low in New England and the Middle Atlantic states but relatively high in the Rocky Mountain, Southeast, and Far West states. In some cases, these regional patterns result from (1) the relative fiscal importance of state as opposed to local governments, (2) the nature of the economies in these states and regions, or (3) historical factors coupled with inertia.

Geographic or regional competitive factors influencing revenue structures are often not decisive, however, as reflected by a number of regional anomalies – similar states located together with very different revenue structures. For instance, Oregon has no general sales tax and relatively high reliance on individual income taxes, whereas neighboring Washington has no individual income tax and high reliance on the sales tax. New Jersey relies much more on property taxes and less on income taxes than neighboring New York State. New Hampshire has very high reliance on property taxes and has no sales tax and a very limited income tax; Maine and Vermont's tax structures are more similar to the national average with more balanced use of income and sales taxes and user charges. And there are a variety of special cases. Alaska receives substantial revenue from oil leases and severance taxes, and Delaware generates substantial revenue from corporate license fees as the official legal "home" state for many of the largest corporations.

These differences in revenue structure raise the issue of whether there are any economic, as opposed to historical or institutional, explanations for these different fiscal decisions by various states. One economic argument that consistently is offered to explain the choice of revenue structures is the opportunity to "export" tax and other revenue burdens to nonresidents. An analysis by Mary Gade and Lee Adkins (1990) of state government (only) revenue structures supports the idea that differences in the opportunity to export taxes go a long way toward explaining states' choices of tax structure. Gade and Adkins's analysis shows that severance taxes are relied on heavily by states with an immobile resource base and that taxes that are deductible against the federal income tax are used more intensively by states where a substantial number of taxpayers itemize deductions and face relatively high federal tax rates. For instance, Florida and Hawaii rely on sales taxes to take advantage of the many visitors to those locations; states with substantial mineral deposits, such as Alaska, Louisiana, Montana, and Wyoming, rely disproportionately on severance taxes.

Interstate variation

State-local spending differences declined substantially during the 1980s and 1990s, but they have increased a bit since, as shown in Table 1.4. In 1982 the difference between the highest- and lowest-spending states was relatively greater than in 2002. The coefficient of variation for per capita spending fell by half, from .47 to .23, and the ratio of the highest- to lowest-spending state fell from 5.9 to 2.8. Even if the two outlying jurisdictions of Alaska and the District of Columbia are excluded from the analysis, an important decline in interstate

Table 1.4 Variation in per capita state-local general expenditure

		Mean	*Coefficient of variation*	*Maximum*	*Minimum*	*Max to min ratio*
1982	All states	$1,992	0.47	$7,958	$1,345	5.9
1992	All states	3,900	0.30	9,893	2,751	3.6
2002	All states	6,217	0.23	13,466	4,889	2.8
2012	All states	8,595	0.28	17,250	6,320	2.7
2018	All states	9,980	0.27	20,343	6,975	2.9
1982	Excluding AK & DC	1,841	0.19	3,157	1,345	2.3
1992	Excluding AK & DC	3,708	0.17	7,788	2,751	2.1
2002	Excluding AK & DC	5,856	0.13	8,523	4,889	1.7
2012	Excluding AK & DC	8,249	0.17	14,043	6,320	2.2
2018	Excluding AK & DC	9,570	0.19	15,352	6,975	2.2

Source: US Census Bureau

variation in spending is still apparent. Not surprisingly, there was also a similar decrease in interstate variation in per capita revenue, which is slightly greater than the variation in per capita spending, reflecting the equalizing role played by federal aid. Therefore, some of the narrowing of fiscal differences over this period was the result of growth and changes in the structure of intergovernmental grants, and another major factor was the narrowing of regional economic differences (i.e., convergence of state personal income).

Spending differences widened some, however, in the years after 2002, although spending differences remain much smaller than in the 1980s. This latest change may reflect growing income inequality, the effect of the Great Recession, increasing political polarization, or other factors.

International comparison: Government spending in selected nations

Although this book focuses most on the institutional features of state and local finance in the United States, the concepts and policy approaches that are covered and discussed apply to other nations as well. And the experiences of those other nations can help inform practices in the US. Comparison of the experiences of the other major federal systems of government – in Australia, Canada, Germany, and Switzerland – seem especially valuable and interesting.

As measured by the OECD, government spending relative to the size of the nation's economy is smaller in the United States than in most other major industrialized nations, as shown in Figure 1.8. Total (federal, state, and local) government spending in the United States is about 38 percent of GDP, about the same as Japan, slightly more than in Korea, and substantially less than in Australia, Canada, France, Germany, the United Kingdom, and the average of all industrialized nations (the nations in the Organisation for Economic Co-operation and Development). Among other nations, the government sector is relatively smaller in Mexico and Russia and much larger in Brazil. Total government receipts as a percentage of GDP are lowest in the United States among these nations (except for Korea). In 2019, the total public sector was operating a budget deficit in most of these nations – outlays are greater than receipts, so borrowing of some type is necessary – with the exception of Canada, Germany, and Korea.

Several other nations – particularly Australia, Canada, Germany, Mexico, and Switzerland – have federal systems of government, as does the United States. In each of these nations, there are separate federal, state, and local governments. The equivalent levels to US state governments are called "states" in Australia and Mexico, "provinces" in Canada, "*länder*"

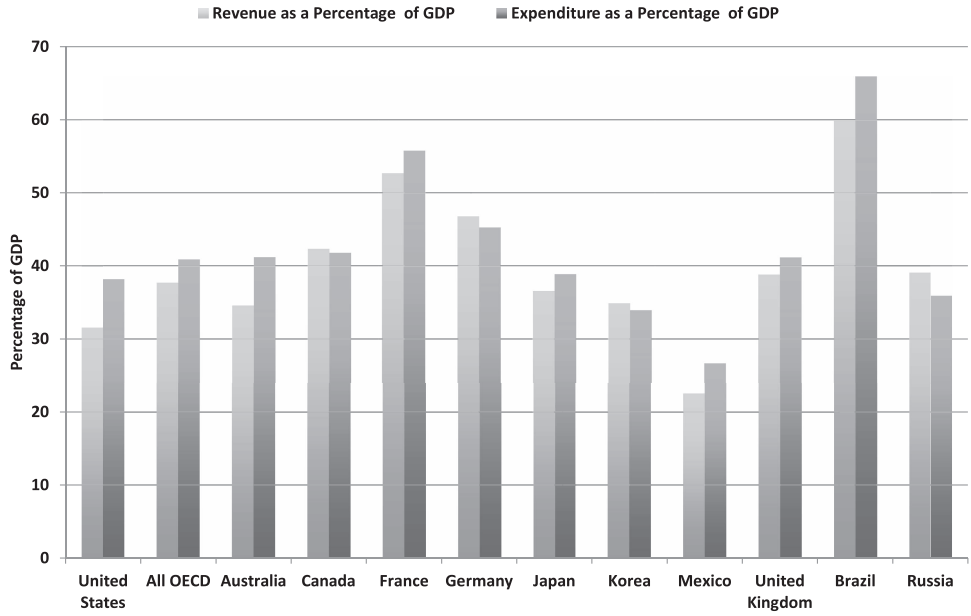


Figure 1.8 Public sector size, selected nations, 2019

Source: Organization for Economic Cooperation and Development (OECD)

in Germany, and "*cantons*" in Switzerland. Although the structure seems similar, the relative role for subnational government compared to the federal government is quite different among these nations.

The subnational government share of revenue and taxes is shown in Figure 1.9. Whether compared in terms of own-source revenue generated or taxes, Australia, Germany, and Mexico are more centralized than the United States, whereas Canada and Switzerland are less centralized. Differences in the subnational government share of taxes are particularly striking. State and local governments collect less than 20 percent of aggregate tax revenue in Australia but nearly 50 percent in Canada (and about 36 percent in the United States). Of course, these revenue data exclude grants paid from the federal government to states and localities. Thus, in all these cases, subnational governments are ultimately responsible for a relatively larger share of government spending than of revenue generation. If federal grants are very substantial, then the federal government can be responsible for the majority of revenue generation, although subnational governments remain responsible for the majority of final spending.

Fiscal role of subnational governments

What is the appropriate economic role for subnational governments in a federal system? What responsibilities are better handled by the federal government or by the subnational governments, and which can be shared among them? In what ways do the characteristics of mobility and diversity influence those roles? Richard Musgrave (1959) identifies three traditional economic functions for government: (1) maintaining economic stabilization, (2)

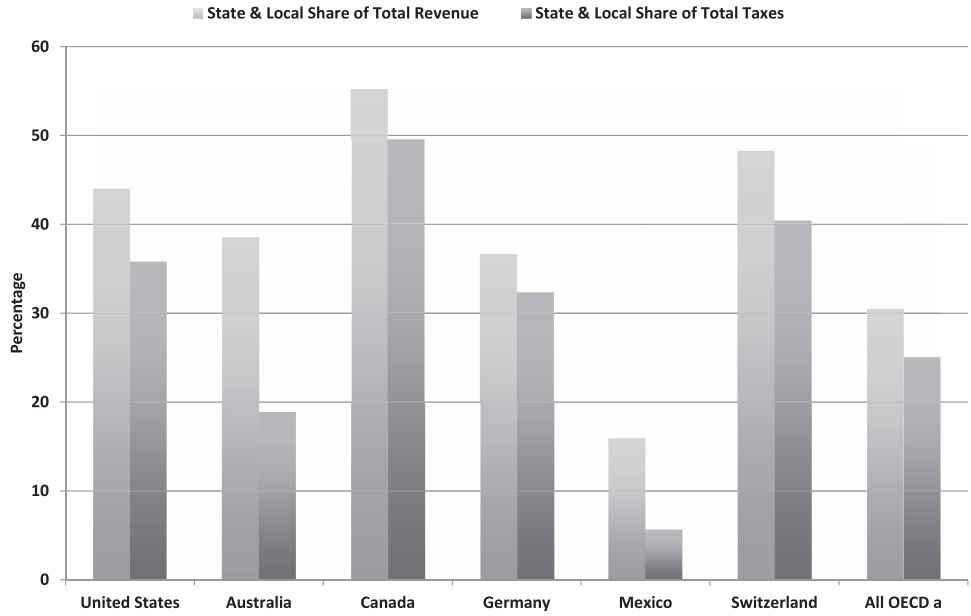


Figure 1.9 Subnational government fiscal role, federal nations, 2019

Source: Organization for Economic Cooperation and Development (OECD)

altering the distribution of resources, and (3) obtaining an efficient allocation of society's resources. The conventional wisdom has been that state-local governments are limited in achieving the first two principally by the ease of mobility among them. Yet many state-local services have substantial distributional implications, and the sheer size of the subnational government sector means that it may have macroeconomic effects. Thus, the conventional wisdom and some recent challenges to it are considered next.

Stabilization policy

Stabilization policy refers to the role of the government in maintaining employment, price stability, and economic growth through the use of fiscal and monetary policy. Conventional wisdom is that state and local governments are inherently limited in that function because a single state or municipality has little control over prices, employment, and the general level of economic activity in that jurisdiction. One reason is that state-local governments do not have any monetary authority, which rests with the Federal Reserve Board. Indeed, it is usually argued that states should not have monetary authority because separate state monetary decisions would increase the costs of transactions over boundaries and because each state would have an incentive to pay for trade by expanding its own "money supply," a large portion of which would be held by nonresidents.

A second factor is that the general openness of state-local economies restricts the opportunity for fiscal policy to be effective. Imagine a state or city attempting to expand economic activity by the traditional expansive fiscal policies – lowering local taxes, providing cash grants to residents, or expanding government purchases. Residents are likely to increase

consumption spending, but the ultimate effect may occur in other jurisdictions where the goods and services are sold or produced. Suppose your city borrows $100 per resident and gives each resident $100 "free" to spend in any way. If residents use the money to buy shirts, for example, the economic gain goes to the producers of shirts (and suppliers of their inputs), which may not be in your city. In addition, of course, the borrowed funds used to finance the expansive fiscal policy eventually must be repaid, with a portion of the borrowed funds (perhaps even all) having come from nonresidents.

If state or local economies are less open – that is, if residents purchase more goods locally and if residents and businesses do not move among jurisdictions – then state-local stabilization policy may have greater effect. Edward Gramlich (1987) argues that individuals may not move between states in many cases for economic reasons and that a growing share of expenditures is for services purchased locally. In addition, Gramlich argues that macroeconomic problems may be regional rather than national, resulting from economic factors affecting specific industries. In that case, regional or state fiscal policy might be necessary and appropriate. These issues are considered further in Chapter 20.

Conversely, the aggregate fiscal position (taxes and spending) of the subnational sector may influence the overall national economy. With subnational government spending accounting for 12 to 15 percent of the national economy, the expectation is that this sector does have an impact on national macroeconomic conditions. First, the state-local sector has an aggregate budget surplus in many years, which partly offsets the federal government budget deficits that have been common since 1970. In effect, the investment of surplus funds by state and local governments is a source of finance for both the federal government deficit and private-sector borrowing.

Second, state-local fiscal changes during national economic recessions or expansions might contribute to or offset the national economic cycle. For instance, subnational government policy would be procyclical if states and localities reduce expenditures as a recession causes state-local revenues to decline (or increase less than was anticipated), thereby further reducing aggregate demand and slowing the economy more. Studies show that for a number of years when this does not occur – when state-local government fiscal policies tend to be countercyclical – states and localities respond to the revenue decrease caused by a recession by spending from reserves or by raising tax rates (Bahl, 1984). Similarly, during economic expansions, state-local governments often build up reserves, thereby moderating the increase in aggregate demand. This pattern applies to the aggregate state-local sector and not necessarily to every subnational jurisdiction. The magnitude of this state-local countercyclical effect also is expected to vary for different recessions and expansions. This issue is considered further in Chapter 7.

In summary, individual states and localities have been thought to be limited in their ability to influence aggregate demand in their own jurisdictions, although the collective fiscal decisions of states and localities do have an impact on national economic conditions. It is incorrect, therefore, to focus only on the federal government's fiscal behavior in evaluating the macroeconomic implications of the public sector.

Distribution policy

Distribution policy refers to the role of the government in obtaining and maintaining the socially preferred distribution of resources or income, in most cases by redistributing resources from rich to poor. Similar to stabilization, the conventional wisdom has been that state-local governments are limited in their ability to redistribute resources because different jurisdictions select different amounts of redistribution, and individuals and firms can easily move among the jurisdictions to frustrate any intended redistribution. If that is

the case, then it is more appropriate for the federal government to engage in redistribution, at least if international mobility is less than interjurisdictional mobility within the United States.

As an illustration, suppose that your city proposes to tax all families or individuals with income above $50,000 and to use the revenue to provide cash grants to individuals and families with income below $50,000. Such a purely redistributive policy would create an incentive both for taxpayers with income above $50,000 to move to a different city where such a redistributive tax did not exist and for individuals with income below $50,000 to move to your city to receive the grants. Paradoxically, if such moves occur, the program does result in a more equal income distribution in your city but little redistribution from rich to poor. All individuals may not respond to the incentives in this way – moving is costly, and other locational factors may offset these redistributional incentives – but if some respond in this way, part of the program's intent is mitigated. One expects that the incentive will be greatest for very high- and very low-income individuals and when mobility is easiest. Moving among localities within the same area is expected to be easier and less costly than moving among states and moving among nations more costly than moving among states. For these reasons, it has been argued that redistribution is best handled at the national level and, if not, at the state level.

This conventional position flies in the face of several important facts. State governments administer major health and welfare programs (especially Medicaid), which are inherently redistributive, and other services provided by state-local governments, especially education, have important distributional implications. Finally, distributional concerns influence many state-local fiscal decisions, including the choice of tax structure. There is substantial diversity in the degree of redistribution selected in different states (even though the federal government typically pays about half the cost through a system of matching grants), and there are similarly wide differences in education services offered in different states and localities. Thus, despite the conventional notion that the federal government handles redistribution, the actual fiscal structure leaves a substantial amount of redistribution to the subnational sector.

What accounts for the continuing distributional responsibility of subnational government? If individuals only care about the welfare of other individuals who reside in their jurisdiction and if there is little mobility in response to redistributional policies, then redistribution should be a subnational government responsibility. In that case, redistribution would be similar to, say, waste collection and would be best handled at the local level where individual preferences could be satisfied. On the other hand, if individuals care about the welfare of individuals in the society regardless of what state or city they live in or if mobility frustrates local decisions, then some federal government involvement in redistribution policy is called for.

The federal government is involved in the redistribution decisions of states through the federal grants for those programs. In effect, having federal grants pay for part of subnational government redistribution prevents higher-income individuals from avoiding some contribution. The available evidence seems to show that few transfer recipients – on the order of 1 to 2 percent – move to other states to receive higher welfare benefits annually (Gramlich, 1985b). However, the cumulative effect of a small number of moves in each year can be a substantial change in the geographic distribution of welfare recipients over time if the interstate pattern of benefits does not change. Even so, Edward Gramlich's analysis shows that the degree of mobility of recipients alone is not sufficient to justify the relatively large federal government share in grants for welfare programs.

The observation, then, is that the mobility of taxpayers among jurisdictions is not so severe as to preclude subnational redistributive policies but that even with generous federal

grants, many states choose very low benefit levels. In Gramlich's (1985b, 43) words, "[V]oters in these low-benefit states appear to have little taste for redistribution." The issue of the appropriate level of government to carry out redistribution policy depends, then, on our view about this variation in benefit levels. If the variation is tolerable, then the current structure (with perhaps less generous federal grants) is acceptable. If a more uniform standard for benefit levels is desired, then a direct federal income redistribution program or a minimum benefit standard imposed by the federal government is called for. These issues are considered in more detail in Chapter 19.

Allocation policy

Government intervention in the market also may be necessary to ensure that society achieves its desired allocation of resources – that is, for specific goods and services to be produced in the desired quantities. The objective of government is to maintain market competition and to provide those goods and services directly that the private market fails to provide efficiently. The practical issues focus on what specific responsibilities fall into the category of private-market failure, how large government should be to meet those responsibilities, how the government's resources should be generated, and on what mix of services those resources should be spent. Because the government is providing these services as a result of the market's failure to do so in an efficient or equitable way, it is important to consider how government can most efficiently provide those services and whether government can, in fact, do a better job than the market. If a good or service is best provided through government, then the subsequent issue is which level or type of government – federal, state, or local – can best carry out that responsibility. The economic principles about market efficiency and market failure are reviewed in Chapter 2 and the assignment of services among governments in Chapter 6.

Believing that state and local governments are inherently limited in carrying out stabilization and distribution policy, the focus of economic analysis and research has been on the allocative role of subnational governments – their role, methods, and effectiveness in directly providing goods and services. That, too, is the primary focus of the rest of this book.

Summary

Why study state and local finance? The state-local government sector is a substantial part of the US economy, with spending representing about 15 percent of gross domestic product (GDP) and employing one of every seven workers in the US. The major services provided by state and local governments – education, transportation, social services, and public safety – are those that most affect residents on a day-to-day basis. State and local government practices, experiments, and policies often form the basis for subsequent programs or policy changes by the US federal government or by governments in other countries.

In addition, the *diversity* of state-local governments and the ease of *mobility* among them make the analysis of many economic issues substantially different in the state and local government sector than in the federal government. Economic mobility coupled with the choice provided by the substantial diversity of subnational governments is what makes analysis of state-local government finance especially interesting.

The current substantial relative size of the subnational government sector – more than 40 percent of the total public sector in the United States – arose from a 25-year period of sustained rapid growth between the early 1950s and mid-1970s. Since the mid-1970s, growth of the state-local government sector relative to population or income has been modest.

Two categories – education (33 percent) and welfare (22 percent, which includes Medicaid) – account for more than half of state-local spending, with transportation and health and hospitals being the next two largest categories of spending on direct consumer services. To finance these services, state-local governments receive revenue from five major sources: federal grants (22 percent of general revenue), sales taxes (19 percent), property taxes (17 percent), charges and fees (17 percent of the total), and income taxes (13 percent).

The focus of economic analysis and research has been on the allocative role of subnational governments – their role, methods, and effectiveness in directly providing goods and services. Although individual states and localities may be limited in their ability to influence aggregate demand in their own jurisdictions, regional policies may be preferred to national stabilization policies in some cases. The collective fiscal decisions of states and localities do have an effect on national macroeconomic conditions as well. The mobility of taxpayers among jurisdictions is not so severe as to completely offset subnational redistributive policies.

Discussion questions

1 "The state-local government sector stopped growing relative to the size of the economy in the late 1970s because of a decline in the amount of federal aid to states and localities." Do you think this is correct and why?
2 The growth in state and local spending in the twenty-first century relative to income and population and prices is still not as fast as the growth that occurred in the 1952 to 1975 period. Discuss the reasons why state-local spending increased so fast in the earlier period and consider what might be different in the recent period of growth.
3 Although the diversity of subnational governments means that the notion of "typical" behavior is often not meaningful, it is still common in presentations of data, news reports, and political debate to compare a state or locality to the "national average." How does the state-local sector in your state compare to that average in terms of (a) the structure of localities, (b) the level of expenditure, (c) the pattern of services provided, and (d) the mix of revenue sources? Do you know of any reasons why your case might differ from the "national average"?
4 Some surveys show that citizens usually are quite aware of services provided by local governments but often not very certain of the services provided by state governments. Make a list of five services provided by your city/township and five provided by your state that directly benefit you. After thinking about how you directly pay for those services, do you believe you get your money's worth?

Notes

1 Pew Research Center for the People & the Press, "State Governments Viewed Favorably as Federal Rating Hits New Low," April 15, 2013, accessed August 13, 2014, www.people-press.org/2013/04/15/state-govermnents-viewed-favorably-as-federal-rating-hits-new-low/
2 Justin McCarthy, "Majority in US Prefer State Over Federal Government Power, https://news.gallup.com/poll/193595/majority-prefer-state-federal-government-power.aspx
3 Richard L. Cole and John Kincaid, "Public Opinion and American Federalism: Perspectives on Taxes, Spending and Trust," *Spectrum: The Journal of State Government*, 74, no. 3 (Summer 2001): 14.
4 The White House, "State & Local Government," accessed April 14, 2022, https://www.whitehouse.gov/about-the-white-house/our-government/state-local-government/.
5 In addition, the United States includes the national capital, the District of Columbia, which has a unique status, and five territories (American Samoa, Guam, Northern Mariana Islands, Puerto Rico, and Virgin Islands).

6 By either measure, spending is way above average in Alaska. The explanation primarily lies in two factors – high costs of producing services and the collection of substantial amounts of oil-extraction revenue, which is distributed as royalties paid to residents.

Selected readings

Bahl, Roy. "The Growing Fiscal and Economic Importance of State and Local Governments." In *Financing State and Local Governments in the 1980s*, 7–32. New York: Oxford University Press, 1984.

Ebel, Robert, John Petersen, and Ha Vu. "Introduction: State and Local Government Finance in the United States." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert Ebel and John Petersen. Oxford: Oxford University Press, 2012.

Fisher, Ronald C. "Understanding State-Local Revenue: A Taxing Exercise." *Tax Notes State*, January 11, 2021, pp. 137–143.

Oates, Wallace. "An Economic Approach to Federalism." In *Fiscal Federalism*, 3–30. New York: Harcourt Brace Jovanovich, 1972.

Sjoquist, David L., ed. *State and Local Finances Under Pressure*. Northampton, MA: Edward Elgar, 2003.

Yilmaz, Serdar, Francois Vaillancourt, and Bernard Dafflon. "State and Local Government Finance: Why It Matters." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert Ebel and John Petersen. Oxford: Oxford University Press, 2012.

2 Microeconomic analysis

Market efficiency and market failure

Headlines[1]

From the days of Adam Smith, economists have recognized that a system of perfectly competitive markets enhances economic well-being in several ways: by permitting resources, products, and services to go to those who value them most; by providing incentives for cost savings and innovation in the production and distribution of goods and services; and by fostering low prices. Yet like Adam Smith, today's economists also recognize that under some limited but important circumstances, markets do not always achieve these desirable ends. When they do not, appropriate government action can improve markets' functioning and so increase economic well-being.

Adam Smith published *The Wealth of Nations* in 1776, the same year Thomas Jefferson wrote the Declaration of Independence. Since that time, government has worked in partnership with the private sector to promote competition, discourage externalities, and provide public goods.

An important issue in microeconomics is when and why collective action, such as that by government, may be preferable to separate economic decision making by individual consumers and producers – what is usually referred to as the **private market**. In short, what is the economic rationale for government provision of some goods and services, and how can microeconomic tools be applied to evaluating the relative merits of government and private provision? As noted in Chapter 1, Richard Musgrave (1959) argued that government's economic role might include attaining a more efficient use of society's resources, altering the distribution of resources, and achieving macroeconomic stabilization. However, the focus of microeconomic analysis and research concerning state and local governments has been on the first role – their effectiveness in directly providing goods and services. As Roy Bahl has noted "The economic function left to state and local governments in the United States system is the allocation function, that is, the determination of the amount and mix of local public services to be offered."[2]

Before the potential for government provision can be evaluated against society's goals, one should understand the nature of economic efficiency and the reasons government intervention may improve on the results of private-market provision. This chapter reviews the basic microeconomic principles of market operation and economic efficiency, including why private markets may be efficient, the conditions under which private markets will not generate efficiency, the potential distributional concerns from private provision, and the ways government involvement generally in an economy (and not just state-local government) may improve efficiency or resource distribution compared to private markets.

DOI: 10.4324/9781003030645-3

The efficiency of the market

The concept of economic efficiency most often used in economics is called **Pareto efficiency** or optimality (named after the Italian economist Vilfredo Pareto [1848–1923], who proposed the definition), which states that an economy is efficient if it is not possible to make at least one person better off without making someone else worse off. This concept of economic efficiency is broader than the everyday use of the word *efficiency*. Economic efficiency includes the idea of technical or engineering efficiency, requiring that goods be produced at lowest cost, but it also requires that the type and quantity of goods and services being produced are consistent with society's desires.

The test for efficiency, then, is to search for changes to the current economic situation that can improve the welfare or economic conditions of some people but not decrease the welfare of any others. The efficiency definition requires only that it be *possible* to make some consumers better off without hurting anyone and does not address the issue of how any change actually is to be accomplished. If, in fact, no one will be hurt by a change, then those who gain from that change would have to compensate those who lose. This requires that the aggregate benefit be greater than the aggregate cost, so the net benefit can be used to compensate anyone who is hurt initially.

If such changes are possible, the economy is not efficient; if those changes are not possible, then the original situation is efficient. If the gain to society from one small change is called the **marginal social benefit**, and the cost of the change is the **marginal social cost**, then a general efficiency rule for evaluating changes can be stated as follows:

> If marginal social benefit equals marginal social cost, then the economy is efficient because there is no net gain from any change. If marginal social benefit is greater or less than marginal social cost, the economy is not efficient, and the proposed change would improve economic efficiency.

Suppose, for example, that it is possible to produce more goods with the same resources by changing to a different (more efficient) production process. With more goods, the welfare of some (or even all) consumers could be improved at no cost to society. That economy was not producing goods efficiently. By "welfare," economists mean the utility or satisfaction consumers receive from consumption. Because a consumer's utility depends on his or her own preferences – what he or she likes and dislikes – each consumer is the sole judge of his or her own welfare. To put it another way, more goods will not improve a consumer's welfare if that consumer does not like those goods.

As another example, suppose that society decides to allocate fewer resources to the military and to use the freed-up resources to produce more education. If consumers in aggregate value the increased amount of education more than the reduced military structure, the economy was not producing an efficient mix of consumer goods. The marginal benefit of providing more education is greater than the marginal cost. At least some consumers are made better off by the change, and any consumers who might be made worse off by the loss of military service could be compensated (and thus not hurt) because the gain to consumers in aggregate is positive.

This notion of economic efficiency has several advantages and one apparent weakness. The advantages are that value judgments about how much society "cares" for different types of consumers are not necessary and that no consumer need be opposed to changes to an inefficient economy. These both follow from the fact that if an economy is not Pareto efficient, no one need be hurt by a change to an efficient situation. The weakness of the definition is the narrow view of inefficiency. If a potential economic change must hurt

even one consumer while making all others better off, by the Pareto definition, that situation *is* efficient. Because of that narrowness of definition, achieving Pareto efficiency would not resolve all social issues, but there appears to be no shortage of situations that could be improved even by this narrow definition.

How do competitive markets satisfy this definition of efficiency? Although elegant mathematics is required to "prove" the efficiency of competitive equilibrium, the underlying principles are easily demonstrated. The long-run equilibrium of a competitive market is depicted in Figure 2.1a. The market demand for the product approximates the marginal benefit to consumers from consuming this good or service. If producers act to maximize profits, the market supply corresponds to the marginal cost of producing the good or service. At the market equilibrium, the marginal cost of producing one more unit equals the marginal benefit – all the possible aggregate social gains from producing this good or service have been achieved. The equilibrium price $P^\star$ is equal to both the marginal cost and the marginal benefit.

From the point of view of a typical firm in this competitive market, the equilibrium price also equals the lowest possible production cost per unit – that is, the minimum of the average cost function (Figure 2.1b). At that price, firms are earning normal profits – that is, rates of return equal to those available elsewhere in the economy. Because investors are doing exactly as well in this business as they could in any other, there is no incentive for changes in output or prices.

The dollar magnitude of the gains to society from producing this good or service also can be approximated in Figure 2.1. **Consumer's surplus** is defined as the difference between the marginal benefit to consumers from a unit of the product and the market price they actually pay, which is represented by area $ABP^\star$ in Figure 2.1a. **Producer's surplus** is defined as the difference between the price charged for the product and the marginal cost of producing a unit of the product, which is similarly represented by area $CBP^\star$ in Figure 2.1a. The net gain to society from producing $Q^\star$ units of this good or service can be measured by the sum of producer's and consumer's surplus. This is nothing more than the difference between the marginal cost and marginal benefit for each unit, summed for all the units produced.

If marginal social cost does not equal marginal social benefit for the amount of a good or service provided, then the outcome is not efficient, as depicted in Figure 2.2. If 100 units of this product are produced and consumed, the marginal benefit or gain to society from unit 101 is \$10, whereas the cost to society of producing unit 101 is only \$5. Production of one

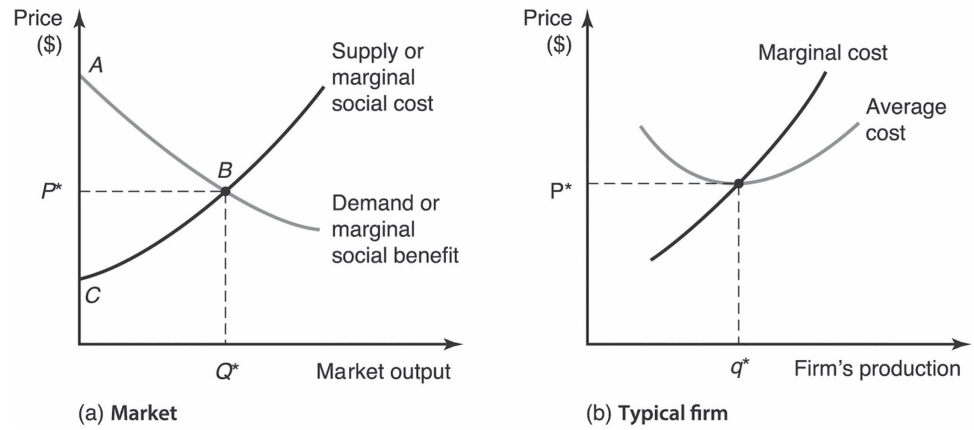


Figure 2.1 Competitive market equilibrium

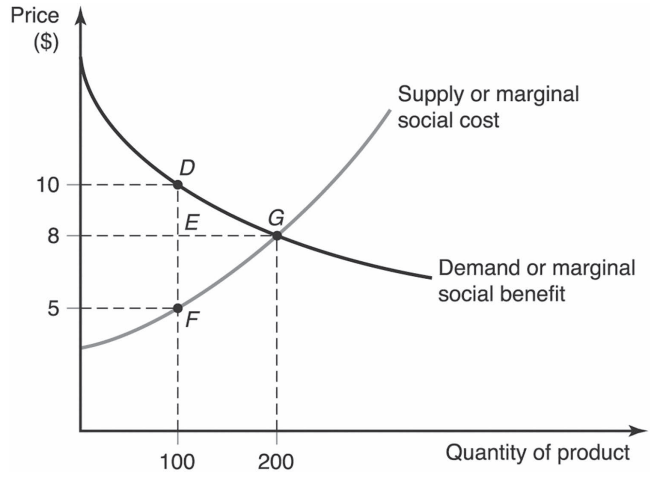


Figure 2.2 Efficiency requires marginal social cost and benefit

more unit of this product (beyond 100) would provide society a net gain in welfare worth $5. Conversely, if the market fails to provide that unit 101, society effectively loses or forgoes that potential $5 welfare gain – the outcome is not efficient. Similarly, the marginal benefit is greater than the marginal cost for all the potential units of output between 100 and 200. If output and consumption are restricted to 100 units rather than the efficient quantity of 200, the welfare loss or welfare forgone by society can be measured by area DEFG, the sum of producer's and consumer's surplus.[3]

The results in a competitive market when producers act to get the highest possible profits and consumers act to get the greatest possible satisfaction are as follows:

1 Marginal cost equals marginal benefit, with both equal to price.
2 Price equals the lowest possible production cost, and producers earn normal profits.
3 Because price equals both marginal cost and marginal benefit in all competitive markets – that is, $P_{A\star} = MC_A = MB_A$ and $P_{B\star} = MC_B = MB_B$ – it follows that the relative prices of different products reflect the relative production costs and relative marginal benefits in consumption, or

$$\frac{P_{A\star}}{P_{B\star}} = \frac{MC_A}{MC_B} = \frac{MB_A}{MB_B}$$

When markets are not efficient

What might prevent provision through the private-market system from achieving economic efficiency? One possibility is that the marginal cost faced by producers does not reflect all the costs to society from additional production or that an individual consumer's marginal benefit does not equal society's benefit. If benefits accrue to other than the direct consumer or if private production costs do not reflect total social costs, then the competitive market choices may not be socially efficient choices. Although the competitive market sets marginal cost equal to marginal benefit, the costs and benefits are not properly measured. A second

possibility is that a lack of competition, such as if economies of scale are present or entry of firms is blocked, may prevent the market from reaching the "marginal cost equals marginal benefit" equilibrium.

Externalities

One problem arises if consumption or production causes **external effects** – that is, if one person's consumption or one firm's production imposes costs or benefits on other consumers or producers. In essence, an **externality** exists if one economic agent's action (consumption or production) affects another agent's welfare and does so outside changes in market prices or quantities. For instance, in the course of production, one firm (a steel mill) may discharge pollutants into a river, thereby increasing production costs for a downstream firm (a brewer) who must clean the water before using it in production. The pollution is an external effect because it is outside the steel market – that cost is involuntarily transferred from the steel producer and consumers to the beer producer and consumers. In essence, no market or other mechanism exists to assign a price for river pollution to be paid by the polluter.

Externalities create an efficiency problem because the consumer or producer causing the external effect usually does not take the external costs or benefits into account. If an activity creates external costs, then the producer or consumer underestimates the social cost of the activity and chooses too much of that activity from society's viewpoint. If consumption or production generates benefits for others that are not considered, then the consumer or producer underestimates social benefits and chooses too little of that economic activity.

This issue is illustrated in Figure 2.3, which shows an individual's marginal benefits (demand) and marginal costs (price) from consuming a particular good or service. Constant marginal cost is assumed only to simplify the illustration. The quantity selected by consumers who equate marginal cost to marginal private benefits (their benefits) is Q_1. Because each unit of this good purchased by one consumer generates benefits for others as well, the marginal benefit to society is greater than to the direct consumers alone. In that case, the efficient amount of consumption is $Q^\star$, where marginal private cost equals marginal social benefit. Because the direct consumers underestimated benefits, an inefficiently low amount of consumption is selected from society's viewpoint. When externalities are present, private choices by consumers and firms in private markets generally will not provide an economically efficient result. In this particular case, the benefits to other than direct consumers as a result of increasing consumption from Q_1 to $Q^\star$ are represented by area *HIJK*. The net gain to society from increasing consumption from Q_1 to the efficient amount is represented by the area *HIK*, which is the difference between marginal social benefit and marginal cost.

Government may be able to intervene and create incentives so that private choices of consumers and firms will be efficient in the presence of externalities, however. If there are external costs, a tax equal to the marginal external cost will force the consumer or firm to include all costs in the economic decision, and thus, the efficient quantity will be selected. Similarly, inefficiencies caused by external benefits can be corrected by a government subsidy equal to the marginal external benefit. If a consumer underestimates benefits by not considering those that accrue to others and thus chooses too little consumption, the subsidy will reduce private cost and induce an increase in consumption to the efficient amount. Returning to Figure 2.3, if marginal costs are reduced to $P^\star - S$ by a subsidy of $\$S$ per unit, then the consumer is induced to choose consumption level $Q^\star$. The externality has been eliminated, and the private market choice of the consumer is efficient.[4]

Externalities are common among the goods and services provided by state and local governments. Education, police and fire protection, transportation, and sanitation services all have benefits that accrue to those who are not direct consumers and to nonresidents of the

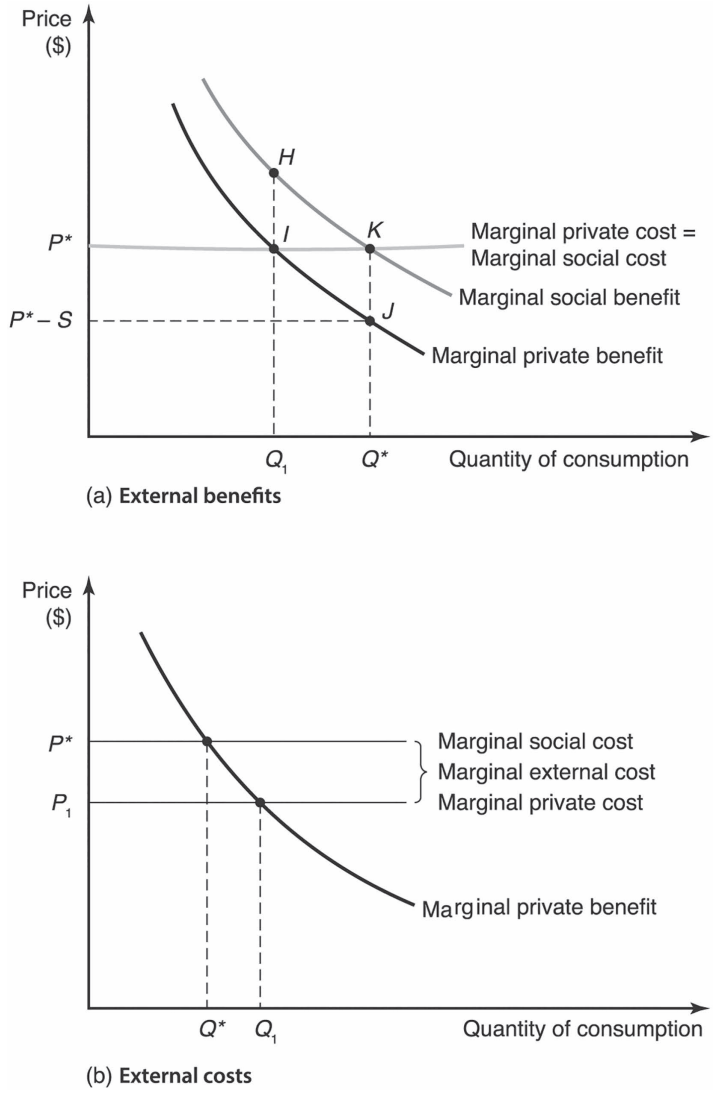


Figure 2.3 Market efficiency with externalities

communities providing those services. Negative externalities also are important for state and local governments because tax payments do not respect political boundaries. Nonresidents not only enjoy the benefits of services provided by a local government but also may pay part of that local government's costs through taxes.

Application 2.1: An external benefit example: Vaccination

A vaccine is developed to help protect from an infection. In a state of 1,000,000 people, the demand to receive a vaccine, which reflects the marginal private benefit, is shown in Figure 2.4. The marginal private cost (perhaps the copayment after health insurance) to receive

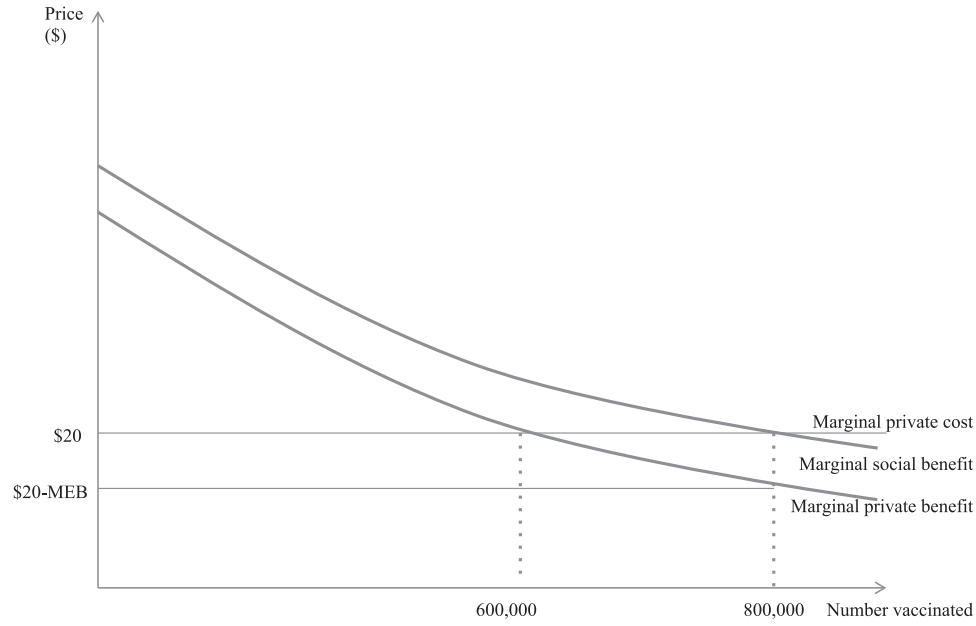


Figure 2.4 Vaccination externality example with a subsidy

a vaccine is $20. In this circumstance, 600,000 state residents would elect to receive (buy) a vaccination. The marginal value of the last vaccination is $20, equal to the marginal cost.

In addition to protecting vaccinated individuals from infection, the vaccine protects others by reducing transmission of the infection and reducing health-care costs for society. Therefore, the vaccine provides a marginal external benefit (MEB), so the marginal social benefit is greater than marginal private benefit, as shown in Figure 2.4. Following the discussion in the prior section, the efficient number of people to be vaccinated, where marginal social benefit equals marginal cost, is 800,000. Because individuals consider only the benefit to themselves, the actual social benefit is underestimated, and too few people are vaccinated from a broader society viewpoint. Unconstrained individual choice is economically inefficient.

In this circumstance, government intervention can improve the situation and offset the inefficiency. One option is to subsidize the cost of the vaccine by an amount equal to MEB, so that private cost falls to $20 − MEB. With the subsidy, the number of people who elect to receive the vaccine increases to 800,000, which is the socially efficient amount. As an alternative, government might mandate vaccination based on some population characteristics so that 800,000 vaccines are administered.

It is possible, however, that a traditional subsidy to reduce cost might not be sufficient to achieve efficiency in a case of this type. Suppose the marginal private and social benefits are as shown in Figure 2.5, with a greater marginal external benefit from vaccination than in the first example but still a $20 marginal private cost. If the vaccine cost were reduced to zero, 700,000 people would voluntarily elect to receive the vaccine, although that remains less than the efficient number of 800,000. Because the marginal external benefit is large in this example – in fact, larger than the marginal private cost – a negative cost would be necessary to induce 800,000 people to elect the vaccine. Negative prices are not common. The meaning of a negative price is that not only would the cost of the vaccine be zero, but people would also be paid to receive it. If the "price" were low enough, the efficient number of

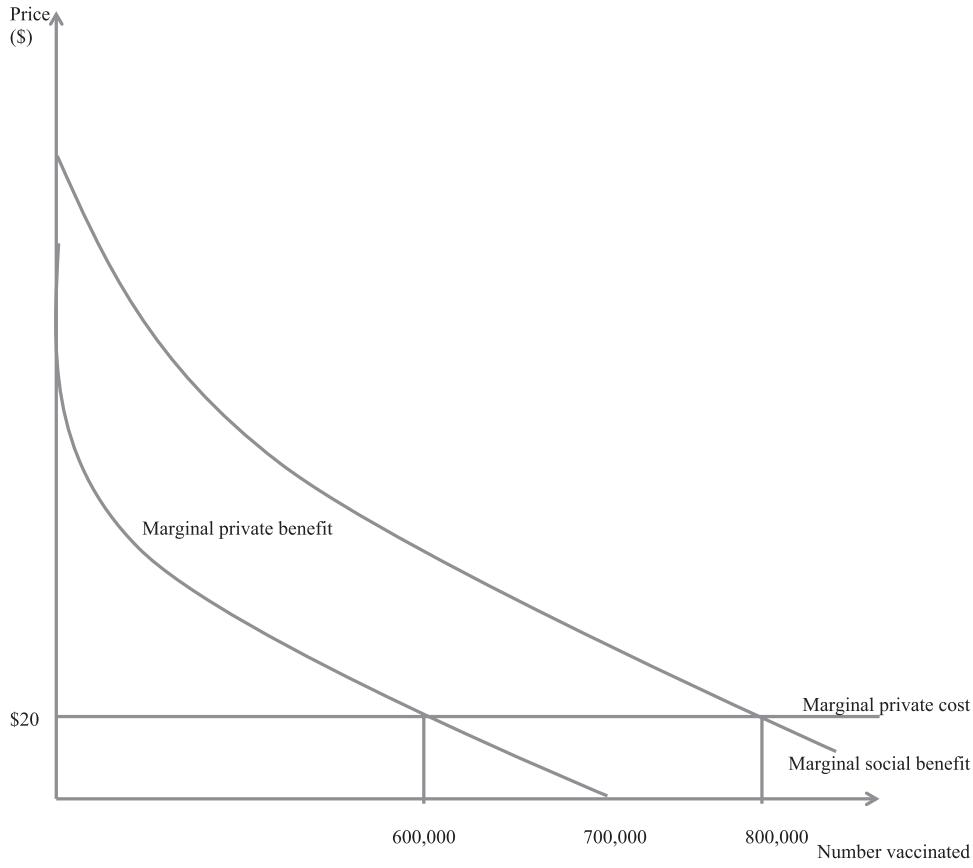


Figure 2.5 Vaccination subsidy example with a negative price

people would elect to receive a vaccination. If a negative price is not feasible – that is, payment to receive a vaccine is socially unacceptable – then government would need to utilize a requirement to establish market efficiency.

In fact, this is precisely how K–12 public education is handled in the United States. Public education is provided to students at zero marginal private cost ("free" public education), but in addition, states require that students attend until a minimum age, typically 16 or 18. Alternatively, states could pay students to attend high school.

Public goods

The term **public goods** is used classically to refer to goods or services that exhibit two properties. Public goods are *nonrival*, meaning that one additional person can consume the goods without reducing any other consumer's benefit; after the good or service is produced, the marginal cost of an additional consumer is zero. Public goods often are also said to be *nonexcludable*, meaning that it is not possible (at least at reasonable cost) to exclude consumers who do not pay the price from consuming the goods or service. The traditional example of a good said to exhibit both properties is national defense. Once a region is defended, there is no extra cost from adding one person to that region, nor can any one individual in the

region be excluded from protection. Another example is a lighthouse. After a lighthouse is operating, the light can guide an additional ship while others are using it, and it could be very expensive to enforce a "lighthouse-use fee" on ships that come in view of the light.[5]

If a good is nonrival, the marginal social cost of adding another consumer is zero, so efficiency requires a zero price. A zero price obviously would not provide revenue to cover any fixed costs, so these goods would not be provided in an efficient amount by private firms. Examples of nonrival goods include several usually provided by state-local governments, such as an uncrowded street, bridge, or park. If a park is not crowded, then another person can enter and use the park without reducing the enjoyment or benefit of any other user. To charge a fee to enter a park in that case is not efficient because the fee might induce some people not to use the park. Because the resources (mostly land) for the park already have been set aside, use of that resource at less than capacity is wasteful or inefficient from the viewpoint of the entire society. Of course, the problem remains of deciding on the number of park services to provide and paying for acquiring those services.

The potential for government involvement in providing nonrival goods seems obvious. The task is to collect revenue to cover the fixed costs of a service (the cost of acquiring and operating the park) while maintaining the price for each use of the service equal to zero: that is, equal to the marginal cost. Government can use general taxes to pay the fixed costs, and because those general taxes do not depend on a taxpayer's use of the service, the price for each use is zero.

It is worth noting that nonrival or public goods may be thought of as a special externality case. A nonrival good for which another consumer may be added at no cost to others is simply a good with a substantial benefit externality. Everyone can benefit if only one consumer provides a nonrival good so the external benefits are great compared to the private benefits that go only to the buyer. From this viewpoint, the major difference in an efficiency sense between a nonrival good and an external benefit is the degree of public compared to private impact.

If a good exhibits the nonexclusion property so that it is not feasible to charge a price for consumption, then private firms also are unable to collect revenue to cover costs. The tax power of government is needed to finance provision of these goods. If a commodity is both nonrival and nonexcludable, then individual consumers have no incentive to reveal their true demand for that good. Instead they can be **free riders**, benefiting, without paying, from the amount of goods purchased by others. Because all individuals have this incentive to understate their true demand, the quantity of these goods provided usually is inefficiently low. And even if the efficient quantity of these goods can be determined, efficient use of the good may require prices that preclude private provision, as noted previously.

Increasing returns to scale

A final efficiency problem for competitive markets occurs if production of some commodities exhibits **increasing returns to scale** – that is, if a proportional change in all production inputs causes a greater-than-proportional change in output. For instance, if a doubling of the amounts of labor, land, and capital cause output to more than double, then average production costs decrease as output increases. If

$$\text{Total Cost} = (\text{Price}_{\text{Labor}})\text{Labor} + (\text{Price}_{\text{Land}})\text{Land} + (\text{Price}_{\text{Capital}})\text{Capital}$$

and

$$Average\,Cost = \frac{Total\,Cost}{Output}$$

and the amounts of labor, land, and capital are doubled, then total cost doubles, but if twice as much of each input causes output to more than double, average cost falls.

A cost function reflecting increasing returns to scale is depicted in Figure 2.4. If average cost is decreasing, then marginal cost must be less than average cost at all output amounts (because average cost is decreased by more production if the extra cost of producing one more unit is less than the existing average cost). The usual explanation for this type of cost structure is the existence of fixed costs that are large compared to variable costs. Because fixed costs must be paid regardless of the level of output, greater output allows those costs to be spread over more units, causing a decrease in cost per unit. This situation often applies to public utilities including communications, electricity, natural gas, water, sewer, and transit services, all of which have large capital requirements even to serve a few customers. Industries with increasing returns to scale are often called **natural monopolies** because it makes sense to have only one producer rather than duplicate the required infrastructure. Why have two separate but parallel water pipes if one is sufficient?

When increasing returns to scale exist, producers cannot earn a positive profit if price is equal to marginal cost (which is required for efficiency). With the demand for the product as shown in Figure 2.6, efficiency requires a price equal to $P^{\star}$. However, at that price and the resulting output $Q^{\star}$, cost per unit is greater than revenue per unit, so the producer earns negative profits (that is, losses), and no firms would stay in business. In contrast, a price equal to average cost of P_1 allows producers to earn a normal profit or rate of return on investment, but output Q_1 is not efficient because too little of society's resources are applied toward producing this good. The inescapable problem is that with increasing returns to scale, a price equal to marginal cost cannot generate enough revenue to cover total costs.

Government intervention may resolve this difficulty. One option is to have government become the producer. This is often done for water, sewer, and transit services but less often for communications or electricity and gas production. The government can charge consumers a price equal to marginal cost and make up the revenue shortfall with general tax receipts. Also, sometimes more complicated pricing schemes can be used to cover the production-cost deficit while allowing the marginal price to equal marginal cost. This topic is expanded on in Chapter 8 in discussing how governments can set efficient user charges. An alternative to government production of goods with increasing returns to scale is regulated monopoly production, with government as the regulator. In that instance, government grants a firm a monopoly on the sale of the goods and attempts to regulate the price so that the producer earns normal profits. In either case, the outcome is not efficient because the taxes or

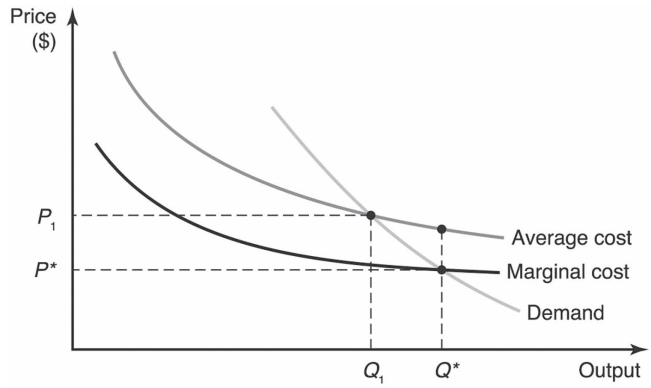


Figure 2.6 Increasing returns to scale

regulation create other efficiency problems, so the preferable choice depends on whether government production or regulation works better practically.

Distributional concerns

The standard competitive market analysis also can be used to explain the distribution of resources. The markets determine the prices of various types of labor, land, and capital goods, and those prices, together with the quantities of the inputs supplied by individuals, determine the resources available for market consumption by each individual. If society highly values the ability to pass a football effectively and if that skill is in short supply, then individuals with the skill will earn high wages and be able to enjoy substantial consumption. Of course, the same argument applies to other types of (more ordinary) skills as well. If individuals have different abilities and if the financial resources for and incentives to acquire skills are not the same for all, then substantial differences in income and welfare can arise.

If society is not satisfied with the distribution of resources that results from that process, the alternatives are either to alter it directly through transfer payments or subsidies or to reject the market as a means of allocating consumer goods, either by altering prices or substituting an entirely different allocation mechanism. Of course, governments do all these things. State governments coordinate major transfer programs, such as Medicaid and food stamps, whereas the national government coordinates others, such as Social Security. Many states subsidize higher education services through public colleges and offer scholarships to needy students. In some states, public (nonmarket) systems provide health-care services for lower-income individuals.

These distributional concerns with the outcome of markets provide another reason for government activity. If society is unhappy with the distribution of resources (income or wealth) among individuals, then the efficient prices for commodities may not be attractive. Theoretically, there is no reason that efficiency concerns should dominate equity considerations, so the efficiency criterion may be relevant only if the socially desired distribution is achieved. The traditional economic solution is to transfer resources among individuals until the desired distribution is attained and then allow markets to allocate goods. If the process of redistribution does not have any costs, then that path may be preferable. Redistribution is not costless, however, because the taxes used to generate revenue and the receipt of transfer payments may alter behavior and create inefficiency and because the institution for redistribution, usually government, is costly itself.

An alternative is to have government provide these goods and services and to alter the prices. As Peter Steiner (1983) has noted, even if it is practical to charge fees for park use, school bus transportation, and school lunches, it may not be desirable if society desires to alter the pattern of consumption as well as increase the level of consumption for some individuals. In addition to these equity reasons, society may wish to alter the pattern of consumption for efficiency reasons because of the externalities involved.

Efficient provision of public goods

The rule for efficient provision of goods is that the marginal social cost should equal the marginal social benefit. For externalities or public goods, social costs and benefits will differ from the costs to and benefits of the direct consumers. Because all individuals consume a pure public good simultaneously, the **efficiency rule for public goods** is that the marginal costs to society should equal the sum of the marginal benefits of all consumers, which is the marginal social benefit.

To illustrate the application of this rule, consider a society with three different individuals (or groups of consumers), each with a different demand for the public good, as shown in

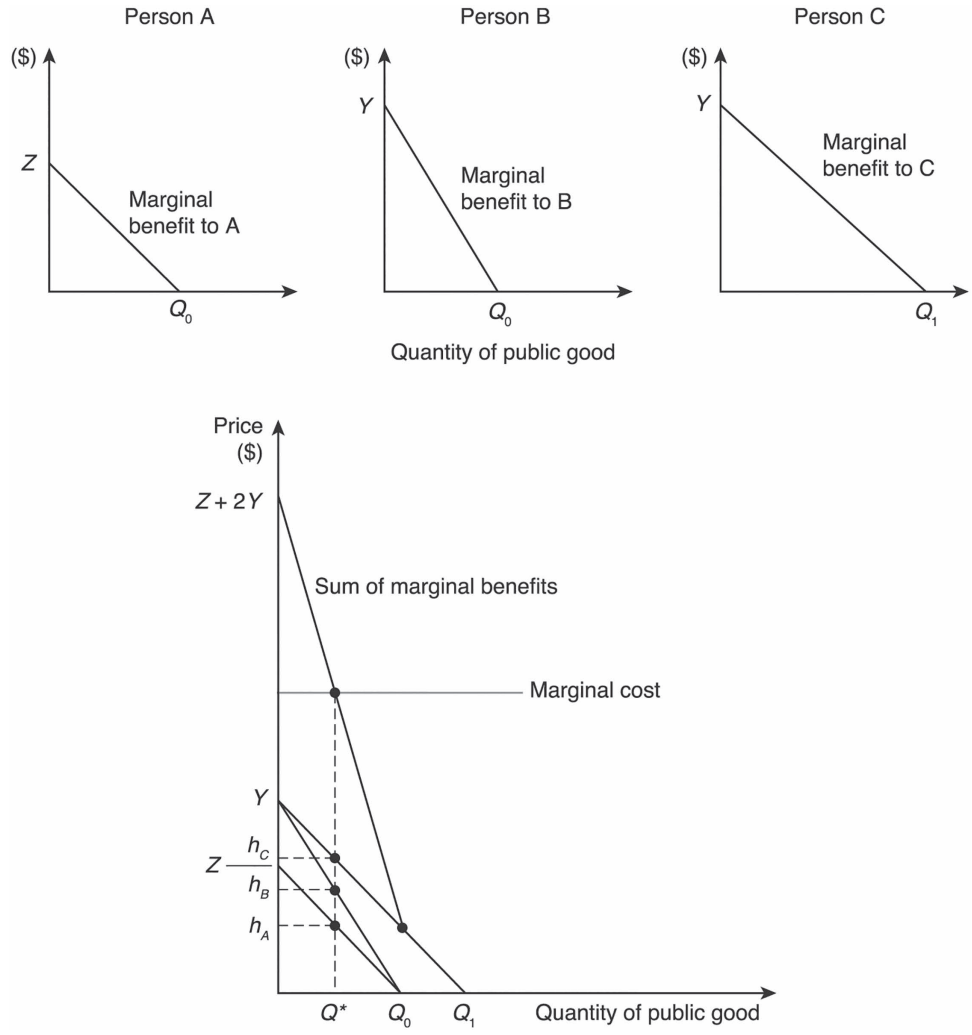


Figure 2.7 Efficient quantity of a public good

Figure 2.7. Person A represents a small demand, Person B a medium level of demand, and Person C a high demand for this public good. A demand function for an individual shows the quantity demanded at *every* price, given that individual's tastes and income and the prices of substitute and complementary goods. The benefits to society equal the benefits to all three consumers together. In the bottom part of Figure 2.7, the marginal benefits of Persons A, B, and C have been added together to give the sum of marginal benefits for all three, labeled $\Sigma_i MB_i$, which means $MB_A + MB_B + MB_C$.

In calculating this aggregate marginal benefit function, the individuals' marginal benefits are added *vertically*. For example, the demand by Person A shows that the marginal benefit of the first unit is $\$Z$; the first unit of national defense, police protection, or whatever provides $\$Z$ worth of benefit to Person A. Similarly, the marginal benefit of the first unit of public goods is $\$Y$ for both Persons B and C. The marginal benefit of the first unit to all three individuals (that is, society) is therefore $\$(Z + 2Y)$. The aggregate marginal benefit curve is

calculated in that way for every unit of the public good. Although all three consumers receive the same level of public good, only Person C values additional units between Q_0 and Q_1.

The efficient amount of this public good is Q^*, for which the marginal cost to society equals the sum of individuals' marginal benefits. It is implicit in this rule that the marginal cost includes all the costs to the society, including opportunity costs generated by production (such as pollution). This rule is often called the **Samuelson rule** or the Samuelson public goods equilibrium, reflecting economist Paul Samuelson's work in deriving the condition. Although the rule was illustrated for a pure public good, it also applies to any good involving externalities (recall that public goods are just special cases of external benefits). If consumption of a good by an individual imposes costs on or creates benefits for other individuals, those costs and benefits must be included to satisfy the efficiency rule that marginal social costs must equal marginal social benefits.

Methods of government provision

An important topic of this book (and one to which we will return often) is how government might be able to achieve or provide for an efficient use of resources. Government can intervene in private markets in at least three ways: (1) by directly providing goods and services, (2) by creating incentives to alter economic decisions through the use of taxes and subsidies, and (3) by regulating private economic activity. Government in the United States, including state and local government, uses all three methods. Government is essentially the sole producer of some goods and services, such as streets and highways, and a parallel producer with the private sector of other services, such as education, police and fire protection, and waste collection and disposal. A variety of taxes and subsidies are used in an attempt to curtail or expand different activities in view of their external effects. Intergovernmental grants, offered both by states to localities and by the federal government to the state-local sector, are one common example of subsidies in the state-local government arena. In other cases, regulations are imposed on activities of the private sector, such as state regulation of public utilities or private schools, or on the activities of a different level of government, such as state regulation of local police agencies or local schools.

Every attempt by subnational governments to improve economic efficiency may not be successful, however. Government provision involves substantial transaction costs – including the administrative costs of the government structure itself, the compliance costs to taxpayers and voters of making economic decisions collectively through government, and the information problems facing government in discerning the "public interest." As Peter Steiner (1983) and Richard Nelson (1987) have argued, the fact that private markets fail to provide goods or services efficiently may be of little relevance if government cannot provide them efficiently either. In that case, a different or at least broader analytical framework than the basic microeconomics reviewed in this chapter is necessary to evaluate the role of government. Society would select government to provide some goods and services if government can better serve the "public interest," which is not defined solely by economic efficiency. Private provision may be selected for some goods even though the market is inefficient if government provision would be too costly or create other problems; government provision may be selected in other cases even if private-market inefficiencies are insignificant or nonexistent if society seeks another objective such as fairness or security.

Benefit taxation

Given these cautions about the emphasis on efficiency, it is still instructive to note one special government fiscal structure that may generate the efficient outcome. At the efficient

amount of output shown in Figure 2.5, $Q^{\star}$, the marginal benefits to Persons A, B, and C, are labeled h_A, h_B, and h_C, respectively. If these individuals were charged a "price" for this public good equal to h_A, h_B, and h_C, the amount of public good demanded by each individual is $Q^{\star}$, the efficient amount. Every consumer demands the same amount of government service, which is the efficient amount.

The particular characteristic of this situation that generates the efficient result is that each consumer is being charged a price equal to marginal benefit at the efficient quantity. Although user fees equal to marginal benefits could perhaps accomplish this, it is more common in the provision of government goods for the "price" to be the taxes a consumer pays. In that case, each consumer's taxes would have to equal marginal benefit or at least the *share of taxes* paid by each individual should equal that person's *share of marginal benefits*. The shares for each consumer are:

$$S_A = h_A/(h_A + h_B + h_C) S_B = h_B/(h_A + h_B + h_C) S_C = h_C/(h_A + h_B + h_C)$$
$$S_A + S_B + S_C = 1.$$

These tax shares are very much like prices because they show the amount each person would have to pay to increase government spending by \$1. For example, if $h_A = 20$ percent, $h_B = 30$ percent, and $h_C = 50$ percent, and spending is to increase \$1, taxes must also increase by \$1, with Person A paying \$.20 more, Person B \$.30 more, and Person C \$.50 more. The price to Person C for another dollar's worth of government service is \$.50. If the shares equal marginal benefits, then each is willing to pay the price up to the efficient amount. This situation, with charges or tax shares equal to marginal benefit shares, is called a **Lindahl equilibrium** after the Swedish economist Erik Lindahl (1919–1958). If consumers' marginal costs reflect their marginal benefits, then the efficient amount of public good will be demanded. Of course, it is not a simple matter to implement that solution (Lindahl, 1958).

First, marginal benefits must be measured and assigned to individuals or at least to groups of individuals. This may be an impossible or expensive task, in part because consumers have little incentive to reveal their true demand. What, for instance, are the marginal benefits by income class of increasing police service spending by \$1? Second, as previously noted, it may not be appropriate to charge marginal prices if the marginal cost of another user is zero. Third, it may not be feasible to exclude consumers from use if they refuse to pay the price set by the government. The Lindahl equilibrium does offer the possibility of efficiency by converting taxes into a form of user charge with tax shares determined by benefit. This idea of benefit taxation and its efficiency properties is raised again in Chapters 5 and 12 concerning property taxes and in Chapter 8 with a more complete discussion of user charges.

Application to state and local governments

The problems of public goods, externalities, and increasing returns to scale provide reasons for government action to improve the efficiency of the economy, and many, although certainly not all, state-local government activities can be explained by these reasons. On the other hand, state and local government intervention is not used for all local goods or services that involve externalities or public good properties. Redistribution of society's resources also can be a legitimate and explicit objective of government policy, and although state and local governments may be limited in carrying out redistribution programs, it seems clear that distribution and equity concerns influence many (if not most) state-local government fiscal decisions.

Despite these qualifications, the framework outlined in this chapter does offer some explanation for common fiscal activities and behavior of many state-local governments.

Why is government, particularly state and local government, deeply involved in the education business? (As explained in Chapter 1, education is far and away the largest subnational government budget category.) First, education produces external benefits such as the gains to all from a literate and educated populace and the information generated by research at educational institutions (which is usually considered a public good). Second, education has the potential to be an important mechanism for income redistribution by affecting earnings potential. Third, education benefits cannot generally be confined to a particular geographic area or industrial sector, so intergovernmental arrangements may be called for. The education case also may illustrate reasons for government provision other than the classic economic efficiency arguments. Public education may be a way of implementing a basic notion of fairness – equal opportunity for all – and it has been a primary way society transmits social values and informal rules of behavior.

Similar arguments can be made about police and fire protection. These services are, to a large degree, nonrival and, to a somewhat lesser degree, nonexcludable. There are also substantial interjurisdictional externalities (or spillovers) in the provision of these goods. Accordingly, almost every municipality or township in the United States provides services of this type. These services also are provided privately, however, in the form of private security guards at businesses, private security patrols in some neighborhoods, and privately purchased and owned equipment such as locks, burglar alarms, smoke detectors, and fire extinguishers. However, largely for the economic reasons, government takes a central but not exclusive role in providing these services. (See Application 2.2.)

Transportation provides a final illustration. State and local governments finance, own, and operate transportation facilities such as streets and highways, airports, and public-transit systems. The economic efficiency arguments again provide some explanation. If uncrowded, these goods are nonrival, requiring a zero price for efficiency. Benefit spillovers among different jurisdictions providing the facilities are also common, requiring some coordinating mechanism. Although state and local governments provide these facilities, they seldom produce them; rather, governments usually contract with or buy from private firms, thereby taking advantage of any economies of scale in production.

Application 2.2: Public and private provision of public safety

Although the discussion in this chapter may seem to suggest that goods and services are provided either privately *or* by the public sector, in fact, it is more common for individuals and firms to purchase goods and services in the private market to complement services provided by government. In some cases, state and local governments themselves purchase services from private firms to augment similar services the government produces directly. Public safety or police service is one area in which joint public-private action is common.

Public provision of police services is usually called for because of substantial social (as opposed to private) benefits from the service (externalities), the difficulty of forcing consumers to pay for public safety benefits other than through government taxes (nonexclusion), and economies of scale in producing services. All these factors are important and help explain why most local and state governments in the United States provide police and other public safety services.

Some forms of public safety services do not meet these conditions; rather, the benefits are mostly private, exclusion is direct, and scale economies are minor, if they exist at all. Individuals and firms privately purchase locks, safes, security lights, and alarm systems, all of which are private goods, providing benefits to the direct consumers. That doesn't mean there is no connection between these goods and publicly provided police services, however,

as they seem to complement each other. A security alarm is not likely to deter illegal entry or theft unless the criminal believes that the alarm will attract public safety officers with the power to make an arrest. On the other hand, locks, safes, video surveillance equipment, private neighborhood patrols, and other security devices may reduce the demand for publicly provided police service, freeing up resources for other public safety matters or even other government responsibilities.[6]

The relationship between public police and private security workers is one important aspect of this issue. In fact, private security forces seem to outnumber public law enforcement staff (Sklansky, 1999). Based on 2019 US Census data, there were approximately 715,000 private security guards in companies that specialize in providing that service and another 80,000 private investigators and employees of armored car services. In addition, there are an estimated 450,000 to 500,000 "in-house" security guards – workers hired solely for that purpose by firms or owners of property – and about 120,000 employees of firms that install and monitor security and alarm systems. In contrast, the US Census Bureau reports a total of about 730,000 state and local government police officers with arrest authority in 2020. Worldwide, data from the United Nations suggest that the number of private security guards was twice as large as public police in 2011. So the number of private security guards has grown to be substantially greater than the number of public police officers.

Private security services may both complement and substitute for public safety services, depending on type. For instance, private security guards to guard specific buildings or parking lots are similar in effect to locks and alarm systems installed by private owners, providing mostly private benefits to the direct users of the service. These uses complement but do not really replace public police.

Increasingly, however, private security forces are being used to substitute for or augment public police services as well. In some cases, groups of individuals or businesses are contracting with private security firms to provide services in addition to those of local police. Such services commonly include patrolling, monitoring behavior, and providing information to public police but usually do not include arrests or criminal investigation. For instance, businesses in Philadelphia's commercial downtown did just that in 1991. Similarly, homeowners in some neighborhoods (often through a neighborhood association) hire private guards to patrol the neighborhood or staff entry centers, a trend that seems to be increasing partly due to the growth of gated communities. Sklansky (1999) reports that more than 800 private security guards patrol neighborhoods within the city boundaries of Los Angeles (a number equal to about one-tenth of the size of the Los Angeles Police Department). In 2013, the *San Francisco Chronicle* reported the growth of similar activity in Oakland, California. In 2015, the *Detroit Free Press* reported about the 30 business firms that had private security patrols operating in the city center and the 500 monitored cameras that Rock Financial had installed around buildings it owned. In an economic sense, one can think of the public police as providing services that provide a general social benefit, with the additional private service satisfying additional marginal private benefits (demand).

The growth of private security services and expenditures – both for traditional services, such as alarm systems, and for newer private security guards and patrols – also creates a number of challenges for public police agencies. False alarms are one major problem. It is estimated there are about 20 million private electronic security systems in the United States. About 99 percent of the alarms from those systems are false, creating substantial direct costs for public police who respond to the alarm and diverting the time and attention of the public police away from actual criminal activity. Competition for workers is another issue. The growth of private security guards and patrols has made it more difficult for public police agencies to attract and retain police officers, driving up public safety costs.

In a few instances, private security guards or firms are actually replacing public police, at least for some services. Some public police agencies are hiring private guards or security firms without true police power to provide such functions as patrolling parks, transporting prisoners, directing traffic, enforcing parking rules, and providing a security presence in government buildings. In essence, public police agencies that do this are changing the way public safety services are produced similar to the way in which other services (such as medicine) divide tasks among specialized groups of workers (physicians, physicians' assistants, nurses). Such changes often reflect pressures to produce public services at lower cost, as discussed in Chapter 7.

In a few other cases, private security forces may completely replace public police. Sussex, New Jersey, replaced its local police force in 1993 with private security guards under contract to the city, and Foley, Minnesota, did the same in 2012. Although driven partly by cost considerations, such complete privatization moves also create new issues for government to resolve – how to specify the service, monitor the performance of the private supplier, and enforce details of the contract if the contractor fails to comply.

The increasing private provision of public safety services challenges the conventional economic efficiency arguments used to support government provision. If police services really are nonrival and nonexcludable, then why do businesses and individuals voluntarily offer to pay for such services? Interestingly, in a historical sense, private security provision and private security forces once were the norm. In the United States, it was only in the late 1800s and early 1900s that serious civil liberty concerns were raised about private security forces, fueling an increase in public police services. Clifford Shearing (1992) notes that private police began to be perceived as protecting the private interests of the firms that employed them – particularly as a result of the role of private security forces in violent conflicts with emerging labor unions – rather than some general public interest. Since the 1960s, however, such concerns seem to have become less important, at the same time that cost considerations and demand for security became more important. As a result, private security services have grown in importance again.

Summary

Important aspects of microeconomics are reviewed in this chapter. An economy is Pareto efficient if it is not possible to make at least one person better off without making someone else worse off. Market efficiency requires that marginal social benefits equal marginal social costs.

Public goods are nonrival, meaning that one additional person can consume the good without reducing any other consumer's benefit. After a nonrival good is produced, the marginal social cost of another consumer is zero, so efficiency requires a zero price.

An externality exists if one economic agent's action (consumption or production) affects another agent's welfare outside the market. When externalities are present, private choices by consumers and firms in private markets generally will not provide an economically efficient result. Government may be able to intervene and create incentives through the use of taxes, subsidies, or regulations so that private choices of consumers and firms will be efficient in the presence of externalities.

If production of some commodities exhibits increasing returns to scale, it is impossible to have a single price equal to marginal cost (which is required for efficiency) and have the producer earn a profit. Government may resolve this difficulty either by becoming the producer or by regulating monopoly production.

Many, although not all, state-local government activities can be explained by the problems of public goods, externalities, and increasing returns to scale. Redistribution of society's resources also can be a legitimate and explicit objective of government policy.

Discussion questions

1 In parts of the country where snow is a regular occurrence, local government almost always provides snow removal from public streets but seldom provides snow removal from public sidewalks. Sidewalk clearing is either left to individual choice or regulated by the government, perhaps by requiring that property owners clear the walks along their property. Yet the theoretical aspects of these two services are the same. What factors might explain why local governments typically don't plow sidewalks? From the other point of view, why do many localities simply require property owners to clear snow from streets along their property? What does this imply about the standard externality/public goods argument justifying government intervention?

2 "For an efficient amount of a public good to be provided, the marginal cost of producing another unit of that good must equal the marginal benefit to each individual who consumes the good." Is this statement true or false, and why?

3 Suppose that your university is considering building new parking lots on campus. The table that follows shows the marginal benefit to students, faculty/staff, and visitors for one to five new lots. The table also gives the total cost of acquiring/constructing those lots.

Marginal benefits

No. of lots	*Students*	*Faculty/staff*	*Visitors*	*Total cost*
1	$75,000	$37,500	$12,500	$30,000
2	60,000	35,000	5,000	70,000
3	45,000	30,000	0	120,000
4	25,000	25,000	0	180,000
5	5,000	20,000	0	250,000

Assuming that the lots will not be completely full so that students, faculty/staff, and visitors can use them simultaneously, derive the aggregate demand curve or social marginal benefit for parking lots. What is the efficient number of additional lots? If this university builds the efficient number of lots, how should the costs be divided among students, faculty/staff, and visitors?

4 Explain why the existence of benefit spillovers across jurisdiction boundaries could lead the jurisdictions to provide too little of that service from society's viewpoint. If the service in question is public safety, what might be the nature of common benefit spillovers?

Notes

1 *Economic Report of the President* (Washington, DC: US Government Printing Office, February 1995), 129.

2 Roy Bahl, *Financing State and Local Governments in the 1980s* (Oxford: Oxford University Press, 1984), 25.

3 Area *DEFG* is approximately equal to $250. *DEFG* is approximately a triangle, the area of which is 1/2 (base)(height), or 1/2 (5)(100) in this case.

4 This is precisely the rationale for many intergovernmental grants: to correct the externality that arises when state or locally provided public services provide benefits to nonresidents as well.

5 Coase (1974) provides evidence contradicting this example, suggesting that lighthouses are not good examples of nonexcludable goods. As discussed in the application at the end of this chapter, the possibility of market failure is only one aspect of potential government involvement in an economy.

6 For more discussion of these types of security expenditures and the economic relationship to public police services, see Clotfelter (1977).

Selected readings

Bator, Francis M. "The Anatomy of Market Failure." *Quarterly Journal of Economics*, *72* (August 1958): 351–379.

Goolsbee, Austan D., Steven Levitt, and Chad Syverson. "Externalities and Public Goods." Chap. 17 In *Microeconomics*. New York: Macmillan, 2020.

Samuelson, Paul A. "Diagrammatic Exposition of a Theory of Public Expenditure." *Review of Economics and Statistics*, *37* (1954): 350–356.

Part II

Public choice and fiscal federalism

Compared to a national government, the most important and distinguishing feature of subnational governments is there are many varied jurisdictions, and it is easy to move among them. These differences have economic implications, perhaps none so important as the implications for tax and expenditure choice by those same subnational governments. That is the general topic of Chapters 3 through 6.

The desire for services by consumers/voters is fundamental to the choice of tax and expenditure by government. Thus, one important issue is how the prices of goods and services, incomes, and personal characteristics affect the demand for government services. Important questions include the following: How sensitive is consumption of, say, education to changes in the price of that service? Does desired consumption of state and local government services increase or decrease as consumers' incomes rise, and by how much? And what does demand imply about the benefits from state-local government services?

Given differing consumer demands for state and local government services, some mechanism must be used to make fiscal choices. Voting is one method commonly utilized, which is considered in Chapter 4. Mobility – or choice of location – is another, considered in Chapter 5. The structure of a fiscal federalism – the comparative number and fiscal characteristics of cities, counties, and special-purpose districts – must also influence the fiscal choices of each subnational government. Alternatively, knowing the types and characteristics of the services that will be provided may determine the best governmental structure to provide those services. The issue is how many governments there should be or, equivalently, how big they should be. At one end of the spectrum, some services may require only one government, in which case, it would cover the entire nation. In contrast, some services may be provided better by many small governments.

The issue then is the optimal design of subnational governments or the optimal allocation of fiscal responsibilities among existing subnational governments. Given any existing federal structure, the issue is whether the fiscal choices of those governments are likely to be efficient and, if not, whether realignment of fiscal responsibilities within that structure would improve things. For example, given a set of local governments in a metropolitan area, should one service – say, police protection – be transferred from city to county government?

In the next four chapters, we use economic analysis to consider how individual choice about the activities of government affects the best structure for government to take.

DOI: 10.4324/9781003030645-4

3 Demand for state and local government goods and services

Headlines

Dozen highest-spending states

	Per capita spending rank	*State per capita income as percentage of US*
Alaska	1	111%
New York	2	126
Wyoming	3	111
California	4	116
North Dakota	5	101
Massachusetts	6	131
Vermont	7	101
Oregon	8	93
Delaware	9	97
New Jersey	10	126
Washington	11	112
Minnesota	12	105

Dozen lowest-spending states

	Per capita spending rank	*State per capita income as percentage of US*
Arkansas	39	79%
South Dakota	40	94
Missouri	41	87
North Carolina	42	86
Tennessee	43	88
Oklahoma	44	86
Indiana	45	87
Nevada	46	90
Florida	47	92
Arizona	48	81
Georgia	49	85
Idaho	50	81

DOI: 10.4324/9781003030645-5

Data availability

There are no data related to the topic covered in the chapter separate from the expenditure and tax data identified in other chapters, especially chapters 1 and 7. Estimates for the measurement of demand are reported later in this chapter.

The demand for the goods and services provided by state-local governments is the relationship between the amount of those goods and services desired by consumers and the tax prices, incomes, and social characteristics of those consumers. To understand demand, the same approach used in microeconomics to analyze consumer demand generally can be applied. As Edward Gramlich noted "Utility . . . maximization has already played a fundamental role in the development of such basic economic concepts as consumer demand functions. . . . It takes only a few extensions . . . to construct a theory of state and local behavior."[1]

The task in this chapter is to consider how prices, income, and various characteristics influence demand for goods and services provided through state and local governments. After reviewing the basics of price and income elasticity, the sources of data and the statistical methods used by economists to measure demand are discussed. The chapter then presents research results showing, surprisingly to some, that the desired amount of state-local government goods and services generally *rises* with income.

Understanding and measuring demand

The standard measures of how price and income influence demand are the price and income **elasticities of demand**, which is the percentage change in quantity demanded that results from a given percentage change in those variables. Demand reflects how consumers behave, and the elasticities are simply measurements of that behavior. Although most of you have been introduced to the concept of demand elasticities previously, the appendix to this chapter presents a review, which you should read now if you are not comfortable with these concepts.

To use demand in policy analysis, it is necessary to estimate the price and income elasticities of demand for the specific goods and services provided by state-local governments. Those computations can be made using statistical techniques if data for the amount of services consumed, prices, incomes, and other personal characteristics are available. Those data may come from census measurements of individual governments, such as the amount of government spending, personal income, population, and tax structure for each state; they may come from the observed voting behavior in individual precincts; or they may be collected by surveying individual consumers. To generate estimates of the elasticities, variations in the selected amount of government service in the data can be related to the variations in price and income.

Suppose, for instance, that the actual selected amounts of expenditures for different categories of services are available for a group of subnational governments (perhaps for all states, cities with a population of more than 100,000, or all school districts in a given state). Many different individuals or voters comprise each of those jurisdictions. Each individual's demand for government service is influenced by that individual's budget. The budget is

$$Y_i = C_i + t_i\,(T)$$

where
Y_i = the income of person *i*
C_i = private consumption spending by person *i*
t_i = the state or local tax share of person *i*
T = total tax collected by person *i*'s state or local government

The budget for the state or local government is

$$E = T + G$$

where
E = total spending by the state or local government
G = lump-sum grants received by the government

Solving for the jurisdiction's taxes T and substituting into the individual's budget yields the following:

$$Y_i = C_i + t_i\,(E) - t_i\,(G).$$

The tax share for person *i* depends on the jurisdiction's tax structure. If the only tax is a property tax, then that person *i*'s tax share is

$$t_i = \frac{V_i\left(1-S\right)}{V}$$

where
V_i = taxable property value of person *i*
V = total taxable property value in the jurisdiction
S = the portion of person *i*'s tax that is offset by tax deductions and credits.

If that tax share is substituted into the equation for the individual's budget, the result is

$$Y_i - C_i - \frac{V_i}{V}\left(1-S\right)E + \frac{V_i}{V}\left(1-S\right)G = 0$$

Given income, property values, and tax credits and deductions, the individual desires to consume whatever quantities of C_i and E give the highest happiness or utility from those that can be afforded. The demand for government spending E by this person depends, therefore, on this person's income, tax price (which is determined by the person's property value with a property tax), credits or deductions that reduce this person's tax cost, and the intergovernmental grants to the government.

For each jurisdiction, which individual's tax price and income should be used to characterize that jurisdiction in estimating the price and income elasticities? The answer depends on how the expenditure choice was made in that community. Given the choice or voting system, the issue is which voter in each jurisdiction is decisive in the choice: that is, which voter best "represents" that jurisdiction.

Median-voter models of demand

If the choice of the amount of government expenditure is made through majority voting, the selected amount will be the median (middle) of the desired amounts of all the voters (discussed in Chapter 4). The demand by any other voter is irrelevant because only the median position can generate majority support. It is as if the median voter's demand *is* the demand of the entire community. If the individual who desires that median expenditure can be identified, then that individual's characteristics – tax price, income, social characteristics – can be used to "represent" the community to estimate the elasticities of demand. The issue is finding a way to identify the median, or decisive, voter, assuming that the conditions required by the median-voter model apply in that community.

Will the median voter have median income? Two economists, Theodore Bergstrom and Robert Goodman (1973), show that under certain conditions, the voter who has the median desired expenditure amount in a community is the voter with median income. Because data for median income and other median social characteristics are generally available for individual subnational governments, this result allows easy computation of demand elasticities, assuming that those conditions exist.[2]

The intuition behind the Bergstrom-Goodman analysis can be demonstrated in Figures 3.1 and 3.2. Suppose, for example, that subnational goods are normal (demand rises with income, so the income elasticity is positive) and that tax prices also increase with income. This is different from traditional demand analysis, in which different individuals face the same price. The price of a shirt at Your Favorite Store, say $30, is usually the same for both low-income and high-income customers. The prices for government goods are determined by the taxes an individual pays, however, so because taxes are not the same for individuals with different incomes, tax prices for subnational government goods and services also will vary by income.[3] Given that $Y_C > Y_B > Y_A$, demand rises as income rises in both cases in Figure 3.1, and tax prices rise with income, although differently, in both cases. Given the demand and tax price for each individual in each case, the desired expenditure amounts for each individual are labeled $A^\star$, $B^\star$, and $C^\star$.

In Figure 3.1a, although prices increase with income, demand increases more, so desired expenditures rise as income rises. The lowest-income individual wants the least amount of government expenditure, the middle-income individual wants the middle amount of

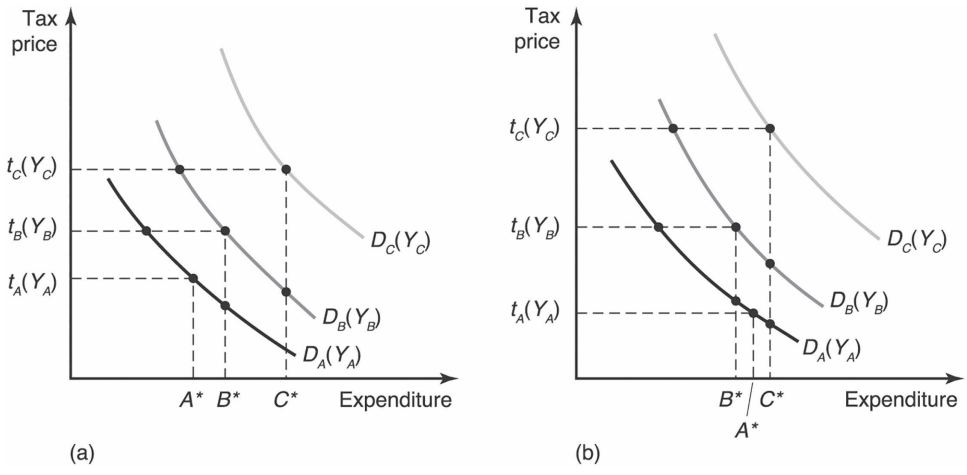


Figure 3.1 Desired government expenditure is determined by demand and tax prices

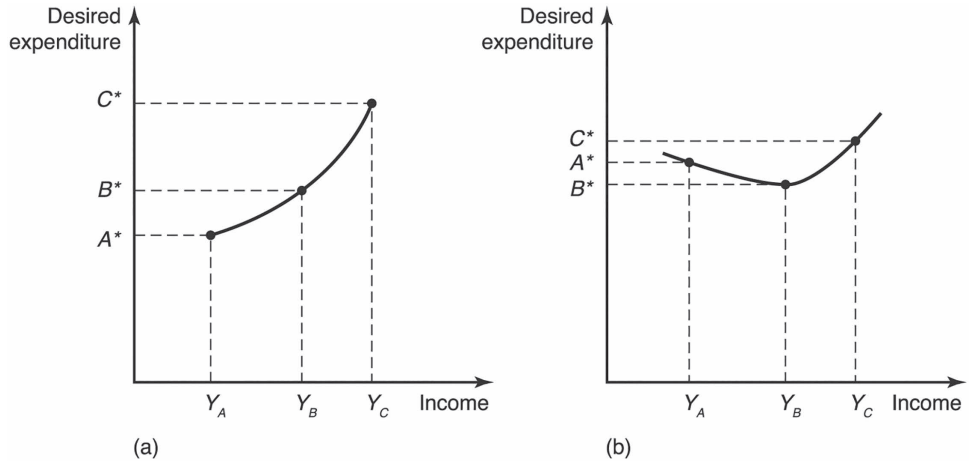


Figure 3.2 The relationship between desired expenditure and income

expenditure, and the highest-income individual wants the most expenditure. This is exactly the possibility envisioned by Bergstrom and Goodman. With a majority vote among the three, $B^\star$ would win, and individual *B* has middle or median income. As shown in Figure 3.2a, desired expenditure rises as income rises.

This outcome is not guaranteed, however, as shown by the situation in Figures 3.1b and 3.2b. In that case, the individual with the median desired expenditure is *A*, the lowest-income individual. In a majority vote among the three desired amounts of expenditure, $A^\star$ is selected, so the median voter is the low-income individual. In this case, Bergstrom and Goodman's conditions are not satisfied. As shown in Figure 3.2b, desired public expenditure is a U-shaped function of income – the high- and low-income voters join together to select a higher level of expenditure than desired by the middle-income voter.

The Bergstrom-Goodman result depends on the relationship between desired expenditure and income. If desired expenditure rises with income, as depicted in Figure 3.2a, or if desired expenditure falls continuously with income, the median desired expenditure is held by the median-income voter. If desired expenditure initially falls with income and then rises with income (the U-shaped relationship) or if desired expenditure initially rises with income and then falls (an inverted U-shaped relationship), the median voter may not be the individual with median income.[4]

Therefore, by assuming that desired expenditure is either a continually increasing *or* decreasing function of income – that is, if one believes the Bergstrom-Goodman conditions are satisfied for the jurisdictions being considered – then the demand elasticities for the jurisdictions can be found by estimating demand for the median-income individuals. This assumption and method have, in fact, been the most used method in recent years for estimating the price and income elasticities of demand for subnational government goods and services.

But is the method appropriate? Is the relationship between income and desired expenditure always a continuously increasing one? There is some evidence that the answer to both questions is no. Byron Brown and Daniel Saks (1983) examined the spending behavior of Michigan school districts for 1970–1971, partly to test whether a continually increasing or U-shaped relationship existed between desired school spending and income. If the

relationship is, in fact, U-shaped, then spending in a school district should depend on the variance, or "spread," of the income distribution as well as on median income because voters at each end of the income distribution form a coalition to select spending. Brown and Saks reported that school spending in these districts did depend on the variance of the income distribution in each district and concluded "the correctly specified . . . curve . . . is U-shaped with a minimum at a family income of about $8300" (in 1970 dollars).[5]

Which view of the world is correct? At this point, it remains an unresolved issue. In fact, it may be that *both* are correct sometimes. For the U-shaped function in Figure 3.2b, desired expenditure decreases with income for incomes less than Y_B and increases with income for incomes above Y_B. Thus, in communities whose residents (mostly) have incomes either below or above Y_B, the relationship in that community is always rising or falling, and the Bergstrom-Goodman conditions are satisfied. In communities where residents' incomes substantially fall across Y_B, the function is U shaped. The minimum may occur at a different income – that is, at a different Y_B – in different communities. Even in those cases, all is not lost because Brown and Saks and others have developed methods to estimate demand for government goods and services in those instances. The difference is that a single number cannot characterize the entire relationship between income and desired quantity in those cases; you must estimate how income and desired quantity are related at all income levels.

Demand and voter participation

Another potential difficulty in using voting models to analyze demand is that typically, only a small fraction of eligible voters actually participates in state-local elections. This is particularly true of special fiscal elections or referenda such as those to select government spending or the property tax rate; voter turnout of only 10 to 20 percent is common in those cases. It is the characteristics of *voters* that determine local fiscal decisions, then, not the characteristics of the whole community. Moreover, the choice to vote is not random but influenced by the individual's stake in the outcome. Families with children in public schools, for instance, might be more likely to vote on the local school district budget than others and might also desire higher spending than other residents. Similarly, a larger percentage of higher-income than lower-income residents tend to vote in local elections; if desired spending increases with income, then the voter participation patterns lead to a higher level of government spending than desired by the entire community.

Alternative models of demand

Of course, not all estimates of the demand for state and local government services have been based on the majority-voting/median-voter theory. One alternative theory assumes that spending decisions are made not by voting but by a government official acting on behalf of residents of a jurisdiction. This so-called dominant party model is intended to represent a situation in which there is no credible political threat to the existing officials or party. The decision-making official is assumed to care about the per capita (or average) taxes and expenditures in that community. In essence, studies of demand based on this theory statistically relate per capita spending on government services to per capita income of the residents, to some measure of per capita tax burden (as a measure of price), and to other average characteristics of the community. (The study by Gramlich and Galper [1973], reported on later in this chapter, is an example of this type.)

Monopoly bureaucrat theories, further discussed in Chapter 4, also are used as the foundation for studies of demand. In these theories, spending decisions are made by majority voting, but the bureaucrat controls the choices from which the voters must choose. As a

result, one or more voters will be decisive, but the selection is only the voter's preferred amount *among those offered* by the bureaucrat. Using this theory, per capita or median spending is related to per capita or median-fiscal variables *plus* some political variables representing the limited choices voters face.

Evidence about demand for state-local services

Despite these alternative theories on which demand studies are based and very different data sources, two fundamental conclusions have emerged consistently: consumption of most state-local government services is relatively insensitive to price, and demand for state-local services generally rises with income (holding price constant). The typical ranges for estimated income and price elasticities for various categories of state-local government services are listed in Table 3.1. For comparison, the demand elasticities for selected privately provided goods and services also are listed.[6]

Price elasticity

When all services are aggregated, the price elasticity tends to fall in a range from –.25 to –.50, indicating demand that is **price inelastic**. It further appears that among local government services, demand for education is relatively more price inelastic than demand for other traditional local government services. The demand for state-local services has price elasticities similar to those for such goods as coffee, tobacco, and (at least in the short run) electricity and alcohol.

Consumers view the services traditionally provided by state and local governments as basic commodities, similar in character to basic foodstuffs and maintenance services. Public safety and quality education are, after all, two of the most sought-after characteristics of local communities. Note that it is the characteristics of these services that make demand price inelastic, not the fact that they tend to be provided by government. If these estimates are correct,

Table 3.1 Representative estimated price and income elasticities

Good or service	*Price elasticity*	*Income elasticity*
For government expenditures		
Total local	– .25 to – .50	.60 to .80
Education	– .15 to – .50	.40 to .65
Police and fire	– .20 to – .70	.50 to .70
Parks and recreation	– .20 to – .90	90 to 1.30
Public works	– .40 to – .90	.40 to .80
For selected private goods		
Electricity (residential)	– .13 (– 1.9LR)[a]	.20
Coffee	– .25	0
Tobacco	– .51	.64
Housing	– .70	.70 (1.0LR)
Alcohol	– .92 (– 3.6LR)[a]	1.54
Automobiles	– 1.35	2.46
Gambling (horse races)	– 1.59	.86
Restaurant meals	– 1.63	1.40

Sources: For government expenditures: Inman (1979, Table 9.1, pp. 286–88). For private goods: Kohler (1982, Tables 4.2–4.4, pp. 101–02); Suits (1979, Table II, p. 160); Harmon (1988, p. 173)

Note:
a Long run

demand for education would be very price inelastic even if education were entirely provided by private schools, just as the demand for coffee would still be price inelastic if suddenly all coffee sales were monopolized by governments.

The fact that demand for state-local government services tends to be price inelastic has many important policy implications. Because consumption is not very sensitive to price, attempts to alter the amount or type of government expenditure by reducing prices – with intergovernmental grants, for example – are only moderately successful. If the prices of state-local services rise, perhaps because of increases in the costs of providing them, consumers are not expected to reduce consumption much, requiring that increasing funds be allocated to those types of consumption. These implications are examined in Chapters 8 and 10.

Income elasticity

State-local government services are normal goods. That is, increases in income (holding prices constant) tend to cause demand to increase, although for most of these services, demand is income inelastic – demand changes less than proportionally to the income change. Demand appears to be income elastic for parks and recreation services – that is, demand increases more than proportionally to an increase in income. That parks and recreation services are superior goods seems reasonable, given the evidence that the demand for vacations and restaurant meals is also income elastic. Higher-income consumers demand these commodities in greater proportion.

Although the income elasticity of demand is a measure of the percentage change in government expenditure due to a percentage change in income, it is sometimes more useful to translate this into a measure of the dollar change in expenditure due to a $1 change in income. Given the actual magnitude of expenditures and incomes, the range of elasticities reported in Table 3.1 is consistent with between a $.01 and a $.10 increase in state-local government expenditure for each $1 increase in consumers' incomes.[7]

As with the price elasticity, these income elasticity estimates have important implications for the expected effects of intergovernmental grants on subnational government expenditures (see Chapter 10) and for the prospects of controlling the growth of the state-local government sector through the use of tax and expenditure limits (see Chapter 7).

Introduction to statistical analysis

In various sections of this book, the results of empirical studies of public finance issues are reported. Discussion of the statistical concepts underlying these types of studies might be helpful in interpreting the results. Statistical analysis of data to clarify economic issues is called **econometrics**.

The first step in doing econometrics is to postulate some relationship between the variables of interest. This relationship is based on economic theory or some specific economic model. For instance, one might think of the demand for government services that arises from the median-voter model. Government spending is influenced by median income, the tax price for the median voter, production costs, and the median voter's tastes. A simple mathematical statement of the relationship might be

$$E = a + (b \bullet Y) + (c \bullet P) + (d \bullet N) + (e \bullet D) + u$$

where
E = spending
Y = income

P = tax price
N = population
D = population density
u = random error, representing other potential effects on spending not captured by the included variables.

Parameters a, b, c, d, and e are to be estimated and represent the effect of a change in each of the variables on government spending. For instance, if $b = .10$, then spending increases by $.10 for each $1 increase in median income, assuming constant values for all the other variables.

After data are available, various statistical techniques can be used to make these estimates. The most common technique used by economists is **multiple regression analysis**, which finds the set of estimates for all parameters that "best" characterizes the observed relationship among the variables.[8] Although it is beyond the scope of this book to explain how or why multiple regression analysis works, the basic idea underlying regression analysis can be illustrated.

Economic theory suggests that there should be a relationship between the level of spending by a jurisdiction and the incomes of that jurisdiction's residents. Data showing per capita state-local expenditure and per capita income for the northeastern states in 2011 are reported in Table 3.2. Based on economic analysis, one might expect the following relationship

$$E = C + aY + e$$

where
E = per capita expenditure
C = constant
Y = per capita income
a = marginal effect of a $1 increase in Y on E
e = error term.

Using the data for E and Y, regression analysis can be used to derive estimates of the variables C and a. The data are shown in the first panel of Figure 3.3. The regression technique in this case determines what linear function (line) is most consistent with these

Table 3.2 Spending and income in the Northeastern states, 2017

State	*Per capita expenditure*	*Per capita income*
Connecticut	$11,465	$72,110
Delaware	12,554	49,925
District of Columbia	26,671	79,782
Maine	9,607	46,485
Maryland	11,559	61,123
Massachusetts	13,526	67,596
New Hampshire	9,372	59,360
New Jersey	12,457	65,387
New York	17,757	65,392
Pennsylvania	11,826	53,363
Rhode Island	12,155	52,943
Vermont	12,995	52,152

Source: US Census Bureau

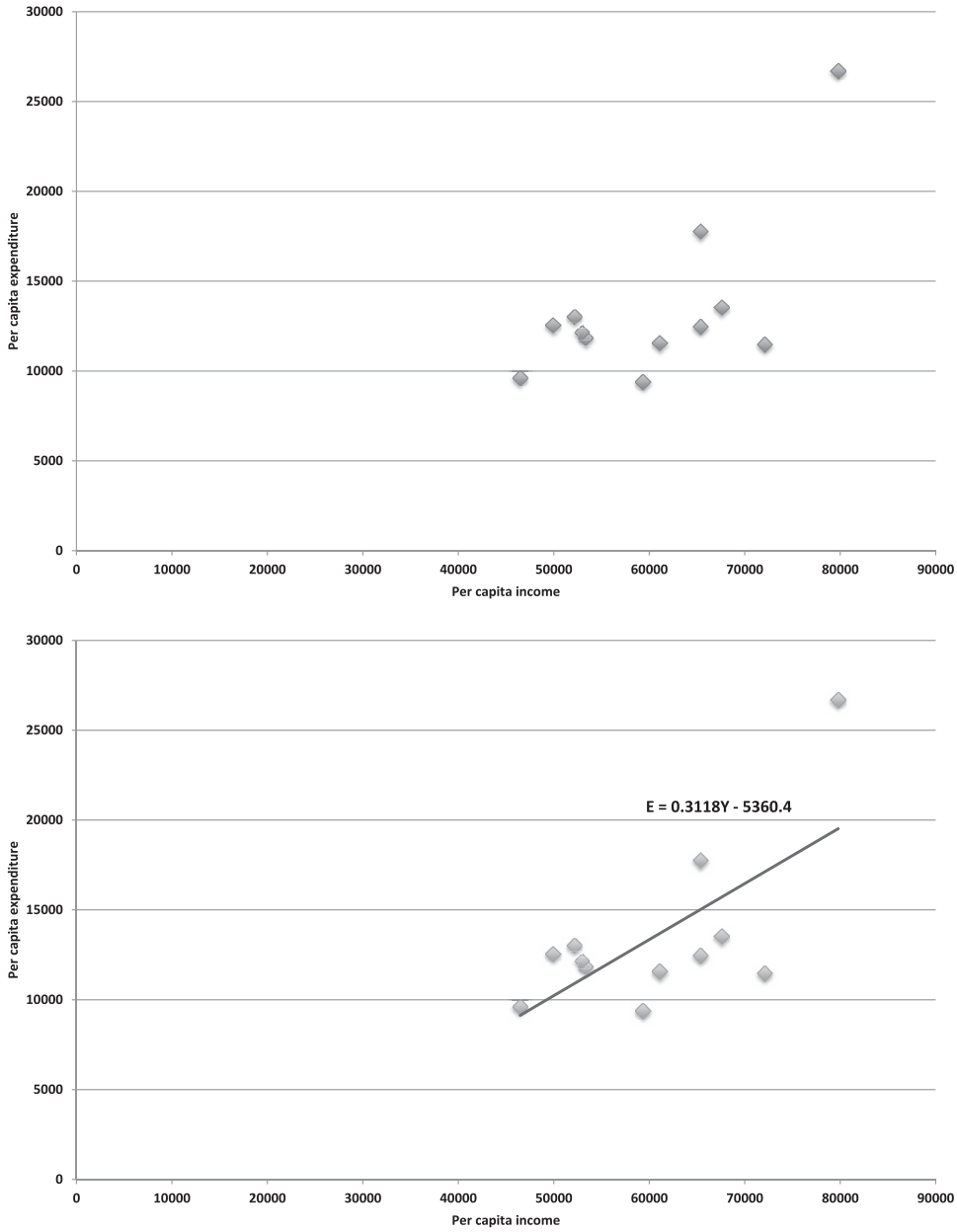


Figure 3.3 Relationship between per capita income and per capita expenditure, Northeastern states, 2017
Source: US Census Bureau; author calculations

data points by finding the line for which the sum of squared differences between the actual data points and those on the line is smallest. That is, the computer program calculates the difference between each data point and the point on a line, squares that difference, adds all those squared differences, and finds which line makes that sum smallest. As a result, the line selected has smallest average error between the estimated data points (those on the line) and the actual points.

It is important to emphasize that this technique provides estimates of the variables in the model but cannot determine those values exactly. In the equation of the model, the error term, *e*, represents the effects of other factors that influence the relationship between *E* and *Y* and are not included in this analysis. Such other factors might include intergovernmental grants received by the state and localities, the state tax structure, and the social characteristics of the residents. The technique also yields only estimates because the data usually represent only a sample of all the cases to be described by this model.

The results of the estimation for this example are shown in the second panel of Figure 3.3 and here as well:

$$E = -5{,}360.4 + .3118Y$$

The line described by this equation best "fits" the data and is shown in the figure. Coefficient *C* is estimated by the *Y*-intercept of that line (– 5,360.4), and coefficient *a* is estimated by the slope of that line (.3118). The economic interpretation of the result is that among the Northeastern states, each $1 difference in state per capita income is associated with about a $.31 difference (in the same direction) in state-local per capita spending. Because *a* is positive, state-local services are normal goods.

The fitted regression line in the figure shows clearly that the model does not fit each state's case equally well. Pennsylvania (with spending of about $11,800) and Maine (spending of $9,607) are essentially on the fitted line, and Rhode Island and Vermont are quite close. But the model predicts spending relatively poorly for Connecticut and New Hampshire, where actual spending is lower than estimated, and for the District of Columbia, which has actual spending well above that suggested by the model.

These regression results also can be used to predict or forecast values for data points that do not exist currently. For instance, the estimated regression line implies that a Northeastern state with per capita income of $60,000 is predicted to have per capita spending of $13,348 [– 5,360.4 + .3118(60,000)]. Thus, the results can be used to extend the analysis to cases not in the sample or to future periods of time.

The basic idea of regression captured by this example can be extended in many ways. Multiple regression differs from this one-coefficient case in that the separate but related influences of a number of coefficients are estimated simultaneously. The technique is still to find the relationship (or set of coefficients) that minimizes the sum of squared errors, but a single line does not characterize the relationship. Each estimated coefficient shows the marginal effect of a change in that factor, holding all others constant. The underlying relationship need not be a linear one either. For instance, if one believes the correct model is

$$E = C + aY + bY^2 + e$$

then the coefficients *a*, *b*, and *C* can be estimated, and the fitted relationship is not a line but a curve.

Every empirical or econometric study, then, has three main components. One is the relationship expected between the coefficients based on economic, historical, or political analysis, called the "model." Second are the data to be used to estimate or test the model. Third are the statistical techniques used to do the estimation. Many statistical issues can arise, so different statistical techniques may be necessary, depending on the nature of the data or model.

Two classic studies

Two classic studies of the expenditure behavior of state and local governments, one based on a majority-voting model of choice and the other on a theory of decision making by

government officials, illustrate how economists go about measuring the demand for state-local government services.

Bergstrom-Goodman study

Bergstrom and Goodman (1973) examined the expenditure behavior of 826 municipalities located in ten states based on 1962 data for three different expenditure categories: total expenditures (excluding education and welfare because not all municipalities in the sample had responsibility for those functions), police expenditures, and parks and recreation expenditures. Using the standard median-voter theory, they assumed that selected expenditures were the desired expenditures of the median-income consumer in each municipality. Expenditures for each category in each municipality were related statistically to median income in that municipality, the share of property tax paid by the median voter, the population of the municipality, and a set of social characteristic variables designed to capture differences in costs (density, percentage of population change 1950–1960, employment-resident ratio) or differences in demand not related to income (percentage of population 65 years and over, percentage of nonwhites, percentage of homes that are owner occupied).

Bergstrom and Goodman reported that price elasticities (with price measured by tax shares) are negative and inelastic. Consumption of these services in these cities in 1962 was not very sensitive to changes in the share of taxes paid by middle-income consumers. The income elasticities are all positive, with the demand for parks and recreation being income elastic ($E_D^Y = 1.32$) while the demand for all other services in aggregate is income inelastic ($E_D^Y =. 64$). By the usual statistical tests, these estimates were statistically significantly different from zero.

Among the other taste/cost variables, population is positively related to expenditures, but the percentage change in population over the previous decade is negatively related, suggesting perhaps that expenditures respond to a growing population only gradually. A larger percentage of the population over the age of 65 is related to higher expenditures, suggesting that older consumers demand more services than younger consumers with the same income and tax share. In contrast, a larger percentage of consumers who live in their own house seems related to lower expenditures, perhaps because owner-occupiers are more sensitive to property taxes than are renters.

Gramlich-Galper study

In the budgetary model of behavior used by Edward Gramlich and Harvey Galper (1973), a subnational government official had four objectives: to increase expenditures for current services, to increase private disposable incomes, to increase the stock of government capital, and to increase the amount of financial assets (or savings) held by the government. These objectives are competing, and the official is constrained in achieving them by the available resources, including the resources provided by intergovernmental grants.

Gramlich and Galper used this model to analyze the aggregate annual expenditures for all state-local governments from 1954 to 1972 and the expenditures of ten large cities over the period from 1962 to 1970. For the cities, expenditures for education, public safety, social services, urban support, and general government were separated. Gramlich and Galper did not utilize a voting model (as did Bergstrom and Goodman) but assumed that a public official made all decisions official, and Gramlich and Galper used data over a time period – called a "time-series" – rather than comparing different jurisdictions at a single time – called a "cross-section."

Gramlich and Galper's analysis provided measures of the price and income elasticities. From the time-series analysis of total state-local expenditures, the price elasticity is –.04, and the income elasticity is 1.08. Here, it appears that state-local expenditures *together* increase slightly more than proportionately with income – that state and local expenditures are superior. As noted in Chapter 1, the state-local sector grew substantially during the period used for this study (1954–1972). Even so, this elasticity implies that state-local expenditures grow only by $.095 for each $1 increase in income. The results of the analysis of city expenditures are more similar to those of Bergstrom and Goodman. The price elasticities vary from –.71 to –.92, and the income elasticity is .86. Demand is price inelastic and increases with income, although inelastically.

Subsequent research

During the past 40 years, there have been many such analyses of the expenditure behavior of state-local governments, some using the same theoretical approach as the two studies reviewed here and others using different theoretical approaches. For instance, Bergstrom et al. (1982) use a theoretical approach to measure demand based on survey responses of individuals and use this technique to estimate the factors influencing the demand for public K–12 education. They report an estimated price elasticity of –.4 and an income elasticity equal to .6 and conclude, "Estimates of the effects of income and price turn out to be quite similar to those found in aggregate studies" (p. 1183). Among other results, renters demand more service, likely because they perceive lower tax costs. Gramlich and Rubinfeld (1982) use the same theoretical approach to estimate the demand factors for local government services based on survey data and again find that "income and price elasticities are similar to those obtained from aggregate data" (p. 536). In a contrary finding, DeBartolo and Fortune (1982) study evidence from votes and issuing municipal bonds and report demand is even less price elastic, with price elasticity in the range of –.1 to –.15.

More recently, Fisher and Wassmer (2014) estimate the demand for state-local capital spending and report the income elasticity is about .4 to .5, indicating that the demand for state-local infrastructure increases with income, although less than proportionately.

A related body of research explores the effect of citizen characteristics – especially age, education, and race or ethnicity – on demand for state-local government services. This is especially relevant given the dramatic changes occurring in the United States in each of these characteristics. For example, Sally Wallace (2003, 2012) notes the change in composition of the population with fewer young and working-age individuals relative to the older population. She argues that the change in age distribution is expected to increase the demand for health, hospital, transportation, and some recreational services and possibly decrease the demand for education services. Similarly, the changing racial and ethnic composition of the population from immigration and population growth is expected to create demands for new or different educational and support services. In addition, the increase in retired people relative to those of working age is expected to affect the demand for pension services and the financial soundness of state-local retirement systems. Importantly, these changes in population characteristics are not uniform among the states, implying that the corresponding demand effects will also be uneven.

Research involving alternative theories, different data sources, different state-local services, and improved statistical methods gives the same fundamental results. The demand for state-local government services is, in most cases, price and income inelastic, with income elasticities positive (demand rising with income).

Application 3.1: Business demand for government service

Although individuals ultimately benefit from and pay for state-local government services, the business sector often plays a role in the public-choice process of taxes and government spending. Businesses are affected by state-local government fiscal policy in at least three ways.

- Taxes are a cost of doing business that may arise from the sale of a product (sales or excise tax) or from the use of a productive input such as labor (unemployment insurance tax) or capital (property taxes).
- Many of the services provided by state-local government become inputs into the production of goods and services by private firms. For instance, businesses make use of highways, airports, and other transportation facilities; are protected from loss by government public safety services; employ workers who have been educated or trained in public schools and colleges; and use public sanitation and utility services. To the extent that government provides these services or facilities, private firms do not have to provide them separately; in that way, government services reduce private business costs.
- State-local governments are important buyers (demanders) of goods and services produced by private businesses. When a state builds or repairs a highway or when a school district builds or renovates a school, a private contractor or builder is hired to do the work. Once the school building is completed, the district buys desks, computers, and books from private businesses. In winter, a county government may purchase salt and sand from a business to winterize roads. And Medicaid pays private doctors, hospitals, and drug companies for health-care services.

Voting models really do not characterize how business influences these fiscal decisions. Individuals vote in elections, not businesses. Businesses try to influence the outcomes of specific elections as well as the decisions of elected representatives by influencing public opinion and by lobbying public officials. As with individuals, businesses are expected to work to achieve fiscal policy objectives that are in their interest.

But what is that interest? Certainly, businesses can be expected to and often do argue for lower business taxes, but businesses can also be concerned about the level and quality of government services, as well as the sales they make to governments. The common perception that business groups always oppose taxes may be wrong, therefore.

The *Wall Street Journal* (Carlson, 1987) reported on a survey of the factors chief executive officers (CEOs) said are "absolutely essential" when considering new office locations. The most often-cited factor was "good public schools" (by 23 percent of the CEOs), followed by "a low crime rate" and "an efficient highway system" (both by 20 percent). "Reasonable state and local taxes" was also mentioned (by 17 percent). Similarly, in the 2019 survey of corporate executives by *Area Development* magazine (2020), the characteristics identified overwhelmingly as important as business site selection factors were "highway accessibility" (92 percent) and "availability of skilled labor" (92 percent). "Quality of life," which includes crime rates and quality of public schools among other factors, was mentioned by 82 percent.

Also, as mentioned, state-local governments are substantial buyers of goods and services from private businesses. In 2017 it was estimated that state governments and local governments each spent more than $1 trillion annually purchasing from private firms. These purchases represent 48 percent of state spending and 56 percent of local spending.

Therefore, interest in good state and local services can lead business groups to support higher taxes sometimes. One such case occurred in Colorado. David Shribman (1986) reported that 20 local chambers of commerce in Colorado launched a campaign to *raise* state taxes to maintain and improve public facilities and services. Shribman quoted the chambers' position as follows: "Without additional revenues, Colorado will be left little choice but to

woefully underfund areas such as higher education, elementary and secondary education, our state highways, water resources and vital capital construction and maintenance projects." The chambers took this position because an increase in the number of state residents had reduced the quality of services and because these services were seen as important for attracting and retaining businesses. Similarly, in 2010 the Michigan Chamber of Commerce Foundation contracted with a consulting firm to study the proper level of funding for road infrastructure. Subsequently, the chamber adopted an advocacy position for "doubling Michigan's investment in roads and public transportation through federal, state and local funding."[9]

Summary

The price elasticity of demand is a measure of the responsiveness of consumption to changes in price.

$$Price\ Elasticity\ of\ Demand = \frac{Percentage\ Change\ in\ Quantity}{Percentage\ Change\ in\ Price}$$

If the absolute value of the price elasticity is greater than 1.0, demand is said to be price elastic, and consumption is very responsive to changes in price. If the price elasticity is less than 1.0, demand is said to be price inelastic, and consumption is not very responsive to changes in price.

The income elasticity of demand is a measure of the responsiveness of consumption to changes in income.

$$Income\ Elasticity\ of\ Demand = \frac{Percentage\ Change\ in\ Quantity}{Percentage\ Change\ in\ Income}$$

If the income elasticity of demand is negative, then quantity demanded falls as income increases, and the good is said to be inferior. If the income elasticity is positive but less than 1.0, reflecting a smaller percentage increase in consumption than income, demand is said to be income inelastic. If the income elasticity is greater than 1.0, then quantity rises by a larger percentage than income rises. In that case, the commodity is said to be superior, and demand is income elastic.

Despite the alternative theories on which demand studies are based and very different data sources, two fundamental conclusions have emerged consistently: consumption of most state-local government services is relatively insensitive to price, and demand for state-local services generally rises with income (holding price constant). When all services are aggregated, the price elasticity tends to fall in the range from –.25 to –.50, indicating relatively price inelastic demand.

Most state-local government services are normal goods. Increases in income (holding prices constant) tend to cause demand to increase, although for most services, demand changes less than proportionally to the income change. The range of elasticities reported suggests a $.01 to $.10 increase in state and local government expenditures for each $1 increase in consumers' incomes.

Some evidence suggests that the relationship between income and desired expenditure is not always continuously increasing. Brown and Saks (1983) reported that school spending depended on the variance of the income distribution in each district in addition to median income and concluded "the correctly specified . . . curve . . . is U-shaped with a minimum at a family income of about $8,300" [in 1970 dollars].

Appendix: Using elasticity to characterize demand

Price elasticity

The price elasticity of demand is a measure of responsiveness of consumption to changes in price, defined as the percentage change in quantity from a 1 percent change in price, assuming that *only* the price changes – incomes, tastes, and other characteristics are held constant. The definition is

$$\text{Price Elasticity of Demand} = \frac{\text{Percentage Change in Quantity}}{\text{Percentage Change in Price}}$$

If demand curves are negatively sloped, as is usually the case, then the price elasticity will be negative because price and quantity move in opposite directions; an increase in price will cause a decrease in quantity, and vice versa. For example, if the price elasticity of demand is –2.0, and the price rises by 5 percent (the percentage change in price is +5), then the quantity demanded decreases by 10 percent (the percentage change in quantity is –10).[10]

In evaluating the price elasticity of demand, distinction is made as to whether the (absolute value of the) elasticity is greater or less than one, as outlined in the Table 3A.1. If the price elasticity is greater than 1.0, demand is said to be **price elastic**, and consumption is relatively responsive to changes in price. For example, a 1 percent decrease in price would lead to a more than 1 percent increase in consumption, perhaps 3 percent. If the price elasticity is less than 1.0, demand is said to be **price inelastic**. Consumption is not very responsive to changes in price because a 1 percent decrease in price would cause less than a 1 percent increase in quantity, perhaps only 0.5 percent. If the demand curve is vertical, implying that consumers demand the same quantity regardless of price, then the price elasticity of demand equals 0.0 and demand is said to be **perfectly inelastic**. This represents a situation where consumers will pay any price for a product, a commodity that is truly priceless. At the other extreme, if the demand curve is horizontal, implying that any amount will be demanded at a given price but that none is demanded at a higher price, the price elasticity is undefined and demand is said to be **perfectly elastic**.

As shown in Table 3A.1, whether demand is price elastic or inelastic has implications for what happens to total expenditure ($P \times Q$) as price changes. If demand is price elastic, then an increase in price causes a relatively larger decrease in quantity purchased, so total expenditure on the product falls. In contrast, if demand is price inelastic, that same increase in price causes a relatively smaller decrease in quantity, so total expenditure rises. Whether

Table 3A.1 Price elasticity values and terminology

Elasticity	*Name*	*Effects*
$E_D^p > 1$	Price elastic	$P \times Q$ falls as price increases $P \times Q$ rises as price decreases
E_D^p " 1	Price inelastic	$P \times Q$ rises as price increases $P \times Q$ falls as price decreases
$E_D^p = 1$	Unit elastic	$P \times Q$ constant as price increases and as price decreases
$E_D^p = 0$	Perfectly inelastic	Demand curve vertical Quantity constant
$E_D^p = u$	Perfectly elastic	Demand curve horizontal Price constant

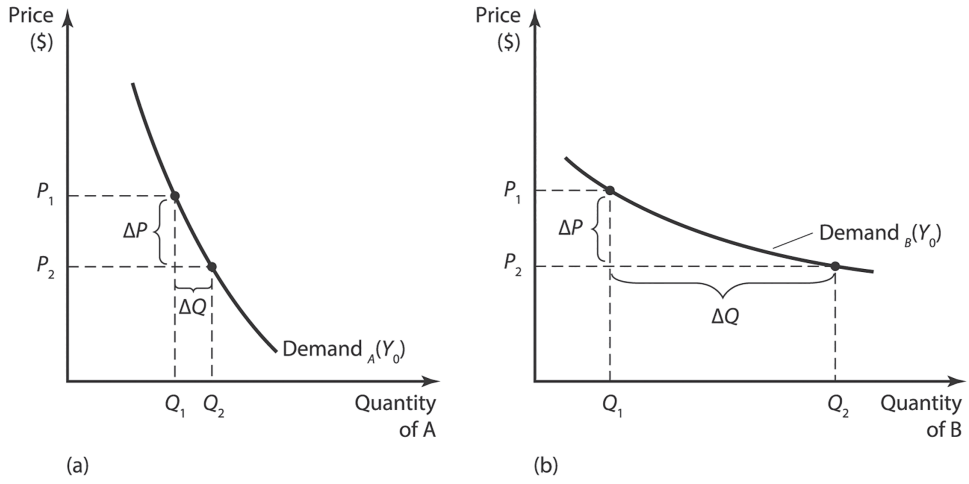


Figure 3A.1 Demand and price elasticity

total expenditure rises or falls from a given price change depends, then, on how much consumers react to the price change.

In some cases, the relative magnitude of the price elasticity in different markets is more important than the actual magnitude of those elasticities. For example, the price elasticity might be 0.5 in one market and 0.8 in another. Although demand is price inelastic in both cases, it can be said to be relatively more inelastic in the first market or relatively more elastic in the second. This is represented in Figure 3A.1, with demand curve *A* being more inelastic than demand curve *B*, because, for the same decrease in price, quantity rises more in market *B* than in *A*. For the same reason, it could be said that demand in *B* is relatively more elastic than demand in *A*.[11]

Remember that price elasticities are simply measurements of how consumers behave. If demand is price inelastic, then consumers are unwilling or unable to alter their behavior much in response to price changes. This may occur simply because there are no good substitutes for a commodity or perhaps because consumers require some time to switch to substitute commodities or to change their behavior. For instance, consumers might substitute insulation for heating fuel when heating fuel prices rise, although that substitution will not occur until consumers are convinced that the price change is likely to last for a while, and even then, the change will take some time. In that case, the price elasticity in the long run will be greater than in the short run. Finally, the degree to which consumers alter consumption in the face of price changes depends on how important the price change is to them and how much they value the product. A given price change has more impact the more one spends on a commodity and the lower one's income. Thus, demand may be more price inelastic for higher-income consumers and for products that occupy a small fraction of consumers' budgets.

Income elasticity

The income elasticity of demand is a measure of responsiveness of consumption to changes in income, defined as the percentage change in quantity from a 1 percent change in income, assuming that only income changes. The definition is

$$Income\ Elasticity\ of\ Demand = \frac{Percentage\ Change\ in\ Quantity}{Percentage\ Change\ in\ Income}$$

Table 3A.2 Income elasticity values and terminology

Elasticity	*Name*	*Effects*
$E_D^Y < 0$	Inferior good	Q falls as income increases Q rises as income decreases
$E_D^Y = 0$	No income effect	Q constant as income changes
$0 < E_D^Y < 1$	Normal good Income inelastic	Q rises as income increases Q falls as income decreases
$E_D^Y = 1$	Normal good Unit elastic	Q rises as income increases Q falls as income decreases $(P \times Q)/Y$ constant as income increases
$E_D^Y > 1$	Superior good Income elastic	Q rises as income increases Q falls as income decreases $(P \times Q)/Y$ rises as income increases

For example, if the income elasticity of demand is 2.0, and income rises by 5 percent (the percentage change in income is +5), then the quantity demanded increases by 10 percent (the percentage change in quantity is +10).

Possible values for the income elasticity of demand and some effects of those values are shown in Table 3A.2. If the income elasticity of demand is negative, then quantity demanded falls as income increases, and the good is said to be an inferior good. As consumers become richer, they consume less of this commodity and presumably substitute some others. In contrast, the income elasticity is positive if consumers demand more of a commodity as income increases. These commodities are said to be normal goods. If the income elasticity is positive but less than 1.0, reflecting a smaller percentage increase in consumption than income, demand is said to be **income inelastic**. Because an increase in income causes a relatively smaller increase in quantity, expenditure rises by a smaller percentage than income, and consumption of the commodity takes a smaller share of the consumer's income than before the income increase. If the income elasticity is greater than 1.0, then quantity rises by a larger percentage than income rises. In that case, the commodity is said to be superior, and demand is **income elastic**.[12] Total expenditure on the product rises by a larger percentage than income, so consumption of this commodity takes a larger share of the consumer's income.

Two possibilities are shown in Figure 3A.2. In markets *A* and *B*, demand rises as income increases; *A* and *B* are normal goods. In both, the increase in income from Y_0 to Y_1 causes an increase in consumption from Q_0 to Q_1, assuming a constant price of P_0. However, the increase in consumption is greater in market *B* than in market *A*. Although the income elasticity is positive in both markets, it is larger in *B*. Demand is relatively more income elastic in market *B*, or demand is more inelastic in market *A*. If the income elasticity for *A* is 0.5 while the income elasticity for *B* is 1.2, for instance, spending on *A* becomes a smaller fraction of this consumer's income, whereas spending on *B* takes a larger share of the consumer's budget.[13]

Again, remember that the income elasticity is a measure of how consumers behave. It is usually argued that demand for basic commodities or necessities such as food will be income inelastic because all consumers choose a basic amount of those commodities, regardless of income. Of course, even if the demand for food in aggregate is income inelastic, the demand for any one food – say, caviar – can be income elastic. Commodities for which demand is income elastic are often referred to as luxuries simply because they tend to be consumed in relatively larger quantities by higher-income consumers.

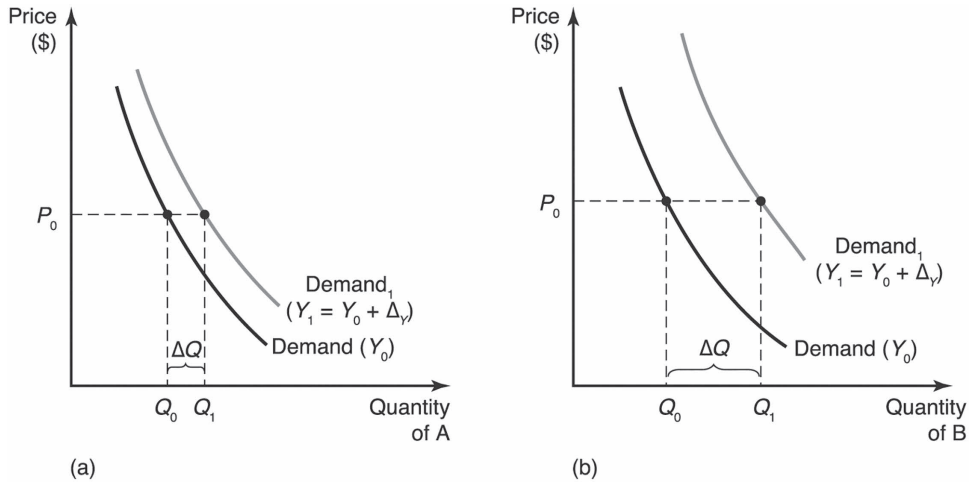
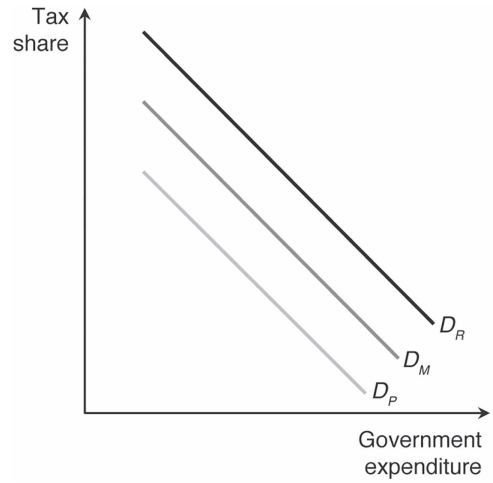


Figure 3A.2 Demand and income elasticity

Discussion questions

1 Suppose you believe that the income elasticity of demand for state government services (measured by expenditures) is on the order of .80. If state per capita income is expected to increase by 20 percent over the next three years, what is the expected effect on desired state spending? If the increase in income were the only economic change expected in these years (no inflation, population growth, or change in consumer preferences), what might be expected to happen to state spending as a percentage of state personal income?

2 Suppose that in one community, there are three groups of voters that differ by income, with P denoting the lowest, M the middle, and R the highest. The demand for local government services by these groups is shown here. Under what conditions would the desired amount of service be the same for all three groups? Is it clear whether the tax structure that generates such a result would be regressive, proportional, or progressive? Is it possible under other conditions that the low-income group would desire the most service, followed by the M group and then the R group?



3 There is some evidence that the relationship between desired local government services (spending) and income is U shaped – that is, lower- and higher-income voters may form a coalition to support higher amounts of local spending than desired by middle-income voters. Using two services for illustration, police protection and education, discuss why this might be the case. Remember that, in general, demand depends on price, income, and tastes.

Notes

1 Edward M. Gramlich, "Alternative Federal Policies for Stimulating State and Local Expenditures: A Comparison of Their Effects," *National Tax Journal*, *21* (June 1968): 119.

2 Bergstrom and Goodman show that the following conditions are sufficient to ensure that the median voter will be the individual with median income:

   1 Individuals' (or families') tax prices, h, are constant elasticity functions of income ($h = wY^c$), where Y = income, and w and c are constants > 0.
   2 All individuals (or families) have the same form of demand for public services, which depends only on that individual's tax price and income and which has constant price and income elasticities ($E = WY^a h^b$), where a is the income elasticity, and b is the price elasticity.
   3 Given the elasticities a, b, and c, $(a + bc)$ must not equal zero.
   4 All individuals vote in a majority vote based on their actual demand (no strategic voting).
   5 The distribution of income for all population subgroups in any one community is proportional to the distribution of income for those subgroups in all other communities.

3 This is true regardless of whether the jurisdiction uses an income tax. For instance, a tax on consumption or one on property value also is expected to vary with income because total consumption and the values of houses chosen by different consumers vary by income.

4 The result depends on the elasticities a, b, and c from note 6. Substituting the equation for tax price into that for demand gives $E = WwbYa + bc$. If $(a + bc) > 0$, then E rises as income rises. If $(a + bc) < 0$, E falls with income.

5 Brown and Saks (1983, 37). Similar results for other cases have been reported by Jorge Martinez-Vazquez (1981) and John Beck (1984).

6 The reported elasticity estimates are illustrative only. In practice, estimates vary depending on how the good is measured, the data used, and the econometric method. For example, at least one study (DeBartolo and Fortune, 1982) finds the overall price elasticity for public services to be even less than shown in the table, in the range of –.1 to –.15.

7 The income elasticity can be written as

$$E_Y^D = (\Delta E / \Delta Y)(Y / E)$$

where E = expenditure, Y = income, and Δ means "change in." Given values for the elasticity, expenditure, and income, $\Delta E / \Delta Y$ can be computed.

8 For more information about econometrics, see Jeffrey Wooldridge (2013).

9 See Michigan Chamber of Commerce, "Encouraging Transportation Investment," accessed August 14, 2014, www.michamber.com/encouraging-transportation-investment.

10 For convenience, the price elasticity is often presented as the absolute value of the percentage change in quantity divided by the percentage change in price, so the number is positive.

11 To compute an approximation of the price elasticity of demand, one can use the formula

$$E_D^P = [\Delta Q / (Q_1 + Q_2)] / [\Delta P / P_1 + P_2)],$$

where ΔQ equals $Q_1 - Q_2$ and ΔP equals $P_1 - P_2$.

12 Neither of the terms *inferior* or *superior* implies any pejorative connotations about quality. They merely describe consumer behavior.

13 To compute the income elasticity of demand, one can use the following formula:

$$E_D^Y = \left[\Delta Q / \left(Q_0 + Q_1\right)\right] / \left[\Delta Y / \left(Y_0 + Y_2\right)\right]$$

where $\Delta Q = Q_0 - Q_1$ and $\Delta Y = Y_0 - Y_1$.

Selected readings

Dye, Richard F. "The Effect of Demographic Change on State and Local Government Budgets." *Policy Forum*, *20*, No. 1 (2007).

Inman, Robert P. "The Fiscal Performance of Local Governments: An Interpretative Review." In *Current Issues in Urban Economics*, edited by P. Mieszkowski and M. Straszheim, 270–321. Baltimore, MD: Johns Hopkins University Press, 1979.

Poterba, James M. "Demographic Structure and the Political Economy of Public Education." *Journal of Policy Analysis and Management*, *16* (1997): 48–66.

Wallace, Sally. "Changing Times: Demographic and Economic Changes and State Local Government Finances." In *State and Local Finances under Pressure*, edited by David Sjoquist. Cheltenham, UK: Edward Elgar, 2003.

Wallace, Sally. "Evolving Financial Architecture of State and Local Governments." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert Ebel and John Petersen. Oxford, UK: Oxford University Press, 2012.

Wooldridge, Jeffrey M. *Introductory Econometrics: A Modern Approach*. Mason, OH: Cengage Learning, 2020.

4 Public choice without mobility

Voting

Headlines

"Arizona Proposition 208, the Tax on Incomes Exceeding $250,000 for Teacher Salaries and Schools Initiative, was on the ballot in Arizona as an initiated state statute on November 3, 2020. Proposition 208 was approved.

A 'yes' vote supported this ballot initiative to: enact a 3.50% income tax, in addition to the existing income tax (4.50% in 2020), on income above $250,000 (single filing) or $500,000 (joint filing) and distribute the revenue from the 3.50% income tax to teacher and classroom support staff salaries, teacher mentoring and retention programs, career and technical education programs, and the Arizona Teachers Academy."[1]

"By law, all school districts in New York State (with the exception of the large city school districts of Buffalo, Syracuse, Rochester, Yonkers, and New York City) must put their proposed budgets up for public vote. A budget must receive a majority vote in order to pass; if the district seeks to override the property tax cap, a supermajority of favorable votes (at least 60 percent) is required in order to pass.

Of the 675 district budgets that were voted on, only 11 failed on the first vote, which is similar to the 12 defeats from last year. Of the 11 defeats that occurred this year, seven passed on revote, three . . . were defeated again, requiring a 'zero-growth' contingency budget, and one district . . . opted to go directly to a contingency budget rather than hold a revote."[2]

Data availability

There are no data related to the topic covered in the chapter separate from the expenditure and tax data identified in other chapters, especially Chapters 1 and 7. This chapter mostly covers a theoretical or conceptual review of alternative voting methods.

Fiscal choices

State and local governments face three fundamental fiscal choices. The first is the choice of revenue or tax structure – that is, what types of revenue sources should be used and in what

DOI: 10.4324/9781003030645-6

relative mix. The second is the level of total spending and thus the total amount of revenue required. Given a choice of tax structure, adjustments in the level of spending can be accomplished by moving all tax rates up or down as required without changing the basic revenue structure. Finally, the government must choose how to allocate total spending among the various goods and services demanded by voters. This is the decision of which services to provide in what quantity within the total spending goal.

These choices are not independent because the level of spending desired by an individual almost always depends on how the individual believes the money will be spent. The desired level of spending may depend on the mix of services provided and on the choice of revenue structure because the tax-and-charge system determines the cost or price of government spending to each individual. A person who is exempt from local taxes, for example, is likely to be more supportive of increased local spending than a person who expects to pay the resulting higher taxes.

It appears, however, that governments make some of these decisions more often than others. The level of spending and taxes usually changes each year, sometimes more often, and commonly by a substantial amount. However, the mix of government services may change only in a more gradual way as incremental adjustments are made in each budget cycle. Over a ten-year period, a city may find itself spending a larger fraction of its budget on public safety and less on education, but it is unlikely for that total change to have occurred in any one year. Finally, the revenue structure may be the most stable of all. Adoption of new taxes or fees or major structural changes to increase the reliance on one tax at the expense of another are relatively rare. More commonly, rates are adjusted for each budget to provide revenues sufficient for the spending plan.[3] Although these three fiscal decisions are interrelated, it makes sense to separate them in order to begin the analysis.

Howard Bowen noted "The measurement of the preferences for [public] goods . . . cannot be subjected to individual consumer choice. The closest substitute for consumer choice is *voting*."[4] Because public goods and services are not being sold in a traditional market, it may not be possible for individuals to select and pay for the quantities of each that they desire. Unlike the choice of two hamburgers, fries, and a drink for $4.65, the city resident cannot order two police patrols per hour, a high school education emphasizing science, and one (unlimited) garbage collection per week for $1,200 per year. Those choices are made collectively with the other city residents (or voters). The use of voting to make these choices suggests that not all residents agree, so voting becomes a method of resolving different desires.

These differences in desired local government fiscal activity might also be resolved similarly to individual shopping in private markets. If there are many different localities available for residential choice, individuals may select among them based on the package of taxes and services provided. For purposes of the current discussion, we assume that individuals are not mobile, that they must make fiscal decisions for the community in which they reside. The alternative to voting created by the mobility of residents will be explored in Chapter 5.

Not everyone desires the same things from government. To an economist, this suggests that individuals have different demand functions for government services. Individuals may have different demands for the same government service either because they have different incomes or because they value the service differently: that is, they have different tastes for that service.

To illustrate different demands, the example from Chapter 2 of three individuals (or groups), each with a different demand for government services, continues in Figure 4.1. If all three have the same tastes, then income differences would be a reason for the different demands. If state and local government services are normal goods (which is usually the case), demand increases with income. The example in Figure 4.1 would require that $Income_A$

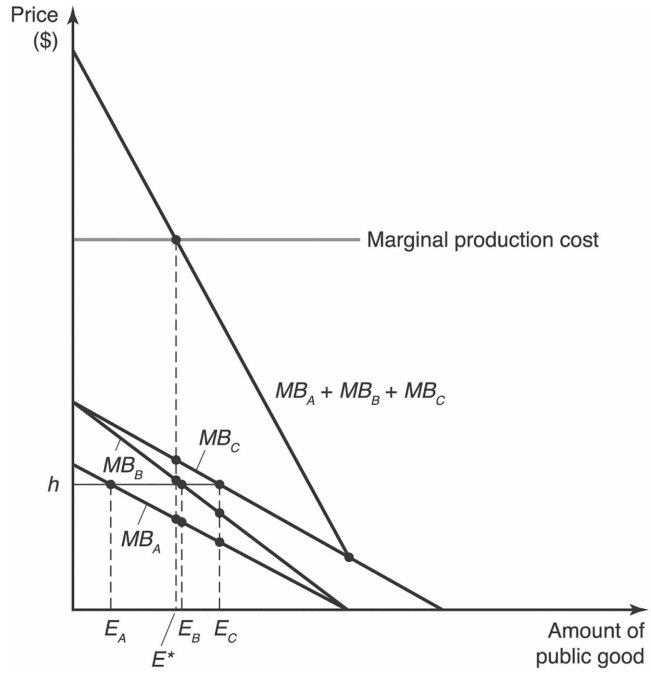


Figure 4.1 Demand for a public good

$< Income_B < Income_C$. Alternatively, if Persons A, B, and C all have the same income, then demand differs because the three value the service differently, with Person C getting the greatest benefit from the service. Of course, it is also possible for demand to differ because both income and tastes vary among individuals.[5]

If an individual's demand function is known, one must know that individual's price to determine the desired amount or quantity of the government service. Individuals "buy" government services with the taxes and fees they pay, so the tax structure determines each individual's price. Here, we assume that this government has selected a tax structure that is not changed depending on the level of spending. The government adjusts the tax rates to generate more or less revenue as required, but the tax mix – the share of revenue from each source – remains the same.

The price to each individual is his or her share of total taxes. For instance, if the government finances services by a property tax, each individual's tax is equal to the tax rate times the property value or Rate • $Value_i$. Each individual's share of taxes is equal to

$$\text{Rate} \bullet \text{Value}_i / \Sigma_i \text{ Rate} \bullet \text{Value}_i,$$

which reduces to

$$\text{Value}_i / \text{Sum of Values}.$$

This is the share of taxes paid by Person *i*. Similar tax shares can be defined for any specific tax structure.

For this example, assume the simplest tax structure in which each individual pays the same tax so that each has an equal tax share. In the example with three individuals, each pays one-third of the taxes collected by the government. In other words, the price to each individual of buying another dollar's worth of government service is \$.333.[6] Given these different demands and the assumed tax shares, the price charged each person is one-third of marginal production cost, or h. The desired quantities of government service are E_A, E_B, and E_C, respectively. Because all taxpayers face the same tax price in this example, the differences in desired quantities are determined entirely by the differences in demand. The problem for the government is choosing among the different desired quantities of government service that result from the combination of demand and tax shares.

In this chapter, the economic implications of several different types of voting on fiscal decisions are examined. We begin by examining the most common method, majority voting, and then consider how the outcome of majority voting may depend on the political characteristics of the government. This line of inquiry, which bridges economics and political science, is now almost a separate discipline called the "study of public choice." Obviously, all public choice issues cannot be covered in one chapter, so the emphasis is on the basic results that are most often applied to analyzing state and local government actions.

Majority voting

The most common voting method is majority voting. Sometimes voting is directly on budget issues such as in local government property tax or budget elections (as in *Headlines*), and sometimes voting is for officials who then make the allocation decisions for the constituents. The victorious position or candidate in a majority vote is one that is supported by at least 50 percent plus one of the votes.

Returning to the example in Figure 4.1, suppose that this government uses majority voting to choose among the three spending levels. Which one, if any, will receive majority support? If the government selects between E_A and E_B, Person A will vote for E_A, the preferred amount of spending, while Person B will vote for E_B. Of these two options, understanding that neither is the first choice, which will Person C select? Because Person C prefers an even greater amount of spending than either A or B, we expect that C will support level E_B because it is closer to the desired amount than E_A. Therefore, spending level E_B receives two votes and is selected by the community over Person A's preferred amount.

How does the community view E_B compared to the higher level, E_C? Again, a majority vote would find Person B supporting E_B and Person C supporting E_C, while Person A would support B over C because spending level E_B is closer to the low level A prefers. Spending level E_B would be selected as the winner of the majority vote.

This simple example illustrates an important point about majority voting that is often misunderstood. Spending level E_B was selected not because a majority of the voters preferred it but because it was the only choice that could receive majority support. If a low spending level was proposed, Persons B and C could band together to defeat it; A and B could similarly prevent the high spending level from being selected. As a result of this majority vote, both Persons A and C are forced to compromise and accept a spending amount different from what they prefer. Only Person B is perfectly happy with the outcome.

Will there be only one winner of a majority vote?

One concern about majority voting is that there may not be a clear winner or that the winner will be different depending on the order in which the choices are considered. This

problem may occur if each voter does not have **single-peaked preferences** – that is, each voter does not have a clearly preferred alternative and does not continually get less satisfaction as one moves away from that alternative in either direction.

The potential difficulty with majority voting when preferences are not single peaked is shown with this example. Suppose the three possible spending levels are denoted E_1, E_2, and E_3, going from low to high. Preferences toward those spending levels are as follows:

Person	*First choice*	*Second choice*	*Third choice*
A	E_1	E_2	E_3
B	E_2	E_3	E_1
C	E_3	E_1	E_2

Person C wants a high level of government spending most, but a low level is C's second choice; the medium amount of spending is least preferred. In a vote between levels 1 and 2, 1 receives two votes (from A and C) and wins. Similarly, in a vote between levels 1 and 3, 3 receives two votes (from B and C) and wins. It appears that spending level E_3 has been selected by majority vote and is most preferred. However, suppose level E_3 is compared with E_2 in a vote. Surprisingly, 2 receives two votes (from A and B) and wins. The voting results are not consistent. Level 3 beats 1, level 1 beats 2, but level 2 beats 3. The implication is that the winner depends on the order in which the votes are taken. Level 3 wins if 1 is first put against 2 and the winner put against level 3, but level 1 wins if 2 is first put against 3 and the winner put against 1.

This result occurs because Person C's preferences are not single-peaked. As spending is decreased from the most preferred high level, Person C becomes less and less happy until spending becomes very low, and then C's happiness increases again. Person C is an extremist who is least happy with moderate positions. If preferences exhibit this property, then majority voting may be inconsistent (that is, the results are not transitive).

The potential for inconsistency may be a theoretical but not real problem in using majority voting to select amounts of government spending because standard downward sloping demand curves imply single-peaked preferences. With the demand curve and individual price shown in Figure 4.2, Q_0 is the desired quantity. The consumer has consumer surplus – the

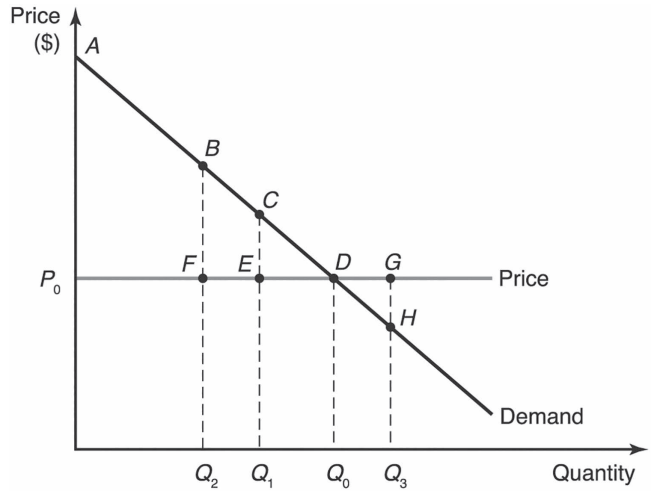


Figure 4.2 Demand and consumer surplus

difference between the maximum amount the consumer is willing to pay and the price – equal to the area ADP_0. As this consumer moves away from Q_0, the consumer's surplus and, thus, the consumer's happiness continually decrease. At Q_1 the area $ACEP_0$ represents the surplus; at the lower quantity Q_2, the surplus is even smaller, represented as $ABFP_0$. If quantity is increased from Q_0 to Q_3, consumer's surplus would also decrease, being equal to area ADP_0 minus area DGH. In short, the desired quantity may be small or large, but if demand is always downward sloping, then consumer happiness continually decreases the greater the distance from that desired amount, and preferences are single peaked.[7]

When thinking about potential problems with majority voting, one must also consider the nature of the commodity for which preferences must be single-peaked. The commodity must be able to be characterized by a single, quantifiable, and continuous value. In the case of government finance, government expenditure (in dollars) appears to be such a measure. Expenditure is really a measure of input purchases rather than goods and service production, however. If a government provides several services, a single expenditure amount is consistent with many different service combinations, so total expenditure may not be an accurate parameter on which to base consumer preferences. The voting system must select the mix of services and the level of total spending. For that reason, the majority voting model of government fiscal choice may be most applicable to single-purpose subnational governments such as school districts or separate utility, park, and transit districts.

Finally, the possibility of strategic behavior or collusion on the part of voters must be considered. Majority voting may be inconsistent if voters do not vote their true preferences in hopes of skewing the result or trade their vote on one issue for others' votes on a different issue. Although vote trading and negotiation may occur in legislative bodies, it is not expected to be as common in general voter elections because of the difficulty of arranging and enforcing collusion among a large number of people. Still, legislative bodies make many (if not most) fiscal decisions, which raises many issues involving vote trading, lobbying, campaign contributions, and other ways of influencing the legislative outcome. In essence, then, the issue is whether state and local fiscal decisions can be represented as if they were made by the participatory majority voting process, even if a more complex political process was actually involved.

The median voter theorem

A general rule of majority voting can now be stated:

> If voters' preferences are single peaked, if the choice to be made by voting is represented along a single continuum, if all alternatives are voted on, and if voters act on their true preferences, then the choice selected by majority vote is the median of the desired outcomes.

(Remember, the **median** is the potential outcome in the middle of the continuum – that is, the one with half the potential choices lower and half higher.)

Applying this theorem to the choice of government expenditures suggests that if all individuals' demand curves for government services are downward sloping, then the expenditure selected by majority vote will be the median of those individuals' desired expenditure amounts. In the simple example of Figure 4.1, the median is expenditure E_B, which is in the middle between E_A and E_C. Two other cases are shown in Figure 4.3, each with seven voters and seven different desired expenditure amounts. For case A, the median is expenditure amount 4, with three voters preferring a smaller amount and three preferring larger ones.

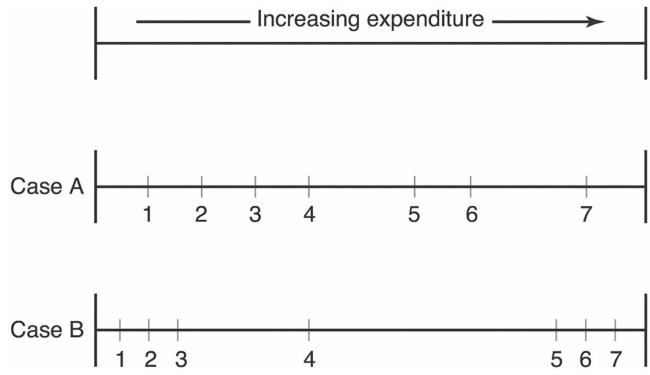


Figure 4.3 Illustration of median-desired expenditure

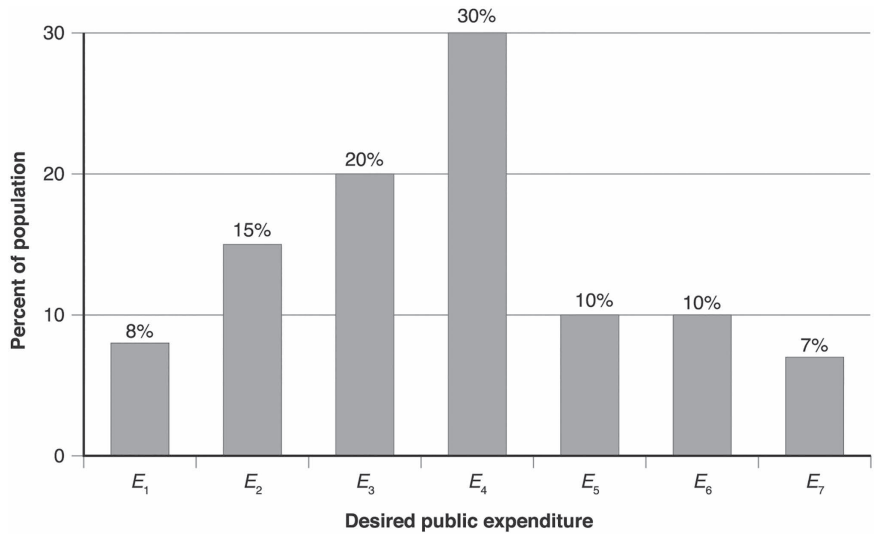


Figure 4.4 Distribution of desired public expenditure

Despite a very different structure of preferences for Case B, the median, and thus the winner of a majority vote, is still the same expenditure amount 4.[8]

An important point about the median statistic, and thus the median winner of a majority vote, is that the median often does not change even if other possible outcomes do change. Although voters 1, 2, and 3 prefer lower amounts in case B than in case A, and voters 5, 6, and 7 prefer higher amounts, the median is the same in both cases. The government expenditure level selected by majority vote, then, does not depend on the relative *strength* of the voters' preferences but only on their *order*.

All the examples so far have associated each potential expenditure with only one voter, which may be somewhat unrealistic. A more realistic characterization of preferences is shown in Figure 4.4, with the percentage distribution of voters shown for seven potential expenditure amounts. Thus, 15 percent of this jurisdiction's voters prefer expenditure

amount E_2 while 20 percent prefer E_3, and so on. The median amount in this distribution is E_4 because if all the voters were counted in order of desired expenditure, the middle (50th percentile) would come among the 30 percent of voters who prefer E_4. This occurs despite the fact that 43 percent of the voters prefer an amount less than E_4, and 27 percent prefer a greater amount. Another way to look at the situation is that 60 percent of the voters prefer expenditures "close to" E_4, 23 percent prefer much lower expenditures, and 17 percent prefer much higher.

The discussion of majority voting has assumed an actual vote among taxpayers on the issue, what is usually called "participatory democracy." In a representative democracy, however, voters elect representatives who then select the expenditure. Will the median voter theorem still apply? In fact, it may. Suppose that candidates for a representative position campaign on the amount of government expenditure (and thus public service) they propose to implement. One candidate might campaign promising to restrict government spending (perhaps to amount E_2 in Figure 4.4), whereas another might propose new programs that would increase spending to amount E_6. If that happened, a third candidate could defeat those two by proposing spending amount E_4, the median amount. Remember that a majority of voters will always support E_4 over any alternative and thus should support a candidate proposing E_4 over candidates proposing any other amounts. Indeed, the tendency for political candidates to try to stake out a moderate position in election campaigns is common.

Applying the median voter model to state and local government fiscal decisions requires an assumption that those decisions are made as if there had been a direct majority vote of the taxpayers. Although political scientists and economists have examined in detail the conditions under which this will be true, the crucial factor for economists seems to be the amount of political competition. If elections are held often and if entry into the political wars is easy, then officials may be pushed toward the median choice to stay in power. This is the parallel of market competition (or potential competition) that pushes firms toward producing and setting prices at minimum average cost.

Characteristics of the median voter result

The most fundamental characteristic of the median voter choice of government expenditure is the inherent dissatisfaction among taxpayers with the outcome. For the example depicted in Figure 4.4, only 30 percent of the voters specifically desire the outcome selected by majority vote, whereas 70 percent are dissatisfied to some degree. In fact, it is possible that only one voter, the median voter, will be perfectly satisfied with the outcome of a majority vote.

Indeed, this characteristic is one reason the median voter model is attractive to economists as the model predicts what is often observed. The Gallup poll sometimes asks the question, "Would you rather have more government services if that meant more taxes, less government services in order to reduce taxes, or services and taxes about as we have them now?" The last option – services and taxes as they are – was selected by only 29 percent in 2013 and 26 percent in 2011.[9] A Pew Research Center poll asked, "Would you increase, decrease, or keep spending the same for education?" The number who chose the current level of spending as preferred was only 18 percent in 2019, 22 percent in 2017, and 29 percent in 2013. Asking the same question about spending for "rebuilding highways, bridges, and roads," only 27 to 33 percent preferred to keep spending the same.[10]

For both opinion polls, a majority favored change rather than the current status, although those favoring change did not agree on what type of change. In the Pew poll in 2019 about

spending for rebuilding highways, 62 percent preferred an increase in spending, and only 7 percent preferred a decrease. For education in 2019, 72 percent preferred an increase in spending compared to only 9 percent who preferred a decrease. These poll results raise an interesting voting issue. If a majority prefer increased spending, why has the political choice system not done that?

Edward Gramlich and Daniel Rubinfeld (1982) used data from a survey of Michigan voters to estimate individuals' demands for government services. The desired amounts of government service are then compared to the actual service levels in those individuals' jurisdictions. The results showed that two-thirds of the voters in cities within the Detroit metropolitan area and other urban areas in the state want no change in the level of public spending; about 19 percent of voters favor a large increase or decrease. It is simply true that in almost every community, there are some voters who want a smaller government, some who want a bigger one, and a substantial number, sometimes even a majority, who are approximately satisfied with the status quo.

A second important characteristic of the median voter model is that the amount of public expenditure selected will, in general, not be the economically efficient amount. Efficiency results only by accident, and there is no method for inefficiency to be removed. This is easily shown, for instance, by the example of Figure 4.1, in which the median amount chosen by majority vote, E_B, is not equal to the efficient amount $E^{\star}$. As seen in Chapter 2, the efficient amount requires that the sum of individuals' marginal benefits equal marginal production cost. The median voters' desired amount (which becomes the community's selection) requires only that their marginal benefit equal their marginal tax cost.

Majority voting can lead to government spending greater than the efficient amount, as shown in Figure 4.1, but it is equally possible for majority voting to lead to too little. In general, it is not possible to predict which occurs, because the result depends on the relationship of tax price to marginal benefit and on the price elasticity of demand. However, it is easy to understand why majority voting might not be efficient. Suppose in a community of three voters, one prefers school spending of $3,500 per student, another $7,000, and the third $12,000. If tax shares are the same for all three, these amounts reflect the relative benefits perceived by the voters. The median is obviously $7,000 per student. The choice of the efficient amount, however, recognizes that the third voter has a substantially higher marginal benefit than do the others at every amount, which causes the efficient amount to exceed the median. Majority voting does not take account of strength or magnitude of preference.

To summarize, if the amount of government spending by a state or local government is determined as if a majority vote were taken among the residents, the amount selected is the median of the residents' desired amounts. That median amount is not likely to be economically efficient, and a large number of voters, perhaps even a majority, will be dissatisfied with the choice.

There are at least three ways to reduce dissatisfaction: change prices, change tastes, or adopt a different public choice method. If the government's tax system is altered so that the tax price increases for those voters who now prefer expenditure greater than the median, their preferred amount will decrease. If tax price decreases for those who want expenditure less than the median, their preferred amount will increase. Because the preferred expenditure amounts move toward the median, the unhappiness with government expenditure decreases. To eliminate the dissatisfaction totally requires that tax prices be proportional to marginal benefits so that each individual prefers the same amount. The difficulties with achieving such a Lindahl benefit tax structure were noted in Chapter 2. Alternatively, tastes

could change if the dissatisfied voters left this community for another, and new residents with tastes similar to the current median voter's moved in. In that case, the differences in demand are eliminated and, with them, the dissatisfaction. That possibility is discussed in Chapter 5.

Alternative voting methods

The dissatisfaction that results from voting about fiscal decisions might be lessened by alternative voting methods, but usually at the cost of more difficulty in reaching decisions. There is nothing magical about requiring a majority to determine the outcome. In **plurality voting**, the winner need only get more votes than any alternative, whereas **supermajorities**, such as two-thirds or three-quarters, are sometimes required to win other types of votes (such as amendments to constitutions or other changes deemed especially significant). What, then, are the advantages and disadvantages of other voting methods?

Supermajority voting

The simplest way to avoid dissatisfaction with the outcome of voting is to require unanimous approval for any choice. Just such a voting method was proposed by the Swedish economist Knut Wicksell (originally published in 1896, reprinted in Musgrave and Peacock, 1967) to eliminate the possibility that a slim majority could adopt government services to benefit itself at the expense of the minority who contributed to the financing. If everyone approves of the choice, then no one is hurt by that fiscal decision, and the outcome achieves Pareto efficiency. One obvious problem with unanimous voting is that it may be exceptionally costly, or even impossible, to achieve unanimous agreement on many fiscal issues. Because of this, strategic voting likely would result; individuals have an incentive to hold out for an agreement that largely benefits them. This again makes it harder to reach an agreement. One can imagine the deals that would be considered, or even made, in order to achieve unanimous agreement on a school tax/expenditure package.[11]

This discussion leads to the obvious possibility of requiring more than a majority of voters to approve a proposal, but fewer than all voters. James Buchanan and Gordon Tullock (1962) noted a tradeoff in the number of votes required to win. As the percentage of the vote required to win increases, it is less likely that choices will be made that hurt groups of voters (dissatisfaction will decrease), but the costs of decision making rise. Balancing these benefits and costs, the efficient percentage of votes to win might be between a majority and unanimity: for instance, two-thirds. With such a voting rule, it is less likely that choices will be adopted to benefit only very limited groups, but no one voter or group has sufficient power to veto all choices. Although supermajorities have been required often in the past for constitutional amendments, in recent years, a number of states have required supermajorities to override various long-term fiscal controls. The latest analysis shows that 13 of the states with limitations on state spending require a supermajority vote of the legislature (60 percent, two-thirds, or three-fourths) to increase revenue.[12]

A major source of the dissatisfaction with the outcome of a majority vote and the primary reason why majority voting does not usually achieve the economically efficient outcome is that majority voting does not account for strength of preference. To alleviate this difficulty, voting methods have been proposed that allow voters to register both their preferred order of outcomes and their relative strength of feeling about those outcomes. In **point voting**, for instance, individuals are given a fixed number of points (say 100) that they can assign to the possible outcomes. The outcome with the most points wins.

For instance, suppose three voters are choosing among possible levels of school spending of $3,500 per student, $7,000, and $12,000. If one voter preferred the highest level of spending very strongly, that voter could allocate all the points to that choice. Such a voter is signaling that they strongly prefer $12,000 of spending, and if that level cannot be achieved, then either of the others is equally good. An illustration of the possible allocation of point votes in this case is shown next:

	Spending level		
Voter	*$3,500*	*$7,000*	*$12,000*
1	60	30	10
2	30	50	20
3	0	0	100
Total	90	80	130

Voters 1 and 2 distribute their points over all three options, although Voter 1 most prefers $3,500, and Voter 2 most prefers $7,000. Voter 3 feels very strongly about the preferred level of $12,000 and allocates all 100 points there. As a result, $12,000 gets the most points and is selected. Unlike with majority voting, strength of preference can matter here.

The point of this discussion is not that these alternative voting methods are "better" than majority voting but that every voting method has different advantages and disadvantages. The disadvantages of majority voting can be offset, but only by creating some other cost.[13]

Monopoly models of fiscal choice

Although majority voting is the most common public choice method, and the median voter model does predict some commonly observed conditions, a model in which the government has some monopoly power over fiscal decisions is one of the most interesting alternatives. The majority voting/median voter model implicitly assumes that the government's role is simply to implement voters' desires about government services in a politically competitive environment. Monopoly models assume, in contrast, that government officials attempt to implement their own preferences and try to get voters to go along. Officials or bureaucrats may be able to do that if they have more experience or more information than the voters and if they have and can maintain a political monopoly.

William Niskanen (1968) first discussed monopoly models by suggesting that bureaucrats attempt to maximize the size of their budgets subject only to a desire to remain in power. Since then, several different variants have arisen. There are several common assumptions among all the variants, however, so we will examine this type of model by discussing the specific one proposed and used by Thomas Romer and Howard Rosenthal (1979) to analyze local government spending.[14]

The assumptions of the model are as follows:

1 Government officials have two objectives: maximize the amount of government spending and remain in office.
2 Government officials know the preferences of the residents of their communities.
3 The amount of government spending will be selected by majority vote of the residents. Importantly, a limited number of options may be voted on, and the government officials select those options.
4 If a majority of voters accepts none of the options proposed by the government, government spending reverts to a predetermined amount.

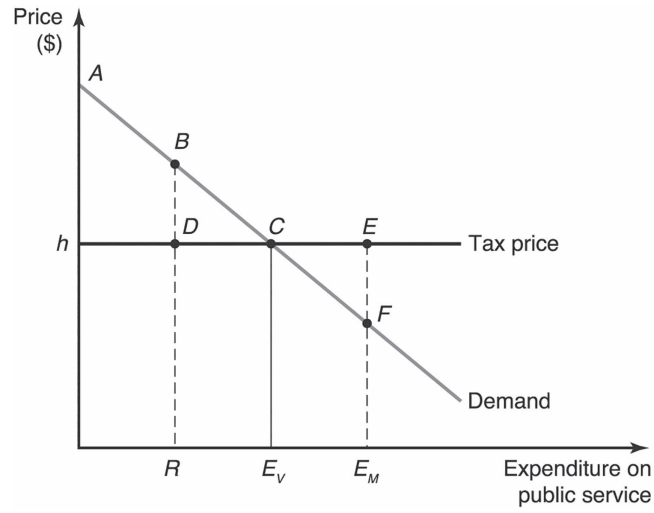


Figure 4.5 A monopoly bureaucrat model of public expenditure choice

There is limited majority voting, but the agenda from which voters may choose is determined by the government officials who wish to spend as much as possible.

The potential outcome of this monopoly agenda control model is illustrated in Figure 4.5, which shows both the demand for government services and tax price of the median voter in the community. This voter prefers expenditure E_V, which is the amount chosen by majority vote of all the options and predicted by the median voter theorem. If voters do not approve any of the amounts offered by the government in a limited number of votes, then expenditure automatically (because of some other law) is set at amount R, which is called the "reversion amount." In other words, the reversion amount is the threatened or imposed expenditure if voters do not approve what government officials offer.

Suppose government officials, knowing all this, propose a spending amount equal to E_M. Voters face a quandary; the choice is effectively R or E_M. Given the conditions in Figure 4.5, this voter is indifferent about R and E_M. That is, this voter would get the same satisfaction from either expenditure amount R or E_M, which would be less than from the most preferred amount E_V. At amount R, the area $ABDh$, which equals area ACh minus area BCD, represents the consumer's surplus. At amount E_M, the consumer's surplus is represented by area ACh minus area CEF. The latter triangle is subtracted because for all amounts above E_V, the consumer's marginal benefit is less than the price, implying a loss of welfare. Finally, because triangle BCD equals triangle CEF by construction, the consumer's surplus at E_M also equals area $ABDh$. This voter would be equally hurt by less than desired government spending at R or more than desired at E_M.

If the alternative is R, therefore, this voter would *prefer* any amount less than E_M. An expenditure proposal for a small amount less than E_M, even \$1 less, would be approved by the voters rather than allow spending to fall to amount R, which would be worse. Because government officials want to spend as much as possible, they would propose spending $\$(E_M - 1)$. As a result, majority voting is used to choose expenditure, and the median voter's demand determines the outcome, but the amount chosen is greater than that most preferred by the median voter and that predicted by the median voter model.

The crucial features that give this model its characteristics are the nature of the reversion amount and the absence of political competition. The simplest reversion is zero – that is, unless the voters approve a proposed expenditure, there will be no government service. If

voters believe this is a credible threat, it will be a powerful one. Most voters would be willing to accept some excess in government spending to prevent the loss of all government services. In reality, reversions are usually not zero. In presenting the model, Romer and Rosenthal (1979) suggest that it represents the situation in many school districts where residents vote on a proposed school budget (or taxes) with the reversion equal to either a state-mandated minimum school expenditure or the previous year's spending amount. As long as the reversion is less than the voter's desired expenditure, the lower the reversion, the more monopoly government officials can exploit their positions to increase spending.

Therefore, government officials have a great interest in how and at what amount the reversion is set. Indeed, one of the weaknesses of this model is that the reversion amount is somehow predetermined, although it must be selected by some type of fiscal choice mechanism as well. This approach is not riskless for government officials. Individuals' preferences are never known exactly, and it is also not sure which residents will vote. If government officials err in selecting the proposed expenditure and select too high, voters will decide to reject the proposal and effectively accept the reversion. As a result, government officials lose by having a smaller amount of government expenditure than the median voter preferred (remember that officials are assumed to be budget maximizers).

An absence of effective political competition also is crucial for the model's results. If government officials are successful in using a reversion expenditure as a threat to force voters to accept greater amounts of expenditure than they prefer, an opportunity is created for opponents in the next election to campaign on the promise of lower expenditure. In effect, opponents can control the agenda in the election and defeat incumbents by selecting a median position. Of course, nothing is to prevent newly elected officials from playing the same game, except the danger of their potential defeat in the subsequent election.

This model seems most applicable to governments dominated by a single political party or group so that effective competition is absent. There have been notable examples. Erastus Corning, a Democrat, was mayor of Albany, New York, from 1942 until his death in 1983, a period of 41 years. This surpasses even the 22 years Richard Daley, also a Democrat, was mayor of Chicago. Of course, it could be that these politicians stayed in office so long because they gave voters exactly what they wanted, and the fact that almost everyone recognizes these examples suggests that they are relatively uncommon. Proponents of monopoly fiscal choice models must identify the institutional factors in each case that permit officials not to satisfy the voters' desires continually.

Application 4.1: Voting for public school budgets

The discussion in this chapter shows how majority voting might lead to a political choice of median desired public service levels. Is there any evidence that this actually happens? The theory outlined in the chapter requires single-peaked preferences, full participation by residents, nonstrategic voting, and a single operational measure to vote on. Any of these conditions could be violated in the complicated case of many state-local budget issues. However, one important research study of the annual budget referenda in school districts in New York, conducted by Robert Inman (1978), supports the conclusion that the majority voting model can be "a useful working hypothesis of how single service budgets are determined" (p. 60).

Inman adjusts the model described in the chapter to recognize that not all residents (or registered voters) usually vote. In the 58 school districts in the study, only about 20 percent of eligible voters participated in the school budget elections. (Such low voter turnout is quite common for many local or special elections that do not involve major statewide or national candidates or issues.) If the nonvoting group contains a disproportionate number of residents

with either relatively high or low demands for public service, then voter participation affects the level of service selected. Inman finds that lower-income residents have a relatively low demand for education spending and are less likely to vote. As a result, majority voting on the budget tends to select higher levels of spending than the median for all residents, at least as a result of this effect alone.

Inman also explored how variations in demand among voters influence the budget outcome. The reference voting group in the study comprised young, non-Catholic homeowners with median family income, which accounted for almost two-thirds of the voters in these districts on average. The issues were whether older voters without children would have lower demand for education spending than the reference group, whether Catholic families might prefer parochial schools and thus also prefer lower levels of public education spending, and whether renters might support higher levels of spending than homeowners if they perceived that property taxes used to finance schools were a burden on landlords rather than on them. Among these three possibilities, Inman found strong statistical evidence only that the elderly exert a significant negative effect on school spending, a result found in subsequent studies also. The preference differences between homeowners and renters or Catholic school users and others were not significant.

The information provided to voters regarding the vote may have an effect on the outcome as well. Eric Brunner et al. (2018) examine school bond votes in Minnesota compared to Wisconsin. In Minnesota, school districts must explicitly note the magnitude of a property tax change if the bond is approved, whereas in Wisconsin, only the total amount of the borrowing (bonds) must be noted. They conclude "that when the property tax implications of voting yes are more salient, the fraction of voters favoring bond passage declines by approximately four to seven percentage points and the probability of bond passage falls by approximately ten percentage points." Presumably, more information permits voters to make more accurate decisions regarding their preferences.

One recent tabulation suggests that citizen votes for school district fiscal decisions are relatively common.[15] According to Ballotpedia, only 9 states require no specific local vote for school tax or borrowing decisions. School district votes to issue bonds (borrow) are most common (used in 40 states).[16] Votes to override specified school tax or spending amounts are required in 18 states, and explicit voter approval of school budgets or taxes are required in 6 states. In short, this research suggests that it is not a bad approximation of reality to think that local fiscal decisions, especially in school districts, are made "as if" the median voter decided.

Summary

State and local governments face three fundamental fiscal choices: the choice of revenue or tax structure, the level of total spending, and how to allocate total spending among the various goods and services demanded by voters. These three choices are not independent.

Individuals may have different demands for the same government service either because they have different incomes or because they value the service differently. The price to each individual is that person's share of total taxes. The problem for the government is choosing among the different desired quantities of government service, which result from the combination of demand and tax shares.

The most common voting method used to make government fiscal decisions is majority voting. The victorious position or candidate in a majority vote is the one supported by at least 50 percent plus one of the voters. If a spending amount is selected by majority vote, it is not necessarily because a majority of the voters prefer it, but because it was the only choice that could receive majority support.

If voters' preferences are single peaked, if the choice to be made by voting is represented along a continuum, and if voters act on their true preferences, then the choice selected by majority vote is the median of the desired outcomes.

The fundamental characteristic of median voter choice of government expenditure is inherent dissatisfaction among taxpayers with the outcome. In almost every community, there are some voters who want a smaller government, some who want a bigger one, and a substantial number, although not always a majority, who are approximately satisfied with the current state.

A second important characteristic of the median voter result is that the amount of public expenditure selected will, in general, not be the economically efficient amount. The efficient amount requires that the sum of individuals' marginal benefits equals marginal production cost, whereas median voters' desired amount (which becomes the community's selection) requires only that their marginal benefit equal their marginal tax cost.

Monopoly models assume that government officials attempt to implement their own preferences and try to get voters to go along. Officials or bureaucrats may be able to do that if they have more experience or more information than the voters and if they have and can maintain a political monopoly. For monopoly fiscal choice models to apply, some institutional factors must allow officials not to satisfy the voters' desires continually.

Appendix: Indifference curve approach to voting models

The economic analysis in this chapter used individuals' demand curves and tax prices to determine desired amounts of government service. Welfare comparisons among alternative allocations were made using a simple measure of consumer's surplus. This technique is sufficient for a general understanding of the theory, but to better understand and analyze more complex issues (to come later in the book), we can examine how consumer's demand is determined. This requires some background in and use of what economists call **consumer theory**. This appendix does not provide a general introduction to that theory, but rather uses the theory to illustrate some of the conclusions of the chapter. For students having experience with the theory (probably a class in intermediate microeconomics), this and subsequent appendices to other chapters provide another way to view and understand the results.

Demand and desired government service

In the simplest model, consumers choose between two types of commodities: private goods purchased in the market and public goods purchased through government. Consumers pay for private goods directly through prices charged by the sellers and indirectly for public goods through taxes or fees collected by the government. Individual consumers are assumed to have no influence over prices, which are determined by the market in response to production cost and total consumer demand. Consumers are limited in the amount of both types of commodities they can consume by their available resources or budgets.

It is usually assumed that consumers can always choose among sets of these goods, that consumers' preferences for both types of goods are consistent (if A is preferred to B and B to C, then A is preferred to C), and that consumers can always be made better off by giving them more of at least one of the commodities. Finally, each consumer is assumed to choose the combination of commodities that provides greatest possible satisfaction or happiness (often called "utility" by economists). These assumptions are the standard ones used to analyze choice of private goods and are simply extended to public goods as well.

A graphical depiction of such a model is shown in Figure 4A.1. The amount of public goods is represented on the horizontal axis, and total consumption of private goods is measured in dollars on the vertical axis. The convention of using dollars as the unit for private

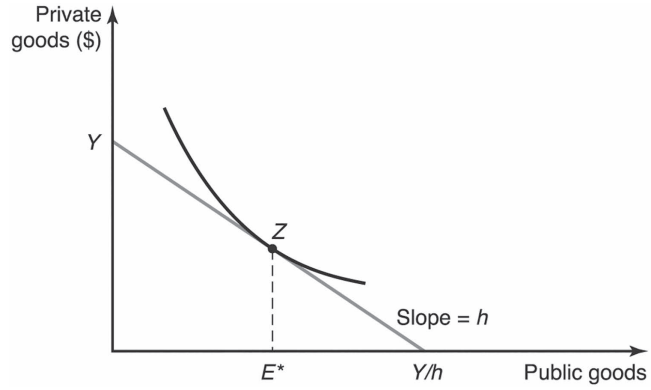


Figure 4A.1 Indifference curve graph of consumer demand

consumption is a way of combining all the different types of private goods into one measure. The consumer's resource or budget constraint is the line from point Y to point Y/hP_E, where Y equals the consumer's income, h is the consumer's share of taxes or tax price, and P_E is the cost of producing one unit of public good.[17] In other words, consumers can choose to spend all their income on private goods, all on public goods, or some on each. If this consumer pays h percent of total taxes, then for each dollar of taxes he paid, there will be $1/h$ dollars for public expenditure (if $h = 0.33$, this consumer pays one-third of total taxes; a $1 tax bill means total taxes of $3). The slope of the budget line in Figure 4A.1, which represents the relative cost of public and private goods to this consumer, is equal to the consumer's tax price h.

The consumer's preferences for private and public goods are represented by a set of indifference curves, one of which is drawn in Figure 4A.1. Indifference curves depict combinations of private and public goods from which the consumer gets equal satisfaction. Each successively higher indifference curve (I_2 compared to I_1) shows combinations that provide greater satisfaction. The convex shape of the indifference curves results because of the assumptions about preferences noted earlier.

If the consumer tries to get the greatest possible satisfaction given the current conditions, the combination of goods (or bundle) on the highest reachable indifference curve is selected: that is, bundle Z in the figure. Because bundle Z includes public good amount $E^\star$, we say that this consumer will demand $E^\star$ given income Y and tax price h. As the consumer's tax price is changed (because the government selects a different tax structure), the budget line will change, and there will be a different bundle similar to Z, which now maximizes the consumer's satisfaction. For each different price (holding income constant), there is a different desired amount of public good, which can then be represented as a demand curve.

Monopoly models: An all-or-nothing choice

This chapter included discussion of how budget-maximizing government officials with political monopoly power could use a predetermined reversion amount to induce consumers to accept a larger amount of government expenditure than desired. That idea also can be understood using the indifference curve/budget line analysis outlined earlier.

Figure 4A.2 depicts the preferences and budget line for a consumer with desired consumption bundle Z and the desired amount of public goods equal to $E^\star$. If this individual is the median voter in the community – that is, $E^\star$ is the median of individuals' desired

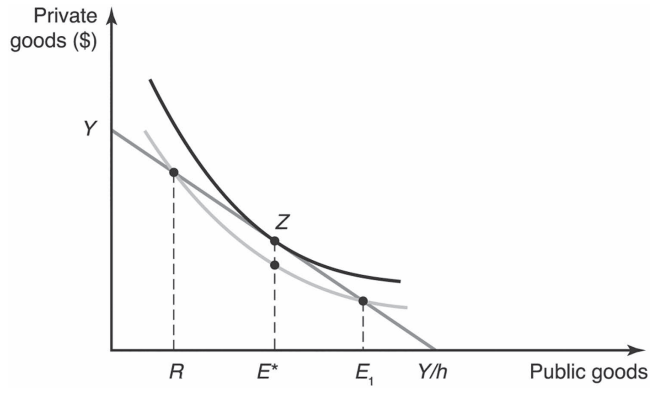


Figure 4A.2 Indifference curve representation of a monopoly bureaucrat public-choice model

amounts – then that amount would be selected by an unrestricted majority vote. However, if government officials allowed only one vote and offered E_1, and if the amount of the public good becomes a reversion to R if the officials' proposal was rejected, this voter would be indifferent between E_1 and R. Both lie on the same indifference curve. It follows that any amount of public good just to the left of E_1 would be on a higher indifference curve and thus preferred by the consumer. Government officials could propose spending $E_1 - 1$, which would be accepted by this voter if the alternative is R.

This representation of the monopoly model also makes clear how the maximum possible amount of public expenditure depends on the level of R. If R is less than the desired amount $E^{\star}$, the maximum possible spending is greater the smaller R is. If R is greater than the desired amount, then the maximum possible spending equals R.

Discussion questions

1 "If school expenditures are selected by majority vote, then most of the voters in the school district will be perfectly happy with the selected amount of spending." Evaluate this statement.

2 "The efficient quantity of a public good is provided if the marginal production cost equals the sum of consumers' marginal benefits. That rule will be satisfied by majority voting about the level of government services." True, false, or uncertain? Explain.

3 In one school district there are 17,000 voters choosing among three alternative proposed levels of spending – $3,000 per student, $6,000 per student, and $10,000 per student. The preferences of the voters, which are single peaked, are shown here:

Spending level	*No. of voters who prefer*
$3,000	4,000
6,000	6,000
10,000	7,000

If this district chooses among these three levels by majority voting, explain which level will be selected.

4 Suppose that there are three equal-size groups of voters in a community trying to select the amount of school spending per pupil. The options are to spend either $3,000, $7,500, or $12,000 per pupil. The lowest level would allow only a bare-bones academic curriculum, the middle level would permit more varied academic courses and some transportation service, and the highest level would allow bus transportation for all students and extracurricular activities in addition to academics. The positions of the three voting groups are shown in this table:

Group	*Most preferred*	*Second choice*	*Least preferred*
I	$3,000	$7,500	$12,000
II	7,500	12,000	3,000
III	12,000	3,000	7,500

Thus, Group I represents those trying to minimize government spending, Group II includes the middle-of-the-roaders, and Group III represents the "all-or-nothing" viewpoint.

(a) Plot the positions of the three groups on a diagram with level of preference on the vertical axis and level of expenditure on the horizontal axis. Connect the plots for each group with lines. Are the preferences of these groups single peaked?
(b) What level of spending will be selected by majority voting?
(c) Can you think of any ways for this community to select a level of school spending and avoid the problem of majority voting?

Notes

1 https://ballotpedia.org/Arizona_Proposition_208,_Tax_on_Incomes_Exceeding_$250,000_for_Teacher_Salaries_and_Schools_Initiative_(2020).
2 www.osc.state.ny.us/files/local-government/publications/2020/pdf/summary-of-2020-21-school-district-budget-vote.pdf.
3 It is an old debate in public finance whether governments "tax to spend," in which case all revenues generated by the existing structure are spent, or "spend to tax," in which case tax rates are set to fund the selected spending level. The characterization of three separate fiscal decisions for analytical purposes does not presume the answer to the debate or which decisions "come first."
4 Howard R. Bowen, "The Interpretation of Voting in the Allocation of Economic Resources," *The Quarterly Journal of Economics*, *58* (November 1943): 33.
5 It is useful to remember that because mechanisms to induce individuals to reveal their true demand for public goods are generally absent, these demands are not known. Thus, public officials cannot directly compute the desired level of services; voting is a mechanism for individuals to reveal their desires. More details about demand for state-local services are in Chapter 3.
6 If incomes differ among the taxpayers, this is a regressive tax system because tax as a fraction of income would decline as income increased (see Chapter 12).
7 Of course, individuals still might have extremist positions regarding state-local finance issues – for instance, favoring a high level of education spending so that the public schools provide academic and extracurricular services to all students or, in the alternative, having all education done privately.
8 It will be important to think about the economic characteristics of the median voter, particularly whether the median voter is the voter with median income. That issue and the use of the median-voter model for measuring demand are discussed in Chapter 3.
9 Gallup.com, "Government," accessed October 3, 2014, www.gallup.com/poll/27286/government.aspx.
10 www.pewresearch.org/politics/2019/04/11/little-public-support-for-reductions-in-federal-spending/.
11 Some economists have noted the relationship between Wicksell unanimous voting and a Lindahl pricing scheme, in which tax shares are proportional to marginal benefits. In that case, all voters demand the same quantity of public service, and unanimity can be achieved.

12 https://higherlogicdownload.s3.amazonaws.com/NASBO/9d2d2db1-c943-4f1b-b750-0fca152d64c2/UploadedImages/Budget%20Processess/NASBO_2021_Budget_Processes_in_the_States_S.pdf.
13 For more discussion of other voting methods, see Johnson (1991) and Mueller (1989).
14 See Niskanen (1968) and Romer and Rosenthal (1979).
15 See Ballotpedia.org, "Voting on School Board and Tax Measures," https://ballotpedia.org/Voting_on_school_bond_and_tax_measures.
16 https://ballotpedia.org/School_bond_election.
17 If P_E is assumed to equal 1, then the production of public goods is subsumed and the amount of public good measured by expenditure in dollars.

Selected readings

Holcombe, Randall G. "Concepts of Public Sector Equilibrium." *National Tax Journal*, *34*, No. 1 (March 1980): 77–80.

Inman, Robert. "Testing Political Economy's 'As If' Proposition: Is the Median Voter Really Decisive?" *Public Choice*, *33* (Winter 1978): 45–65.

Johnson, David. *Public Choice: An Introduction to the New Political Economy*. Mountain View, CA: Bristlecome Books, 1991.

Mueller, Dennis C. *Public Choice II*. Cambridge, UK: Cambridge University Press, 1989.

Romer, Ted, and Howard Rosenthal. "Bureaucrats Versus Voters: On the Political Economy of Resource Allocation by Direct Democracy." *Quarterly Journal of Economics*, *93* (1979): 563–587.

5 Public choice through mobility

Headlines[1]

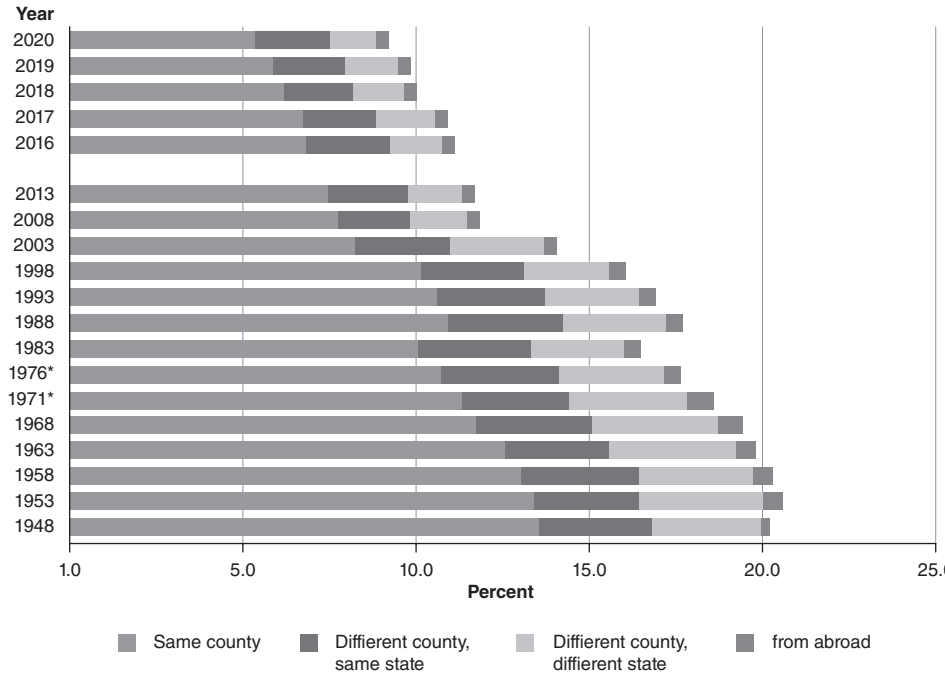


Figure A-1.2 Type of move: 1948–2020 (selected years)

"Mobility rates are about half what they were in the 1940s – when one in five Americans moved each year – and have been steadily declining since the mid-1980s.

Most moves are local, either within the same county or within the same state. Within-county moves accounted for 65 percent of all moves in 2019, while moves between counties in the same state accounted for 17 percent, according to Current Population Survey (CPS) data. 14 percent of moves were across state lines in 2019. . . .

40 percent of movers did so for housing-related reasons in 2019, 27 percent moved for family-related reasons, 21 percent for job-related reasons, and 12 percent for other reasons. This breaks down differently by type of move, however. Local moves

DOI: 10.4324/9781003030645-7

are primarily motivated by housing, but long-distance moves are primarily motivated by jobs.

Sunbelt states are particularly popular for interstate migrants, with Florida and Texas leading the pack, both gaining on average over 100,000 people per year since 2010. In recent years, the Pacific Northwest and other western states, most notably Colorado, have been attracting large numbers of migrants as well."[2]

Data availability

There are no data related to the topic covered in the chapter separate from the expenditure and tax data identified in other chapters, especially Chapters 1 and 7. This chapter mostly covers a theoretical or conceptual review of the relationship between mobility and public service choice.

Since the publication in 1956 of "A Pure Theory of Local Expenditures" by Charles Tiebout, economists studying local governments have been fundamentally concerned with the possibility that consumer residential mobility among competing local communities may lead to efficiency in providing local public goods. As Tiebout famously wrote "Spatial mobility provides the local public-goods counterpart to the private market's shopping trip."[3]

The conventional wisdom is that because more than one consumer may consume public goods simultaneously and because it may be difficult to exclude consumers from benefiting once the good is provided, individuals have an incentive to understate their true preference for the public good. They wish to be "free riders," benefiting from public goods provided by others without fully paying for them. This view led Paul Samuelson (1954) to conclude "no decentralized pricing system can serve to determine optimally these levels of collective consumption" (p. 388). However, the work of Tiebout and others who have followed challenges this position by suggesting that a structure of many small local governments may be a decentralized pricing system, which generates an optimal amount of public goods.

Tiebout's work also provides a contrast to the notion of public choice by voting discussed in Chapter 4. If consumers could not move among communities, differences in public-good demand would have to be resolved by voting. In Tiebout's view, moving and grouping together consumers with the same demand may also resolve differences in public-good demand. Consumers, then, may influence fiscal choices either by participating in the local political process (what political scientists call "voice") or by "voting with one's feet" (exiting).

Probably no one paper in public finance has generated as much subsequent work as that by Tiebout. His model and results have implications not only for the efficiency of the public sector but also for the income redistribution potential of local governments, the appropriate structure of intergovernmental grants, and need for policies to correct for fiscal disparities among localities. If stimulus to further inquiry and research is the measure, then perhaps no paper surpasses Tiebout's in importance for subnational government public finance. For that reason, this chapter reports the original Tiebout theory (although it does not substitute for reading the article) and considers some of the criticisms of and subsequent alterations to the

concept. The theory and its implications are important for analyzing many issues considered throughout the book.

The Tiebout hypothesis[4]

Tiebout's objective was to think of a way of achieving efficient provision of public goods and to characterize the specific conditions under which it would occur. Tiebout's mechanism is easily stated. One factor individuals consider in choosing where to live is the tax burden a resident will bear and the benefits from public services a resident will enjoy. If there are many localities, each with a different tax/service combination, individuals will select the one that gives them the greatest satisfaction, presumably the one for which taxes and services are closest to their desired amount. In essence, individuals "shop" among localities and "buy" the one best for them. This analogy with private markets is important because it suggests that individuals can choose just what they want in the public sector and need not compromise through voting.[5]

The assumptions of the model spell out the conditions under which Tiebout believed this mechanism would work perfectly to bring about the efficient amount of public good in each community:

1 Consumers are mobile and will choose residential location in the community that best satisfies their preferences.
2 Consumers are completely knowledgeable about the differences in tax/service combinations among the communities.
3 There are many communities from which to choose.
4 There are no restrictions or limitations on consumer mobility due to employment opportunities.
5 There are no spillovers of public service benefits or taxes among communities.
6 Each community, directed by a manager, attempts to attract the right-size population to take advantage of scale economies – that is, to reach the minimum average cost of producing public goods.

Tiebout concludes that under these conditions, consumers will locate in the community that best satisfies their preferences. Further, if the production of public goods exhibits constant returns to scale (rather than assumption 6) and if there are enough communities, then consumers will move to the community that *exactly* satisfies their preferences. With constant returns to scale, communities of even one person can produce services at minimum average cost – community size becomes irrelevant for cost.

The demand for public service in that case would appear as in Figure 5.1. Each individual selecting this community would have the same demand or marginal benefit schedule for public service, denoted as "marginal benefit to *i*" in the figure. The sum of all individuals' marginal benefits is just the sum of all those identical demand curves. If all consumers pay an equal share of costs, shown as h_i, then the desired amount of public service is E_i, which is the same for all consumers in this community. Moreover, because each individual's share of marginal benefits equals each individual's share of costs (both equal to $1/N$ where N = the number of consumers), the amount of public service desired by each consumer is also the efficient amount of public service. In fact, the result of the Tiebout process in each community can be called a "benefit tax equilibrium" because everyone's cost reflects the marginal benefit. Unlike the equilibrium of majority voting without mobility, all consumers are perfectly satisfied with the amount of public service provided in their community, and that amount is the efficient quantity.

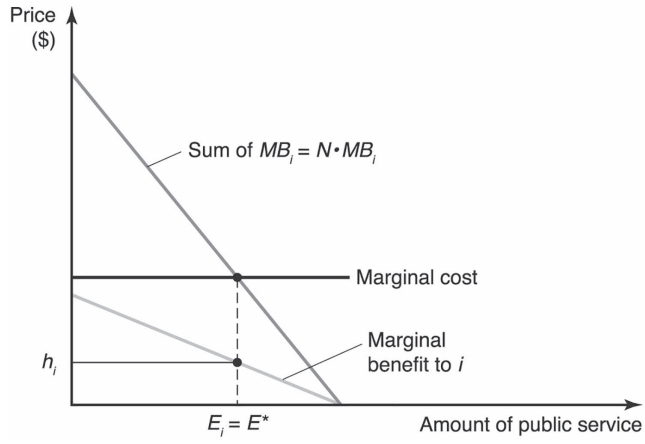


Figure 5.1 Public service demand in a Tiebout community

Evaluation of the Tiebout model

The assumptions

In his article, Tiebout (1956, 421) noted the severity of these assumptions. Concerning the version in which consumer preferences are exactly satisfied, he wrote,

> This model is not even a first approximation of reality. It is presented to show the assumptions needed in a model of local government expenditures, which yields the same optimal allocation that a private market would.

Although the assumptions characterize an "ideal" world, there is some validity to each.

The first three assumptions should be familiar to students of economics because they parallel the standard assumptions of a perfectly competitive market. Consumers with complete knowledge of price and quality differences face many sellers of each product and make consumption choices in order to obtain the greatest possible satisfaction. As Tiebout noted, of these three, the requirement of many communities may be the most troublesome. Because there must be enough jurisdictions to satisfy every preference, it is possible that as many communities as individuals may be required. Such one-person governments mean, of course, that public goods would be consumed as private goods. That effectively eliminates government and collective consumption, which would regenerate the efficiency problems for which government. In fact, the number of different local communities in a given area or region varies greatly and is large in some cases, as reflected by the data in Table 5.1, which show the number of school districts in selected metropolitan areas of different sizes. As schools often are a major determinant of residential decisions within a region, having substantial choice is important if the Tiebout process is to function. A substantial number of different school districts from which to choose is common even in medium-size metropolitan areas. The Albany, New Haven, Madison, Lansing, and Youngstown metro areas, all with fewer than one million residents, average about 36 school districts each. Very large metro areas, including New York, Chicago, Philadelphia, and Boston, as well as Los Angeles and Dallas to a lesser degree, have many separate school districts.

Table 5.1 Number of school districts in selected metropolitan areas, 2014

Metropolitan area	*Population (millions)*	*School districts (2014)*
New York-Newark-Jersey City, NY-NJ-PA	19.216	600
Los Angeles-Long Beach-Anaheim, CA	13.215	108
Chicago-Naperville-Elgin, IL-IN-WI	9.459	353
Dallas-Fort Worth-Arlington, TX	7.573	112
Houston-The Woodlands-Sugar Land, TX	7.066	64
Washington, DC-Arlington-Alexandria, VA-MD	6.280	24
Miami-Fort Lauderdale-Pompano Beach, FL	6.166	6
Philadelphia-Camden-Wilmington, PA-NJ-DE	6.102	196
Atlanta-Sandy Springs-Alpharetta, GA	6.020	37
Phoenix-Mesa-Chandler, AZ	4.948	77
Boston-Cambridge-Newton, MA-NH	4.873	125
San Francisco-Oakland-Fremont, CA	4.732	79
Riverside-San Bernardino-Ontario, CA	4.650	56
Detroit-Warren-Livonia, MI	4.320	101
Seattle-Tacoma-Bellevue, WA	3.980	48
Minneapolis-St. Paul-Bloomington, MN-WI	3.640	88
San Diego-Chula Vista-Carlsbad, CA	3.338	42
Tampa-St. Petersburg-Clearwater, FL	3.195	4
Denver-Aurora-Lakewood, CO	2.967	25
St. Louis, MO-IL	2.803	125
Columbus, OH	1.902	59
Providence-Warwick, RI-MA	1.601	52
Birmingham-Hoover, AL	1.090	23
Grand Rapids-Kentwood, MI	1.077	39
Tucson, AZ	1.047	16
Albany-Schenectady-Troy, NY	0.880	48
New Haven-Milford, CT	0.862	26
Baton Rouge, LA	0.826	12
Madison, WI	0.605	33
Lansing-East Lansing, MI	0.550	26
Youngstown-Warren-Boardman, OH-PA	0.536	46
Lexington-Fayette, KY	0.517	7

Source: "Total School Districts, Student Enrollment by State and Metro Area," *Governing*, March 25, 2016, www.governing.com/archive/school-district-totals-average-enrollment-statistics-for-states-metro-areas.html.

Thus, desires for many different combinations of public services can be accommodated, at least in larger metropolitan areas.

In responding to this set of locational choices, there is little doubt that consumers consider local government taxes and services in deciding where to live. Often the first question that a new or transferred employee will ask is "How are the schools around here?" Whether individuals have complete or even good knowledge about interjurisdictional tax and service differences is more problematic because collecting information is not costless. However, one private-market sector, the real estate industry, does specialize in acquiring and providing that information to prospective residents. And other, less formal networks, often through employers, also exist for transmitting the observations of current residents to prospective ones.

Tiebout's assumption concerning scale economies poses a problem because it requires that each community attract just the right population to allow production of public services at minimum average cost. If population is too small, the marginal cost of adding one more person would be low but the average cost per resident very high. If population is too large, both the marginal and average costs would be high. With the optimal population, the community

could produce at the minimum of average cost – where average and marginal cost are equal. What happens if the number of people who desire a specific amount of public service is greater than the optimal population for the community? Another community providing the same quantity of service would have to be created, but there may not be enough people to populate two communities at optimal size. In that case, community size must change. This difficulty is avoided if the number and geographic size of communities is not fixed or if there are constant returns to scale. In short, it is not just that there are many communities to choose from, but there must be enough communities of efficient size providing the desired public services.

The assumption of no employment restrictions on residential mobility removes several potential problems, including any difference in transportation cost between job location and alternative residential locations and the new costs created by changing job location for whatever reason. Tiebout envisioned someone living on capital income, so the amount of income was independent of where one lived. With that exception, and possibly one for certain types of self-employed individuals, this assumption will not be met in reality. Certainly some actual situations come closer to allowing individuals a choice of a number of different communities in which to live, with equal transportation cost to that job. This is reflected in traditional urban economics models with a central business district or job center circled by suburbs at different distances. To the extent that there are a good number of such choices providing different tax/service combinations in a given metropolitan area, the assumption may be approximated.

The most important assumption for the efficiency implications of the Tiebout model, and the most troublesome, is the absence of externalities or fiscal spillovers. As Tiebout (1956, 423) notes, "There are obvious external economies and diseconomies between communities." Indeed, as noted in Chapter 2 and elaborated on in Chapter 6, the existence of externalities is a primary reason individual consumers should group together for collective consumption. If the amount of public service selected in each community is efficient for that community (as in a Tiebout world), those amounts will not be efficient from the overall society's viewpoint if externalities extend across jurisdiction boundaries.

There are several ways of correcting for the inefficiency caused by interjurisdictional externalities, two of which are most often discussed. First, externalities can be eliminated if governments are bigger (geographically and with larger population). There is no externality if all those who benefit from or pay for a public service are members of the same government. Governments large enough to eliminate externalities may be too large, however, to include only individuals with the same preferences for public service. This creates a potential tradeoff of these two factors, which is discussed in detail in Chapter 6. Second, intergovernmental grants can be used to induce local governments to change their amount of public service to that which is socially efficient (discussed in Chapter 9) without having to alter the size of those governments.

Recognizing the potential difficulty of achieving the assumptions in actuality, it seems appropriate to note Tiebout's own conclusion (1956, 424):

> If consumer-voters are fully mobile, the appropriate local governments . . . are adopted by the consumer-voters. While the solution may not be perfect because of institutional rigidities, this does not invalidate its importance. The solution . . . is the best that can be obtained.

In other words, because there are moving and information costs in reality, consumers may not move from a community because of relatively small differences between their desired public service amounts and those provided. The Tiebout process may not lead to all

consumers in a community having the *same* demand for public service, but they may have *similar* demand. By reducing the variance in public service demand, the Tiebout process may reduce the inherent dissatisfaction with voted fiscal policies.

Property taxes and stability of the model

A criticism of the Tiebout model more fundamental than the severity of the assumptions is the possibility that even if the assumptions *are* met, the process may fail to provide an efficient amount of local public goods. This possibility arises if the local public goods are financed by something other than benefit charges or head taxes. For example, property taxes are the major locally generated source of revenue for local governments. In choosing to reside in a given community, an individual selects the amount of public services to receive. The amount of taxes that individual will pay toward those services (the tax price) depends on the *value* of the house the individual chooses to consume. In other words, with property tax financing, the choices of where to live and what type of house to consume are made simultaneously and, therefore, must be analyzed together.

The basic elements of the potential difficulty with the Tiebout model created by property tax financing are best shown by an example. Suppose that a metropolitan area is divided into two school districts with the following economic characteristics:

Example 5.1

Community A	*Community B*
Big houses, $300,000 value	Small houses, $150,000 value
Tax rate = 4% of value	Tax rate = 3% of value
Tax per house = $12,000	Tax per house = $4,500
One pupil per house	One pupil per house
Spending per pupil = $12,000	Spending per pupil = $4,500

Suppose also that these two governments were populated through the Tiebout process – that is, each family selected the district that exactly satisfied their education preferences. In addition, families have also purchased the type of house they demand. Families in Community A are willing to pay $12,000 for a year of education, while families in B are willing to pay only $4,500, given the prices for all commodities and their other consumption choices. Given the assumptions of the Tiebout model (no externalities, no moving costs), both communities are providing the efficient amount of education service, and there is no consumer dissatisfaction in either community.[6]

The difficulty is that this Tiebout equilibrium may not be stable because some individuals may be able to make themselves better off by moving. If one of the families in Community B acquired a small $150,000 house in Community A, that family would consume the higher amount of education service in that district without paying its full cost. Given the 4 percent tax rate in Community A, the tax on a $150,000 house would be $6,000 rather than the $12,000 paid by other residents. For that $6,000 in taxes, this new family would enjoy slightly less than $12,000 of per pupil education spending.[7] Although that family was not willing to pay $12,000 to receive $12,000 of education spending (or else they would have located in Community A to begin with), they might very well be willing to spend $6,000 to

receive, say, $11,950 of education spending. The trick is to own a house with below-average value in a community providing a large amount of service.

The important point is that some families might be willing to move to a community with higher-valued property and a different tax rate, even if they have to consume more government service and less housing than they demand. The demands for local government service and housing by L-type people (low spending) and H-type people (high spending) are shown in Figure 5.2. If an L-type family acquires a small house in Community A, the tax price of local services is lower than in Community B, and thus the family demands more service (level G_L^A). However, the actual amount provided in Community A is (nearly) G_H^A. If the L-type family moves to A and consumes that level of government service, it will require more taxes and thus less spending on housing (h_L^1 versus h_L). A family might very well be willing to make that trade-off: for instance, accepting $11,950 of school spending per pupil (with taxes of $6,000) and buying a somewhat smaller house than otherwise. This seems particularly likely if there is a sufficiently lower tax price or if the family values the extra government spending (which it doesn't pay for fully).

In other words, even if a perfect Tiebout equilibrium could be achieved, tax financing might generate an inherent instability. The incentive that induced this family to move from B to A exists, of course, for *all* (or at least many of) the families in Community B. If any one family makes this move, the Tiebout equilibrium is destroyed. The amount of education spending in Community A is no longer equal to the efficient amount; dissatisfaction with the amount of government spending arises as consumers with different public service demands enter the community.

The efficiency of homogeneity of demand characteristic of the Tiebout equilibrium might be maintained in two ways. Community A could prevent a consumer from having a $150,000 house (discussed in the following section), or the original residents of A could exit to a third community. Indeed, the residents of A might face the same type of incentive as those of B in the example, if, for instance, there is a community of $500,000 houses with per-pupil spending of $15,000. It is this possibility that led Bruce Hamilton (1975) to note that the instability of the model could give way to a game of "musical suburbs" with everyone trying to move "up" to a wealthier community.

It is important to note that the potential instability of the model is not unique to property taxes but occurs with any tax other than a pure benefit charge or a head tax. If a proportional local income tax financed the local public good, for example, individuals from a lower-income/lower-spending community would similarly be made better off by moving

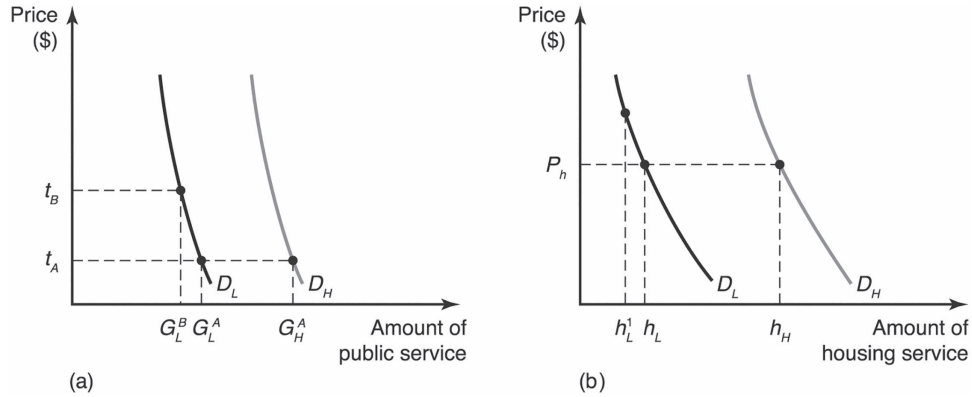


Figure 5.2 Demand for housing and public services together

to a higher-income/higher-spending community. The potential instability arises unless *both* the demand for the public service and the demand for the private good that determines taxes (housing for a property tax, leisure for an income tax) are the same (or highly correlated) for all consumers in each Tiebout community. Example 5.2 illustrates this.

Suppose again that two communities represent a Tiebout equilibrium, providing only education, with economic characteristics as shown in Example 5.2.

Example 5.2

Community A	*Community B*
Big houses, $300,000 value	Small houses, $150,000 value
Tax rate = 4% of value	Tax rate = 8% of value
Tax per house = $12,000	Tax per house = $12,000
One pupil per house	One pupil per house
Spending per pupil = $12,000	Spending per pupil = $12,000

Residents of both A and B are willing to pay $12,000 to enjoy $12,000 of educational service: that is, they have the same demand for educational service. The residents of A and B have different demands for housing, which is the commodity that determines their tax payment. Residents of A like big houses while those in B prefer small ones. Although this could occur because residents of A have higher incomes than residents of B, it might also occur simply because residents of B prefer to spend their income on something else – vacations to Hawaii, for instance.

This equilibrium is also not stable. If a resident of Community B acquired a small $150,000 house in A, taxes again would be $6,000 to consume slightly less than $12,000 of educational service. By moving, this consumer suffers a small decrease in government education spending but a large decrease in tax cost. With the tax savings, the consumer could purchase other goods (including, of course, substitute private education services) to increase happiness.[8]

Extensions of the Tiebout model

Fiscal zoning

The potential efficiency of the Tiebout mechanism may be blocked if an individual can pay less than the average cost of local public goods. If public goods are to be financed by property taxes, this is accomplished by consuming a less-than-average value home. This option would not arise if there were some method of preventing the migration of consumers desiring small houses into communities of consumers who desire big houses, as in the examples. It has been suggested that various forms of land-use restrictions or zoning laws may function, although imperfectly, as such a method.[9]

The simple solution is to prohibit consumption of housing with *value* less than that of the original houses in each community. Using the conditions of Example 5.1, individuals would not be allowed to move into Community A unless they were willing to consume a $300,000 house. Individuals from Community B would not move because they would have

to pay the full average cost of the education in A, which they revealed as less attractive by originally choosing Community B. The value of the house matters because value determines the property tax liability where everyone pays the same tax rate.[10]

Explicit value-based zoning rules may not be possible, so the question becomes whether a set of rules defended for a nonexclusionary reason serve the same purpose. For instance, rules on minimum lot size, minimum setback from streets, and required construction methods and materials serve to increase the production cost of housing and to impose a minimum "type" of house allowed in a community. Restrictions also may be imposed privately rather than by government. For example, developers may build a new suburban community and effectively zone the community for housing value by building only similar-value houses. These styles can be preserved through deed restrictions that prevent subsequent owners from altering the character of the community without the consent of all. This practice is common because many builders offer separate developments of "affordable," "family," or "executive" homes.

There is a difference of opinion about whether local jurisdictions use zoning to restrict entry to communities or force minimum property tax payments. If local communities can and do use housing zoning and regulations to enforce a minimum required amount or value of housing and if the number (and size) of communities can vary, then households cannot escape part of the cost by consuming a less-than-average-value house. The local property tax would function as a benefit tax or user charge, with each household paying the full cost of the services in their community. In that case, the property tax on the zoned or regulated minimum house is the price that each household must pay to enjoy those jurisdictions' services, what has come to be called the "benefit view" of the property tax.

Peter Mieszkowski and George Zodrow (1989) have been prominent in arguing that fiscal zoning usually is not feasible or utilized. Believing either that zoning regulations are not sufficient to mandate a minimum house value or that legal restrictions prevent the attainment of fiscal zoning even if desired by a community, they argue "that perfect binding zoning is not in fact observed in practice." Further, they take the strong view that "a majority of researchers . . . reject the assumption of perfect . . . zoning and conclude that a national system of property taxes is distortionary [not a benefit tax]" (p. 1140).

On the opposite side, William Fischel (1992) argues, "Because of the broad statutory authority for zoning and judicial deference to legislative economic decisions, a local government that wants to protect its property tax base can select from a long menu of exclusionary devices" (p. 173). Fischel includes in this menu rules regarding a master plan set by the planning commission, constraints on required street frontage, yard setbacks, off-street parking, minimum house floor area, height restrictions, and developer or public service impact fees, as well as the common example of minimum lot size. As Fischel notes, tongue-in-cheek, "The family of eight that wants to rent part of a lot in Scarsdale and park two house trailers on it and send their kids to Scarsdale's fine schools is apt to find a few regulations in the way" (Fischel, 1992, 171).

Noting the difference of opinion, we will examine the implications, assuming fiscal zoning is used. If zoning is used effectively to restrict entry, communities are cross-classified by both the amount of public good or service and housing values. If there are only two levels of desired government spending, High and Low, and two types of houses, Big and Small, zoning could be used to preserve four different communities, as shown in Example 5.3. Households from the Small:Low community could benefit from moving to Big:High if they could consume a small house. Similarly, households from Small:High (Small:Low) potentially could gain by living in Big:High (Big:Low) if they could consume a small house. Zoning rules may prevent those actions.

Example 5.3 Types of Tiebout communities

Housing type	*Government spending*	
	High	*Low*
Big	Big:High	Big:Low
Small	Small:High	Small:Low

Because the demands for both housing and public service tend to increase with income (in economic parlance, both are normal goods), the separation of communities by those demands may lead to communities classified by income. Using Example 5.3, households in community Big:High may have the highest incomes followed in order by communities Big:Low, Small:High, and Small:Low. In preventing a Small:Low household from occupying a small house in community Big:High by zoning, an explicit decision is made to maintain the satisfaction of the highest-income households and prevent an increase in the satisfaction of the lowest-income households to preserve efficiency. It may be objectionable to a free society to legally limit where a person may live based on income.

More communities also may be needed to achieve a Tiebout equilibrium as a consequence of property tax financing with zoning because each community must have residents with the same desired amount of public service *and* housing value. The number of households with any particular combination of desired amounts may be too small to achieve scale economies in the production of the public good. It may be, for example, that only one household prefers combination Small:High. The choice then is to have a one-person community, which would be inefficient, or absorb that household into community Big:High, which also seems inefficient.

Fiscal capitalization and homogeneous communities

An economic response may allow mixed housing types to coexist efficiently in the same community. If the tax advantage of a small-house consumer in a big-house community is offset by a higher price for that small house, a process called "tax or fiscal capitalization," then big and small houses might be able to coexist in the same community as long as consumers still desire the same public service.

Suppose an additional community (call it Mixed:High) is created in Example 5.3. This one has a high amount of spending ($12,000 per pupil) but an equal number of big and small houses (houses that are valued at $300,000 and $150,000 in the homogeneous communities). With those prices, the average house value is $225,000, necessitating a tax rate of 5.33 percent to generate $12,000 of revenue per household. Owners of big houses would pay almost $16,000 in taxes, and owners of small houses would pay almost $8,000, although both would receive $12,000 of educational service. The three communities are characterized in Example 5.4.

Consumers of small houses pay less in the Mixed:High community than for the same amount of service in Small:High, and consumers of big houses pay more in Mixed:High than in Big:High. Therefore, consumers who prefer small houses would attempt to move to Mixed:High, increasing the demand for small houses in that community and increasing their price. Similarly, consumers who prefer big houses are expected to leave Mixed:High, decreasing the demand for big houses in the mixed community and reducing their value.

Example 5.4

Big:High	*Mixed:High*	*Small:High*
$300,000 houses	Half $300,000 houses and half $150,000 houses	$150,000 houses
Tax rate = 4%	Tax rate = 5.33%	Tax rate = 8%
Tax = $12,000	Tax, Big = $16,000; Tax, Small = $8,000	Tax = $12,000

The changes in price are expected to continue until the higher price for small houses in the Mixed:High community, compared to the Small:High community, exactly offsets the lower taxes and until the lower price for big houses in the Mixed:High community, compared to the Big:High community, exactly compensates for the higher taxes.[11]

Such a response is called **capitalization**: the full amount of the tax difference has been capitalized into house values. Capitalization is the change in the price of an asset due to a shift in demand. For complete capitalization, the price of a small house in the Mixed:High community must increase by the present value of the tax difference between the homogeneous and mixed communities, and the price of a big house in the Mixed:High community must fall by a similar amount. (They will be equal if there is an equal number of big and small houses in the Mixed:High community.) Assuming a discount rate of 10 percent, small houses would be valued at $176,087 and big houses at $273,913 in the Mixed:High community.[12]

The total residence cost in any community is the price of the house plus the present value of the future tax payments. The present value of future taxes equals

$$\frac{T_1}{(1+r)} + \frac{T_2}{(1+r)^2} + \frac{T_3}{(1+r)^3} + \ldots + \frac{T_N}{(1+r)^N}$$

where
T = annual tax payment
r = discount rate
N = time period.

If N is infinite and all tax payments are the same, this equals T/r. The total residence cost is the same for any given type of house regardless of the community. Assuming a 10 percent discount rate and an infinite house life, this is shown in Example 5.5.

Example 5.5

Big Houses in Big:High vs. Big Houses in Mixed:High
$300,000 + $120,000 = $273,913 + $146,087
Small Houses in Small:High vs. Small Houses in Mixed:High
$150,000 + $120,000 = $176,087 + $93,913

This potential for capitalization of interjurisdictional differences in taxes or services has important implications. First, if capitalization occurs, fewer communities are needed to achieve an efficient equilibrium because only a separate community for each desired amount

of public service is required. Second, because communities need be homogeneous only in the desired amount of public service and can include households desiring the whole range of housing, the equity concerns about the Tiebout process may be mitigated. Consumers preferring small houses are not worse off in a community with a high tax rate because the house has a lower price to compensate. Third, complete capitalization means that the local property tax functions as a benefit tax, with each household paying the full cost of the services in their community. The true cost of residing in a community and consuming its services is not just the tax but also the difference in price for the type of house desired. The true cost (in present-value terms) of consuming the mixed community's services is $120,000 for *both* types of housing consumers.[13]

Implications and limits of capitalization

An important issue is whether this type of capitalization occurs and is maintained. Capitalization almost certainly does occur in the short run, although it may not offset all fiscal differences. Capitalization results from competition for the available land and housing in the fiscally desired community. Thus, if there are not enough communities, if individual mobility is limited by jobs or other factors, or if individuals do not have complete information about differences, then capitalization may be incomplete.

Capitalization might fail to be maintained because either the housing supply or the number of communities might change. If the value of a particular type of housing increases in one community because it is in a desirable community, then either more of that type of housing might be constructed or an entire new community with that type of housing might be created. In either case, the supply of the desired housing increases, prices fall, and capitalization is eliminated. However, if the new community is farther from work or shopping locations and requires higher transportation costs, then the new houses may not be perfect substitutes for the older ones, and some price differences (capitalization) could remain.

A final possibility in which capitalization may not occur is if individuals in one community do not value the additional government services offered in another jurisdiction, even if tax rates or housing prices are lower. Suppose that a community has a higher level of expenditure and lower tax rates than another community. If small-house consumers move from the second to the first community, they might pay less than the average cost of the higher level of services in that community but still pay more taxes than currently. For instance, a family might be able to receive $1,000 more per student in educational spending, but have to pay $400 more in taxes. If the value or utility the family receives from the additional educational spending is not worth at least $400, then they would not make this move. This possibility, suggested by Yinger (1982), implies that capitalization would not occur (at least fully). If individuals are not willing to move to the high-spending community to take advantage of the lower tax rate, then demand for and the price of small houses do not change.

Public choice: evidence

No one believes that a perfect Tiebout equilibrium can be obtained because information and moving costs are not zero; even if it could be obtained, it would likely not be efficient because externalities are always present and because capitalization can remove the incentive for communities to be homogeneous. Casual observation supports this view because community votes on fiscal matters are seldom (if ever) unanimous, which would be expected in a perfect Tiebout world.

Nevertheless, the Tiebout process does seem to apply to some degree. The tendency for individuals with similar demands for public services to group together, particularly in larger

urban areas, was demonstrated in research reported by Edward Gramlich and Daniel Rubinfeld (1982). Based on a survey of individuals asking about desired changes in spending and taxes, Gramlich and Rubinfeld estimate individual demand functions for public services. They test whether demands are similar for people who live in the same community and whether those demands are close to the actual level of services offered in that community. They find that

> in these urban communities there appears to be a high degree of grouping by public spending demands. . . . [A]ctual spending does conform to desired levels in these Tiebout-like communities, it does so less in rural communities where a Tiebout mechanism is unlikely to operate.
>
> (Gramlich and Rubinfeld, 1982, 558)

In short, the Tiebout process seems to have reduced the variance in desired government service within the urban communities in their sample.

If individuals with similar public service demands group together, then there should be more communities in metropolitan areas where there are greater differences in desired government spending, other factors equal. Research by Nelson (1990) and Fisher and Wassmer (1998) suggests that this is exactly the case in the United States. Based on data from 1982, Fisher and Wassmer show that there are substantial differences in the number and average size of municipalities across major metropolitan areas. The average-size municipality in these urban areas had a population of about 34,000. However, in some areas with more localities, the average municipality was much smaller (average population of 2,300). In others there were fewer but larger (average population of more than 700,000) jurisdictions. The metropolitan areas of Chicago, Philadelphia, Newark, Cleveland, and Louisville all had many very small localities, whereas the areas of Baltimore, San Diego, Phoenix, Milwaukee, and New Orleans had few but relatively large localities. After comparing the number of localities to variation in demand for local government services in the urban area, they conclude

> The empirical findings show that after controlling for political, historic and institutional factors, variations in the characteristics that affect demand for local government services do influence the number of local governments. This result is consistent with the hypothesis put forth by Tiebout.
>
> (Fisher and Wassmer, 1998, 444)

Oates (2006) reviewed a wide set of studies about the Tiebout process. One group of studies, examining the degree of income variation across existing communities, is the opposite of those discussed here. Income (and housing value) stratification are consistent with the type of sorting suggested by the Tiebout process. Oates reports on several research studies that find exactly this. But not all the studies find the type of income and housing stratification (more variation across communities than within them) consistent with the Tiebout perspective. Oates concludes, "a body of widely differing kinds of evidence exists, much (but not all) of which seems favorable to Tiebout" (p. 37).

The Tiebout hypothesis seems particularly appropriate in describing suburban areas of relatively large metropolitan areas. There is less agreement on whether this perspective applies in rural areas or large central cities. In rural areas, individuals' residential options may be limited by distance or the difficulty of separating residential location from work. Large cities are inherently heterogeneous because of their size. Where it does apply, the Tiebout process likely reduces but does not eliminate the variance in desired government service within communities and, thus, the inherent dissatisfaction with voted outcomes. Because

differences are not eliminated, voting is required and used to find a compromise position within those remaining differences of opinion. Rather than competing public-choice mechanisms, voting and moving are complementary. There is substantial evidence that residential choice is greatly influenced by the type of schools in a community. For instance, families who choose to live in a community are likely to approve generally of the amount of local school spending, but differences may still arise over the allocation of those funds between music and advanced math, for example.

Perhaps the most important legacy of the Tiebout idea is the emphasis on the welfare advantage of a decentralized government structure. However, that advantage must be balanced against other economic forces that require a more centralized government to bring about economic efficiency. Robin Boadway and Jean-Francois Tremblay (2012) argue that although the Tiebout model may be especially relevant for local government, it may be less relevant for thinking about the role of state government or the overall structure of fiscal federalism. They note,

> The way in which fiscal federalism has departed most from Tiebout is in the appreciation that fiscal decision-making in a federation is much more complicated than the community manager view. Government decision-making is inherently complex, involving political, historical and institutional factors.

We turn to that issue in Chapter 6.

Summary

If there are many localities, each with a different tax/service package, individuals will select the one that gives them the greatest satisfaction, presumably the one for which taxes and services are closest to their desired amount. This view, offered by Charles Tiebout, suggests that individuals can choose just what they want in the public sector and need not compromise through voting.

As a result of the Tiebout process, all consumers can be perfectly satisfied with the amount of public service provided in their community, and that amount can be the efficient quantity.

Because moving and information costs are important in reality, consumers may not move from a community because of relatively small differences between their desired public service amounts and those provided. The Tiebout process, then, may not lead to all consumers in a community having the same demand for public service, but they may have similar demands.

The Tiebout process may fail to provide an efficient amount of local public goods if public goods are financed by property taxes. By consuming a less-than-average-value home, an individual can pay less than the average cost of those goods, thereby preventing the potential efficiency of the Tiebout mechanism.

The inherent instability caused by tax financing would not arise if migration of consumers desiring small houses into communities of consumers who desire big houses was prevented. Various forms of land-use restrictions or zoning laws may function as such a method.

If zoning can be used to limit the types of housing in communities and if the number of communities can be changed, the local property tax functions as a benefit tax, with each household paying the full cost of the services in their community. A minimum tax is set on each house through zoning that is just sufficient to pay the average cost of the public services.

Because the demand for both housing and public service tends to increase with income (in economic parlance, both are normal goods), the separation of communities by those demands may lead to communities classified by income.

If the tax advantage of a small-house consumer in a big-house community is offset by a higher price for that small house, a process called "tax capitalization," then big and small houses can coexist in the same community as long as the consumers desire the same public service.

With capitalization, the price of the house plus the present value of the future tax payments is the same for any given type of house regardless of the community. The true cost of residing in the community and consuming its services is not just the tax but includes the difference in price for the type of house desired.

The Tiebout process serves to reduce the variance in desired government service within communities. If the differences are not eliminated, voting is required and can be used to find a compromise position within those remaining differences of opinion.

Discussion questions

1 The following data depict the fiscal characteristics of two school districts in a metropolitan area, each composed of identical single-family houses with one pupil per house:

School district A	*Characteristic*	*School district B*
$200,000	Per-pupil property value	$100,000
50	Property tax rate (in dollars per $1,000 of value)	100
10,000	Per-pupil expenditure	10,000

The voters who have chosen to live in both districts desire and select $10,000 of educational spending per pupil and collect property taxes to finance it. Because B has small (low-value) houses while A has big (high-value) houses, the tax rate in B is much higher than in A.

(a) Would a voter in District B prefer to live in a big ($200,000) house in District A? Why?
(b) Would a voter in B prefer to live in a small ($100,000) house in District A? Explain.
(c) Suppose that there is a third school district to choose from with an equal number of big and small houses so that the average-per pupil value is $150,000. What tax rate is required in this district to spend $10,000 per pupil? If small houses also cost $100,000 in this district, are consumers of small houses better off here or in B? If big houses also cost $200,000 in this district, are consumers of big houses better off here or in A?
(d) Given your answers to (c), what do you expect will happen to the demand for big and small houses in this third district? What will happen to the prices of these houses in this mixed district?
(e) Characterize the equilibrium that would allow all three districts to exist simultaneously. What does this imply about the equity implications of the Tiebout process? Do you think it is fair if some communities require higher tax rates than others to provide an equal amount of government spending?

2 The Tiebout process in this chapter represents an alternative to the majority voting model described in Chapter 4 as a way of making public fiscal decisions. Compare these two alternative theories in terms of what they predict about the nature of local governments, including political characteristics and whether efficient public-good provision is likely to result.

3 Some people have suggested that political voting and "voting with one's feet" simultaneously apply in determining the amounts of local public services to provide. Discuss how this might happen. How might the limitations of the assumptions of the Tiebout theory contribute to a role for voting?

Notes

1 US Census, CPS Historical Geographic Mobility/Migration Graphs, www.census.gov/library/visualizations/time-series/demo/historic.html.
2 Riordan Frost, "Who is Moving and Why? Seven Questions About Residential Mobility," www.jchs.harvard.edu/blog/who-is-moving-and-why-seven-questions-about-residential-mobility.
3 Tiebout, "*A Pure Theory of Local Expenditures*," 422.
4 This section obviously is based on and adapted from Tiebout (1956).
5 The government fiscal package need not be the only factor individuals consider in selecting where to live. Transportation cost, for example, and other factors also may be important.
6 Of course, expenditure on education may not measure the amount of education service, particularly if environmental conditions or prices vary between the communities. Here, the assumption is that they do not differ. See Chapter 7 for more on this issue.
7 The per-pupil spending in Community A falls because one more pupil is added, but only $6,000 of new tax revenue is added. The amount of the anticipated decrease depends on the number of residents of A. For instance, if there were originally 100 families in A, spending falls to $11,940.59 ($1,206,000/101). If there are initially "many" families in A, the decrease in spending expected by a mover is insignificant.
8 Of course, if the demands for both government service and the good to be taxed locally (such as housing) are both highly related to income, then this instability may not arise. In that case, higher-income consumers may demand both more government service and more housing.
9 See, for example, Hamilton (1975), Fischel (1978), and Fischel (1992).
10 Housing is the target of restrictions only because a property tax is presumed. If public services are financed by a beer tax, then minimum amounts of beer consumption would be required. Similarly, if local governments use an income tax, the residence restriction must be on income.
11 Of course, the supply of houses can also adjust, with more small houses and fewer big ones resulting from the change in prices. If this occurs, the tax difference is not capitalized into the value of the house but rather into the value of the land used for a particular type of house.
12 Hamilton (1976b) derives the equations for full capitalization.
13 For consumers of big houses, the cost is $146,087 minus the $26,087 house price advantage; for small-house consumers, the cost is $93,913 plus the $26,087 house price addition.

Selected readings

Fischel, William A. "Property Taxation and the Tiebout Model: Evidence for the Benefit View from Zoning and Voting." *Journal of Economic Literature*, *30* (March 1992): 171–177.

Fischel, William A. *The Homevoter Hypothesis*. Cambridge, MA: Harvard University Press, 2005.

Hamilton, Bruce W. "Zoning and Property Taxation in a System of Local Governments." *Urban Studies*, *12* (June 1975): 205–211.

Mieszkowski, Peter, and George R. Zodrow. "Taxation and the Tiebout Model." *Journal of Economic Literature*, *27* (September 1989): 1098–1146.

Oates, Wallace E. "The Many Faces of the Tiebout Model." In *The Tiebout Model at Fifty*, edited by William Fischel, 21–45. Cambridge, MA: Lincoln Institute of Land Policy, 2006.

Tiebout, Charles M. "A Pure Theory of Local Expenditures." *Journal of Political Economy*, *64* (October 1956): 416–424.

6 Organization of subnational government

Headlines

"[T]echnological advances promise to improve the environments in which people live and the services that city governments and companies offer."[1] The "Technology and the Future of Cities" report from the President's Council of Advisors on Science and Technology specifically identifies information and communication technology (including digital, mobile, and smart improvements), new models of transportation, new kinds of water systems, sharing-economy businesses, and clean and small-scale manufacturing, among others. These technological changes are expected to affect personal decisions of where to live, business investment decisions (especially with more remote work), and how both people and goods are transported.

Changing technology may also affect the structure of local governments. As one illustration, technology changes may provide greater scale economies for producing public services, thus requiring fewer small localities. Both the development of infrastructure for and regulation of autonomous transportation may better be handled by more centralized government. Autonomous transportation, sharing, and remote work may encourage less dense residential patterns and affect the demand for parking. Advances in educational technology may change the role of both local schools and public universities. A precise picture of how change will proceed is not available, of course, but there is no shortage of forecasts.[2]

Data availability

Information about the structure and number of subnational governments in the United States is collected for and provided in the Census of Governments conducted for years ending in 2 and 7. The most recent report (at the time of this writing) is for 2017. A description of the structure in each state is in this report (www.census.gov/content/dam/Census/library/publications/2017/econ/2017isd.pdf), and the great variety of data reported by the census for this year is available in a series of reports available here (www.census.gov/data/tables/2017/econ/gus/2017-governments.html). Information from the 2022 Census of Governments should become available in early 2024.

The Census of Governments includes information about the number and population size for all the various types of subnational governments, both nationally and for each state. Therefore, the data cover not just the 50 states, but each county, city,

DOI: 10.4324/9781003030645-8

township, school district, and other special district that comprise the subnational government sector. The detail provided by these data is very important as there are more than 90,000 subnational governments in the US collecting revenue and providing public services varying from only 22 in Hawaii to more than 6,900 in Illinois.

Another useful source of information is the set of "Fiscally Standardized Cities" reported by the Lincoln Institute for Land Policy (www.lincolninst.edu/research-data/data-toolkits/fiscally-standardized-cities). Because both the organization of local governments and the allocation of service responsibilities differ widely among the states, it can be difficult to make comparisons. For example, in one city, the city government might have responsibility for police and fire, for schools, for road maintenance, for water and sewer, and for parks. But in another city, those service responsibilities might be divided among the county, city, school district, and several special district governments. The FSC system provides revenue and expenditure data for the 150 largest US cities that combines all the government levels and thus allows for equivalent comparisons.

The work by Tiebout and others emphasizes the advantage of decentralized government for satisfying the diverse public service demands of consumers in an efficient way. Other economic factors may require that governments be larger than those envisioned by Tiebout in order to provide public services efficiently. Among these are interjurisdictional cost or benefit externalities, economies of scale in the production of public goods, and the administration and compliance costs of government itself. The importance of these factors is not equal for all types of subnational government services. Accordingly, Wallace Oates argued "It would be extremely desirable to find a mechanism to reduce the inefficiencies that arise from an imperfect correspondence in the provision of public goods."[3] The issue, then, is what structure – size and number – for subnational governments works best to provide each type of service. Alternatively, once a federal system of national and subnational government is in place, the issue is which level of government in the federal system ought to have responsibility for each service.

Economic issues of fiscal federalism

Variations in demand

The greater the variations in public service demanded by individual consumers and the more consumers with similar demands group together, the stronger the case for decentralized provision – that is, for having many small local governments. If all consumers desire the same amount and type of service, then there is no reason for more than one government. Conversely, if a single government serves consumers with different demands for government service, many of those consumers will be dissatisfied because the amount of service provided by the government may be different than the amount desired. That dissatisfaction translates into less happiness or welfare for those consumers than they would obtain in a community of consumers with like demands. More governments are required to satisfy a larger number of desired amounts of government service. More government means smaller ones or provision at the most decentralized level of a federal system.

The existence of different demands for government service is not sufficient to justify decentralized provision unless consumers with similar demands are, or can be, located geographically together. Two separate government jurisdictions would not help unless those

with the same demand are geographically close. If consumers can freely change residential location, then the advantage of decentralized government is strengthened, as Tiebout emphasized.

Spatial externalities

A **spatial externality** (often called a "spillover") occurs when the distribution of the costs or benefits of government services is not confined to the jurisdiction boundaries of the providing government. Nonresidents either pay part of the costs or enjoy part of the benefits of a government's service. Spatial externalities can cause a government's choice about taxes and spending to be inefficient from the viewpoint of the entire society. If there is a spillover of costs, residents underestimate the true social cost and demand too much of the good or service, whereas a spillover of benefits causes residents to underestimate the true social benefit and demand too little. Of course, there can be simultaneous spillovers of costs and benefits, with the effect on the efficiency of provision depending on the relative size of each.[4]

Examples are common. When a nonresident landlord bears part of a city's property tax burden or a city's business property taxes are passed on to buyers of the product, some of whom are nonresidents, there is a spillover of local tax costs. When a nonresident drives on the city's streets and finds traffic flowing smoothly and safely, there is a spillover of the city's transportation and public safety benefits. Or when a student is educated at public expense in the city and emigrates to another state or town, there is a spillover of educational service.

The classic economic solution to any externality problem is to internalize the externality – that is, to force the decision maker to consider the true social costs and benefits. A simple way to do this is to make the government's jurisdiction big enough to include all consumers who bear costs or enjoy benefits. If all consumers who benefit from services and pay taxes are residents, then there is no externality. The possibility of spatial externalities, then, can be a factor requiring a more centralized government structure composed of fewer, bigger subnational governments.

Spatial externalities are one reason it is often argued a central government can best carry out redistribution and stabilization policy. Expansionary fiscal policy by a state government to increase consumption would generate benefits in other jurisdictions where the consumer goods are produced. The state's residents would underestimate the benefits of that action and therefore fail to engage in an efficient amount of stabilization policy. Similarly, a state government is unable to internalize all the costs and benefits of an income redistribution policy. The mobility of consumers and openness of subnational government economies create the spillovers that limit subnational government effectiveness in these areas.

Economies of scale

In standard microeconomics, **economies of scale** refers to a decrease in average cost as the quantity of output rises. In reference to the optimal size for governments, the term usually refers to a decrease in cost per person for a public service as population served increases. For instance, economies of scale would exist if the per-pupil cost of achieving a given degree of education was smaller for a district with 5,000 pupils than one with 1,000. To put it another way, total cost or expenditure does not have to increase as much as population served to keep the service level constant. This concept of economies of scale is sometimes referred to as the **advantage of joint consumption**: individual consumers can reduce their costs by sharing the good and its total cost with others.

An example of a good for which joint consumption might reduce cost per person is a swimming pool. One household could purchase a swimming pool for its own use. That

household could also join together with another household to purchase the pool jointly, reducing the household cost by half. If the sharing of the pool does not reduce the benefits by half, then the household cost of a unit of swimming service is reduced. As a special case, suppose that both households can swim as much and as easily in the shared pool as in singly owned ones. In that case, the benefit of owning a shared pool is the same as a single one, but the cost is half as great.

Evidence is not conclusive about the existence of this type of economies of scale for the goods and services usually provided by state and local governments in the United States. Economies may exist for very small service populations but may quickly be exhausted, and the size where economies end is different for different services. The reasons most often given for potential economies are the elimination of duplication of inputs, increased coordination, and economies in purchasing. There are cases of services with capital-intensive production, such as water, sewer, electric, and gas utilities, for which substantial economies may exist. Indeed, consolidation to produce those services is common to avoid duplication of expensive capital structures. However, similar gains may be difficult for many subnational government services, which are very labor intensive.

In a classis analysis, Werner Hirsch (1970) divides government services into those that are horizontally integrated, which results when existing units engaging in one stage of production are under common control, and those that are vertically integrated, which occurs if production and distribution are jointly provided. Hirsch suggests that traditional services such as police and fire protection are examples of horizontally integrated services, with many production "plants" under control of one government; utility services such as water and electricity provision are examples of vertically integrated services. Using this characterization, Hirsch concludes that scale economies appear to be substantial for vertically integrated services but not important for horizontally integrated ones, noting "the average quasi-long-run cost function of horizontally integrated services tends to be reasonably horizontal over a wide range of operations" (p. 184). In another classic review of the literature, Roy Bahl and Walter Vogt (1975, 13–14) conclude:

> Most positive findings of scale economies are based on statistical results that show a negative relationship between population size and per capita expenditures. There are great statistical and theoretical problems with interpreting such results as showing scale economies, and about as many studies that find a negative relationship find a positive one.

In a recent examination of city and county consolidation, Pat Hardy (2012) reviews a number of studies of the cost effects of consolidation and finds little evidence of substantial economies of scale. He reports research showing that economies of scale for general-purpose local governments are likely exhausted after populations of 15,000 to 20,000.

Recent research regarding school districts suggests that scale economies are achieved at a district enrollment of about 2,000 students.[5] For example, Andrews et al. (2002, 255) provide a comprehensive review of research and conclude that "sizeable potential cost savings may exist by moving from a very small district (500 or less pupils) to a district with ca 2000–4000 pupils" but cautioning that "these cost function studies do not take into account the opportunity costs of increased travel time for students and parents." DeBoer et al. (2009) find that for Indiana school districts, per-student costs are minimized at a district size of about 1,950 students, with costs rising for larger sizes. Thus, even if economies of scale exist in the provision of local government services, the efficient scale seems to be quite small.

The existence of scale economies may not be relevant to optimal government size anyway if providing a public service can be separated from the production of that good or service. Scale economies arise in the production phase, whereas the primary role of the government

is to provide a given amount of the good or service. Governments too small to achieve all economies of scale on their own can contract for service provision with another government or with a private firm to achieve any economies of scale in production of services.

Suppose that economies of scale exist for garbage collection service up to 50,000 households served; that is, the per-household cost of a given quality of garbage collection (once per week, pickup at curb, trash bags required) is greater for a 25,000-household community than for larger ones. This might occur, for instance, if one standard garbage truck combined with one worker can serve exactly 50,000 households per week in this area. Communities with less than 50,000 households could find their truck idle for a portion of the week (unless they had some other use for it during those times or want to change the quantity of service to more frequent weekly pickups). This difficulty can be resolved without making all governments bigger to include 50,000 households. One possibility is for one 25,000-household community to lease their truck to another 25,000-household community for half of each week. Another is for one 25,000-household community to contract with another 25,000-household community to pick up its garbage, subject to specific quality conditions. Still another is for all communities too small to take advantage of the economies in production to contract with a private firm for garbage collection at a quality of service specified by each community.

Local governments in the United States commonly use intergovernmental service contracts (under which one government pays another to provide a carefully specified service), private-service contracts (a government pays a firm or nonprofit agency to provide a service), and joint-service agreements (under which two or more governments join in financing and producing a service). In the first two types of contracting, the contracting government retains decisions about service provision with production performed by the contractor; in the third case, both provision and production decisions are made jointly.

The International City/County Management Association periodically conducts surveys of local governments concerning use of intergovernmental service agreements and other forms of contracting. The survey in 1982 showed that slightly more than half of all cities and counties contracted with another government to provide some of their services and that a slightly larger percentage entered into joint-service agreements. By the 2017 survey, more than three-quarters of local governments reported using contracting. Among service responsibilities, 20 percent were provided through private sector contracts, 28 percent through intergovernmental contracts, and 10 percent through nonprofit organizations.

Joint purchasing agreements among local governments are also relatively common. Governments sometimes enter into joint agreements for collecting or enforcing taxes, such as a state government collecting sales or income taxes for a city. Some agreements provide joint or pooled borrowing of funds by localities to conserve on the fixed (transaction) costs of bond sales.

To the extent that such opportunities exist, scale economies are removed as an economic issue for the optimal size and structure of government. Contracting with private firms or other governments and joint purchasing agreements permit governments to provide the amount and type of services desired and achieve the cost advantage of scale economies in production. Each local government retains control over the amount of service to be consumed and finances the service by taxes or government fees, although the government does not directly produce the service.

Administration and compliance costs

A final reason for few subnational governments (and thus more centralization) is to conserve on the costs of administering those governments and the costs for individuals to participate

in the political process. **Administrative costs** include the compensation paid to elected and appointed officials and staff and the overhead (buildings, supplies, utilities) accumulated in support of those officials. **Compliance costs** include such things as citizen costs of becoming informed on issues and candidate positions and the potential cash and time costs of registering an opinion (by participating in hearings or voting, for instance). The existence of fewer subnational governments may reduce these costs.

Centralization will reduce administrative costs if there are economies of scale in administration of government, just as there may be economies in the production of public services. For instance, a set of small cities, each with a separate manager, finance director, and planning director is duplicative and might be administered with no loss of efficiency by a single set of those officers. Consolidating those governments into a larger unit could therefore reduce these costs. However, there is no guarantee that such opportunities will always, or even usually, exist. It could be just as likely that administrators become less effective the further removed they are from the people and operations they coordinate. In that case, **diseconomies of scale** result, with larger governments requiring proportionally more administrators (perhaps with more layers in the administrative hierarchy) to run as well as smaller ones. Depending on the service (or set of services) provided, administrative scale economies could be a factor in favor of more or less centralization.

A relatively centralized subnational government structure would reduce compliance costs only if the number of separate governments that each individual must deal with is reduced. For instance, if all city government functions are transferred to existing county governments, and each county encompasses several cities, then each resident of the county will be a member of one rather than two local governments. This may reduce compliance costs because voters must participate in only one election and become informed about one set of candidates.[6] In contrast, the consolidation of a set of school districts into one larger but independent district would not reduce compliance costs. Each individual would still be a member of one district. Similarly, the transfer of only one or two city-government functions to a higher-level government in the federal system, such as a county or state, would not reduce the number of separate governments serving each household and thus would not reduce compliance costs.

Optimal government size[7]

This section discusses a method for applying the economic issues described earlier to actual decisions about government organization and the allocation of service responsibilities among levels of government. After examining the theory of optimal government size, several applications of that theory to policy cases are considered.

The correspondence principle

Suppose that governments provide a number of different public goods (nonrival goods), with the benefits of each confined to a fixed and known geographic area. Some of these goods benefit the entire nation (or world), whereas others benefit only a subset of the nation (perhaps even as little as one household). For example, the defense advantages of a radar system can benefit the entire nation, whereas local fire protection services can be provided feasibly only in a specific area around its location, determined largely by response time. This type of public good, which can be simultaneously consumed in equal quantities by all but only in a limited spatial area, is often referred to as a **local public good**.

Suppose that the population has no mobility, that the average cost of producing public goods is independent of the number of people served (or the size of government), and that

there is some variation in the desired amounts of public goods among the population. Under these conditions, the optimal government structure is a separate government for each area of benefit from a public good. One central government can provide goods that simultaneously benefit all households, such as the defense radar system, and a set of separate subnational governments will provide each good that benefits only a limited area or number of households. Wallace Oates has called this result the **correspondence principle** because the size of a government corresponds to the area of benefit from the goods it provides. As a result, each public good is provided in the smallest (that is, lowest-level) government consistent with no externalities, often called the "decentralization theorem."

The correspondence principle generates a federal system of governments along a spectrum from many small local governments to one national government. Variation in desired amounts of public goods is necessary to justify subnational governments. Otherwise, it would be efficient to have one central government provide public goods to all using a number of different production plants. For instance, if all households desire the same amount of fire protection service, a national government could provide the function with many fire stations located throughout the nation. The reason to have each station operated by a separate government is to provide different amounts or types of service. However, the areas just consistent with no externalities may encompass households that desire different amounts of a good or service. Although the benefits of the radar system may go to all households in the nation, not all households may want the same amount of radar protection.[8]

Professor Oates and others have noted one important qualification to this correspondence principle.[9] Suppose that the national government or some more centralized jurisdiction than localities could provide local public goods at different quantities in different locations. In that case, providing different amounts or types of service would not require different local governments. Rather, a national or state government could be responsible for providing a service and select different levels for different cities (or even different neighborhoods). Of course, there may be political or legal restrictions that would prevent centralized governments from doing this. And even if feasible, it would still be necessary for the centralized level of government to discover the quantity or type of service desired in each local or decentralized area. Thus, even with this qualification, the value of decentralized provision still may be substantial.

Preferences versus spillovers

The possibly conflicting objectives of having governments big enough to avoid cost or benefit spillovers but small enough to allow uniform desired amounts of public service suggest a trade-off between those two factors. For each public good or service, the optimal-size government is the one that maximizes social welfare. As government size increases, the welfare gain from a reduced amount of spatial externality can be compared to the welfare loss due to increasing dissatisfaction among government members with the amount of public service selected. The optimal-size government for each service is the one for which the difference between the welfare gain and loss is greatest.

That choice of the optimal-size government for a given service is shown in Figure 6.1. The cost function represents the cost or welfare loss that results from combining individuals with different demands for public services as government size increases. The total cost rises as government size increases, and the marginal cost of increasing government size – represented graphically as the slope of the cost function – also increases as size increases. This occurs if the new residents added first as government size increases have demands most similar to the original residents. The benefit function depicts the benefit or welfare gain from the reduction of spatial externalities as government size increases. Those benefits also rise as size

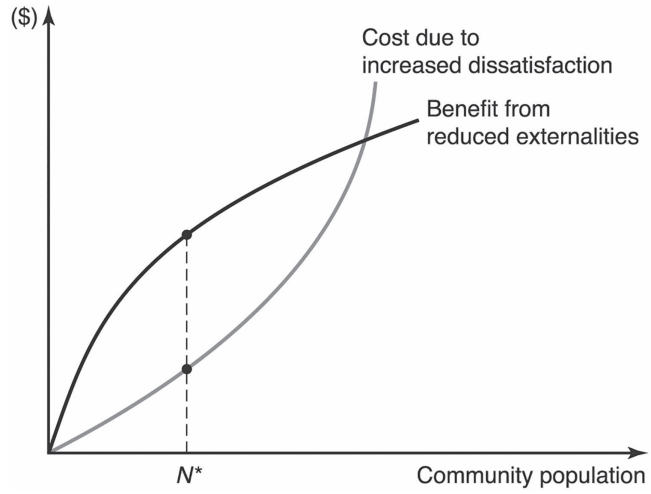


Figure 6.1 Optimal jurisdiction size for a service

increases, although the marginal benefit of increasing government size – represented by the slope of the benefit function – decreases. That is, the largest gains from reducing externalities occur from the initial actions to form or enlarge local governments. For a public good or service with these characteristics, the optimal population size is $N^{\star}$.[10]

The benefit and cost functions for other public goods and services are different, with a resulting change in the optimal size. For example, if the differences in desired amounts for another service were much greater than the case in Figure 6.1, the cost function would rotate up, reducing the optimal *N*. On the other hand, if the problems of spatial externalities for another good were less severe – that is, a larger fraction of the externality is eliminated at smaller government sizes – the benefit function would rotate down, and the optimal *N* would also decrease.[11]

In this manner, the optimal size government for every public good and service can be determined. Two examples are shown in Figure 6.2, one for a good requiring relatively small governments and one for a good with a larger optimal government. This analysis is fully correct only if governments of any size can achieve all economies of scale in production of these goods by outside contracting and joint purchase agreements. If such arrangements are not possible, then the government size determined by this approach is a minimum size, with a larger size being optimal if economies of scale can be achieved by expanding. Similarly, this analysis does not consider potential savings of administration and compliance costs, the issue to which we now turn.

Decision-making costs and clustering

If the optimal government size is determined by this procedure, it is likely that the optimal size will be different for each public good or service. As a result, as many levels of government would be required in a federal system as there are types of public goods and services. Every individual or household would be a member of that number of subnational governments. Such a structure may not be optimal, however, if consideration of the administration and compliance costs is added to the externality and preference issues.

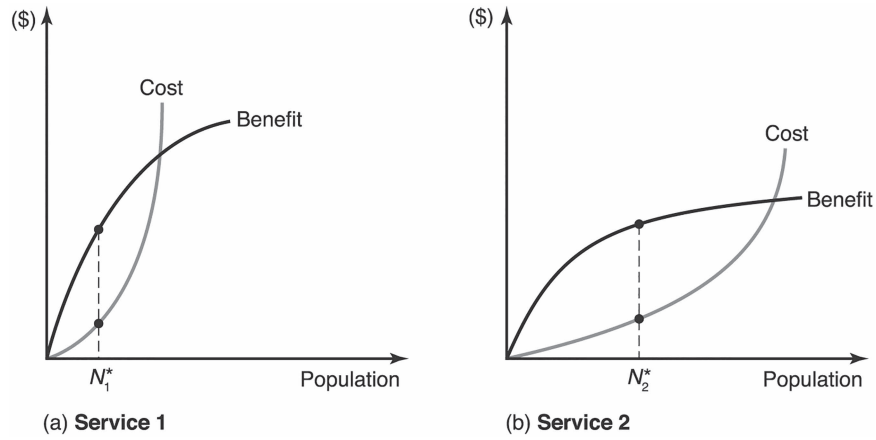


Figure 6.2 Optimal jurisdiction size for different services

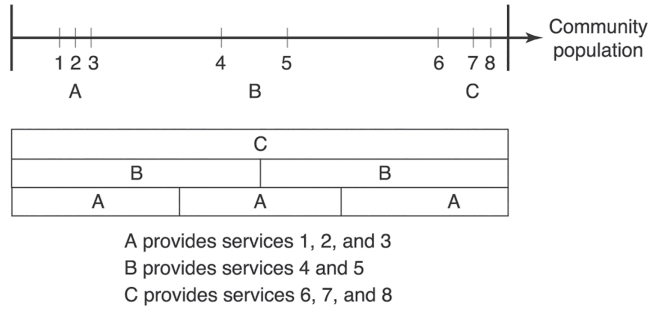


Figure 6.3 Clustering of jurisdictions by size

Suppose, for example, that government is to provide eight different public goods, which can be denoted 1, 2, 3, and so on. The optimal-size government to provide each is determined by comparing consumer welfare losses from grouping together consumers with different demands to the welfare gains from a reduction of spatial externalities, as described previously. Those optimal government sizes (measured by optimal population size N) are given in Figure 6.3. Good 1 requires the smallest size government, whereas, at the opposite end of the spectrum, Good 8 requires the largest. For instance, Goods 1, 2, and 3 might represent fire protection, recreation services, and water provision; Goods 4 and 5 might represent education and roads; and Goods 6, 7, and 8 might correspond to income redistribution, health regulation, and defense. Good 1 (fire protection) would be provided by many small local governments, whereas Good 8 (defense) would be provided by the federal government, with the other six provided by intermediate levels.

Oates (1972) suggests that it is possible to reduce administrative costs by clustering together goods with similar optimal sizes into single government units, reducing both the number of government layers and the number of separate governments in each layer. For the example shown in Figure 6.3, Goods 1, 2, and 3 might be clustered together for provision by government level A, Goods 4 and 5 by larger governments at level B, and Goods 6, 7, and 8 by the

federal government at level C. Rather than eight levels of government, there are only three, and rather than, say, five separate localities in the lowest level, there are three.

This looks suspiciously like the government structure in the United States and other federal nations where the levels are the federal, state, and local governments, although the local government level in reality is more complex than suggested by this example (see Chapter 1). Given that such a structure exists, the policy question is whether responsibility for providing the goods has been allocated properly.

International comparison: government structure in four federal nations

The four major industrialized nations listed in Table 6.1 have federal systems of government: a federation of autonomous states. In all these nations, the federal structure is important not only politically but also fiscally. States have some economic and fiscal responsibilities that are independent of the federal government, whereas other fiscal responsibilities are shared. The states establish or oversee local governments with which they share a fiscal relationship similar to that between the states and federal government. Thus, the term **fiscal federalism** reflects separate but intertwined levels of government.

Two large regions in both Australia and Canada are called "territories" rather than states, but in many fiscal respects, these areas operate similarly to states. The Australian Capital Territory, where the national capital, Canberra, is located, is similar in some ways to the District of Columbia in the United States. The Northern Territory in Australia and the Northwest and Yukon Territories in Canada also are similar to each other. All are large but sparsely populated regions with severe climates and geography. Although called by the same name, these are very different from the US territories, such as Puerto Rico and the Virgin Islands.

Although the overall structure in these four nations is similar, the number, and thus average size, of subnational governments differs substantially. Australia and Canada are geographically large areas with relatively small populations. Although they have many fewer states than the United States, the average population in those states still is substantially less than in the United States – 4.3 million in Australia and 3.7 million in Canada compared to 6.6 million in the United States. States in Germany also average more than 5 million people; although the population of Germany is about one-quarter of that of the United States, so is the number of states.

The number of local governments seems directly related to population, with more localities in those nations with larger populations. The United States has the most fragmented local government structure, with the largest number of localities even after adjusting for population. There are about 27 local governments for every 100,000 people in the United States compared to 19 in Germany, 10 in Canada, and only 2 in Australia.

Table 6.1 Government structure of four federal nations

Nation	*Population (millions)*	*Area (thousand sq. miles)*	*States*	*Territories*	*Local governments*
United States of America	331.0	3,718	50 (states)	5	90,000
Commonwealth of Australia	25.5	2,967	6 (states)	2	565
Canada	37.7	3,855	10 (provinces)	2	3,800
Federal Republic of Germany	83.8	138	16 (*länder*)	–	16,000

Source: US Census Bureau, Australian Local Government Association, Federation of Canadian Municipalities, City-Mayors.com

Policy applications and cases

Applying these principles in practice to the issue of proper allocation of service responsibility among levels of government in a federal system usually comes down to a comparison of the importance of "local autonomy" versus concern about externalities, usually expressed as "what's best for all concerned."

Consider a proposal to consolidate all local police departments into one metropolitan-area police authority. Because local governments would continue to provide other services, there would be no savings of compliance costs. There appear to be few economies of scale to be achieved, and if they do exist, they may be captured without consolidation by cooperative agreements. Those opposing the consolidation would argue that local control would be lost, suggesting the concern that the consolidated authority would not provide the type or amount of police service the local department does. This concern is multiplied if there are varied types of communities and police departments in the area. Those in favor of consolidation would argue that public safety is a metropolitan-area problem and that criminals do not recognize local government boundaries, perhaps even that the amount of police protection in some communities is "too low" and that public safety is "too important to be left to localities."

This is a familiar refrain to those with experience in local government. It is repeated in debates over all types of public services. Primary and secondary education ought to be a state government function because the benefits of an educated citizenry accrue to all and because everyone has an interest in ensuring that all students receive some minimum amount and type of education. Or primary and secondary education should be a local function because each community knows what type of education is best for its students and because it would be dangerous to allow state bureaucrats to determine what students should learn. If the issues and principles involved are clear, the best way to measure the importance of these factors in actual cases often is not. Practical cases involving K–12 education are reported next.

School district consolidation in New York: Greene and Parliament's study[12]

Kenneth Greene and Thomas Parliament (1980) measured the potential welfare losses that could result from consolidation of 12 separate school districts into one countywide district in Broome County, New York. Following the approach in this chapter and Chapter 5, welfare losses occur because the single amount of education to be provided by the consolidated district may be different than the amounts provided in many (or perhaps all) the separate districts. If households are consuming their desired amounts of education service in each separate district, then consolidation would force some households to consume other than their desired amounts and suffer welfare losses. If consolidation were a good idea, these measured welfare losses would have to be offset by gains from fewer externalities or scale economies.

Following the median voter model, Greene and Parliament suggest that every household in each separate district may not be consuming the desired amount of education service. Because of costs and barriers to mobility, homogeneity of demand in each district is not expected. In that case, consolidation of education services will make some consumers better off by moving them closer to their desired amount of service. Thus, the potential welfare losses from consolidation are smaller than if one assumes a perfect Tiebout world to start.

Greene and Parliament's approach is represented in Figure 6.4, which shows the demands for education for three types of households in one of the separate school districts. The amount of education expenditure is selected by majority vote, so the median amount E_B is chosen. Group A prefers less education expenditure while Group C prefers more. The current welfare loss, because A and C are not consuming their desired amounts, is represented by areas *RST* plus *SUW*, which measure the loss of consumer surplus for these groups.

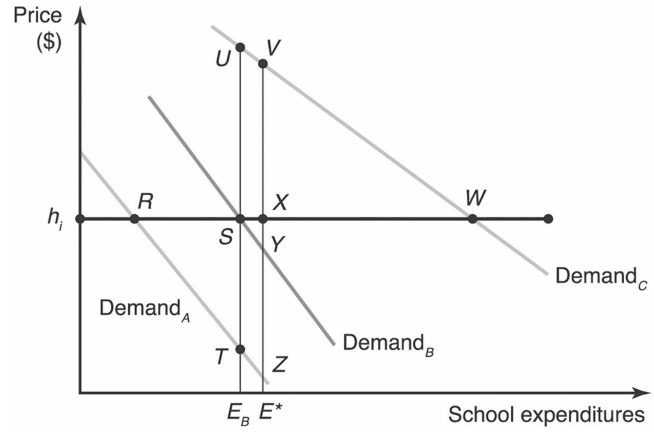


Figure 6.4 Welfare effects of school district consolidation

Now suppose that consolidation occurs, and the amount of expenditure chosen is the efficient amount of expenditure, $E^\star$. Group A is made even worse off because the new expenditure is even further from its desired amount. Group B is also worse off because it no longer exactly consumes the desired expenditure. Group C, however, is made *better off* because the new expenditure is closer to the desired one. The change in welfare due to consolidation is represented by area $SUVX - SXTZ - SXY$. This term may be positive or negative. If it is positive, it means that consolidation has *increased* welfare because the gain to Group C offset the losses to Groups A and B. The issue is whether consolidation moves the community toward the efficient level, $E^\star$, because at this level consumer surplus is maximized.

Greene and Parliament attempt to measure these welfare changes by estimating a demand curve for education statistically based on all school districts in New York and then using that demand curve to predict both the amount of education expenditure that would be selected in the consolidated district and the desired amount for different income households. This demand function, in combination with assumptions about the distribution of tax burdens by income, is used to measure the loss of consumer surplus for each of seven income households in each separate district.

The average welfare loss for all 12 school districts operating independently is $67 per capita if no tax exporting is assumed or $22 per capita if there is substantial tax exporting. If all 12 districts are consolidated, the welfare losses increase to $116 per capita with no tax exporting or $63 with tax exporting. The change in welfare losses caused by consolidation – that is, the political cost of consolidation because households with greater differences in desired expenditures are grouped together – is then $49 per capita if no tax exporting is assumed or $41 with substantial tax exporting. If consolidation is to be economically desirable, cost or welfare savings of that magnitude, perhaps from scale economies or reduced externalities, must be gained by the consolidation.

School district consolidation in New York: Duncombe and Yinger's study[13]

All local government consolidations may not lead to welfare losses, however, depending on the differences that exist between localities before consolidation and the effects of the

combination itself. If there are such welfare costs, they may be more than offset by gains in productive efficiency or economies of scale. Those are precisely the results obtained in a study by William Duncombe and John Yinger, who also explore school district consolidation in New York.

Duncombe and Yinger focus on 12 consolidations that occurred between 1987 and 1995 among rural districts. They explore the changes in those districts after consolidation and compare those changes to a control group of 190 similar rural districts that did not consolidate. Among their major findings, one is that the consumer welfare or consumer surplus losses due to changes in school spending from consolidation among these districts were very small. A primary reason is that consolidation may change not only the actual level of education spending or service provided but also the desired levels of spending or service by the residents of the consolidating areas. In the cases examined, the lower-spending district before consolidation also had the smaller per-student tax base (and thus a higher tax price for education service). Consolidation has the effect of lowering the tax price for residents of the lower-spending district, and the lower price induces those individuals to demand a larger quantity of service. Residents of the higher-spending district before consolidation see their tax prices rise by combining districts, which reduces their desired level of service. In this case, consolidation moved desired spending levels closer together and reduced any potential consumer welfare losses from the changes in actual school spending.

In addition, Duncombe and Yinger find substantial evidence of economies of scale for both operating and capital spending among these smaller rural school districts. They report "doubling enrollment [which results if two 300-pupil districts combine] cuts total costs per pupil by 28 percent for a 300-pupil district and by 9 percent for a 1,500 pupil district" (Duncombe and Yinger, 2003). They also find economies of scale (per-student costs decline as enrollment increases) for transportation and capital costs, although capital costs initially rise (as adjustment to the consolidation occurs) and then subsequently fall. Indeed, the simple fact that these districts elected to consolidate suggests that the gains from productive efficiency and lower costs were large enough to offset any potential losses due to different desired levels of spending or capital adjustment costs. Otherwise, voters in these districts would likely not have approved the consolidations.

School district consolidation in Iowa: Gordon and Knight's research[14]

School consolidations may be driven by forces external to districts and may not lead to welfare gains or losses, as research by Nora Gordon and Brian Knight shows concerning consolidations among Iowa school districts in the 1990s. Districts initially were offered financial incentives from the state to engage in "whole-grade sharing" in which one district might provide high school and the other junior high school for students from both districts. Then, beginning in 1991, the state government provided districts incentives in the form of lower property tax rates and higher state per-pupil aid if they had complete consolidation, although these incentives were limited to districts with fewer than 600 students.

Applying a sophisticated econometric approach, Gordon and Knight (2009) found that the state financial incentives were the primary reason districts merged along with a hope to achieve economies of scale. Consolidation was most common among districts that were geographically close, indeed sharing a border. However, fiscal and social differences between districts tended not to be important factors discouraging consolidations, as economic analysis suggests. Districts seemingly believed the financial incentives and potential cost savings offset any demand differences.

As a result of grade sharing or full consolidation, Gordon and Knight (2008) reported that expenditures increased in the consolidated districts as a consequence of increased state aid, and district financial surpluses increased, but there was no effect on total enrolment, class sizes (pupil-teacher ratio), or dropout rates. The economies of scale the state and districts were looking for apparently did not materialize. The authors conclude, "[T]hese findings suggest an absence of efficiency gains from either whole-grade sharing or consolidation." Unlike the New York cases, demand differences did not restrain consolidation or lead to efficiency costs, but economies of scale were not achieved either.

Government organization trends in the United States

Three important trends have marked the changing structure of US local government. The number of independent school districts has decreased substantially (so districts have gotten larger on average), the number of new special districts (local governments established for a single function in most cases) has increased dramatically, and community and homeowner associations (essentially private local governments) also have increased.

Independent school districts declined from 15,800 in 1972 to 12,754 in 2017, continuing a trend that began in the 1940s (there were more than 115,000 school districts in 1940). Special districts, what the US Census Bureau defines as "established to provide only one or a limited number of designated services (functions) and have sufficient administrative and fiscal autonomy to qualify as independent governments," increased from 23,855 in 1972 to 38,542 in 2017, growth of more than 60 percent in 45 years.

Although a number of factors have influenced these changes, the conceptual framework discussed in this chapter provides some understanding. More centralization has been the story in the case of education, and not just the fewer, larger local school districts noted here but also a relatively greater role for state governments, as discussed in Chapter 17. Two factors might contribute to centralization: an attempt to reduce costs through economies of scale and concern about the social or external effects of education that might be better addressed by broader governments. The latter seems to have been the more significant driving force, as concern about disparities in educational spending and results and focus on increasing educational standards have been prominent in changing educational policy in the United States since the 1970s.

For other local government services, the changes are consistent with a focus on meeting differences in demand for public services more efficiently. Special districts are established in most cases to provide a single service over a geographic area that typically encompasses multiple municipalities and even counties. The analysis depicted in Figure 6.3 suggests a different geographic area for each service. If services are not to be clustered together in just a few levels of government, then special districts provide a structure with separate governments for each service, whose benefits may overlap regular boundaries. For instance, public transportation might be provided by a regional transit district, which can include all the users, rather than by individual counties or cities. Indeed, the most common functions for special districts in 2017 are water and sewer provision (17 percent), fire protection (16 percent), and drainage and water conservation (8 percent). However, there is also some belief that special districts are sometimes a means of avoiding political restrictions or limitations imposed on general-purpose localities, especially tax or borrowing limits, and proliferation of differential local governments may make it more difficult for citizens to understand and interact with localities.

Community and homeowner associations may serve two functions principally. They can be a method of enforcing Tiebout-like homogeneity even within municipalities, and they

can be a means of providing complements to traditional local government services. For instance, if a group of residents prefers additional public safety service beyond that provided by the city, a neighborhood association can collect a fee and hire a private security service to supplement the city police. In essence, the public service provided by the local government is a minimum that can be augmented by private associations. Thus, the existence of private associations may affect how individuals vote regarding fiscal choices.[15]

Summary

The greater the variations in what individual consumers want from government and the more consumers with similar wants are grouped together, the stronger the case for decentralized provision – that is, for having many small local governments.

The correspondence principle requires that the size of a government correspond to the area of benefit from the goods it provides. As a result, each public good is provided in the smallest (that is, lowest-level) government consistent with no externalities.

The possibly conflicting objectives of having governments big enough to avoid cost or benefit spillovers but small enough to allow uniform desired amounts of public service suggest a trade-off between those two factors. The optimal-size government for each service is the one for which the difference between the welfare gain from fewer externalities and the loss from greater demand variety is greatest.

In reference to the optimal size for governments, economies of scale usually refer to a decrease in cost per person for a given amount of service as population served increases. Governments too small to achieve all economies of scale on their own can nevertheless take advantage of those economies by purchasing the good or service from governments or private firms that are large enough to exhaust all economies.

A final economic factor that may be a reason for few subnational governments (and thus more centralization) is to conserve on the direct costs of administering those governments and the costs to individuals of participating in the political process.

It may be possible to reduce decision-making costs by clustering together goods with similar optimal sizes into single-government units, reducing both the number of layers of government and the number of separate governments in each layer.

Application of these principles to the practical issue of the allocation of service responsibility among levels of government in a federal system usually comes down to a comparison of the importance of "local autonomy" to concern about externalities, usually expressed as "what's best for all concerned."

Discussion questions

1 "Unless there are economies of scale in the production of government goods and services, they should always be provided by the smallest available government units (that is, the lowest-level government in a federal hierarchy)." Evaluate this position.

2 Suppose it is proposed to create a single local jurisdiction and government for your entire metropolitan area or region, to be called Metroland. It would replace all cities and/or towns that currently provide basic local services (such as public safety, streets, and recreation services).

   (a) Make the economic case *for* this consolidation into a metropolitan-area government. (There are at least three potentially favorable economic reasons.)
   (b) Now suppose you were hired as an economic consultant to advise about this change, and your research uncovers four facts: (i) currently, there is a big difference in per

capita spending among the municipalities to be consolidated, from $2,000 at the top to $500; (ii) the variance in per capita income for people living in the area is relatively large; (iii) there is a relatively small variance in per capita income within each of the municipalities; and (iv) currently, many of these municipalities contract with the county (or state) government to have some services (such as jails, emergency dispatch, and parks) provided. Do these facts support or argue against the proposed consolidation? Explain your reasoning for each factor.

3 In the United States, primary and secondary education is usually provided by local government, although partly financed by state government grants. As a result, there are often substantial differences in the quantity and quality of education offered by different schools, even in the same state. Yet in Hawaii, education is a state government function. Similarly, in Australia, which has a federal structure similar to that in the United States, primary and secondary education are provided by the states. And in some US states, such as Michigan, New Mexico, and Washington, the state government dominates and provides a substantial majority of the financing for schools, reducing local differences. What reasons might a state government offer to support a proposal to transfer education from a local to a state responsibility? Why might some individuals oppose such a transfer? Discuss how those reasons might lead one state or nation to select local provision while others opt for state provision. Would you favor such a transfer (or the opposite) in your case?

Notes

1 "Technology and the Future of Cities." Report to the President, Executive Office of the President, February 2016.
2 For example, see https://www2.deloitte.com/content/dam/insights/us/articles/government-trends-2020/DI_Government-Trends-2020.pdf and www.governing.com/next/Coronavirus-Has-Potential-to-Reshape-Government-Technology.html.
3 Wallace E. Oates, *Fiscal Federalism* (New York: Harcourt Brace Jovanovich, 1972), 53.
4 Reciprocal externalities may also occur – that is, both spillouts of costs and benefits from and spillins to a jurisdiction. Wallace Oates (1972) shows that such a condition is also likely to result in an inefficient allocation of resources.
5 See Andrews et al. (2002), DeBoer et al. (2009), and Faulk and Hicks (2011).
6 The gain from this example may be exaggerated. City and county elections may be held at the same time and place, and the ballot for the consolidated county election may be longer.
7 This section is based on Oates (1972).
8 The correspondence principle applies best to goods and services that provide only direct benefits in a defined spatial area. If individuals benefit from the existence of a service, even if they do not use it directly, then the benefits can be dispersed throughout a wide area, even the nation. For instance, some individuals might want to have the option of using another state's parks, even if they do not do so now.
9 See Oates (2006) and Besley and Coate (2003).
10 If the population is not mobile, then population size translates directly to a spatial area.
11 Note that the origin of each function should not change.
12 This example is from Greene and Parliament (1980).
13 This example is from Duncombe and Yinger (2003).
14 See Gordon and Knight (2008) and Gordon and Knight (2009).
15 Individuals commonly augment public services with private purchases, such as door locks or student tutoring, but with private associations, these purchases are made jointly rather than individually.

Selected readings

Chernick, Howard, Adam H. Langley, and Andrew Reschovsky. "Comparing Central City Finances Using Fiscally Standardized Cities." *Journal of Comparative Policy Analysis: Research and Practice*, 17:4 (2015): 430–440.

Fisher, Ronald C., and Robert W. Wassmer. "Economic Influences on the Structure of Local Government in US Metropolitan Areas." *Journal of Urban Economics*, *43* (1998): 444–471.

Martinez-Vazquez, Jorge, Mark Rider, and Mary Beth Walker. "Race and the Structure of Local Government." *Journal of Urban Economics*, *41* (1997): 281–300.

Oates, Wallace E. *Fiscal Federalism*. New York: Harcourt Brace Jovanovich, 1972. See especially Chapter 2.

Oates, Wallace E. "Local Government: An Economic Perspective." In *The Property Tax and Local Autonomy*, edited by Michael Bell, David Brunori, and Joan Youngman, 9–26. Cambridge, MA: Lincoln Institute of Land Policy, 2010.

Part III

Provision of state and local goods and services

This section covers the economic theory and evidence of the supply of goods and services usually provided by state and local governments in the United States. The central issue is how the important economic factors that determine supply – prices of those goods and services, prices of factors of production, incentives provided by markets and the governmental structure, and production technology – influence the amount of those goods and services produced and how they are produced. Among the questions to be considered are these: How important are labor costs for subnational governments? Are there alternative ways of producing government services to hold down costs without sacrificing quality? How does the financing method – through taxes, grants, borrowing, or user fees – make a difference? How do incentives provided by the federal government through grants or tax policy affect state-local supply decisions?

In the process of supplying goods and services, the state-local government sector also influences the macro economy. The historical results of state-local budgeting and fiscal policy, including the pattern of surpluses or deficits and the response to periods of national recession or economic growth, are noted in Chapter 7. The Great Recession and the pandemic period as a result of COVID were times of dramatic disruption for the national economy, and so both the effect of recessions on the state-local sector and the response of state and local governments are examined.

The method of financing state and local government goods and services obviously can affect the amount of those goods and services produced, so the effects of user charges, intergovernmental grants, and borrowing are considered in this section. The characteristics of services for which user-charge financing or borrowing is most appropriate and the ways in which user-charge financing or borrowing can improve the efficiency and fairness of subnational government provision are discussed. Borrowing is directly tied to capital investment, the building and maintaining of public infrastructure, which is explored in Chapter 10. Intergovernmental grants, which serve to affect the prices of goods or services and the resources available to a community, are evaluated as a method of influencing spending and taxing decisions of subnational governments. The potential purposes for grants are presented and matched to the expected effects of grants of different types.

Of course, no discussion of the supply of any commodity can go forward without first specifying the commodity and how it will be measured. This seemingly straightforward task, however, is fraught with difficulties for many of the services provided by government. What, for instance, is the appropriate measure of service provided by local schools or a city police department? Although the amounts of money spent on those functions – expenditures – are the most readily available and commonly used measure of the quantity of service, that measure often is not informative. Additional expenditures that do not translate into more educated students or a safer environment may not represent more "service." Throughout this section of the book, and particularly in Chapter 7, the problems of appropriately measuring service and the limitations of using expenditures as that measure are emphasized.

DOI: 10.4324/9781003030645-9

7 Supply of state and local goods and services

Headlines[1]

"State governments, local governments (including not only cities but also counties, towns and school districts) and public colleges in aggregate employ almost 19 million people, one in seven of all workers nationally. (It was nearly 20 million before the recession, but more than 1 million already have lost jobs.) More people work for these governments than in manufacturing, construction, leisure and hospitality, and retail and wholesale trade."

In January 2021, state-local government employment was about 1.2 million less than in January 2020, before the recession induced by the pandemic. More than 60 percent of this decrease – 760,000 – was workers for local schools, including especially those in food service, transportation, building maintenance, counseling, and other support services. It is possible that these and other state-local government jobs will return when the pandemic ends and schools are in person again. However, it is also possible that state and local governments will discover or advance alternatives to employees to deliver service.

"John Mahalis of Philadelphia was two and a half months from qualifying for his full pension when he learned that he would be permanently laid off from his job as a toll collector on the Pennsylvania Turnpike. . . . The job evaporated overnight when the Pennsylvania Turnpike Commission, struggling during the coronavirus pandemic, decided in June to move up its plan to . . . replace them with electronic tolling."

Data availability

There are two main sources of data about state-local government employment. The Bureau of Labor Statistics (part of the US Department of Labor) reports monthly data about the number of payroll employees in various industries, including both state and local governments (www.bls.gov/). The data for both are separated into workers in education and those in other functions. This measure of state and local employment is national (for all states) and does not show employment by state. This is the most current employment information as it is released each month for the prior month.

However, the US Census Bureau collects and reports annual employment and payroll data for state and local governments in each state both in total and for various functional categories (www.census.gov/programs-surveys/apes.html). This information is made available with about a six-month lag. (The 2019 data were released in June 2020.) Although not as current as the BLS data, the census data are much more

DOI: 10.4324/9781003030645-10

detailed as they include both full- and part-time employment and payroll by state and by governmental function (education, police, fire, hospitals, corrections, and more). The data are collected for March of the reporting year. The payroll amounts for March multiplied by 12 provide an estimate of annual labor expenses for state and local governments.

Although current expense for employees is a major component of state-local government costs, these governments also incur deferred labor expenses for employee retirement. The Center for Retirement Research at Boston College has a collaborative venture to provide data and analysis encompassing all public employee retirement plans (https://crr.bc.edu/special-projects/state-local-pension-plans/). The Center provides information not just about the overall financial status of public employee retirement plans but detail about plan assumptions and forecasts, investments, anticipated payouts, and more.

Data about the financial status of state and local governments is available from several sources. The US Bureau of Economic Analysis, which is the federal government agency responsible for measuring macroeconomic data, reports data about current receipts, current expenditures, net saving, and other macroeconomic measures for state and local governments on a quarterly basis (https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=3&isuri=1&1921=survey&1903=86). The National Association of State Budget Officers (www.nasbo.org/home) provides data (current and historical) for fiscal balances and legislative changes in revenue and budgets for state governments. The annual report *Fiscal Survey of States* (www.nasbo.org/reports-data/fiscal-survey-of-states) is particularly important.

In economics, analysis of supply is essentially an analysis of production cost. The cost of producing alternative amounts of output, combined with the structure of the market, determines how producers behave. Similarly, the costs of producing services provided by state-local governments, the components of cost, and the factors that affect those costs are crucial for understanding and comparing the fiscal behavior of subnational governments. Of course, costs must be combined with demand to determine fiscal outcomes. David Bradford and colleagues note ". . . programs designed to expand the quantity of existing services to meet the needs of an expanding population or . . . to improve the quality of these public services mean additional expenditures over and above those resulting from the seemingly inexorable rise in costs per unit of output."[2]

In order to discuss production technology and cost, a definition and measure of the good or service produced is necessary. This is not straightforward for many services, including those provided by state-local governments. Education is the dominant subnational government service in the United States, so is education output to be measured by dollars spent per pupil, by the number of graduating students, by student test scores, or by some other measure? The way to increase each of these alternative measures of education may be different, so the cost of producing "more" of each may vary and even depend on different factors. The first task in this chapter, then, is to consider alternative ways to characterize the output of state and local government services so that "cost" and the factors that affect cost (and thus supply) may be understood.

Measurement and production of government services

Production function[3]

To produce services, state-local governments purchase inputs, including labor services, capital goods, materials, and supplies, and combine them to provide public facilities or what can

be called **"directly produced" output**, such as police patrols or classrooms with teachers and books. The ways in which inputs can be combined to produce this type of output are referred to as **technology** and can be represented mathematically by a **production function**. For instance, the directly produced education output is a function of the number of teachers and administrators; the number of buildings and classrooms; and the number of books, desks, and other equipment provided. Mathematically, one can write

$$Q = q(L, K, X)$$

where
Q = directly produced output
L = labor input
K = capital input
X = the set of other inputs such as materials and supplies.

The $q()$ function represents production technology. Any given amount of directly produced output usually can be produced by different combinations of inputs – that is, there is usually more than one way to combine inputs to produce a service. The production function $q()$ does not specify a unique input combination for each output but rather the possible input combinations to produce each level of output.

The cost of producing any amount of directly produced output depends on the production technology and the prices of the required inputs. Economists usually assume that for each possible level of output, producers select the combination of inputs that will produce the chosen output at lowest cost.[4] For instance, if L_1, K_1, and X_1 are the amounts of inputs that will produce output Q_1 at lowest cost, then the

$$\text{cost of } Q_1 = wL_1 + rK_1 + pX_1$$

where
w = the price of labor
r = the price of capital
p = the set of prices for the other inputs.

This cost of the directly produced output is also the expenditure of the government on this service.

The public facilities or directly produced outputs provided by state-local governments may not reflect the services desired by consumers, however. Citizens often are more concerned about results than production; for instance, the education output of interest is knowledge and skills acquired rather than merely the number of classroom hours per year. The service result, which is what individuals consume or use, depends on both the directly produced output provided by the government and the characteristics of the community and the population. For example, an equal number of classroom hours, teachers, and books will not necessarily produce an equal amount of learning in districts with different numbers and types of students. It is useful, therefore, to distinguish **consumer output**, or the final result for consumers, from the directly produced output or facilities. Mathematically,

$$G = g(Q, X, N, E)$$

where
G = consumer output
X = private goods purchased directly by individuals

N = population to be served
E = environment, a set of community and population characteristics
$g(\ )$ = transformation function from output to results.

The "cost" of producing more directly produced output Q is different from the "cost" of producing more consumer output G. The latter depends on private consumption by residents and on community characteristics E and N, which are often outside the direct control of the state or local government. Private consumption may raise G if individuals purchase goods or services that contribute to the public service, such as private education or locks or smoke detectors; private consumption might reduce G if consumption imposes greater burdens on the public service, such as with consumption of alcohol and drunken driving. Changes in population or the environment may require a larger Q, just to keep G constant. For instance, to reduce class size from 25 to 20 students requires 25 percent more teachers and classrooms (assuming teacher workload and school operating hours are to remain the same), but such a change may not provide a 25 percent increase in "learning" per student; indeed, it may not increase "learning" at all!

This discussion suggests that the output of state-local governments can be measured in three different, broad ways. Output can be measured by the amount of money spent by a government on a service, what is referred to as expenditure, which is really a measure of the inputs used by the government in the production process. Alternatively, government service may be measured by the amount of directly produced output provided by the government. Finally, government service may be measured by results, by the level of consumption enjoyed by citizens.

Examples of how these three different measurement concepts can be applied to specific state-local government services are shown in Table 7.1. Fire protection services, for instance, may be measured by the amount of money spent on firefighters, stations, trucks, and other inputs; by the number of hydrants and stations per square mile; or by some mix of the number of fires (prevention) and damage per fire (suppression). Similarly, police protection services may be measured by expenditures on officers, vehicles, jails, and other inputs; by

Table 7.1 Sample output measures for selected state-local services

Service	*Inputs*	*Direct outputs*	*Consumption*
Fire Protection	Firefighters; inspectors; stations; trucks; equipment; water supply	Stations per square mile; firefighters per station; trucks per station; hydrants per square mile	Fire prevention and suppression: number of fires per household or firm; damage ($) per fire; civilian fire deaths per fire; fire insurance rates
Police Protection	Patrol officers; supervisory officers; stations; vehicles; electronic equipment; jails; weapons	Stations per square mile; number of patrols (or patrol officers) per square mile; number of intersections with traffic control; number of jail cells per capita	Crime prevention and resolution; crimes per capita (perhaps by type); civilian deaths or injuries from crime; amount ($) of stolen goods; arrests per crime; crimes solved per reported crime
Education	Teachers; books; computers; buildings; classrooms; desks; internet access	Teachers, books, or computers per student; classroom hours per year; class size; number of subjects taught	Knowledge and skills; average and/or variance of test scores; percent graduating in x years; percent attending college; percent employed after x years; added earnings

the number of police patrols per square mile; or by the number of arrests and crimes solved. Similar measures can be devised for every service function or responsibility of state-local governments. But which measure is best? Perhaps more appropriately, how do the measures differ in the information they provide?

Expenditures compared to produced output

Directly produced output of a service can fall even if expenditures are constant or even increasing. Similarly, two different subnational jurisdictions providing equal per capita expenditures on a particular function may result in different produced outputs for that service.

Expenditures equal costs, and costs depend on both the amount of inputs used and the prices of those inputs. If the prices of inputs rise, then it will cost governments more to provide the same produced output. Of course, governments may select a different production technology if relative input prices change – using relatively less of those inputs whose prices increase the most – but even then, total cost for every amount of directly produced output will increase, although perhaps by less than if the government did not alter production methods. It follows that if input prices differ for subnational jurisdictions, equal expenditures do not necessarily translate into equal produced output. Simply put, if teachers of the same quality cost more in one state than in another (and all other inputs cost the same), equal per-pupil expenditures in the two states translate into larger class sizes or less of some other input (books, for example) in the state with higher wages.

These implications are very important because expenditures are the most commonly used measure of subnational government output, at least for comparisons over time and among different jurisdictions. Over time, increases in input prices require increased expenditures unless directly produced output is to fall or new technologies for producing those services can be found. One can attempt to allow for changing input prices over time by deflating aggregate government expenditure data with a price index, usually the gross national product (GNP) implicit price deflator, which is separately available for federal and state-local government expenditures. For comparisons among different jurisdictions, however, no such general correction is available. This is important because land prices and labor prices appear to vary widely at different locations, and both inputs are purchased in substantial amounts by state-local governments.

Produced output compared to consumption (results)

The consumption or result of a particular service could decline or worsen even though a government provides constant or even increasing direct output. Indeed, even if two governments provide equal directly produced output, citizens in those jurisdictions may receive different results or benefits as consumers.

The consumer result, which results from a given amount of directly produced output, also depends on private consumption and the environmental characteristics of the community and population. Between two cities with identical fire departments, one might expect more fires and more serious fires in the city with fewer smoke detectors, older buildings, or more wooden (as opposed to metal or brick) buildings. Equal fire protection in both cities may require more directly produced output in one city – perhaps fire stations closer together, more pumper trucks per capita, or a more aggressive fire-inspection program. Similarly, as environmental conditions change over time, changes in directly produced outputs will be needed if consumer results are to remain the same. Of course, the environment can change in a positive way over time as well, requiring less produced output to maintain consumer results. For instance, if building materials and technology mean that newer buildings are at

lesser risk from fire or if individuals more commonly keep fire extinguishers at hand, then the amount of directly produced fire-protection output consistent with constant fire protection could decline.

Thus, there are four reasons why government expenditures may not be very good measures of the ultimate benefits received by consumers from government production. Differences among jurisdictions or changes over time in (1) production technology, (2) input prices, (3) community environmental characteristics, and (4) private consumption patterns all can affect that relationship. For instance, rising expenditures may be sufficient to maintain constant produced output, given rising input prices, but a deteriorating environment may require increased produced output to maintain results. Thus, rising expenditures may be consistent with declining results or service quality. The opposite also may be true. In some cases, decreasing expenditures can be consistent with rising service results or quality if input prices decrease or the production environment improves and/or individuals substitute private consumption for public service. Therefore, at the very least, these four factors must be considered when using government expenditures for comparison purposes.

Among government policy makers, the idea of focusing on results rather than spending is referred to as "benchmarking." The idea is that states and localities evaluate their programs by a series of "benchmarks" or performance measures comparing one jurisdiction to others. For instance, *Governing* reported that "Mississippi plans to shift away from old-style line-item budgeting that merely measures inputs – what the state is spending on specific programs – to one that measures outcomes – what, actually, is the effect of all that government spending" (Walters, 1994, 33). The goal is that a focus on outcomes will help governments better allocate resources. Or, as officials in Mississippi contend, "If government begins to measure the effects of its activity rather than merely what it spends on those activities, those effects – 'results' – will begin to drive the budget process" (Walters, 1994, 34).

Employment and other state-local costs

State and local governments use a number of different inputs to produce public goods and services, including labor, materials and services, land, and capital goods. These are the factors that comprise the costs of these governments. Labor represents the workers employed by state or local governments, whereas materials and services as well as capital goods (and land) represent inputs that these governments purchase from private businesses or owners.

Some measure of the importance of these various inputs is represented by the data in Table 7.2, which shows the components of direct expenditure by both state and local governments in aggregate. Labor costs are measured by wages and salaries and insurance payments made to benefit workers. For state governments, these costs account for about 32 percent

Table 7.2 Components of Direct Expenditure[a], 2018

Category	*State-local government*	*State government*	*Local government*
Wages and salaries	26.0%	15.4%	36.1%
Insurance benefits and payments	9.5%	16.5%	2.9%
Materials and services	49.5%	55.4%	44.0%
Capital expenditure	9.9%	7.3%	12.4%
Interest	3.3%	2.6%	4.0%
Assistance and subsidies	1.7%	2.8%	0.6%

Source: US Census Bureau

Note:
a Direct expenditure is total expenditure minus intergovernmental transfers.

of direct spending, whereas they amount to almost 40 percent of direct expenditure by local governments. Costs for materials and services account for about half of state-local government direct expenditure. This category includes supplies purchased by governments (motor fuel, electricity, paper, and food products, among many others) and services acquired from private businesses (such as medical services, technology, accounting, legal, and others). Capital expenditure is direct spending to acquire capital goods (buildings, capital equipment, and land), whereas interest is the cost of borrowing in the past, usually to acquire capital goods.

Two components of cost deserve additional comment. First, a major component of state and local government costs and expenditure is the cost of labor (employees). As shown in Table 7.2, 26 percent of state-local government direct expenditures in 2018 were for wages and salaries of employees, and another 9.5 percent went for worker insurance benefits (unemployment and worker's compensation insurance and employee retirement).[5] Labor costs were slightly greater for local governments in aggregate than state governments. In fact, labor costs are highest relatively for school districts. If comparison is limited to expenditures for current operations, labor costs are obviously an even larger share.[6]

In 2019, state and local governments employed nearly 20 million people or more than 13 percent – about one in seven – of all payroll employees in the United States, as shown in Figure 7.1 and Table 7.3. The number of state-local employees declined during the Great Recession, increased gradually after, and then declined sharply during the pandemic-induced recession in 2020. The share of total employees working for state-local governments has been relatively consistent, varying between 13 and 15 percent since 1980. Within states and localities, the largest number of employees is the functional area of education, both K–12 and higher education. More than half of state-local employees work in this area. The next largest concentration of state-local employees is in public safety: police and fire protection at the local level and corrections (prisons) at the state level. In contrast, fewer than 5 percent of state-local employees work in administration of those governments.

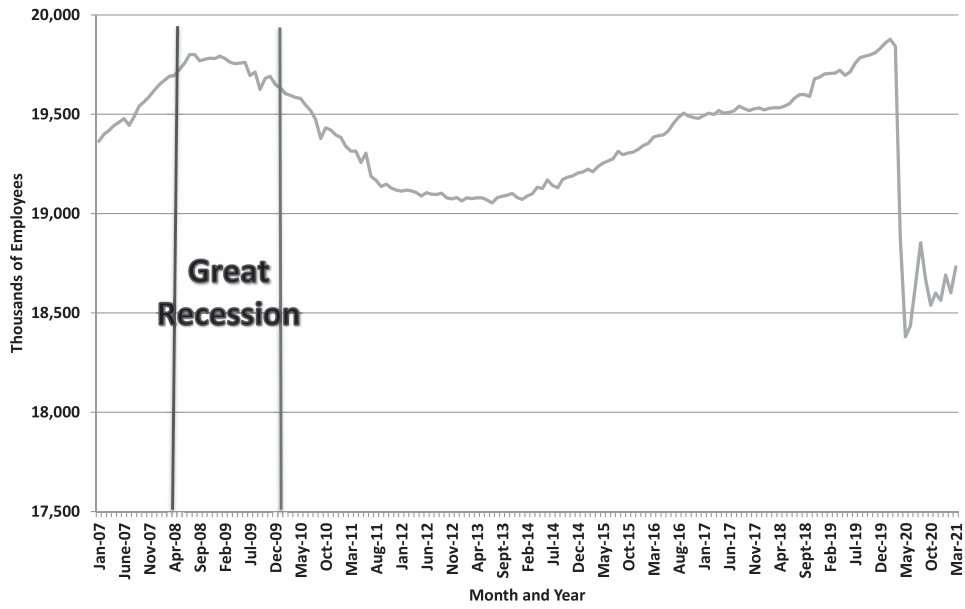


Figure 7.1 State and local government employment

Table 7.3 Level and distribution of state and local government employment, March 2019

State government		*Local government*	
Employment	5,478,092	Employment	14,210,107
Share of national	3.65%	Share of national	9.46%
Functional distribution		*Functional distribution*	
Higher education	50.59%	K–12 education	54.44%
Corrections	8.08%	Police protection	6.29%
Hospitals	7.93%	Hospitals	4.69%
Public Welfare	4.61%	Government administration	4.51%
Government administration	4.23%	Higher education	4.02%
Highways	3.91%	Fire Protection	3.17%
Health	3.64%	Parks and recreation	2.76%
Judicial	3.32%	Highways	2.06%
Police protection	1.95%	Corrections	1.93%
All else	11.73%	All else	16.15%

Source: US Census Bureau; Bureau of Labor Statistics

In 2019, state-local governments paid an average salary of about $63,800 to full-time employees. It is difficult to compare salaries or wage costs of state-local governments to those of the federal government or private business because of substantial differences in the types of employees and work activities. One study by Bradley Braden and Stephanie Hyland (1993) compared the cost per employee for wages, salaries, and benefits for state-local governments and private industry and concluded "compensation costs were similar for industry activities common to government and the private sector" (p. 15). Research by Alicia Munnell and colleagues (2011) documents that wages of state-local workers are lower than those for equivalent workers in the private sector, but retirement and health-care benefits seem greater. They conclude that the two nearly offset, so "annual public sector compensation – including both wages and benefits – is about 4 percent less than that in the private sector" (2011, 1).[7]

Productivity and costs

Input price increases will lead to increased costs of providing state-local government services unless the input price increases are matched by increases in productivity. Because of the importance of labor costs for state-local governments, changes in wages and worker productivity should be particularly important. The market for state and local government workers is not isolated from the rest of the economy, however, so changes in the demand for and supply of labor throughout the economy can have important implications for the costs of providing state-local government services. This relationship among worker productivity, wages, and production costs between the state-local sector and the rest of the economy is the basis for one theory of state-local government costs. This perspective is valuable for understanding the growth of state-local government spending.

The Baumol hypothesis

In a now well-known 1967 article, William Baumol argued that productivity increases in some sectors of the economy would force wage increases throughout the economy, increasing the production costs in those sectors where productivity improvements do not occur. Professor Baumol further argued that the nature of some services, including many of those provided by state-local governments, effectively precludes productivity gains because the

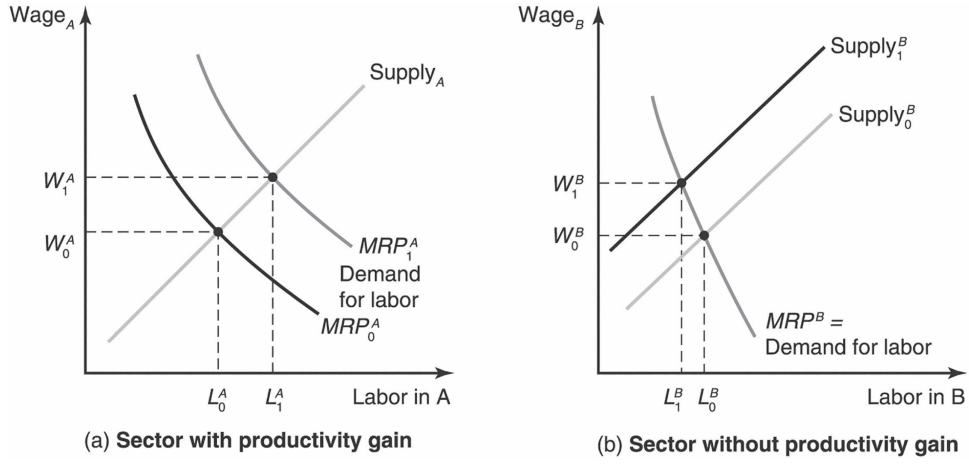


Figure 7.2 Productivity gains cause wage increases

essence of the service is the labor itself. If higher wages cannot be offset by substituting other inputs for labor for some services, unit production costs increase. The choice for consumers is either to reduce consumption of the service substantially or to spend ever-increasing amounts to continue consuming at current levels.

The first part of Baumol's argument is represented in Figure 7.2. The economy is divided, somewhat artificially, into two sectors: one in which productivity gains occur relatively easily and regularly (Figure 7.2a) and one in which productivity gains are difficult to achieve (Figure 7.2b). For this second sector, Baumol has in mind labor-intensive services with little opportunity for capital/labor substitution. In his words (1967, 416),

> There are a number of services in which the labor is an end in itself, in which quality is judged directly in terms of amount of labor. Teaching is a clear-cut example. . . . Here, despite the invention of teaching machines and the use of closed circuit television and a variety of other innovations, there still seem to be fairly firm limits to class size. . . . An even more extreme example is one I have offered in another context: live performance. A half hour horn quintet calls for the expenditure of 2½ man-hours in its performance, and any attempt to increase productivity here is likely to be viewed with concern by critics and audience alike.[8]

Which services and to what degree this characterization applies are debatable. The key point is that productivity gains for some state-local services are more difficult to achieve than for some other industries. Accordingly, the demand for labor in both sectors is shown in Figure 7.2, with demand less elastic in that sector in which substitution for labor is more difficult. Note that the demand for labor is labeled the **marginal revenue product of labor** (MRP), which is defined as the extra revenue a firm receives from hiring one additional unit of labor. The marginal revenue product is marginal revenue times the marginal product of labor and thus depends on both labor productivity and the value of the product produced. From microeconomic principles, a profit-maximizing firm will employ additional labor as long as the marginal revenue product is greater than the marginal cost of another worker, which is the wage in a competitive labor market. The demand for labor, then, represents

the benefit to a firm of more labor, which must be compared to the cost of hiring another unit of labor.

An increase in labor productivity in sector A is represented by an increase (a shift up) in the demand curve for labor; marginal revenue product is greater for every amount of labor because workers now produce more. The increase in labor productivity brings forth an increase in wage. The increase in wage in labor market A means that workers in sector A are now earning a relatively higher wage compared to those in market B than before the productivity improvement. The relatively higher wages in A will attract workers from market B, causing a reduction (a leftward shift) in the supply curve of workers to market B and thus an increase in the wage of workers in B. In essence, employers in market B must match the wage increase in market A to retain employees.

These wage increases have very different effects in these two sectors. For sector A, workers are earning *and* producing more, so cost per unit of output need not increase. For sector B, the higher wages have been forced by changes in the other market and are not matched by productivity gains; the premise of sector B is that substantial productivity gains are not possible. Therefore, the cost of producing a unit of sector B output rises. If B represents the condition of state-local governments, productivity gains in the industrial sector of the economy *cause* cost increases in the production of state-local government goods and services.

Figure 7.3 represents the effect of these cost increases on consumption of sector B's output. If the demand for output B is price inelastic (Figure 7.3a), then the increased cost results in a higher price but only a small decrease in quantity, and total expenditures on service B rise. If demand for output B is price elastic (Figure 7.3b), then the cost increase causes only a small increase in price but a large decrease in consumption. As discussed in Chapter 3, the evidence suggests that the demand for the services provided by state-local governments is price inelastic. Therefore, the implication of the Baumol hypothesis is that productivity gains in some sectors of the economy will force increasing amounts to be spent on state-local government services. This is consistent with state-local government expenditures representing a larger and larger share of income. This condition will continue as long as private-sector productivity gains continue, and public sector productivity gains are difficult to achieve.

This story, although simplified, seems applicable to many practical cases. As wages in manufacturing and the business service sector rise, fewer students may be attracted to teaching,

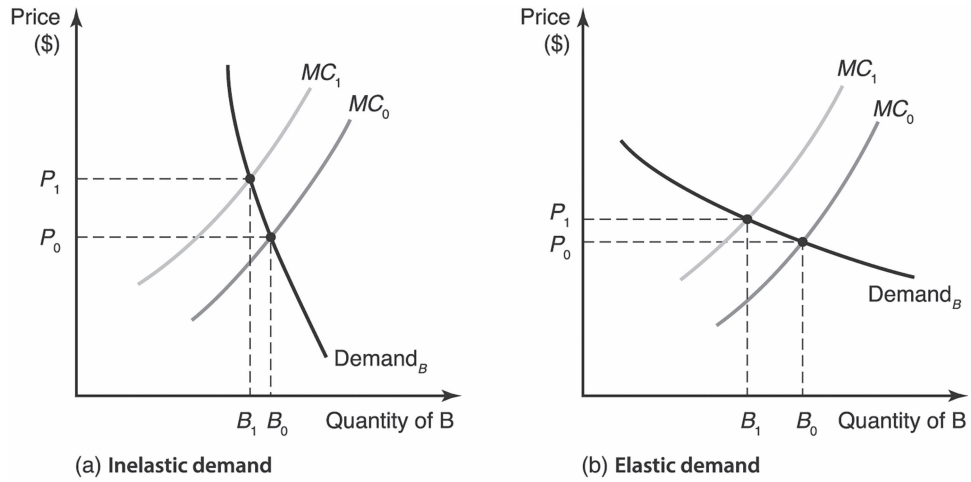


Figure 7.3 How increases in costs of government services affect spending on services

a phenomenon that can be particularly evident for science, math, or business teachers who may find an attractive private market for their general knowledge and skills. As improved technology becomes a more important factor in manufacturing and demand for engineers rises, it becomes increasingly difficult and expensive for universities to staff engineering schools. Of course, as noted by Baumol, the process applies to many other services such as the arts, restaurant meals, fine handcrafted furniture, and clothes.

Evidence: Government productivity

It is difficult to directly measure productivity change in the production of government services precisely because it is difficult to measure the output being produced. One study (Hulten, 1984) attempted to measure productivity change in state and local governments indirectly, however, by utilizing the difference between directly produced output and consumed output. Households can be thought of as producing all final services by purchasing and combining different directly produced outputs, some provided by the private sector and some by government. (For instance, a household combines a privately produced recreational vehicle with a publicly provided park to produce a service called "camping.") In that case, the share of public to private expenditures depends on the relative prices of the products and relative change in productivity and environmental factors for the sectors. The combined change in productivity and environmental factors for the state-local sector can be inferred from observed data about relative prices and the share of state-local expenditures in GNP.

Using quarterly data for the period 1959–1979, Charles Hulten estimated the annual rate of change of the combined productivity/environmental factor to be –.50 percent, although the estimate was not significantly different from zero. Hulten (1984) reports that one "cannot reject the hypothesis of zero productivity growth for the state-local sector" (p. 261). Perhaps more accurately, if there had been productivity growth over this period, it was not sufficient to offset a deteriorating production environment. After noting that private sector productivity had increased at an average 1.45 percent annual rate over this period and that the state-local share in GNP had risen substantially, Hulten concludes that "the results of this paper are thus consistent with the Baumol hypothesis on unbalanced growth" (p. 263).

Evidence: Government costs

Other studies have examined the costs of producing state-local government services and changes in those costs over time. In one such study, the changes in the prices of inputs and workloads from 1962 to 1972 for different state-local government services were computed and compared to changes in expenditures for those services over the same period (Sunley, 1976, reporting work by Robert Reischauer). For instance, local school input prices include teacher salaries, book prices, and transportation costs, whereas workload is the number of school-age children. If expenditures increased more than required by increases in input prices and workloads, the remainder is assumed to represent increases in amount or quality of service.

The result of this study was that 52 percent of the increase in total state-local expenditures over this ten-year period was due to increases in input prices, and 13 percent resulted from increased workloads. Thus, only about 35 percent of the increase in state-local government spending in that decade represented increased quality or new service. There were, however, substantial variations for different services. Workload and price increases were particularly important for highways and parking, health and hospitals, and police and fire protection. The increases in input prices and workloads alone were sufficient to increase total state-local government expenditures from 11.4 percent of GNP in 1962 to 12.0 percent of GNP by

1972. This was a period when state-local government wages were increasing rapidly in an attempt to catch up with private-sector wages. Thus, state-local sector costs are influenced by changes in the rest of the economy, and increases in state-local expenditures do not necessarily represent increases in output or service.

From the latter half of the 1970s through the first half of the 1980s, state-local government expenditures did not rise relative to income, however, suggesting that some aspect of the story changed. Possible explanations are that large productivity gains were made in producing state-local services, that the demand for state-local services became more price elastic, or that low productivity growth in private industry helped hold down relative state-local sector costs. The latter seems consistent with the evidence.

One observation consistent with the Baumol hypothesis is that costs of state-local services (measured by the GDP-implicit deflator) increased more than the prices of private consumer goods during the entire period since 1963. Since 2010, for example, based on the GDP price deflator, the cost of state-local services increased by 23.6 percent, whereas the prices of private consumer goods rose by 16.1 percent. This happened even though the earnings of workers in the state-local sector sometimes increased faster than those of private sector workers and sometimes slower. The fact that the relative costs of state-local goods continued to increase suggests that states and localities have not discovered ways of increasing labor productivity as much as the private sector has.

Thus, the experience since 2010 has seen the prices of state-local goods increase relative to those in the private sector. In that period, productivity growth slowed to about 1 percent annually, so the increases in labor earnings (46.1 percent) resulted in increases in unit labor costs in business (20.7 percent). The increase in earnings economy-wide exerted upward pressure on state-local wages and costs. Although labor earnings in the state-local sector grew more slowly, the relative price of state-local services still continued to increase.

The resulting fiscal pressure on state-local governments was somewhat hidden in the 1990s as the state-local tax structure continued to generate substantial revenue as a result of fast national economic growth. But that ended with the national recessions in 2001 and 2007, which resulted in enormous fiscal pressure for states and localities. The implications of growing labor costs are explored in two major areas of policy change influenced by costs – pension finance and public safety provision – in the rest of this chapter.

Application 7.1: Changing criminal justice production and policy in response to costs

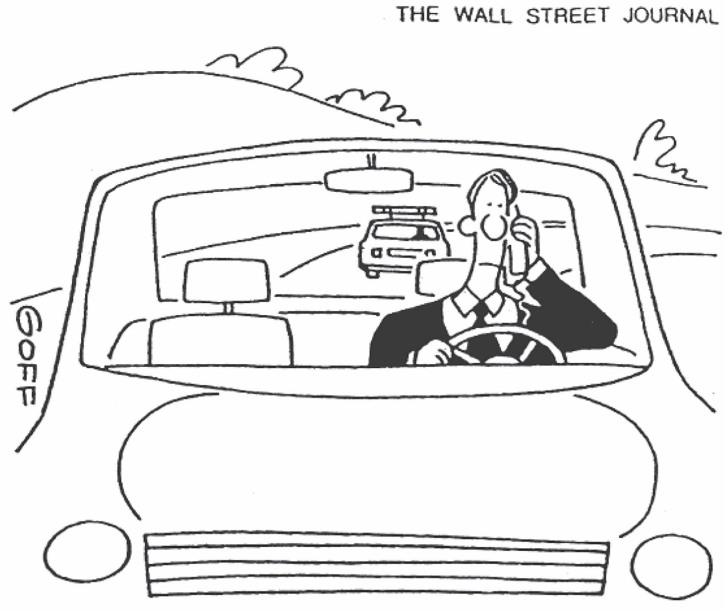
The essence of the Baumol hypothesis is that it is difficult for service providers, including state and local governments, to increase labor productivity by using more capital-intensive production technologies. This can lead to substantial production cost increases. In response, state-local governments both look for new technologies and changes in policy in response to those cost increases. The case of criminal justice production and policy is one such example.

State-local governments spent about $241 billion on criminal justice service in total (police, prisons, and courts) in 2017. This spending represents 6.6 percent of total spending and 7.9 percent of general expenditure. Criminal justice expenditure is 3.8 percent of state government expenditure but 8.0 percent of local government spending. State-local governments spent $352 per person on police protection, $147 per person on courts, and $242 on incarceration. Spending in this category grew exceptionally in the 1980s, 1990s, and early 2000s, with average annual growth of about 10 percent. Real per capita spending on all criminal justice services increased from $542 in 1993 to $741 in 2017, with most of that increase in the category of spending for police by local governments.[9]

New technologies – some involving electronic inputs – are being applied for one traditional state-local service: public safety. In the area of policing and criminal justice, technological production inputs include computers and information databases, computer analyses of physical and biological evidence, and electronic devices for gathering data or restraining prisoners, as well as new weaponry. The use of cameras is common in private security work (banks, retail stores, restaurants, parking lots, apartment buildings, ATMs). Only recently has the use of cameras and other electronic equipment been adopted and expanded by state and local police agencies. In some states and in many other countries, cameras are used to enforce traffic laws, including cameras integrated with radar guns, stop signs and traffic lights, toll booths, and restricted driving areas. A photograph can be taken of the license number of an offending vehicle and the registered owner sent a bill. In some larger cities, cameras are now used to monitor activity in key areas or on busy streets. The possibilities for this type of enforcement seem limited only by imagination, as reflected by the accompanying *Pepper . . . and Salt* cartoon.

Electronic monitoring is commonly used to keep track of or restrict persons who are under investigation or who have been arrested for or convicted of crimes. An "electronic tether" that emits a signal can be attached to an individual's body (usually the ankle), allowing officials to monitor the signal and know the location of the individual. Such systems are used to prevent flight by someone waiting for trial, as a means of partial confinement for someone who has been convicted, or to monitor the behavior of someone on parole.

Pepper . . . and Salt



"This is Officer Halloway. You are exceeding the speed limit by 6 mph. A ticket is being faxed to you."

Source: Reprinted from the *Wall Street Journal*, August 27, 1993, p. A9, with the permission of Cartoon Features Syndicate

Computerized data collection and information hold out the possibility of providing details about individuals, things, or events to public safety officials broadly, quickly, and at low cost. It is possible for public agencies to access detailed personal information about any person that could be used in solving specific crimes or predicting potential criminal activity. Most local police agencies now include internet-connected computers in police vehicles to access data and utilize computerized geographic records of crime to allocate resources. Such information must be available widely to be useful, which increases the danger that such information might be misused. Most recently, the advancement of facial recognition technology may assist police in identifying those engaged in criminal activity, but serious questions have been raised about the accuracy of and possible inherent bias in such technology.

The potential for autonomous (self-driving) vehicles also may create new technological options. Autonomous vehicles typically are assumed to be safer that personally driven vehicles (as least as used currently), so fewer collisions and more law-abiding vehicles will lower demand for traffic police and emergency response. An effective autonomous transportation system would likely require a substantially different safety and enforcement environment. Fewer traffic enforcement personnel may be required, especially if the electronic control systems that operate autonomous vehicles also permit remote electronic monitoring or control of vehicle behavior.

These methods hold the promise of more efficient production of public safety service (and perhaps lower costs) but also raise difficult questions about the role of government and whether capital technologies change the meaning of "public safety." Some electronic public safety activities might violate various provisions of the US and state constitutions (such as privacy, unreasonable search and seizure, and the presumption of innocence), but even when these measures are constitutional, serious problems of implementation and acceptance by citizens remain. Thus, state and local laws regulating electronic public safety activities vary greatly.

Thinking about such uses of cameras and monitoring, one can reasonably ask whether people would feel "better off" or even "safer" if they were being watched all of the time. In short, it does seem possible to use technology to improve efficiency, increase worker productivity, and reduce the cost of providing public safety service, at least to some degree. Some seem straightforward, whereas others may change the nature of the service "public safety." That raises the possibility of an interesting economic choice to be faced by voters. Voters can accept new technological methods of producing public safety and enjoy lower costs (and taxes) but suffer a loss of privacy, or they can retain privacy by continuing to pay higher and higher costs for producing public safety with less invasive technology.

Changes in policy, rather than production, are another possible response to costs. During the 1990s and early 2000s, state-local spending on public safety and corrections grew very rapidly, in large part because the number of prisoners in state prisons increased substantially. The rapid growth in spending meant that corrections and public safety were occupying a larger fraction of state budgets. At the same time, there was concern that incarcerating so many people was not improving public safety outcomes correspondingly. The combination of rapidly increasing spending without sufficient results induced states to reconsider criminal justice policy.

The increase in criminal justice and corrections spending was driven primarily by increases in the number of prisoners. The United States has the highest incarceration rate in the world, and incarceration rates doubled in the 1980s, increased by 60 percent in the 1990s, and peaked in 2007. In 1987, there were about 585,000 state and federal prisoners (240 per 100,000 population). The number peaked in 2009 (at about 1.61 million). By 2019, the number of state and federal prisoners had decreased to 1.48 million, or about 419 per 100,000 of population.[10] In addition, the cost of operating prisons can be substantial.

Census data show the average total cost per state prisoner in 2017 to be more than $37,000, including retiree benefits and capital costs, whereas research supported by the Pew Charitable Trusts found the average cost per prisoner for local jails was about $34,000. Both are substantially more than per-student costs in either K–12 or higher education.

The increase in the number of prisoners was largely the result of state criminal justice policies (rather than underlying changes in crime). Many states adopted mandatory sentence policies, "three-strike" laws that sentenced criminals to life after three convictions, and rules limiting parole or requiring parole violators to return to prison. Policy decisions concerning illegal drugs were a substantial contributor to the growth of the prison population. Indeed, by 2005, 53 percent of prisoners in federal prisons and 20 percent of state prisoners were sentenced for drug-related offenses, some involving supply and some for use. The criminal justice policy followed by states and the national government in the 1980s and 1990s, which led to the high rate of incarceration, also had disproportionate effects on the population. In 2008, 58 percent of federal and state prisoners were Black or Hispanic, with 35 percent being Black males, both far in excess of the ratio of those groups in the population. Indeed, the incarceration rate for Black males (3,161 per 100,000) was six times greater than that for the total population (504 per 100,000).

The high costs of operating prisons, the increasing share of state budgets being occupied by corrections expenditures (including the need to build more prisons), and evidence that crime had been decreasing independent of penalties induced many states to reverse course to reduce the number of prisoners. The Pew Research Center reported that 40 states acted between 2009 and 2013 to change drug laws – lowering penalties, reducing sentence times, substituting alternatives to incarceration, or decriminalizing drug possession or use. Beyond drug crimes, the National Conference of State Legislatures (NCSL) reported that 25 states modified minimum penalties or sentences, 14 states increased the dollar value required for a felony, and more than half the states have altered policies that in the past sent parole violators back to prison. This trend continues, as a report by the Sentencing Project shows that 19 states acted during 2020 to reduce both prison admissions and length of time in prison, to reduce the period of parole, to expand releases as a result of the pandemic, or to expand opportunities after the completion of sentences.

A report by the Public Safety Performance Project of the Pew Research Center indicates that states can reduce the number of people on parole and length of parole time without compromising public safety.[11] For example, changes in California law in late 2020 shortened the maximum probation sentences for most offenses with the potential to cut the state's probation population by as much as a third and save more than $2 billion over five years. Similarly, in early 2021, Michigan adopted a series of reforms to reduce the number of people in county jails, partly by reducing readmissions for minor probation violations. In addition, the Michigan reforms provide alternatives to arrest and jail for some low-level offenses.[12]

In summary, rising costs may bring about changes in both production technology and policy in a way that not only controls costs but also improves public service.

The national economy and fiscal results

In addition to production technology and costs, national economic conditions also affect the ability of states and localities to supply goods and services. Thus, the relationship between the national economy and state-local fiscal activity is considered next. Four observations stand out: (1) there is an aggregate state-local budget surplus in most years, (2) the magnitude of the surplus (or deficit) varies according to national economic conditions, (3) state-local fiscal outcomes seemingly have become more volatile over time, and (4) state-local government fiscal activity has been less countercyclical during recent recessions than was historically true.

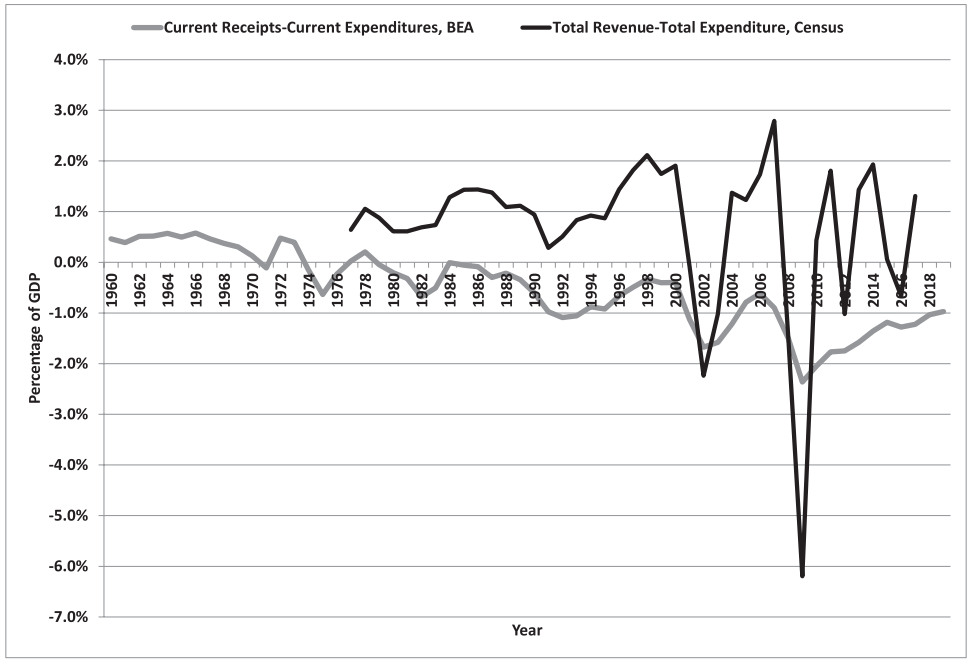


Figure 7.4 State and local government surplus or deficit
Source: US Bureau of Economic Analysis; US Census Bureau

The aggregate budget surplus or deficit for state-local governments as a fraction of GDP is shown in Figure 7.4. Two outcome measures are presented. One is "current receipts" minus "current expenditures," as measured in the National Income and Product Accounts (collected and reported by the Bureau of Economic Analysis [BEA]). The other is "total revenue" minus "total expenditures," as measured by the Census Bureau. The accounting differences between the two measures are complicated, but a few aspects are clear. The BEA measurement is for calendar years, whereas the census data are based on fiscal years. Spending by "government enterprises" (including utilities and transit systems among others) are included in the census data but classified elsewhere by BEA. BEA expenditures also exclude payments made for unemployment and workers compensation insurance funds and spending on employee retirement systems. The two measures also differ in how capital goods are handled.

Despite the accounting differences, the two fiscal balance series show a consistent pattern over time. The state-local budget surplus/deficit is sensitive to the national economic conditions. The surplus fell during the recessions in 1974–1975, 1980–1982, and 1990–1991, reflecting both reduced growth of state-local revenues and increased spending. Fiscal balance decreases were substantially greater during the relatively brief recession in 2001 and the Great Recession in 2007–2009 than in previous periods.

The historical pattern of change in state government budgets and revenue decisions, as reported by the National Association of State Budget Officers, is shown in Figure 7.5. Panel A shows that state budgets have grown in most years, even during national economic recessions, although growth sometimes slows (as happened in the 1980–1982 and 2001–2002 periods). However, growth became negative – that is, state government budgets decreased – during the Great Recession. As illustrated in panel B, state governments commonly have

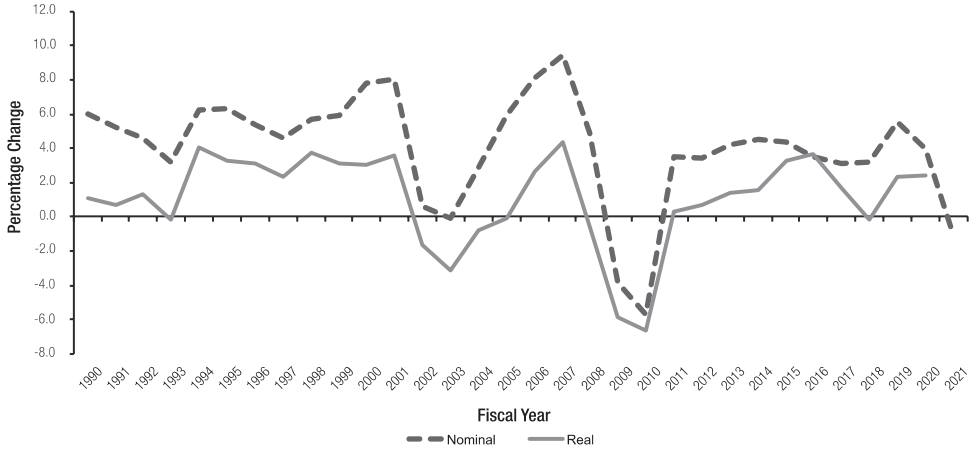


Figure 7.5a Annual percentage budget changes, 1990–2022

Source: "Spring 2021 Fiscal Survey of the States," National Association of State Budget Officers, reprinted with permission

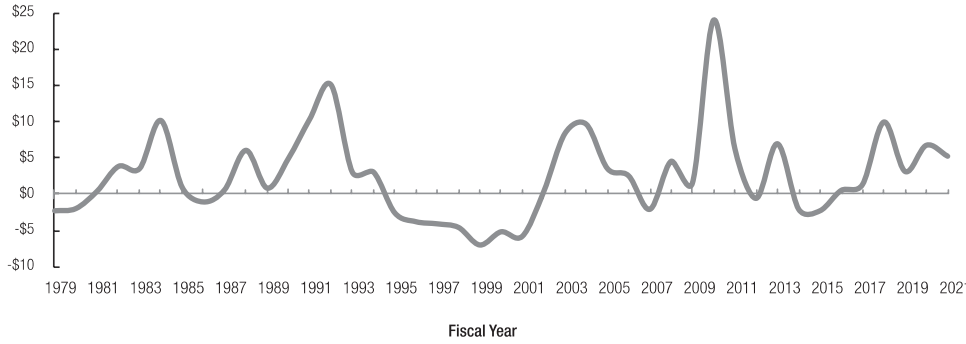


Figure 7.5b Annual enacted state revenue changes, 1979–2022

Source: "Spring 2021 Fiscal Survey of the States," National Association of State Budget Officers, reprinted with permission

enacted revenue increases (through taxes or fees) during or immediately following national recessions (as happened in 1980–1981, 1991–1992, 2003–2004, 2008–2011, and even 2020–2021). A cyclical pattern is apparent in panel B, showing that state governments have tended to alternate revenue increases and decreases (i.e., state governments raise taxes then cut taxes then raise taxes, and so on).

Consequently, the state-local sector traditionally provided a countercyclical element to national macroeconomic policy, using reserves and tax increases to maintain, or even increase, spending during recessions. As noted by Robert Rafuse in a classic article, "abstracting from trend, state and local expenditures have been a stabilizing factor in the economy during every postwar expansion and contraction" (Rafuse, 1965).

The situation seems to have been different recently, however. The fiscal position of state and local government deteriorated dramatically between 2000 and 2003. The deficit of state-local governments in 2002 was the largest it had been relative to GDP – until the Great Recession. Why? According to McGuire and Steuerle (2003), one important factor was the reductions in taxes and increases in expenditures made during the extended period of strong

economic growth in the 1990s. McGuire and Steuerle (2003, 360) conclude that as a consequence, "when the downturn in the economy hit and revenues fell, expenditures exceeded revenues by a fair amount." Other important factors included less substantial enacted tax increases than in past recessions, especially large declines in personal income tax revenue (partly because of changes in capital gains), and new state revenue systems that were more cyclical than in the past.

The response by state and local governments to the Great Recession, which started formally in December 2007 and concluded at the end of June 2009, also was different from conventional wisdom and behavior in the past (Fisher, 2010b). When responses to the 2007–2009 Great Recession are compared to those in 1981–1982, which was the last economic decline of a similar magnitude, state and local governments increased revenue less and decreased spending more in the more recent case. In 1984, states increased revenue by about 3 percent, so spending decreases were less than 1 percent. In 2010, spending decreases were more than 5 percent because states increased taxes an aggregate of less than 2 percent. Thus, increasing revenue was the relatively greater response to the 1981–1982 recession, whereas decreasing spending was the somewhat greater response to the Great Recession.

The fiscal implications of the Great Recession for state and local governments were dramatic. For the overall state-local sector, tax revenue declined for four consecutive quarters, beginning in the third quarter of 2008 (FY, 2009), so nominal state-local tax revenue during calendar year 2009 was less than in both 2007 and 2008 and about at the same level as 2006. The decrease in tax revenue was more serious for state governments than local governments. Aggregate nominal state government tax collections decreased by about 12 percent in 2009 and only returned to the prerecession nominal level in 2012. In contrast to state governments, aggregate nominal local government revenue was relatively stable initially, before declining in 2011.

The revenue decreases, coupled with increases in service demand related to the recession, caused state governments to face potential deficits or "budget gaps" of more than $60 billion for FY 2009 and more than $120 billion for FY 2010, according to National Association of State Budget Officers (NASBO) estimates. Reacting to the deficits they faced, approximately 30 states raised taxes or fees for FY 2010. Increases in various excise taxes or various charges and fees were most common, although 12 states increased the income tax, mostly for higher-income taxpayers. States and localities received federal financial support as part of the American Recovery and Reinvestment Act of 2009 (ARRA) of about $165 billion in fiscal years 2009 and 2010, according to analysis by the US General Accounting Office. These resources from the federal government resulted mostly from increasing the federal government share of Medicaid financing and new grants to support public education, with funds for transportation projects a third category. By all accounts, ARRA funding had its largest effect in FY 2010, although it continued in subsequent years.

Even with the tax increases and federal support, state governments reduced spending by about 4 percent in 2009 and an additional 5 percent in 2010, according to NASBO. Much of the reduction in spending represented decreases in the number of workers. Employment by state and local governments decreased by 170,000 in 2009 and another 240,000 in 2010. The employment effects continued, as the number of state and local government employees decreased by 675,000 or nearly 3.5 percent from the beginning of 2009 through the end of 2013. Education employees accounted for 41 percent (280,000) of the overall decline in state-local employment during this period.

Application 7.2: The COVID pandemic and resulting recession

An extended economic downturn began in March 2020 from the COVID-19 virus and the responses intended to slow the spread of the virus. This downturn in economic activity was

not a typical recession, a result of underlying economic factors, but a result of the individual reactions and policy response to mitigate the pandemic and the expected effects on human health. Individuals elected to reduce activity involving interactions with groups of people, state governments created restrictions on the operation of certain businesses (especially in the leisure and hospitality industry), governments and businesses adopted work-from-home requirements, and state governments imposed other limits on activity (limited business hours or capacity, mask wearing, online education replacing in-person schools, and others).

The national unemployment rate increased from 3.5 percent in February 2020 to a peak of 13.3 percent in May 2020, subsequently gradually falling to 6 percent by March 2021. Assuming that the medical and policy interventions continue to be successful, the "virusces-sion" will have been deeper but shorter than the Great Recession.[13]

As in the past, the federal government provided a number of initiatives to support individuals and businesses and strengthen the economy. The Coronavirus Aid, Relief and Economic Security Act (CARES Act) was adopted in March 2020 and included an extension of the time a person could receive unemployment benefits, an increase in the amount of those benefits, application of UI benefits to workers previously not eligible, and direct payments ("checks") to individuals. In addition, the Paycheck Protection Program (PPP) provided loans to small businesses, which would be forgiven if workers were continued and paid, and the Federal Reserve was authorized to provide special lending to state and local governments.

Other federal actions continued or further authorized these programs. Then, in March 2021, the American Rescue Plan was adopted, continuing the extended and enhanced unemployment insurance benefits (at a lower level) and providing new support payments ("checks") directly to individuals, as well as a number of additional tax structure changes and programs to support various businesses. The ARP also provided direct payments to state and local governments to offset budget effects.

The combination of the pandemic and the recession had substantial effects on state and local government budgets. States and localities experienced less revenue than anticipated and budgeted, as well as additional expenditures to deal with the public health crisis. On the revenue side, income taxes, general sales taxes, motor fuel excise taxes, and a variety of user charges declined or grew less than expected. In terms of spending, these governments incurred new costs for health services (including Medicaid), protective equipment, educational technology, and unemployment benefits, among many others.

Tracy Gordon, Lucy Dadayan, and Kim Rueben (2021) examine the potential effect on state and local government finances overall and review data about revenue and spending effects through May 2020. They report very large sales and income tax revenue decreases, comparing the year ending in May 2020 to the year ending in May 2019. They also make a strong case for federal government support, which eventually did happen as noted earlier. Howard Chernick et al. (2020) provide an initial estimate of the fiscal effect on cities and report estimated fiscal effects for two scenarios of economic conditions. The average revenue decrease is between 5 and 9 percent for the two cases, although there are substantial differences among cities for both scenarios. Cities that rely more on property tax revenue are likely to fare the best as that tax tends to be the most stable.

More recent data reported by the Tax Policy Center (2021) show that state revenue declined only 1.8 percent in the last three quarters of 2020 compared to the same period in 2019. The federal government intervention helps explain why the revenue effects for state governments were not as great as initially forecast.

Income tax revenue was supported during the recession directly by payments through the PPP program and the time extension, the supplemental amount, and the addition of self-employed workers to those eligible for UI benefits. In addition, the "stimulus checks,"

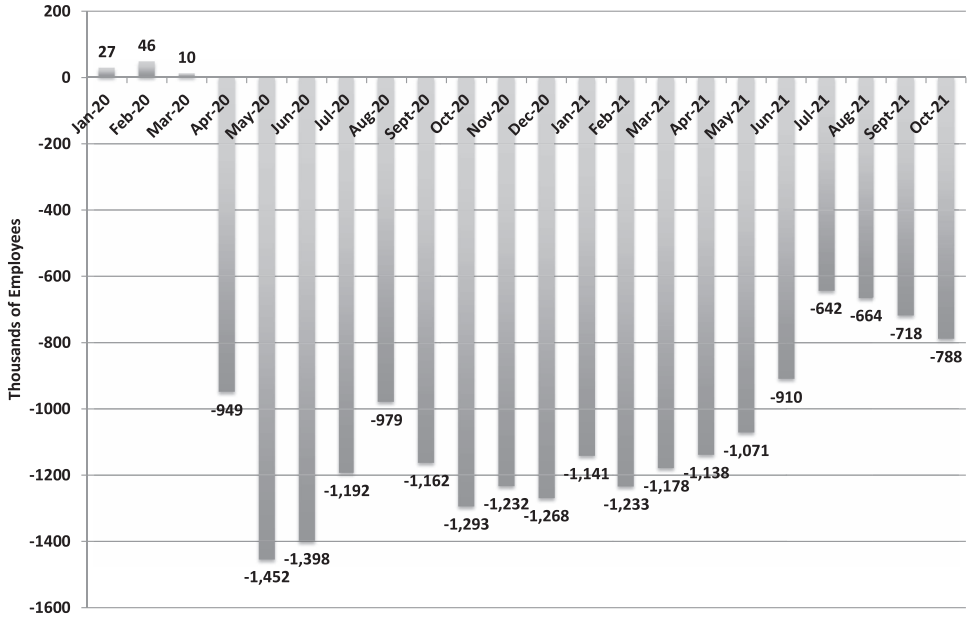


Figure 7.6 Change in state-local employment from December 2019

Source: US Bureau of Labor Statistics

although not taxed directly, have helped maintain jobs and income by supporting consumer spending. Two opposing forces affected sales tax collections. With the increase in online ordering during the pandemic, most states adopted mechanisms to tax remote online sales as a result of both corporate decisions and the *Wayfair* court decision (see Chapter 13). On the other hand, the shift from restaurant sales (taxed) to grocery purchases for at-home consumption (mostly not taxed) reduced sales tax revenue.

Separate from taxes, governments had substantial revenue decline from decreases in user fees and charges. Many public colleges and universities moved to online mode with resulting reduced revenue, and public hospitals were fiscally stressed by both the loss of regular business and the cost of treating COVID. At the local level, use of public transit and airports plummeted.

As a consequence, state and local employment fell dramatically beginning in April 2020, as shown in Figure 7.6. In May 2020, state-local government employment had fallen by 1.45 million compared to December 2019 and was still down by 788,000 in October 2021. About half of the decrease in state-local employment was for workers in K–12 education, primarily support staff in transportation, food service, maintenance, and similar activities.

Tax and expenditure limits

When state-local expenditures increase, often due in large part by cost increases, one common response is to limit revenue or spending directly. Nearly all local governments and two-thirds of state governments are constrained in their budgeting by statutory or constitutional limits on taxes or spending or both. Local government tax limits (imposed by state

governments) date at least since the late 1800s. The most common form of local tax limit prior to 1970 was a maximum property tax rate – either for specific services, for specific types of local governments, or for overall local government taxes. Around 1970, a number of state governments acted to add new tax and expenditure limits on local governments, and in the late 1970s and early 1980s, taxpayer-initiated tax and expenditure limits affecting both local and state governments were adopted in a number of states. California's Proposition 13 in 1978 is often identified as the start of this movement.

It is difficult to report on and characterize the current status of state and local government tax and expenditure limits in the United States because they differ in legal structure, practical application, the governments to which they apply, how they were adopted, and the mechanism for exceptions. In addition, the laws regarding limits may be changed periodically, so a reporting for a specific year may be quickly outdated. These limits – and the tax revolt they were said to represent – have altered the way in which state and local tax and expenditure decisions are made. The effectiveness of these limits in reducing the level or growth of spending is unsettled, however, and their desirability still questioned.

Types and use of limits

The oldest and most common form of local government limit is a **maximum property tax rate**, either for overall property taxes or for only those specific purposes. According to Mullins (2010), 33 states imposed either an overall or specific property tax rate limit or both on some local governments. A maximum rate obviously has no restricting effect if tax rates are well below the maximum. If tax rates are at the maximum, property tax revenue can increase only to the extent that the property tax base increases (because revenue equals the rate multiplied by the base). Thus, rate limits do not prevent increases in revenue but may restrict increases in revenue to the rate of growth of the tax base. This is the type of limit adopted when California voters approved Proposition 13 – the local property tax rate is limited to no more than 1 percent of assessed value, and assessed value is defined to be the market value in 1975–1976 plus a maximum annual 2 percent increase for inflation.[14] In addition to limits on property tax rates, local governments with the authority to levy local income or sales taxes also are restricted by state-imposed maximum rates for those taxes.

A second relatively common form of local tax limit is a **limit on tax revenue**, either for a specific tax or overall – what is often called a **levy limit** in the case of local property taxes. Revenue or levy limits usually are specified as a maximum allowed percentage increase from the prior year or by a maximum percentage of income. For instance, some local governments are restricted to property tax increases of no more than 5 percent (for instance) per year or two percentage increases no greater than the percentage growth in the consumer price index (the inflation rate) and the percentage growth in population. Mullins (2010) reports that property tax levy or revenue limits were used in 30 states.

A third type of state-imposed local limit is a restriction on the **maximum allowed level of expenditure**, usually set as a maximum allowed annual percentage increase. Local expenditure limits applying broadly to general-purpose local governments are used in only a few states. School district expenditure limits are sometimes used as well in conjunction with state education aid programs in an attempt to equalize per-pupil school spending among different districts in a state (see Chapter 17).

State government tax or expenditure limits apply in 28 states, according to the National Association of State Budget Officers.[15] These limits generally restrict the annual growth in own-source revenue or expenditures to the percentage growth rate of state personal income, to the percentage growth in population and the general price level, or to another variable, including relating spending to a revenue measure. In describing these state government

limits, Daphne Kenyon and Karen Benker (1984) note that these state limits generally do not apply to all state expenditures or revenues, that several of the limits are not very restrictive in that they apply only to proposed expenditures (that is, appropriations), and that some provision for exceeding the limit exists in each case. In addition, Sharon Kioko (2011) notes that in some cases, state limits may apply to the limited amount in a prior year as opposed to actual appropriations or expenditures in the prior year. These differences in the structure of limits are expected to influence the effectiveness.

The specifics of the limitations, including the provisions to override a limit and the legislative votes required to adopt a revenue increase, vary greatly among the states. The Tax Policy Center provides an overview of both state and local tax limits as well as a review of recent research.[16]

Objectives of tax and expenditure limits

In general, fiscal limits can be designed to set a maximum level for taxes or expenditures, to reduce the level or alter the growth of taxes or expenditures, or to require some specific action to alter taxes or expenditures. The intent of these types of limits can be to reduce the level of government taxes and spending, to impose more political control over changes in taxes and spending, to alter the mix of government revenue sources, or to alter the relative fiscal roles of state and local governments. These objectives are not mutually exclusive – some limit proposals are intended to accomplish more than one objective, whereas voters may perceive others that way. For instance, in one analysis of state limits on local governments adopted in the 1970s, Helen Ladd (1978) reports that states with higher per capita property taxes and those with higher rates of growth of per capita expenditures were more likely to have adopted limits, suggesting that lower expenditures and lower property taxes were likely objectives.

Why would individual voters use the political process to adopt limits to reduce government taxes and spending when the level of taxes and spending was originally chosen through that same political process? The answer must be that there is a perception that the political system is imperfect, so government is not providing the magnitude of taxes and spending that the public desires. As you learned in Chapter 4, this conclusion can be consistent with several different economic models of voting on government fiscal issues. In one of those cases, the monopoly bureaucrat model, the government acts as a monopolist in offering voters the choice between two alternative expenditure levels – one at a level higher than that most desired by the median voters and the other at a very low level. Given that choice (because political competition has been eliminated by the government officials), voters select the higher expenditure level. From this viewpoint, tax and expenditure limits can be seen as an attempt to create political competition – to lower spending levels by reducing the monopoly government's ability to control the choices proposed to voters.

Suppose that political competition does exist (either from viable alternative political candidates or from interjurisdictional competition for residents and businesses) and that fiscal choices are made by majority voting. In this case, voters will select the median desired level of taxes and spending. Limits make sense even when fiscal decisions are made by majority voting because there is no guarantee that majority voting will result in the economically efficient level of expenditure being selected. This possibility is illustrated in Figure 7.7. If the voting groups with the three different demands shown all face the same tax price, then their desired levels of spending are $A^{\star}$, $B^{\star}$, and $C^{\star}$. With majority voting, expenditure level $B^{\star}$ – the median level – is selected.

Suppose that a fiscal limit is imposed that reduces expenditures to EC. Groups B and C are made worse off because the new spending level is further from their desired levels than

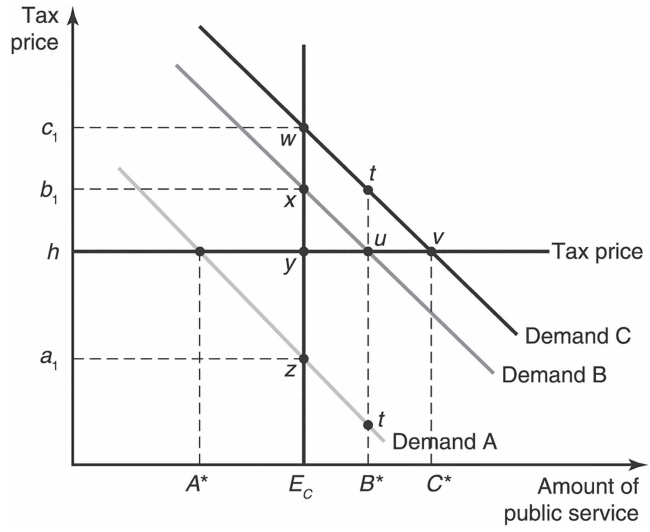


Figure 7.7 A spending limit may increase economic efficiency

$B^\star$ is, but Group A is made better off because EC is closer to A's desired spending level than is $B^\star$. The welfare gain by Group A would be greater than the sum of losses by B and C if the original spending level $B^\star$ was inefficiently too high. In Figure 7.5, the loss of consumer surplus by B is represented by triangle yxu, which is the difference between the value of government service to B and the cost to B for the quantity eliminated by the limit. For each \$1 of spending between EC and $B^\star$, the value to B is greater than B's tax cost. Similarly, the welfare loss to Group C is represented by area $ywtv$. On the other hand, Group A gains because each \$1 spent beyond $A^\star$ is worth less to A than the tax cost. The gain to A is represented by area $zyut$. Depending on the nature of demand, the tax price, and the level of the limit, the gain to A may be greater than, equal to, or less than the sum of welfare losses by B and C.

Comparing the value of the marginal unit of public expenditure at the controlled level, E_C, for each group to the tax cost for each group, the marginal value of additional public expenditure is c_1, b_1, and a_1 respectively, with $(c_1 - h) + (b_1 - h) \gtreqless (a_1 - h)$ depending on the nature of the demands at E_C. As explained by Michael Bell and Ronald Fisher (1978, 391–392), the possibility that a fiscal limit can improve economic efficiency and increase welfare

> occurs because majority voting takes account only of each group's rank-order of expenditures and does not compensate for different magnitudes of preference. Thus a net welfare gain would be possible if the difference in provided and desired service levels was much greater for the group desiring less than the median amount than the group desiring more.

Thus, tax and expenditure limits may be intended to correct for inefficiencies that result from the political choice process.

In some cases, fiscal limits may be supported because of voters' misperceptions about the expected effects. Suppose, for instance, that a limit to reduce local property taxes is proposed

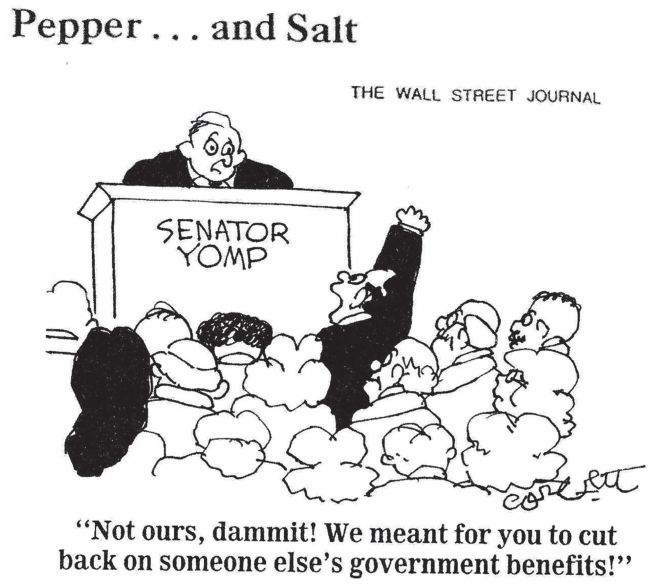
with no provision for substituting a different source of revenue. A logically correct perception is that a reduction in local government or state government services would result, which would be desirable for voters who preferred that option. Research about voters' perception of tax limits suggests that three misperceptions are common, however.

1 *Free lunch perception*: Voters may believe that the effect of a limit will be to reduce taxes but have no effect on government-provided services. The notion is that the limit will induce government officials to "reduce waste." This perception usually is faulty either because "waste" in the sense of unnecessary expenditures may not exist, or if it does, because there is no reason for government officials to reduce it. If government officials prefer a large budget, as is often claimed by proponents of limits, then reducing services in response to the limit may be the most effective way to eliminate the limit.
2 *Head-in-the-sand perception*: Voters may believe that the effect of a limit will be to reduce taxes and government services, which is desirable if those voters believe they do not get any benefits from government services. These voters have their heads in the sand because such a perception is silly – everyone benefits from some services provided by state and local governments.
3 *Optimist perception*: Voters may believe that the effect of a limit will be to reduce taxes and government services, but only other voters' favorite services will be cut, as reflected in the accompanying *Pepper . . . and Salt* cartoon. Again, this perception seems contrary to the political notion that makes limits attractive in the first place. If government officials are trying to maintain expenditures higher than the voters' desire, then the politically strategic response of such officials to the limit is to reduce services that are most popular so that the limit might be rejected or overturned.

Several surveys of voter attitudes about government taxes and fiscal spending limits support the existence of these faulty perceptions. Jack Citrin (1979) analyzed survey data that included California voters' positions on Proposition 13, their socioeconomic characteristics, and their preferred change in taxes and spending on a variety of different services. Citrin reported that in most cases a majority preferred the status quo level of taxes and spending despite the approval of the proposition. He argues (p. 127) that his findings "confirm that the main intention of California voters in passing Proposition 13 was to cut taxes rather than eliminate a wide range of government services." Paul Courant et al. (1980) analyzed a survey of Michigan voters from 1978 taken at a time three different constitutional tax limitation proposals were on the ballot. In the survey, voters were asked about how they voted on each proposal, about their desired changes in state-local taxes and services, and about their perceptions of the likely effects of each proposal. Voters who perceived that the limit would reduce taxes were more likely to vote for the amendments, even if they did not desire a reduction in spending. Courant and his colleagues concluded (p. 19) that "it appears that voters are perceiving that their own taxes will be cut without expenditures being cut, either because of supposed efficiency gains, greater uncertainty about the spending side of the budget, or the unending search for a free lunch."

Effectiveness of tax and expenditure limits

Although there have been many research studies of the effects of tax and expenditure limits for both state and local governments, a clear or unambiguous set of findings has not emerged. In part, the variety of results is found because both the characteristics of the limits and the political and economic circumstances differ greatly among states. It is also difficult to evaluate the effectiveness of tax and expenditure limits because the objective is not



Source: Reprinted from the *Wall Street Journal*

always clear. Limits may affect the target (taxes or spending) but also may have unintended effects on other aspects of state and local government finance. Finally, a number of statistical (econometric) issues arise in such studies, so different models or research techniques may lead to differing results. To learn about the variety and details of the research about tax and expenditure limits, Nathan Anderson (2006), Daniel Mullins (2010), Sharon Kioko (2011), and Phuong Nguyun-Hoang (2013) provide recent reviews of the literature.

Studies of local property tax limits in the 1970s and 1980s tended to find no significant effects, whereas more recent research using newer techniques has found decreases in taxes or spending more often. Reviewing the literature, Mullins (2010) notes two interesting aspects common to many studies. Tax limits sometimes are associated with lower property taxes but not lower spending, suggesting that the limit shifts financing to other taxes or charges or borrowing or grants. Anderson (2006) suggests that residents may support property tax limits even if they do not favor lower spending as a way of protecting against unexpected increases in property taxes in the future. Local tax or spending limits also may be associated with changes in local government structure as special districts or public authorities are established to avoid the effects of the limit. Rather than analyzing the direct effect of a property tax levy limit, Nguyen-Hoang (2013) examined whether the fiscal behavior of school districts changed when the limit was repealed. He reports no significant change in spending, suggesting that the levy limit was not affecting behavior.

Research regarding state government tax and expenditure limits has followed a similar pattern, with initial studies showing no effects and more recent research providing a mix of results based on the case and analytical technique. Daphne Kenyon and Karen Benker (1984) examined the change in state spending relative to state personal income for all states between 1978 and 1983 to see whether there was a difference in those states with state government tax or expenditure limits compared to those with no state limits. They concluded that tax or expenditure limits did not restrict growth in taxes and spending in most cases, a conclusion borne out by both the opinions of state budget officers and actual expenditure data.

Expenditures increased more than income in some years and less than income in others for states with and without limits, so state expenditures in aggregate remained at a nearly constant share of personal income. If demand for state-local services is income inelastic, then expenditures would not increase faster than income if that was the only factor changing.

Reviewing more recent studies, Kioko (2011) notes that some studies show state government expenditure limits having a greater effect than revenue limits, that immediate effects may dissipate in the long run, that effects were greater in certain types of states than others, that spending may be reallocated between state and local governments, and that aggregate spending by the state-local sector does not seem to have been changed. Consistent with the notion of unintended effects, James Poterba and Kim Rueben (1999) found that tax limits increase state borrowing costs, whereas expenditure limits decrease borrowing costs through their effects on the perceived financial stability of governments. Similarly, Ronald Fisher and Robert Wassmer (2014) report that states with tax or spending limits tend to have higher debt (suggesting relatively more borrowing).

Colorado adopted a relatively broad and restrictive limit in 1992 – the Colorado Taxpayer Bill of Rights (TABOR) – that attempted to constrain both taxes and expenditures. Subsequently, in 2005, Colorado voters adopted a proposal to suspend TABOR's revenue limits for five years and to loosen many of the spending restrictions. Paul Eliason and Byron Lutz (2018) used a complicated empirical approach to study the effects of the Colorado limit on both revenue and spending simultaneously. Their results showed no evidence of an effect of TABOR explicitly on the level of taxes or spending in the state. They conclude, "TABOR appears to have been partly evaded by policy makers . . . and partly nothing more than a ratification of the state's preference over the size of its public sector."

Thus, an important technical issue for all this research involves the direction of causation. It may be that states whose voters prefer lower spending or taxes choose to adopt tax or expenditure limits or balanced budget restrictions. In that case, there may be a correlation between lower taxes or spending and the existence of limits, but it is a preference for lower spending that caused the adoption of limits rather than the opposite. This is a difficult econometrics problem to resolve in the research.[17] For instance, research into the impact of supermajority vote requirements to increase taxes often finds no effect. However, Brian Knight (2000) controls for the propensity of certain types of states to adopt such vote rules and then finds that supermajority vote rules reduce tax rates substantially.

Application 7.3: The pension funding crisis

Traditionally, the compensation of many state and local government employees includes retirement benefits in the form of defined-benefit pension programs. In such programs, the employing government is expected to make annual payments to a pension fund on behalf of workers, and sometimes workers also contribute a portion of salary to supplement the government payments. The pension fund invests the amounts received in order to pay defined benefits to workers when they retire. The employment contract for the workers specifies how long one has to work to be eligible for benefits, how the benefit amount will be calculated, and other characteristics such as transferability and whether cost-of-living adjustments are expected. Importantly, about one-quarter of state-local government employees are not covered by the US federal Social Security program, so the pensions must provide what otherwise would be social security benefits and any additional retirement benefit.

The Center for Retirement Research at Boston College reports that in 2020, there were about 6,000 such public retirement systems in the US administered by various state and local governments. These retirement plans included 14.7 million current working employees and

11.2 million retirees. The plans had $4.5 trillion in assets and paid $323 billion in retirement benefits annually.

Future retirement payments from the pension funds represent deferred compensation to employees. The concern is that some governments may have adopted this compensation system in an attempt to keep current costs of state-local services low, while deferring a substantial component of the costs to the future. This would happen if governments did not continually make sufficient payments to the pension funds to pay future benefits fully, or what has come to be called the problem of underfunded public pensions. Depending on contractual and other legal aspects, as well as the government's practices of funding this deferred compensation, these liabilities may represent a claim on future receipts and assets of the government.

Measuring future liability for employee pension costs is not straightforward. It requires an estimate of both the value of assets for the pension program and a value for future liabilities; the "unfunded liability" is the difference. First, because most state and local pension funds invest in stocks, bonds, and real estate, asset values can vary substantially from day to day. Therefore, unfunded pension liability will differ depending on when the asset value estimates are made. Accounting practice has been to measure the value of fund assets as the average over several years. Second, estimates of pension liability depend on (1) whether liabilities are counted for all retirees and current public employees, assuming they work to retirement, or only liabilities incurred to date (which excludes some future liabilities if current employees continue to work) and (2) the discount rate used to calculate the present value of future liabilities or, equivalently, the rate of return that pension funds can expect to earn.

The rate of return issue is as follows. Most states traditionally assumed they would earn an average rate of return of about 8 percent and used that to calculate unfunded liability or the ratio of assets to liability. Recently, the assumed return has been closer to 7 percent. However, in order to earn an 8 percent rate of return, states would incur substantial risk, implying that such a value for a risk-adjusted rate of return is too high. It is often suggested that states can more realistically earn average rates of return of 4 or 5 percent adjusted for risk, the traditional rate on long-term US Treasury bonds. If the long-term Treasury bond rate is used to discount future pension liabilities rather than the 8 percent that states commonly use, then the estimate of future liability is greater than the states calculate.[18]

There is general agreement that state and local pension programs in aggregate, as well as most individual programs, are underfunded – that is, current assets plus expected future returns are insufficient to pay future expected benefits. Aubry (2020) reports that since 2000, pension fund investment returns have been greater than assumed in about half the years, but the average return remains less than the assumed 7 percent. Therefore, the average actuarial funded portion of benefits declined and has been in the area of 71 to 73 percent since 2012 (or 28 percent of future benefits are currently unfunded). Similarly, the Public Fund Survey, which collects and reports financial information for about 85 percent of the state and local government pension programs, primarily from retirement systems' annual financial reports, showed that in 2019, these pension programs had assets of about $3.75 trillion and future liabilities of $4.94 trillion; thus, the unfunded future liability was about $1.2 trillion. The actuarial funded level was about 72 percent.

As is typical in state-local finance, substantial differences exist in funding ratios in different states and different pension plans. Among 120 plans in the Public Fund Survey, funded ratios varied from less than 40 percent to more than 100 percent for FY 2019. Aubry et al. (2020, 4) report "In 2020, the average estimated funded ratio for the 20 worst-funded plans in our sample is 38.3 percent."

These results illustrate two of the key points in understanding state pension funding. First, estimated financial liability depends crucially on the estimated returns (or how liabilities are

discounted); the estimated returns used by states are higher than the risk-neutral Treasury bond rates, implying that states may be underestimating their true pension liability. Second, the estimated financial status depends directly on the status of the investment markets, as dramatic change in stock prices greatly affects the estimated underfunding of state pension systems.

There was substantial concern about how the recession that resulted from the pandemic might affect state and local pension plans. Investment returns increased substantially during 2019, which strengthened those pension plans financially. However, investment returns (asset and stock prices) declined substantially in early 2020 as the effects of the pandemic became clear. As a result, pension plan financial conditions worsened in fiscal year 2020. Since the middle of 2020, however, stock and asset prices have risen to more than offset the decline early in that year, again improving the financial position of public pension plans. An additional concern is whether state and local governments, buffeted by the effects of the pandemic, will have the resources to make annual contributions to the pension funds.

State and local governments with substantially underfunded pension programs have just a few options. One possibility, obviously, is for governments to allocate current revenue to increase payments to the plans so that assets grow and become sufficient to pay benefits. However, because many plans have been underfunded for a number of years, trying to resolve a long-term problem with short-term payments would take large reallocations of current resources or substantial current tax increases. A second possibility is to change employee conditions, either by reducing benefits or by requiring larger payments from workers. Typical ways of reducing benefits include increasing the retirement age (or years of service required to retire), altering the formula that determines annual pension amounts, reducing or eliminating cost-of-living adjustments, and explicit reductions in defined benefits. Because many states are constrained in reducing benefits by constitutional or contractual protections for workers, current retirees commonly are excluded from benefit adjustments, or they are applied only to "new" employees. A third option is to replace an existing defined-benefit retirement program with a defined-contribution plan – that is, one in which both workers and the government contribute annually, and the employee invests the funds for retirement in a tax-deferred account. When this option has been used, typically new employees must adopt the defined-contribution plan, whereas current employees might be able to choose either plan.[19] Of course, the unstated option is to make no change, in which case future taxpayers will face either a bill to fund the unfunded pension benefits or these same choices.

In future years, many state and local governments may face these choices. Although the magnitude of the issue and the constraints may be different, the fundamental dilemma will be the same. Are employment arrangements with past workers to be revised after the fact, or will current taxpayers bear the cost of the compensation of those workers that was deferred by past taxpayers? Of course, some pension plans have acted already. Jamie Lenny and coauthors (2021) argue that the pension funding issue may not be as severe as some have suggested as reforms already instituted by plans will cause benefit payments to decline significantly in the future. If their analysis is correct, then only modest fiscal adjustments may be required to stabilize pension finance.

International comparison[20]

We learned that labor is a very important input for the production of state and local government public services in the US. However, both the relative magnitude and distribution of government employment differ substantially among industrialized nations. The OECD reports that among 32 major nations in 2017 the public (government) share of total

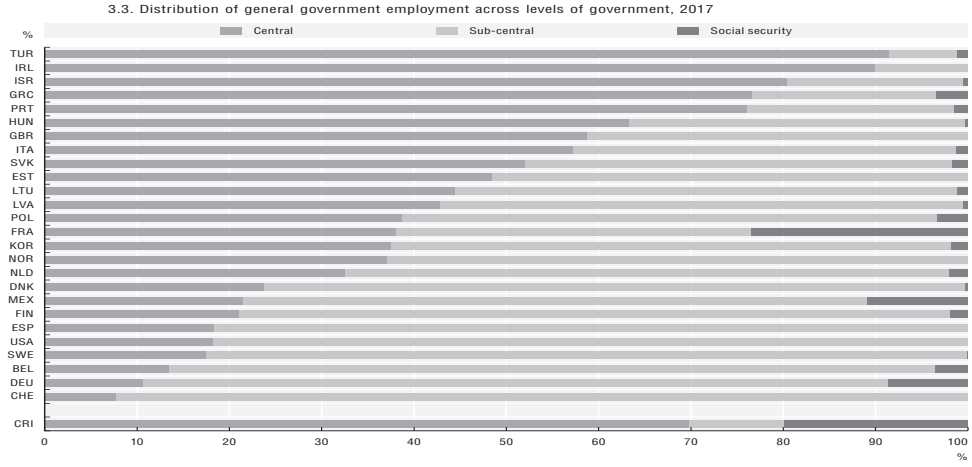


Figure 7.8 Distribution of general government employment across levels of government, 2017

employment varied from 30.3 percent in Norway to 5.9 percent in Japan, with the United States in the lower third of countries at 15.2 percent and the OECD average at 17.7 percent. Obviously, the national share of government employment parallels the overall relative size of government in the country.

The distribution of public employment at the national as opposed to subnational level of government reflects the decentralization of the public sector. The OECD reported the distribution of public employment between the national and subnational government sectors (as well as public employment for Social Security funds, where separate), as shown in Figure 7.8. For the US, about 82 percent of public employment is at the subnational government level, compared to an average of 54 percent for the 26 OECD countries reporting data for 2017. Only Switzerland, Germany, Belgium, and Sweden had a larger share of public employment at the subnational levels of government than the US. Countries with a unitary government model as opposed to a federal system, such as Turkey, Ireland, and Israel, are at the opposite end of the spectrum.[21]

Summary

There are at least three different, broad ways to measure the output of state-local governments. Output can be measured by the amount of money spent by a government on a service, referred to as "expenditures"; by the amount of directly produced output provided by the government; or by results – the level of consumption enjoyed by citizens.

State-local governments purchase inputs such as labor services, capital goods, and materials and supplies and combine them in some way to provide public facilities, or what can be called "directly produced output." The cost of the directly produced output, which depends on the production technology and the prices of the inputs, is the expenditure of the government on this service.

The service result, what can be called the "consumer output," depends on the directly produced output provided by the government and on the private consumption decisions of individuals as well as the characteristics of the community and the population.

If the prices of inputs rise, then it will cost governments more to provide the same produced output. If input prices differ for different subnational jurisdictions, equal expenditures by different jurisdictions do not necessarily translate into equal produced output.

Expenditures for direct labor services represent about half the expenditures by state-local governments on average. State-local governments are also among the largest employers in the economy, employing about one of every seven employees.

Baumol argued that productivity increases in some sectors of the economy would force wage increases throughout the economy, increasing the production costs in those sectors in which productivity improvements do not occur. The nature of some state-local government services precludes productivity gains because the essence of the service is the labor itself. For those services, unit production costs would certainly increase, and the choice for consumers is either to substantially reduce consumption of the service or to spend increasing amounts to continue consuming current levels.

There is an aggregate state-local budget surplus in most years, although the magnitude varies according to national economic conditions. The state-local sector historically provided a countercyclical element to national macroeconomic policy, although behavior during the two most recent recessions was different.

Nearly all local governments and about two-thirds of state governments are constrained by statutory or constitutional limits on taxes or spending or both. Property tax rates are limited in 33 states, property tax amounts in 23, local general revenues or expenditures in 6, and state own-source revenue or expenditures in 33.

Discussion questions

1 "If one city spends more on police protection per capita than does another, one expects less crime in the first city than in the second." True, false, or uncertain? Explain.
2 At a public budget hearing, a citizen once argued, "Education expenditures have increased 5 percent in each of the past three years even though student enrollment has been declining. Where is the extra money going? It seems to me that if the number of students declines, expenditures should also decline." Is the citizen right or wrong?
3 "If the Baumol hypothesis is correct concerning local government finances, and if the demand for local services is inelastic, then we are in trouble – eventually, spending for education, police and fire protection, and sanitation will require half our incomes." Evaluate this concern. What changes could occur to prevent this from happening?
4 Competing with private-sector salaries is a common problem for some academic departments in universities, particularly in engineering, accounting, other business fields, and biological science. If universities do not match the salaries, they may be unable to hire professors, or at least the better candidates, and if they do match the salaries, then the cost of operating those programs (and eventually tuition) will increase. How might universities change the production of engineering or business education to avoid this problem – that is, how could professors be substituted for or made more productive? Do you think those changes would affect the "quality" or nature of education in these fields? Does this problem apply to private as well as public universities?
5 Suppose a state is considering three different types of fiscal limits for local governments in the state – a maximum property tax rate, a limit that property tax revenue may not increase more than population and inflation together, or a limit that spending may not increase more than 5 percent. In each case, the limit may be exceeded by majority vote. Which limit is most restrictive and why? Contrast the three in terms of the sources of allowed increases in taxes or spending and the potential effect on local services.

Notes

1 Ronald Fisher, "State and Local Governments are Crucial to the Economy," *Governing*, September 28, 2020; Jeanna Smialek, "Toll Workers Job Losses Highlight Long-Term Fallout of Pandemic," *The New York Times*, February 4, 2021

2 David Bradford, R. A. Malt, and Wallace Oates, "The Rising Cost of Local Public Services: Some Evidence and Reflections," *National Tax Journal*, *22* (June 1969): 202.
3 The discussion in this section follows that in David Bradford et al. (1969).
4 Of course, governments might not always select the minimum cost input mix. For instance, it has been argued that due to patronage consideration or public-employee unionism, state-local governments may choose to use more labor than is cost minimizing.
5 Labor costs for the federal government have been a much smaller fraction of expenditures. State and local governments provide goods and services to individuals and businesses that require a substantial amount of labor to produce, whereas the federal government mostly transfers money either to people (such as with Social Security and Medicare) or to state-local governments (through grants). The federal government produces few services directly, so its labor-cost share is lower.
6 Direct expenditures are total expenditures excluding intergovernmental transfers. Expenditures for current operations are direct expenditures excluding expenditures for capital, assistance and subsidies, interest, and insurance benefits. Expenditures for current operations represent money spent for current goods and services.
7 Gittleman and Brooks (2011) find that state and local government workers' compensation costs are slightly higher than in private sector, whereas Keefe (2012) reports a very small compensation penalty for public sector workers. Thus, the research seems to show small differences if they exist at all.
8 Perhaps Baumol did not foresee the advent of computer-based music synthesizers so that one programmer-performer could produce the horn quintet. But one might suspect that Baumol and others would see this option as substantially changing quality. In essence, the performance by the synthesizer is a different good (or bad) completely compared to the quintet.
9 http://econ.msu.edu/people/docs/Criminal%20Justice%20Spending.pdf.
10 US Department of Justice, "Prisoners in 2019," www.bjs.gov/content/pub/pdf/p19.pdf.
11 The Pew Charitable Trusts, States Can Shorten Probation and Protect Public Safety, https://www.pewtrusts.org/en/research-and-analysis/reports/2020/12/states-can-shorten-probation-and-protect-public-safety.
12 www.pewtrusts.org/en/about/news-room/press-releases-and-statements/2021/01/14/pew-applauds-michigan-for-enacting-bipartisan-legislation-to-safely-reduce-jail-populations.
13 The highest unemployment rate during the Great Recession was 10 percent in October 2009.
14 However, properties can be reassessed at their full market value when sold. See Chapter 12.
15 Budget Processes in the States, Spring 2015, https://www.nasbo.org/reports-data/budget-processes-in-the-states.
16 www.taxpolicycenter.org/briefing-book/what-are-tax-and-expenditure-limits.
17 As another example of the difficulty of determining causation, does the adoption of a state lottery "cause" a state's voters to want to gamble, or do those states whose voters are interested in gambling adopt lotteries?
18 If states earn a 4 or 5 percent return on investment annually rather than 8 percent (risk adjusted), then states must allocate greater funds to investment to meet future liabilities.
19 Michigan did this for state government employees in the 1990s. For evidence of the results, see Papke (2004).
20 OECD, *Government at a Glance*, 2019.
21 Data for two other major federal nations, Australia and Canada, were not available.

Selected readings

Baumol, William. "Macroeconomics of Unbalanced Growth: The Anatomy of the Urban Crisis." *American Economic Review*, *62* (June 1967): 415–426.

Brennan, Geoffrey, and James Buchanan. "The Logic of Tax Limits: Alternative Constitutional Constraints on the Power to Tax." *National Tax Journal Supplement*, *32* (June 1979): 11–22.

Gordon, Tracy, Lucy Dadayan, and Kim Rueben. "State and Local Government Finances in the COVID-19 Era." *National Tax Journal*, September 2020.

Hirsch, Werner. "State and Local Government Production." In *The Economics of State and Local Government*, 147–165. New York: McGraw-Hill, 1970.

Munnell, Alicia H., Jean-Pierre Aubry, Josh Hurwitz, and Madeline Medenica. *The Funding of State and Local Pensions: 2012–2016*. Boston: Center for Retirement Research at Boston College, July 2013.

Suits, Daniel B., and Ronald C. Fisher. "A Balanced Budget Constitutional Amendment: Economic Complexities and Uncertainties." *National Tax Journal*, *38* (December 1985): 467–477.

8 Pricing of government goods

User charges

Headlines

After Hours Automated Self-Pay Machine

If you arrive at the Summit or Kīpahulu District of Haleakalā National Park and the entrance station is closed, please use the automated self-pay machine located next to the entrance station.

DOI: 10.4324/9781003030645-11

Arizona State Parks

Lake Havasu State Park

Fee type	*Price in US $*
Daily entrance Fridays, Saturdays, Sundays, & state holidays:	
Per vehicle (1–4 adults)	20.00
Daily entrance other days: Per vehicle (1–4 adults)	15.00
Daily entrance: Individual/bicycle	3.00
Camping	35.00
Camping: Beachfront	40.00
Camping: Overflow	25.00
Cabins: Standard rate	99.00
Cabins: Holiday rate	109.00
RV parking with cabin rental (includes hook-ups and dump station)	30.00
Additional vehicles at cabins	15.00
RV campsite in cabin loop (includes dump station)	40.00
Overnight parking fee (10 p.m.–6 a.m.)	5.00
Dump station fee	15.00

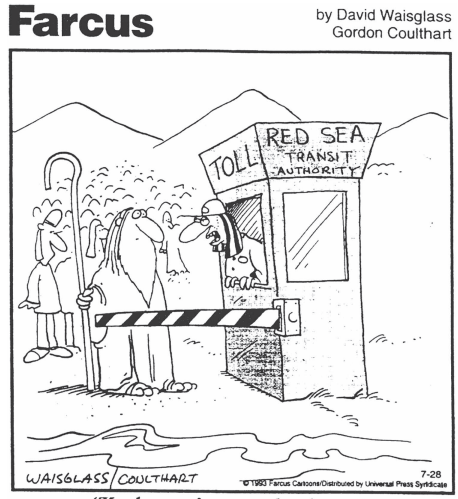
New York City Department of Parks and Recreation Tennis Permits and Renewal Applications

A permit is needed to use an outdoor tennis court from the first Sunday of April to the Sunday before Thanksgiving.

Full-season permits for adults ages 18 to 61 cost $100. Adults with a valid IDNYC card can receive 10% off their full-season permit fee. Permits for seniors ages 62 and older cost $20. Permits for kids and teens younger than 18 years old cost $10.

You can purchase a single-play permit for one hour of play for use throughout the tennis season. Single-play permits cost $15.

You can purchase a new tennis permit online.



"You know, of course, there's a toll."

Data availability

The Governments Division of the US Census Bureau is the major source of data about the revenue for state and local governments, including user charges. These data are reported annually in several different reports. State and aggregate local government revenue from all sources is reported annually with a year or two lag (https://www.census.gov/programs-surveys/gov-finances/data/datasets.html). Data about the amount of user charge revenue received by specific types of local governments – counties, municipalities and townships, school and other special districts – are reported in the Census of Governments, which is completed every five years, in years ending in 2 or 7.

As noted throughout the book, you may access these data directly from the Census or by using the valuable and easy-to-use data tabulation utility maintained by the Urban Institute (https://state-local-finance-data.taxpolicycenter.org//pages.cfm).

Data for fees and charges connected to specific public services are often available from organizations connected to the service. For example, information about the magnitude of user fees for higher education (i.e., tuition) is provided in the annual report "State Higher Education Finance" by the State Higher Education Executive Officers Association (https://shef.sheeo.org/). Information about data sources for transportation-related charges and fees is reported in Chapter 18.

User charges are prices charged by governments for specific services or privileges and used to pay for all or part of the cost of providing those services. Such fees have always been important but have become increasingly so (although perhaps not quite as much as the *Farcus* cartoon suggests). User charge financing differs from financing with general taxes because with user charges, there is a direct relationship between the fee and service received. Common examples of user charges used by state and local governments include water charges, tuition at public colleges and universities, public hospital charges, parking fees, highway tolls, subway or bus prices, and park entrance or use fees (as reflected in *Headlines*).

User charges are important for fiscal decisions of state and local governments both because they help measure citizen demand for services and because they help allocate scare resources. Thus, Selma Mushkin and Richard Bird suggest "The economic case for the expansion and rationalization of pricing in the urban public sector rests essentially on the contribution it can make to allocative efficiency. Prices will provide correct signals to indicate the quantity and quality of things citizens desire."[1]

Types and use of charges

The types of financing methods considered user charges include direct charges for use of a public facility or consumption of a good or service, license taxes or fees paid for the privilege of undertaking some activity (such as fishing license and driver license fees), and special assessments, a type of property tax levied for a specific service and based on some physical characteristic of the property, such as front footage (for example, assessments for sidewalk construction).

The US Census Bureau reports the data for these activities in several categories. "Current charges" include fees for education, hospitals, highways, airports, parks and recreation, natural resources, sewer systems, solid waste collection, and other similar activities. The census reports data, including revenue, for public utilities – water, electricity, gas, and transit – separately. Thus, water bills are reported as water system revenue, but sewer bills (outgoing

Table 8.1 Amounts of charges and fees, state and local governments, 2018[a]

Type	*Amount (billions of dollars)*	*Percent of general revenue*	*Percent of total charges*
Current charges	$547.5	16.6%	71.5%
Motor vehicle license fees	30.1	0.9	3.9
Special assessments	10.5	0.3	1.4
Other unallocable taxes	91.1	2.8	11.9
Water revenue	69.2	2.1	7.7
Transit revenue	17.3	0.5	2.3
Total	765.7	23.3	100.0

Source: US Census Bureau, *State and Local Government Finances, 2018*

Note:
a This measure of charges excludes revenue from electric and gas public utilities and liquor stores. In most cases, these services are sold directly, so prices represent the bulk of financing. See Netzer, 1992.

Table 8.2 State-local user charges and expenditures, by category, 2018

Category	*Category user charge as percent of all user charges*	*Category user charge as percent of direct expenditures in category*
Hospitals	30.8%	84.5%
Higher education	22.2	40.3
Sewers & sanitation	14.5	94.0
Air transportation	4.6	82.9
Highways	4.0	11.7
Other education	2.9	2.1
Parks & recreation	2.1	25.7
Parking	0.6	143.4
Other	18.3	–

Source: US Census Bureau, *State and Local Government Finances, 2018*

water) are reported as general charges. Finally, special assessments are included with several other things in a category called "miscellaneous general revenue." State and local governments collected about $766 billion of these types of charges in 2018, as shown in Table 8.1. All charges and fees together represented 23.3 percent of the general revenue of state-local governments in 2018, again shown in Table 8.1, with traditional user charges alone representing more than 16 percent of revenue.

Most state-local traditional user charges ("current charges") arise from the budget categories of education and hospitals, as shown in Table 8.2.[2] About 56 percent of subnational government direct user charges are attributable to those categories, 31 percent from public hospitals, and 25 percent from education. Of all other individual categories, sewers and sanitation account for 15 percent of charges, with all others much less. For that reason, extreme caution should be used when comparing reliance on user charges among different states (or localities). Without large public higher education and hospital systems, user charges may appear as a small fraction of revenue simply because those services are not provided. Interjurisdictional comparisons should be made by budget category.[3]

More than half of state-local expenditures on airports, hospitals, and sewer and sanitation systems are financed by user charges, whereas only about 3 percent of K–12 education expenditures are financed that way, as shown in Table 8.2. Although tuition and other charges by public colleges and universities are a large fraction of total user charges, they represent a small fraction of total state-local education expenditures when the mostly

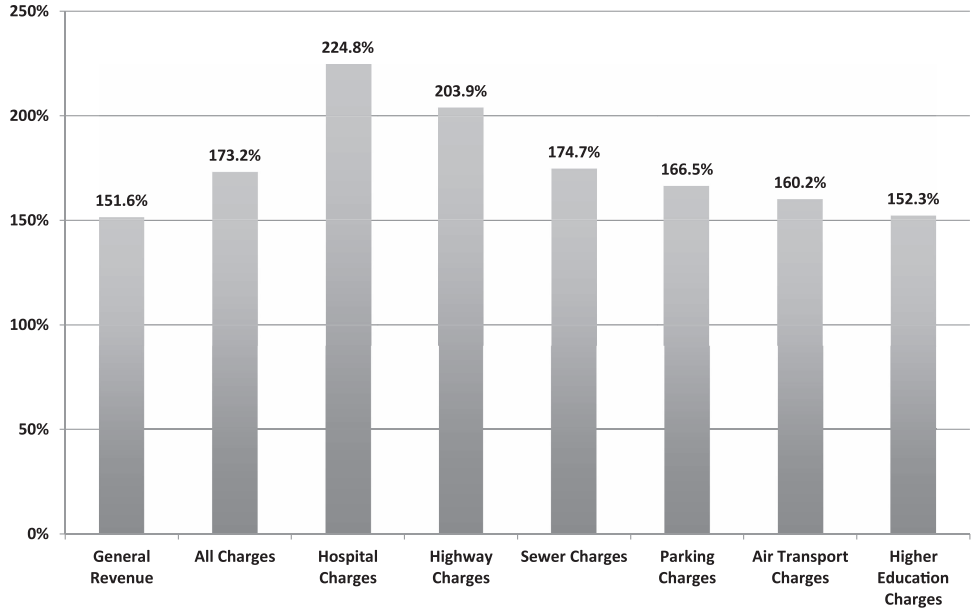


Figure 8.1 Percentage change, real state-local revenue, 2019 vs 2000
Source: US Census Bureau

tax-financed primary and secondary school expenditures are included. The opposite is true for airports, sewer and sanitation systems, and parks and recreation services, for which user charges are a small fraction of all charges but a represent a large fraction of spending in those categories.

The magnitude of state-local traditional user charges, both in nominal and real dollars, has risen substantially since the early 1960s and particularly fast since 2000, as shown in Figure 8.1. Since 2000, general user charges increased by 173 percent in real terms, substantially more than the 152 percent growth in all types of general revenue. Indeed, the six categories of user charges shown – for hospitals, highways, sewers, parking, air transport, and higher education – all increased faster than overall state-local general revenue. In part, of course, the increasing reliance on user charges reflects increased spending on higher education and health care, the two budget categories that generate large charges.

User charges (broadly defined) are relatively most important for counties and municipalities, where they accounted for more than 20 percent of general revenue in 2017 (see Table 8.3). Fees at public hospitals are the largest component for county governments, whereas water and sewer charges are the largest component for municipalities. Water and sewer fees also dominate for townships. For state governments, fees at public hospitals and higher education institutions provide the greatest component of user charges. Charges provide a very small (and decreasing) fraction of revenue for school districts and a relatively large fraction (more than 40 percent) for special districts.

As reported by Netzer (1992), reliance on user charges is negatively correlated with state per capita income. For 2018, the correlation coefficient between all charges and other miscellaneous revenue as a percentage of general revenue and per capita income is –.40, and

Table 8.3 Charges as a percentage of general revenue, by type of government, 2017

Government	*All charges*	*Largest categories*
State	11.4%	Higher education, 5.5% Hospitals, 3.5%
County	21.1%	Hospitals, 9.3%
Municipality	20.9%	Water, 7.9% Sewers, 7.3% Hospitals, 2.4% Solid waste collection, 2.1%
Township	9.7%	Sewers, 4.3% Water, 2.9%

Source: US Census Bureau, *State and Local Government Finances, 2017*

–.53 for general charges alone. The five states with the largest fraction of revenue from traditional user charges alone are South Carolina (27.8 percent), Alabama (25.7 percent), Utah (25.0 percent), Kansas (23.2 percent), and North Carolina (22.8 percent), whereas the five with the smallest user-charge reliance ratios are Connecticut (8.3 percent), New York (10.6 percent), New Jersey (11.0 percent), Massachusetts (11.3 percent), and Illinois (11.5 percent).

Theory of user charges

In theory, user charges should operate as benefit taxes (discussed in Chapter 2), with an individual's charge depending both on benefit (use) and cost of provision. The principal rule for economic efficiency requires that marginal benefit equal marginal cost. For services that primarily benefit the direct consumer, the price charged should equal marginal cost.

The reason this makes economic sense is simple. If consumers believe that public services and facilities are "free" – that is, that more can be produced at no cost to the consumer (when, in fact, additional amounts do entail a production cost) – consumers will be induced to demand more than the efficient amount of those services or facilities. One function of user charges, therefore, is to make consumers face the true costs of their consumption decisions, thereby creating an incentive for efficient choice.[4]

The basic idea is illustrated by Figure 8.2, which depicts the marginal benefit schedules for both direct users (MB_U) of a service or facility and all of society (MB_S), who also benefit generally. Those marginal benefits are added together to determine the aggregate marginal benefit to the entire society or community from an additional unit of the service (RMB_i). Given a cost of producing one more unit equal to *MC*, the efficient amount of the service or facility is $Q^\star$. The private marginal benefits to users and general marginal benefits to all at that quantity determine how the production costs should be divided among users (a user charge) and all of society (general taxes). In this case, user charges should account for $MB^\star_U/MC$ of the cost of the facility. Because direct users would face a marginal cost of $MB^\star_U$, they would demand quantity $Q^\star$, which is the **efficient quantity**.

In contrast, if users perceive the marginal cost to be zero, they would demand amount Q_2. This is not efficient because the marginal benefits to everyone – the sum of the marginal benefits to direct users and to society generally – are less than the cost of production for all the units of output between $Q^\star$ and Q_2. That difference between marginal cost and aggregate marginal benefit represents the potential efficiency cost of not charging appropriate prices for this service.

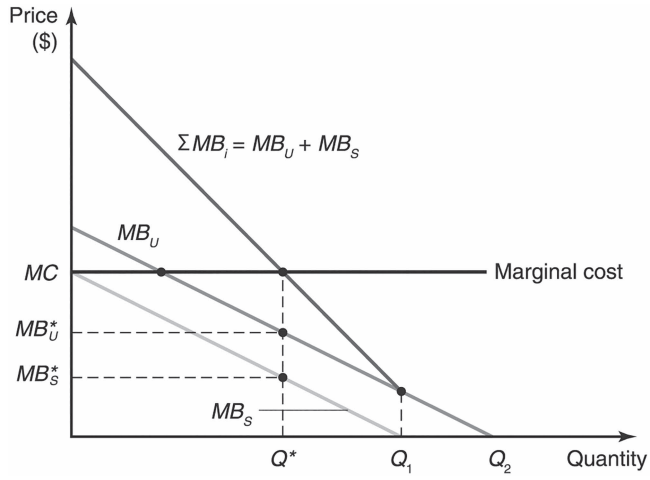


Figure 8.2 Allocation of costs to direct users and society in general

Several general principles of efficient user charges follow from this analysis.

1 The greater the share of marginal benefits that accrues to direct users, the more attractive user-charge financing becomes.
2 User-charge financing requires that direct users can be easily identified and excluded (at reasonable cost) from consuming the service unless the charge is paid, assuming that most of the benefits of a service or facility go to direct users.
3 The efficiency case for user-charge financing is stronger if demand is more price elastic. In the special case of a perfectly inelastic (vertical) demand, price does not matter. No inefficiency would result if consumers underestimated cost. Obviously, the more price elastic the demand, the greater the potential for inefficiency if consumers do not face true costs.
4 Marginal benefits, not total benefits, matter for determination of user charges. For instance, in Figure 8.2, quantities of the facility beyond Q_1 provide benefits only to direct users. Thus, despite the fact that all of society benefits some from this facility, direct users should *entirely* finance production of amounts greater than Q_1.

This last principle deserves additional explanation. The general rule is that costs should be allocated proportional to benefits, but which costs? Here it is helpful to distinguish between the capital costs for the *amount* of a service or facility to provide – the long-run decision about the quantity to produce – and the operating costs associated with the *use* of a given facility, which is a short-run decision. For instance, a local community faces a decision about the appropriate number and size of parks to provide, whereas a state government selects the number and size of public colleges. But once a given quantity of those facilities is provided, each government also faces a choice about how much and by whom those facilities are to be used. Should park use be free, or should there be an entrance charge? Should the charge be different for residents and nonresidents? Should the charge be different at different times? Similar questions apply to college tuition. User charges can have a role to play in the decisions about both amount and use.[5]

Allocating access (capital) costs

The costs for constructing or acquiring a public facility should be paid by those in society who will benefit from the *existence* of the facility, who may not be the ones who benefit from using the facility directly. For instance, an individual who may never drive a car still benefits from roads as a result of transportation of goods and other people. Individuals may benefit from a facility, even if they do not use it directly, in three main ways. First, existence of a facility provides individuals the option of use in the future, should their demands change. An individual may not use a particular bridge currently but may want to maintain the option of changing to a residential location in the future that would require use of the bridge to commute. Such option value might be particularly significant in cases in which it would be very costly, or even impossible, to provide the public facility in the future. Such might be the case with public parks that preserve land in a relatively undeveloped state (as it might be impossible to reverse development once it has occurred).

Second, individuals who are not direct users also might benefit if the facility generates spillovers in the form of additional economic activity. Such monetary benefits to nonusers associated with public facilities or services might include spending on private services that are complements to public services (a private ice cream shop near a public park), attraction of funds from other jurisdictions (tourism), or improving the environment and attracting workers (which increases the supply of labor and holds labor costs down). Third, nonusers might benefit from pure altruism, receiving psychic benefits from providing service to others.

If all residents of a jurisdiction benefit from the existence of or access to a public service or facility, then all residents should contribute toward the acquisition of that facility based on those general benefits, which are independent of use. If all residents as well as users should pay all or part of the long-run production costs of public facilities, these charges should be independent of the amount of actual use of the facility. These charges therefore might be flat per capita or per household charges or perhaps charges based on property size if long-run capital costs vary by size. Examples include a fixed service charge common in public water systems to cover the capital costs (pipes, pumps, storage) and special assessments for sidewalks, streetlights, and neighborhood parks. Of course, these access costs might also be covered from general tax revenues if everyone benefits equally from existence of the facility.

Allocating use (operating) costs

After a public facility – whether a park, road, water system, or college – has been provided, attention turns to covering the variable or operating costs. How this is accomplished determines how much and by whom the facility is to be used. The general principle of efficiency, again, is that marginal benefit should equal marginal cost, but now the relevant marginal cost is short-run marginal cost, the cost of accommodating an additional consumer or providing another unit given the capital input selected. At issue here is the appropriate charge for each gallon of water consumed, each admission to the park, or each college class.

Operating costs should be allocated based on marginal benefit from *use*. In many and perhaps most cases, the benefit from additional use (as opposed to existence) goes only to users. If so, then it may be appropriate to charge fees to users to cover all the marginal operating costs. In some cases, though, there may be external (nonuser) benefits associated with additional use of a facility or service, such as the benefit to all of society from having an additional person educated. In those cases, only the portion that corresponds to their share of marginal benefits from use should be charged to direct users.

Assuming that users are to pay all the operating costs, some possibilities are illustrated in Figure 8.3. In Figure 8.3a, the short-run marginal cost is positive and constant; each

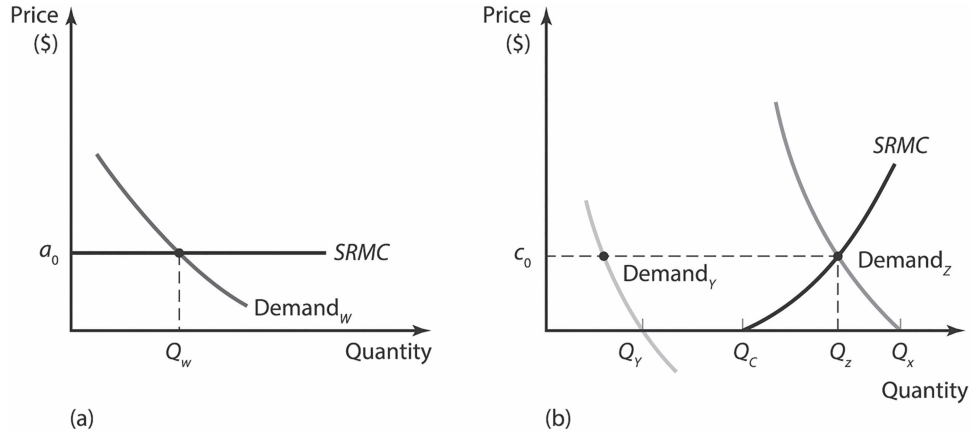


Figure 8.3 Efficient user charges with and without congestion

additional unit of service imposes a constant additional variable cost of a_0. Demand for this service is represented by Demand$_w$. The appropriate use charge (if users can be identified and excluded) is a_0 dollars *per unit* consumed – for example, $.01 per gallon of water or $2 per car for admission to a park or $1,000 per college class. In Figure 8.3b, marginal cost is zero up to quantity Q_C. If demand is Demand$_Y$, then the correct user charge is zero; there are no operating costs at the margin to cover.

Allocating congestion costs

For some services, an additional consumer may impose extra costs on other users, called **congestion costs**. As roads and bridges become more crowded, traffic slows and the (time) costs to all users increase; as parks become more crowded, there is less space for those in the park to enjoy activities; and when all the parking spaces and tennis courts are occupied, other potential users incur a waiting cost (or must forgo the activity). Because government incurs no additional cost of providing a service to an additional consumer (if one additional car parks in a space or an additional couple uses a tennis court), the government does not need to collect more revenue for operating expenses. Yet governments should and sometimes do charge user fees for all these services. The purpose of use fees in those situations is to allocate a scarce resource among competing demands.

The economic notion of congestion is formally represented in Figure 8.3b. For quantities of use or service less than Q_C, additional consumers can be accommodated without imposing any costs on other users. In essence the facility is not yet "crowded." Because marginal cost (operating and congestion) is zero, the efficient price is also zero; no use fee is required. If demand for the service is *Demand*$_Y$, no use fee should be charged, with capital costs covered either out of general taxes or by some fixed charge as discussed previously. For quantities of use or service above Q_C, the facility starts to become crowded; additional consumers do impose congestion costs on other users (at an increasing rate in Figure 8.3b). Therefore, if demand for this service is *Demand*$_Z$, the appropriate use fee is c_o, with a resulting amount of use equal to Q_Z. If no use fee were charged, then the amount of use would be Q_X, and the facility is overused: that is, "too crowded."[6]

Correcting for congestion costs may require charging different fees at different times. For the service represented in Figure 8.3, demand is sometimes *Demand*$_Y$, requiring an efficient

use charge of zero, and sometimes $Demand_Z$, when the efficient use charge is c_0. For instance, parks may be crowded on weekends and not during the week, demand for bridge crossings may be great at the commuting hours and low at other times, or public transit facilities may be used extensively at rush hour and little at other times. In other words, there may be a difference between demand at *peak times*, when higher use fees are appropriate, and demand at *off-peak times*, when lower or even zero use fees may be appropriate.[7]

Obviously, efficient application of use charges could generate revenue that is more than needed to cover extra operating expenses. In Figure 8.3b, a congestion charge at price c_0 during peak demand time generates net revenue because the marginal operating cost is zero. This is precisely one of the advantages of user charges: they measure the real demand for new facilities and provide the resources to create those new facilities. If current users are paying the appropriate costs of their consumption (including congestion costs) and there still is excess demand (evidence of serious congestion), then there is evidence that the amount of the facility selected is too small and that consumers would pay, and indeed are paying, to expand the facility. The revenue above operating costs, which was paid by the peak-time users, can be used to expand the facility or create another one.

Potentially, therefore, user charges can be composed of three separate parts: (1) an access charge to cover all or part of capital costs, (2) a use fee to cover all or part of the operating costs to the government associated with use, and (3) a congestion charge to cover the costs imposed by an additional user on other users. An alternative but equivalent way to think of determining user charges is to consider how a single producer should set its price based on its costs, including both its fixed and variable costs. That is the approach that follows for a natural monopoly.

User charges with natural monopoly

A **natural monopoly** is said to exist if the production of a good or service exhibits increasing returns to scale, so the long-run average cost continually decreases as output increases, as depicted in Figure 8.4. Decreasing average cost arises when there are very large capital costs relative to operating costs. Average capital cost decreases as the capital cost is spread over a larger and larger output, and the decreasing average capital cost (combined with relatively small marginal costs) causes average total cost to decrease as well. Average total cost always decreases as output rises, and marginal cost is always less than average cost. This leads

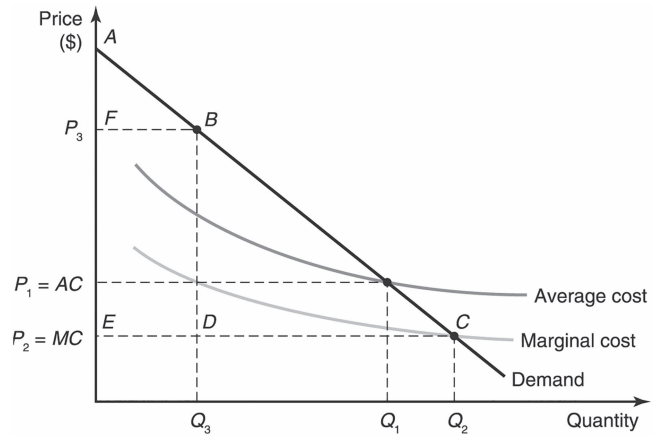


Figure 8.4 Two-part pricing by a natural monopoly

naturally to monopoly because any given output can be produced at lower average cost by one large firm than by several smaller firms.

This cost situation usually is said to characterize many utilities, including electricity, natural gas, and perhaps water and sewer and public transit services, but it also may apply to many other facilities provided by state and local governments, including parks and beaches, roads, bridges, airports, and others. In all these cases, capital costs are great relative to operating costs, and the facility has some unique aspect that generates monopoly power. Therefore, the usual approaches are for the government either to grant a private firm monopoly rights to a given market and then regulate the prices the firm may charge or to become the producer directly.

Setting an efficient price or charge in the case of increasing returns to scale faces an inherent conflict. If price is set equal to marginal cost (for instance, at P_2), then price is less than average cost, and the firm or operating authority cannot cover all its costs. If price is set equal to average cost, at P_1, so the firm or public authority can cover both operating and capital costs, then price is greater than marginal cost, causing the facility to be used less than efficiently. It is sometimes suggested that the government should set or enforce a price equal to marginal cost, with the government using general tax revenues to cover the resulting financial losses. That could be an appropriate user-charge strategy if everyone were to contribute toward the capital costs, with users covering only operating costs. But that, too, leads to inefficiency because of the inherent inefficiencies created by the taxes necessary to offset the entity's operating losses. In practice, utility regulation often settles on solutions that effectively set charges equal to average cost – for example, at P_1 – allowing the regulated utility just to cover costs and earn average profits.

One possible and often practical solution to this difficulty is to set a **two-part price**, charging different prices for different quantities of the service. For example, in Figure 8.4, one could set a price of P_3 for quantities up to Q_3 and a price of P_2 for amounts greater than Q_3. Because the charge for marginal units of output is equal to marginal cost, total consumption will equal the efficient amount of Q_2. But the producer may be able to avoid operating losses because the price discrimination generates larger revenue than if a single price was charged. With the two-part price, revenue is $P_3Q_3 + P_2(Q_2 - Q_3)$ or $(P_3 - P_2)Q_3 + P_2Q_2$, which is greater than the revenue from a single price, equal to P_2Q_2.

Two-part pricing takes advantage of the fact that some consumers are willing to pay prices higher than marginal cost for so-called inframarginal units (units other than the last one purchased). The two-part price captures some of that surplus for the producer, allowing the producer to charge a marginal cost price for marginal units and still cover all costs. With a single price of P_2, consumers enjoy a surplus represented by the area of triangle *ACE*. With the two-part price involving P_2 and P_3, consumers' surplus is smaller, represented by the areas of triangles *ABF* plus *BCD*. Rectangle *BDEF* represents the added revenue to the producer.

Of course, there is no reason the inframarginal price needs to be set at P_3; the price should be selected to generate enough extra revenue to cover the producer's operating losses, if possible. In fact, the inframarginal price could apply only to the first unit consumed, effectively serving as a type of cover or access charge. In the case of Figure 8.4, that could entail charging a price of $\$A$ for the first unit and a price of P_2 for all subsequent units. This is equivalent to charging an access fee to cover capital costs and then a use fee to cover operating costs.

Two-part prices of this type are quite common, but use of the technique probably could be expanded in the case of other user charges. Many public water systems charge a fixed monthly access charge as well as a per-gallon use fee. The access charge is a second price effectively imposed on the first gallon of water consumed and serves to cover the capital costs. Some public transportation systems sell passes that allow riders to pay a lower fee for each ride than paid by consumers without the pass. Those who purchase the pass effectively

pay a high price for the first ride in each period (the inframarginal ride) and a low price (usually zero) for all subsequent rides (the marginal ones). It is not hard to think of other potential user-charge applications of this type. A public refuse system might levy a fixed monthly access charge in addition to a small fee per unit or bag collected, or a public parking facility could offer lower hourly parking charges to individuals who have purchased a monthly pass.

Two-part prices also can make sense even if the marginal cost of an additional user is zero. In that case, the first price covers the capital costs and the second price (the marginal use fee) is zero. Some private amusement parks (including the Disney parks) price this way, charging a single admission fee and no extra charge for each ride. Similarly, the Michigan Department of Natural Resources sells an annual vehicle pass for Michigan state parks, which entitles that vehicle to unlimited admittances without further charge to all state parks for that year. Those who purchase the pass therefore pay $12 for the first admittance in a year and a zero price for all others.[8]

It is relatively easy to add a congestion charge to the two-part price when that is appropriate. For instance, for those who purchase a monthly pass for $20.00, a public transit system might charge $.50 per ride during off-peak times (compared to $1.00 for others) and $1.00 during peak periods (compared to $1.50). Or a park system might offer an annual pass for $20 that permits free use of the park on weekdays, while weekend use entails an additional $4.00 fee. In both cases, the additional marginal price during high-demand periods represents the marginal congestion cost.

Other user-charge issues

The theoretical discussion suggests that user charges are most appropriate when most of the benefits of a government service go to identifiable direct consumers of a service whose demand shows some price elasticity. Two other potential advantages of user charges should be noted as well. Many public services provide benefits to individuals who are not residents of the providing jurisdiction, and user charges are one way to have those nonresidents pay for the benefits they enjoy. And having users directly finance (at least partly) the services and facilities from which they benefit may portray a type of fairness in public policy that results in more public acceptance of state and local government provision of certain services.

Several potential problems with user charges should be addressed as well. Sometimes, objection is raised to user fees on the grounds that they are a disadvantage for consumers with lower incomes. That notion is often coupled with the statement that general taxes, in contrast, are based on "ability to pay." The presumption of such an argument is that it is not fair to base consumption of the government service in question on income or "willingness to pay," as is done when following the "benefit principle" of public finance.

It is certainly true that allocation of any good or service by money prices gives an advantage to those consumers with more money. Because that point is general, the relevant issue is why a particular government service that mostly benefits direct users should be treated differently than privately provided goods and services such as housing or Mercedes automobiles. One possible explanation is that the service is a means of redistributing income, which is one of the fundamental economic roles of government. This is undoubtedly part of the reason primary and secondary education is financed almost entirely from taxes. Education provides external benefits to all of society, one of which is as a means of improving the economic conditions of the poor. One should be careful not to carry this argument too far, however. It is not clear that free use of public golf courses, for instance, is a very effective way of assisting the poor.

Avoiding user charges also may be an inefficient way of helping the poor. Some state-local government services are consumed much more by higher-income consumers than lower-income ones. Avoiding user-charge financing in those cases to assist lower-income consumers may actually benefit higher-income consumers to a greater degree. It could be more efficient for the government to charge everyone the user charge and give direct assistance of some type or a specific subsidy to the lower-income consumers affected by the charge.

A second potential problem with user charges is that the administration costs (to the government) and compliance costs (to the consumers) of collecting the charge are, in some cases, large enough to offset any expected efficiency gains from user-charge, as opposed to tax, financing. Typically, administration costs include costs of measuring use, billing users, and collecting the fee, whereas compliance costs include delay at road or bridge tollbooths and the time and postage costs of making the required payments. Besides the other necessary conditions, therefore, user-charge financing is attractive only if a means of collecting the charge at reasonable cost is available. (For instance, the advantages and disadvantages of alternative ways of administering highway user charges are discussed in Chapter 18.)

Application 8.1: Pricing at congested tennis courts

At one university, the school's policy was to not charge students and faculty members any fee for use of the tennis courts, the argument being that use of the university's facilities should be free to those who pay tuition or work for the school. Because this university is in a Northern city and because the tennis courts are outside, this policy posed no problem for half the academic year. In the fall and especially in the spring, however, there was substantial excess demand for the tennis courts; waits of 30 to 60 minutes for a court were common. The courts were therefore not "free" but were allocated by having people wait. Presumably, those who had the lowest-valued time ended up using the tennis courts most. This university had no summer session, so it made the tennis courts available to the general public during the summer months. The difference was that a use fee was charged in the summer to everyone – students who remained in the town, faculty, and the public. Not surprisingly, there were many vacant courts during the summer.

This situation is represented in Figure 8.5. The supply of tennis courts is fixed at Q_C, so marginal cost is zero for quantities less than Q_C (vacant courts mean there is no cost

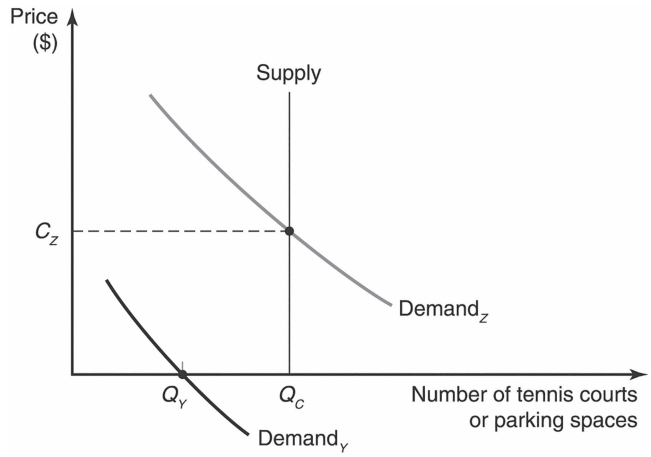


Figure 8.5 Efficient pricing when supply is fixed

to accommodate another player); however, marginal cost becomes very high once all the courts are in use (the cost of accommodating another user is the cost of building another court). When demand is $Demand_Y$, as during the summer, there is excess capacity, and no fee should be charged. When demand is at the peak level of $Demand_Z$, a use fee equal to C_Z would generate efficient use – only those who are willing to pay C_Z – that is, those who get C_Z dollars' worth of benefit from using the tennis court – would play. With the fee, there is no excess demand for the facility. By charging a fee during the summer when demand was low (when the university was not in session) in an attempt to generate revenue from the public, the university's facilities were wasted from society's viewpoint. By not charging a fee during the spring when demand was high, the university made an implicit decision to allocate the scarce tennis courts by having people wait – what is often called "first come, first served." Although allocation either by fees or waiting gives some consumers an advantage over others, under the first-come, first-served system, potential tennis players do not know the charge (the required amount of time to wait) until they arrive at the courts.

One might believe that the proper policy for the university in this case is to build more tennis courts because the excess demand during the spring and fall suggests that more are "needed." But that analysis is faulty. There is excess demand only because tennis court use appears to be "free." Although the extra courts would be used during the peak times, they would enlarge the excess capacity that exists during the off-peak time. As the discussion about the efficient amount of public facilities showed, more tennis courts should be built only if those who demand the courts are willing to pay the full cost of constructing them (assuming that extra tennis courts benefit only direct users). Interestingly, use fees provide a test of that hypothesis. The efficient use fee C_Z in Figure 8.5 equals the marginal benefit of a tennis court to users. If the fee that equates supply and demand turns out to be large enough to finance another court – that is, if marginal benefit is greater than marginal cost – then another court should (and can) be built.

Application 8.2: Parking fees and parking meters

Here is a do-it-yourself application that you can use to see how well you understand user charges and congestion. The analysis and diagram of Application 8.1 can be applied to the question of parking meters. Consider the following argument: *The streets have been paid for by and belong to the people. Therefore, parking meters should be abolished*. Analyze that position and prescription in light of the previous discussion. If there were no parking meters or fees, how do you think the available parking spaces would be allocated? Would that allocation system be better? For whom? Without parking fees, do you think people would perceive that there is more or less of a "parking problem"? If parking fees are to be used, should they vary by location? Time of day? Time of year?

Application of user charges

The application of user charges to five specific state-local government services – public higher education, K–12 education, water and sewer service, refuse collection, and parks – is discussed in this section. Discussion of transportation user charges is presented in Chapter 18, and charges to offset the infrastructure costs associated with economic growth and development are covered in Chapter 20.

Financing public higher education[9]

For most readers of this book, and especially for those attending public colleges and universities, tuition is the best known of all subnational government user charges and the one

with the most immediate personal as well as academic implications. In the United States, tuition generally covers between 30 and 50 percent of the expenditures of public colleges and universities, with the remainder financed mostly from state (and, for community colleges, sometimes local) taxes. The clear trend, however, is for an increasing share of higher education cost to be covered by tuition (user charges). The State Higher Education Executive Officers Association reports that the average tuition share of all public higher education revenue has increased from about 20 percent to about 45 percent since 1980. In 2020, the average public college student paid tuition of about $6,725 to finance about $15,300 of higher education spending per student. Among four-year institutions, students pay $9,385 to finance spending of $17,645.

The net tuition share of higher education revenue for the overall US and regions in the country is shown in Figure 8.6. The net tuition share has declined a bit in recent years as a result of some tuition freezes and higher state allocations. The net tuition share is highest among the Midwest states and lowest among Western states. The increasing importance of tuition has paralleled the growth in enrollment, suggesting that increasing demand for higher education has fueled, or at least permitted, the increases in tuition.[10]

This trend naturally leads to the question of whether public college students should pay a larger (or smaller) fraction of the cost of their college education and how those charges should be structured. Those who argue that tuition (or other user charges) should be more important in financing public higher education usually suggest that most of that education's benefits are captured directly by the students in the form of higher incomes, jobs with more prestige, and information that assists those individuals in all aspects of their lives. Moreover, those beneficiaries are directly identified, the charge can be collected at low cost (indeed, at zero extra cost after any tuition is levied), and students easily can be prevented from consuming the service unless they pay the charge. With that viewpoint, higher education seems to meet all the tests for substantial user-charge financing. However, at least five issues suggest that this view is incomplete.

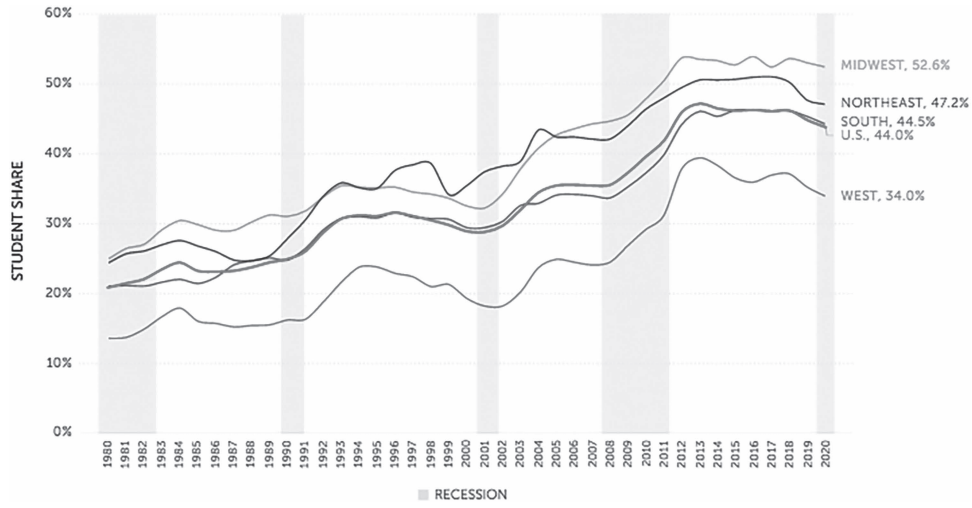


Figure 8.6 Net tuition as a percent of total education revenue, US, FY 1980–2020

Source: Reprinted with permission from State Higher Education Finance FY 2020, State Higher Education Executive Officers Association

First, the assumption that most of the benefits from public higher education are private might be overstated. If there are substantial external or social benefits from having more individuals with post-secondary education, then the education component of higher education spending should not be fully financed from user charges but reduced by the social or external benefit share.

Second, public institutions of higher education usually produce research and public service in addition to education of students, although those three outputs are clearly not independent. Even if one believes that students capture all the benefits of the *education* component of output, the research and public service components of output benefit all of society and are thus appropriately financed by the government. Pure scientific research is usually identified as a classic public good: discoveries, once made, can be used by anyone at zero marginal cost to society. Therefore, research and public service should be financed by the general society and not directly by students.[11]

It remains to be determined what fraction of public higher-education output is research and public service compared to education, a fraction that undoubtedly differs by type of institution. In major state universities, research and public service usually represent at least half of a faculty member's job and similarly at least half of the university's output. The output of community colleges, in contrast, is usually almost entirely education. It follows, therefore, that the appropriate degree of user-charge (tuition) reliance might be greater for institutions primarily producing education as opposed to those producing education and research. Indeed, public subsidies of four-year colleges generally are greater than those of two-year colleges.

Second, students already bear a larger fraction of the social cost of public higher education than it appears from comparing tuition and state appropriations. A hypothetical but illustrative computation of both the social and private cost of public higher education for one student is shown in Example 8.1:

Example 8.1: Per-student economic costs of higher education

Category	*Social cost ($)*	*Student cost ($)*	*Percentage*
Instruction, books, supplies	$20,000	$10,000	50%
Transportation	2,000	2,000	100
Forgone income	30,000	30,000	100
Total	52,000	42,000	80

The cost of instruction, which is essentially the college or university expenditures per student, is assumed to be $20,000, of which half is covered by student tuition. The cost of books, supplies, and transportation represents expenditures on these items greater than would be made if the student did not attend college. These costs are therefore true opportunity costs of choosing to attend college. Similarly, forgone income represents the difference between the income the student could have earned if not attending college and actual income earned. In the example, $30,000 is the approximate annual earnings of a full-time employee paid $15 per hour. This forgone income is a true social cost, in addition to a cost to the student, because society gives up the goods and services that this individual's work would have produced, the value of which can be estimated by the factor payment.[12] In the

illustration, then, students bear more than 80 percent of the social cost of their public college education, not the 50 percent that appears from comparing tuition to college operating expenses.[13]

Third, even if, after consideration of these two issues, greater reliance on tuition for financing public higher education is desired in a given state, it may be difficult for individual states to act unilaterally. Potential college students can change their states of residence to those states that make low reliance on tuition and away from those states that act to increase tuition reliance. Moreover, with an increasingly mobile society, the social benefits from higher education are not likely to be confined to any given state.

Fourth, it may be that the cost to the university of adding another student or having a student take more classes – the marginal cost – is close to zero, at least for some limited number of additional students. If the university is not crowded – that is, if another student can be accommodated without reducing the education provided to other students – then it is inefficient to charge a positive price at the margin. Of course, the solution to this problem might be a two-part price, charging a fixed tuition per year or semester and a lower or zero charge for each class or credit taken. The fixed tuition could cover the fixed costs of the university without creating a disincentive for students to take additional academic work.

The argument usually raised against increased reliance on tuition – that it would prevent many lower-income students from attending college – requires adjustment. The evidence shows that college students, including public college students, tend to be mostly from higher-income (above the median) families; at least, the fraction of students attending college increases with family income. To maintain low reliance on tuition for all students, then, provides substantial benefits to many students who clearly are not poor.

If equity is the concern, an alternative to low reliance on tuition, and indeed an alternative to low reliance on user charges generally, is targeted assistance to lower-income consumers. Of course, this is already done in higher education. The state or university can set tuition at a level that seems efficient given the perceived social benefits and costs, and lower-income students can then be assisted with financial aid based on income. This method has the potential to be a more efficient way of improving equity because assistance (in the form of lower prices or charges) is provided only to consumers who society decides require and deserve such assistance.[14]

Financing K–12 education[15]

Among all state and local governments, user charges are relied upon least by local school districts. As shown previously in Table 9.3, user charges account for about 4 percent of school district general revenue, a share that has actually declined in the past 40 years at the same time that user charge reliance has grown for all other governments. Nearly two-thirds of school user charges arise from prices or fees for school lunches. Activity fees, which represent about 20 percent of the total, are the other major category of school charges. Recent research by Downes and Killeen (2013) confirms that relative user-fee use by schools has not been increasing and remains less than $75 per student annually.

This relatively minor reliance on user fees by school districts raises the question of whether K–12 schools might be able to increase use of charges either to supplement revenue or to permit tax reduction. Work by Ronald Fisher and Robert Wassmer (2002) suggests that the strongest case for increased use of user fees by public schools is for the provision of auxiliary services – such things as meals, transportation, after-school care, medical care, adult education, and perhaps certain clubs or special activities that are not necessarily part of the standard curriculum. These types of services tend to provide substantial private benefits, may be consumed by only a fraction of students in a school, and have close private substitutes,

with relatively low-cost collection mechanisms available. By one measure, schools spent more than $30 billion on these types of services in 1992, amounting to about 13 percent of expenditure. An updated calculation for 2010 suggests this amount may have risen to more than $75 billion, still approximately 13 percent of expenditure.

So why don't schools use charges and fees more? Or, equivalently, what factors have affected the choice of fees by schools in the past? One factor is obvious as school user fees are prohibited or limited by state law in some states, although that fact just raises the parallel question of why some states have adopted these limits. Given that state constitutions often require state governments to provide for education, these fees have drawn legal and policy concerns. In California, such fees led to a new law that makes it easier for residents to appeal to the state about fees levied by local schools if the fee applies to an "integral" aspect of public education, which is prohibited in California.[16] Similarly, the Ann Arbor, Michigan, school district cancelled a plan to charge a fee for any "extra" classes students took beyond the minimum required after a lawsuit was filed challenging the proposal.[17]

User fees tend to be used more by schools in districts that are less homogeneous, where there may be greater variation in the types of services that are used by different students. These include districts with a relatively small fraction of families with children, high student density, lower incomes, and more rural components. User fees also are used to a greater degree by districts that are constrained by property tax limits as those limits effectively force districts to find alternative revenue sources. And user fees seem to be relied on less in states that exhibit a liberal political bias. This last point may arise because individuals with those political beliefs may be more concerned about the equity implications of charging prices for some school-related services to all students, regardless of family income.

Financing water and sewer services[18]

Water-use fees are very common, whether a local government or a privately operated water-utility company provides water service. These fees comprise, either explicitly or implicitly, three separate charges – a connection charge, a capital and distribution charge, and a water supply charge. The water supply charge is intended to cover the marginal cost of additional gallons of water and therefore, ideally, should be based on the amount of water used. Use is sometimes approximated by the number of water outlets per structure or by the number of persons per structure, but it is far more common for the actual number of gallons of water consumed to be measured by a water meter. Assuming that marginal cost per gallon of water is constant, which appears reasonable for all but some special industrial users, a use fee can be computed from the measured usage and the appropriate constant per gallon charge.

In fact, water utilities apply a variety of pricing strategies. One conservation option is "increasing block prices," in which one price is charged per gallon up to a threshold, after which the price per gallon is higher. The threshold might be set at an expected or average household consumption amount. Some utilities charge different prices seasonally as demand varies, and other might apply higher prices during drought periods.[19] In some states, water for business (particularly agricultural) uses is allocated by region or characteristics of the business. In those cases, businesses often are permitted to trade their water rights so that a business that uses less than their allocation can trade (sell) those rights to other businesses. This, too, becomes a form of water pricing.

The capital and distribution charge is usually a fixed charge, which may depend on the location or size (front footage) of the structure served. A charge based on front footage is intended to represent the extra cost of supplying the pipe, as distribution costs depend on user density. It is sometimes argued that distribution charges also should depend on distance from the supply source, although application of that concept is problematic. The location

of the supply source – the water-treatment plant – is not fixed but is selected by the government. Indeed, that location may be changed after many consumers have selected their locations. In addition, although a new and isolated development far from the supply source would entail large extra costs of service for running new supply lines, a new development next to an existing one would only require extension of the water line (unless an entirely new and larger supply line was required). In practice, this charge is most often a fixed front-footage charge.

Water users also are often charged for the direct costs of hookup to the water system. This one-time connection charge may depend on the number of feet of pipe required, or it may be a flat charge reflecting the large fixed costs to the utility.

Analysis of potential user charges for sewer services is essentially similar to that for water (indeed, sewer disposal is a result of indoor water consumption); costs depend on the amount and type of sewage disposed and the size and location of the structure. However, actual metering of sewer discharge is not common, except for certain industrial users. Apparently, sewage flow meters are relatively expensive compared to water meters. The usual approach, particularly for residential users, is to assume that sewage flow is some percentage of water consumption and to compute a sewer-use fee from the number of gallons of water used. Of course, there is no reason for the sewer charge per gallon to be the same as the water charge. This method does not allow for variation among users in the purpose for which water is consumed, but it may still be the best option, given the costs of measurement and administration.

These charges usually are collected from consumers through monthly or quarterly billings, much the same as electricity, natural gas, or telephone bills. The water and sewer charges are usually on one bill, and the capital/distribution charges may be combined into a single amount per front foot, paid through a monthly service charge or included in the gallon charge. So, in aggregate, how much does public water cost in the US? The average price is about $1.50 for 1,000 gallons, which is 15 cents per gallon (or about 1/6 of a cent per gallon).[20] By almost any measure, then, water in the US is relatively inexpensive.

The equity effects of user fees are a valid concern, perhaps especially so for water. The typical utility policy is to shut off water connections for consumers who do not pay water bills (usually after some period). This was an important policy issue during the recession resulting from the pandemic. A number of states acted to suspend water shutoffs (and, in many cases, other utility shutoffs as well) as many households suddenly found they could not pay bills due to illness, job loss, or income reduction. Restricting access to public water during the pandemic not only had equity implications but also could have had serious public health consequences.

This discussion is about government agencies providing water through a public system (water plant, distribution pumps and pipes, sewer collection and disposal). But what about "groundwater": that is, water that exists in an aquifer and can be accessed by private wells? Such wells may be used to supply water not only to households but also to farms for agricultural use. Increasingly, governments are looking for ways to measure, regulate, and price the use of groundwater.

California adopted the Sustainable Groundwater Management Act (SGMA) in 2014, which is based on the principle that groundwater is a shared public resource. The law requires that the managers of the state's groundwater basins balance the inflow and outflow of water by 2040. Accordingly, many have already installed meters to measure groundwater use and, in some cases, are charging for use of groundwater (that is, well water).[21] This approach is based on the idea that all water is owned collectively rather than privately and should be regulated and priced regardless of the distribution method. After all, the aquifers supplying water to private wells are the same ones providing water to public water systems.[22]

Financing refuse collection and disposal services

The costs of waste services arise from both collection and disposal. Disposal costs depend on the amount and type of refuse and should include the cost of any environmental damage resulting from the disposal. A user charge to cover disposal costs should therefore be a unit charge that varies by type of unit (the disposal cost of a pound of household garbage is different from that of a pound of used nuclear fuel). One difficulty in applying such a use fee is in measuring the amount of refuse. Possible measures include the number of cans or bags collected or the weight of refuse collected. The first suffers because different amounts of garbage may be packed into a fixed-size container, and both entail substantial administrative costs in making and recording the measurement. Even if those problems could be overcome, individuals would have an incentive to deposit refuse at a neighbor's location, which gives rise to all sorts of silly notions about enforcement and neighborhood wars.

One innovative solution to this measurement problem is to require that all refuse be deposited in specific bags sold only by the local government. The bags are delineated by unusual colors and insignia typically. The fee per bag charged by the government includes not only the cost of producing the bag (what would be charged in a store) but also the disposal cost per bag. This method avoids both the administrative costs of use measurement and the incentive for individuals to attempt to shift their costs to neighbors. There is a compliance cost to users, however, because they must arrange to purchase the special bags. To make this easier and reduce compliance costs, the local government may arrange to have the bags sold by private retailers rather than just at the government offices, although counterfeiting is a potential problem. This method could also be extended to provide different charges for different types of refuse (bottles and cans versus paper, for example) by having different color bags sold for different fees. As noted earlier, it also might be appropriate to charge a fixed disposal fee per month or year to be eligible to use the bag system.

The increased use of automated trash collection vehicles, which reduces costs, has made the designated bag system inefficient in many cases. It is now common for local governments or private waste collection firms to require consumers to use fixed-size carts that can be emptied into a collection vehicle by an automated arm. In some cases, the carts are sold to consumers, and in other instances, the collection organization provides the containers. Different prices can apply to different size containers. Separate from the price of a container, private collection firms charge a price per collection (every week, month, or quarter). Some local governments also charge a collection fee, whereas others use tax revenue to cover collection cost.

Any use fee based on the actual amount of refuse generates an incentive for consumers to avoid the charge by littering and a corresponding cost to the government of enforcement. For instance, illegal dumping might occur on vacant land, in business dumpsters, or into surface-water sewer systems. It is possible for the costs of those externalities to outweigh any gains from the use of a refuse collection fee. On the other hand, a use fee based on quantity also generates an incentive for consumers to avoid refuse through recycling, use of returnable containers, and substitution of reusable for disposable materials (such as cloth shopping bags rather than plastic). One alternative is to impose a fee on manufacturers or sellers to induce them to change the packaging or nature of products, such as a disposable-diaper tax considered in some states. Another option is a recycling fee that is returned to the consumer if the product is recycled, such as bottle and can deposits.

Increasingly, both communities and private collection firms are encouraging or requiring consumers to recycle by separating different types of refuse – cans and bottles, paper and cardboard, plastics, and landfill items, for instance – for separate collection. Different fees may be charged for disposal of the various types. Such a system creates extra costs both for

consumers, who have to separate the materials, and for governments, which might require additional workers or equipment for separate collections. *Governing* reported in 2013 that Houston, Texas, is working on a different mechanism for recycling, which permits consumers to deposit all refuse in one container, and the city subsequently sorts centrally as appropriate. The plan is that such an option might reduce costs for both the city and residents.

Refuse collection costs depend on the type of refuse and the density and location of the users. Obviously, collections requiring a special vehicle or extra trip (such as collection of household durables, such as refrigerators) should ideally entail a specific charge. In practice, however, it is not clear that the absence of such a charge generates much inefficiency – replacement of those durables is probably insensitive to disposal costs. The argument for these special collection charges, then, must be fairness. Routine collection costs, on the other hand, depend mostly on time and the density of consumers. It takes longer to collect from widely spaced single-family residences, for example, than from multifamily residences with all refuse in one location, perhaps deposited in specially designed large containers. It may be appropriate therefore, as some localities evidently do, to charge a lower fee per unit of refuse for apartments and commercial establishments than for residences.

In practice, both local governments and private firms provide refuse collection and disposal. In the first case, financing out of general taxes still is most common, although fixed charges per structure per month are sometimes used. Among private firms, monthly charges are most common, although the charge often applies to a fixed maximum amount of service; extra service brings extra charges. In many rural areas, refuse disposal is still the responsibility of individual consumers who travel to a disposal site or recycling facility, which may be operated by the government or a private firm and which is financed either from taxes or dumping charges.

Financing public parks and recreation areas

Paying for admission to private recreational facilities (such as beach clubs, pools, tennis courts, golf courses, and camping facilities) is expected. Similar use fees are used for some types of public parks, beaches, and recreation facilities, including national parks and many state parks (see the *Headlines* at the start of this chapter). Three issues seem to have been important in limiting the broader application of state-local user fees for these types of facilities.

First, taxpayers often question the fairness of charging for the use of public facilities that have been acquired with general tax revenues, arguing that such facilities already have been paid for and thus should be "free" to all taxpayers. This viewpoint may reflect a misunderstanding about the difference between fixed capital or access costs and variable operating costs. Both types of costs must be paid somehow, and it might make sense to charge everyone for the first type of cost and only users for the latter cost. Indeed, one can ask whether it is "fair" not to charge users for operating costs, if those services primarily benefit users.

This distinction and resulting policy was explained as follows in an unusually candid letter to the editor by the director of a state natural resources department:

> Proposal D [allowing the state to borrow funds by selling bonds to be repaid from future taxes] provided $60 million for badly needed repair of existing facilities . . . includ[ing] updating sewage systems, replacing electrical services, repairing bathhouses, picnic shelters and rustic cabins, and repaving roads. The bond money will not pay operational costs.
>
> Operation is primarily financed by the users. Approximately 80 percent is from the motor vehicle entrance fee and fees collected for camping and other services. The

> remaining 20 percent is from general tax revenues. Fees pay wages, provide maintenance, and pay operational expenses such as electricity.
>
> (Hales, 1989)

It seems important, as is done here, to explain the types of costs to be paid by all taxpayers and those specifically by users.

Second, in some cases, there is not a sufficient level of use of these facilities to warrant user fees. Two forces often work together here. At low use levels, there may be no marginal operating costs, which calls for a zero price. Even if an efficiency reason for use fees exists, collection costs may be prohibitive when use is low. It usually doesn't make sense to pay a toll collector $10 an hour, if toll collections aren't greater than that (and perhaps substantially so). One alternative is a voluntary "honor system" for collection of fees, perhaps using an automated fee collection device or gated access with automated fee collection. But even such a system is likely to require enforcement (and costs) some of the time to encourage participation.

Third, combining the first two issues, even if sufficient use or crowding exists for charges to make sense, congestion seems to be the least understood and often most opposed reason for fees. A probable reason is that there are no direct costs to the government or public authority that can be identified to justify the charge. Rather, the reason for the congestion charge is to ration use of a public facility, with some preferring a different rationing mechanism (first come, first served; lottery; or some alternative) and others denying that rationing is called for. One possibility is to dedicate the congestion charge to a fund for expansion or improvement of the facility, thereby creating a direct reason for the extra use fee.

Although congestion charges are exceedingly common in the private sector (higher prices at recreational resorts or parks during peak demand periods such as holidays and weekends), their use by state and local governments remains problematical. For example, Walt Disney World has adopted a date-based ticket pricing system through which the price of admission to the park varies based on expected demand.[23] Some professional sports teams similarly use dynamic pricing through which the ticket price for a game continually adjusts based on demand. As you saw in *Headlines*, admission fees for Lake Havasu State Park in Arizona are higher on Saturdays, Sundays, and holidays, but this remains unusual in the public sector. In my home state of Michigan, a $12 annual vehicle pass (sold as part of car registration) provides access to any state park any day – providing there is parking space available. On July 4, one might have to wait several hours in line to enter Grand Haven State Park on Lake Michigan, even with a pass. In that case, the congestion charge is the waiting time rather than a higher entrance fee.[24]

Other creative user-charge examples

State and local governments sometimes apply fees in new and different ways, some of which work better than others. At one point, Milwaukee funded city street repairs or repaving by levying a fee on the owner of property adjacent to the street. Homeowners would receive large bills for street repair even though the benefits accrued to many others. In 2008, Milwaukee replaced this fee with a special car registration fee.[25] Sjoquist and Stoycheva (2012) report about fees for ambulance responses (sometimes different for residents and nonresidents) and for false fire alarms. Perhaps the most challenging case happened in Tennessee. A county does not provide fire protection service, but residents can contract with a neighboring city for fire protection service at a fee. In several instances, county residents did not pay the $75 fee, so when a house caught fire, the city's fire department would not act,

although the city fire department did protect adjacent houses from the flames because that owner had paid the fee.[26] As fiscal pressures and opposition to taxes continue, interest in user fees seems certain to grow – and with that, new challenges as well.

International comparison

Whether to utilize user charges to finance goods and services provided by the public sector is a classic issue in many nations, not just the United States. For instance, there has been increased attention to how water service should be financed in Australia. In 1992, the Federal Industry Commission recommended that the state and local water authorities move toward a complete user-charge system, under which consumers would be billed for water by the liter. The commission based its position on a concern about efficient use of resources, arguing that if consumers see water as "free," they are more likely to waste it. The commission noted that user-charge financing "will reduce water consumption and thereby waste water discharges and bring financial savings by deferring investments to expand water and sewage networks" (Tideman, 1992, p. 9).

In the past, water service had been financed mostly through a property tax. Most consumers paid a separate water property tax (a water rate), allowing consumption of water with no additional charge up to an annual limit. Water charges applied over the limit. Because the limits were often quite high, in most cases, a household's water payment depended on the value of the house or property rather than the amount of water actually used. Not surprisingly, therefore, many consumers living in expensive houses supported a move to water charges because they believed that their water property tax was more than what direct water charges based on use would be.

Subsequently, the National Water Initiative (NWI) was agreed to by the Australian Council of Governments in 2004 (representing the national, state, and local governments) and endorsed by the Natural Resource Management Ministerial Council in 2010. The NWI is both a representation of the agreement among the three levels of government to improve the efficiency of water use in Australia and a set of principles for how water use should be managed and priced. Pricing principles are presented for covering capital expenditure and setting urban water prices, as well as the costs of planning and dealing with storm water and recycled water. The objectives were to "promote economically efficient and sustainable use," "ensure sufficient revenue," and "facilitate the efficient functioning of water markets."[27]

The principles incorporated in the NWI reflect the discussion in this chapter. One principle calls for "two-part tariffs (comprising a service availability charge and a water usage charge)." The principles note, "The water usage charge should have regard to the long run marginal cost of the supply of additional water," and "the service availability charge should be calculated as the difference between the total revenue requirement . . . and the revenue recovered through water usage charges." Further, "The service availability charge could vary between customers or customer classes, depending on service demands and equity considerations." In short, the Australian governments have signaled an intent to price water following standard microeconomic principles, resulting in a user-fee structure consistent with the theoretical discussion in this chapter.

The majority of water consumption in Australia nationally is for agricultural uses, about two-thirds of the total. Farmers use both rainwater and irrigated water for crops, so in years of some drought, agricultural demand for irrigated water is higher than in years with plentiful rainfall. The water pricing principles apply to agricultural demand as well as demand by consumers, but the variation in agricultural demand by year poses special problems for determining costs and setting appropriate prices. Partly to deal with these considerations,

Australia also has a system that permits the trading of irrigation water rights from farmers with more than required to those with more demand.

The Australian Productivity Commission analyzed and reviewed the NWI in 2017, as required by law, and found that is has been a positive change on balance.[28] The report notes "Since its creation in 2004, the National Water Initiative (NWI) has made a significant contribution to [managing water resources]. . . . [T]he NWI remains nationally relevant and the principles it contains are sound." In the report, the commission offers a number of recommendations for further adjustment, including using independent organizations to set or review water prices to help reduce politicization of water decisions. They recommend, "Independent economic regulation should be applied to all urban water service providers of a sufficient scale." The commission noted that water management must be continually evaluated in the light of population growth, urbanization in the country, and overall climate change.

Summary

User charges, prices charged by governments for specific services or privileges and used to pay for all or part of the cost of providing those services, have always been important but have become increasingly so for state and local governments. They are to be distinguished from financing services with general taxes that have no direct relationship between tax payment and service received. User charges create an incentive for efficient choice because consumers face the true costs of their consumption decisions.

Types of user charges include direct charges for use of a public facility or consumption of a service, license taxes or fees paid for the privilege of undertaking some activity (such as fishing license and driver license fees), and special property tax assessments levied for a specific service.

All charges and fees together represented 23.3 percent of the general revenue of state-local governments in 2018, with traditional user charges alone representing more than 16 percent of revenue. Education and hospitals are the two budget categories from which most state-local user charges arise; on average, about 56 percent of all subnational government direct user charges are attributable to those categories. More than half of state-local expenditures on airports, hospitals, and sewer and sanitation systems are financed by user charges, whereas only about 3 percent of K–12 education expenditures are financed that way. Total user charges of state-local governments have increased faster than other revenues since 2000.

User-charge financing is more attractive the greater the share of marginal benefits that accrues to direct users, the greater the percentage of benefits of a service or facility that go to direct users, the more easily users can be identified and excluded (at reasonable cost) from consuming the service unless the charge is paid, and the more price demand is elastic. Two other potential advantages of user charges are that they are one way to have nonresidents pay for the benefits they enjoy, and the perception of fairness from users paying may result in more public acceptance of state and local government provision of certain services.

Two concerns about user fees are that they may be a disadvantage for consumers with lower incomes and that the administration costs (to the government) and compliance costs (to the consumers) of collecting the charge may offset any expected efficiency gains.

Even if there is no additional cost to the government of providing a service to an additional consumer, that consumer may impose congestion costs on other users. The purpose of use fees in those situations is to allocate a scarce resource among competing demands and provide a measure of the demand for new capital investment.

Potentially, user charges can be composed of three separate parts: (1) an access charge to cover all or part of capital costs, (2) a use fee to cover all or part of the operating costs to the government associated with use, and (3) a congestion charge to cover the costs imposed by an additional user on other users. Two-part prices can be one way to accomplish this: the first price covers the capital costs and the second price (the marginal use fee) covers marginal operating and congestion costs.

Discussion questions

1 In many large cities, the government operates a museum, library, and zoo that are visited by substantial numbers of people who are not residents of the city. They may come from the metropolitan area or from around the state. What economic reasons would justify the city financing these services through user charges? What problems would user-charge finance present in these cases? Consider how the charges might be structured for each service.

2 Suppose that your state provides a number of parks with majestic mountains, beautiful beaches, and unspoiled wilderness areas. These parks were acquired and operated in the past using the state's general tax revenue. Now the state proposes to charge a daily entrance fee of $10 per vehicle, with the revenue earmarked for the "state park fund" (to be used for operating expenses, capital improvements, and acquisition of new parks). At a public hearing on the proposal, one citizen complained, "It is unfair to require taxpayers who have paid for these parks with their tax dollars to now also pay a fee to use them." As director of the state parks department, how would you respond to this citizen?

3 Suppose that partly as a result of this type of complaint, the state park user-fee proposal is revised so that no fee will be charged for park use Monday through Friday, a $10 fee will be charged on weekends, and a $20 fee will be charged on holidays and holiday weekends (Memorial Day, Fourth of July, Labor Day, and so on). Is there any economic rationale for such a structure? Do you think it is fairer than charging the same fee at all times? More efficient?

4 Your local government is considering how to finance solid waste collection service. The government has acquired automated waste collection trucks that use an automated arm to empty specific trash containers. The government is evaluating three potential plans: (a) provide the containers free to residents and pay collection service costs from property taxes; (b) provide the containers to residents for an annual fixed fee ($50 per year) and pay collection service costs from property taxes; and (c) provide the containers free to residents and charge a weekly collection fee of $5 (billed quarterly) to cover service costs, with an extra fee for anything that exceeds the container.

   What are the economic advantages and disadvantages of each financing proposal? Which do you prefer? Which of these (or something different) does your local government use?

5 Suppose that the apartment building you live in at college has only one water meter for the entire building. The landlord receives a water bill from the city each quarter based on the gallons of water used, but each apartment or tenant is not charged separately – the cost of water effectively is included in the rent. Now the water department decides to install separate meters for each apartment and to bill each separately rather than the landlord (so the rent is reduced by $\$X$ per person for all tenants). The city justifies the cost of the extra meters and billings on the grounds that the city's scarce water resources will be used more efficiently. What is the price to a tenant or apartment per gallon of water before and after the new meters are installed? Do you think the new procedure will reduce water use? If so, how might the student tenants of these apartments act to conserve water? Will there be a gain in economic efficiency?

Notes

1 Selma J. Mushkin and Richard M. Bird, "Public Prices: An Overview." In *Public Prices for Public Products*, edited by Selma Mushkin (Washington, DC: Urban Institute, 1972), 11.
2 When state or local government owns and operates public utilities (electric or natural gas) and liquor stores, the prices for those services also represent user charges. See Netzer, 1992.
3 The US Census Bureau includes state colleges and universities as part of state governments in reporting state-local fiscal data. Thus, states with large public higher-education systems will naturally show greater reliance on user charges because of tuition and other fees.
4 You may want to review the section on public goods and benefit taxation in Chapter 2.
5 It may not be practical to separate long-run and short-run pricing decisions, however, because that might require prices to change substantially over time. If price is set equal to short-run marginal cost, higher prices are called for as demand rises. Because those prices will be greater than long-run average cost, funds will be provided to finance the desired capital expansion. But once the facility is enlarged, marginal costs, and thus prices, will fall again. Some type of average cost pricing would maintain more price stability but would be inefficient. Price stability in itself might be desirable, however.
6 At Q_Z, the marginal benefit to the last user is c_0, equal to the marginal cost that user imposes on all other users.
7 Examples of congestion pricing for roads and highways are discussed in Chapter 21.
8 Even with the pass, there is a daily charge for camping in the park, rather than just visiting.
9 For discussion and evidence concerning these issues for specific states, see Lee Hansen and Burton Weisbrod (1969) and John Goddeeris (1982).
10 There is substantial variation among states in the reliance on tuition, however; indeed, for many years some states provided "free" college education to qualified residents. Information about the importance of tuition in each state's public higher education institutions is available from "State Higher Education Finance FY2020," published by the State Higher Education Executive Officers Association.
11 For that reason, it is often argued that research should be largely financed by the federal government. And the federal government, through such entities as the National Science Foundation, the National Institute for Education, and the National Institutes for Health, does substantially support university research.
12 This computation is different than the out-of-pocket budget students usually consider; for instance, costs of room and board are not included. Because some room and board costs are incurred regardless of whether the individual attends college, those costs would be included in the economic cost computation only to the extent that they are larger because of college attendance.
13 The results in the illustration are very similar to the results reported by Hansen and Weisbrod (1969) for the California state college and university system.
14 It is also sometimes argued that lower-income students face a problem in financing higher education because the capital markets do not work properly; if these students will indeed earn higher incomes due to education, then financial institutions should be willing to make loans against those future earnings. If financial institutions will not, then an appropriate solution is government-sponsored education loans.
15 See Ronald Fisher and Robert Wassmer (2002); Downes and Killeen (2013).
16 Loretta Kalb, "California to Schools: Students Don't Have to Pay for Graduation Attire, Other Items 'Integral' to Education," *Sacramento Bee* (May 6, 2014): 16.
17 Chelsea Hoedl, "Lawsuit Dropped after Ann Arbor Revokes Fees for 7-hour Classes," *Ann Arbor (MI) News* (August 21, 2013).
18 For a more comprehensive discussion of these issues, see Paul Downing and Thomas DiLorenzo (1981).
19 www.epa.gov/watersense/understanding-your-water-bill.
20 www.akwater.com/story_of_water/html/costs.htm.
21 www.governing.com/now/california-ends-free-groundwater-for-farming-with-meters?utm_term=California%20Ends%20Free%20Groundwater%20for%20Farming%20with%20Meters&utm_campaign=Do%20We%20Really%20Need%20a%20Moratorium%20on%20Evictions%20&utm_content=email&utm_source=Act-On+Software&utm_medium=email.
22 Does a landowner also "own" the water under that land? Traditionally in the US, the answer had been yes, but that the approach in CA and other places changes the answer to no. A similar question is whether someone who owns land adjacent to a lake or stream also owns or controls the water along the property. In the US, almost universally, the answer is no (although such policies differ by country).
23 www.usatoday.com/story/travel/experience/america/theme-parks/2019/03/13/walt-disney-world-ticket-prices-increase-christmas-holidays/3149733002/.
24 One important difference is that the user may not know the price until they arrive.
25 "Whose Pothole Is It, Anyway?" *Governing* (October 2008).

26 "Firefighters Let Home Burn over $75 Fee – Again," December 7, 2011, accessed October 3, 2014, https://www.nbcnews.com/id/wbna39516346.
27 "National Water Initiative Pricing Principles," Australian Government Department of the Environment, accessed October 3, 2014, www.environment.gov.au/resource/national-water-initiative-pricing-principles.
28 Productivity Commission, National Water Reform, Inquiry Report. December 2017, www.pc.gov.au/__data/assets/pdf_file/0009/228177/water-reform-overview.pdf.

Selected readings

"Costing and Pricing Local Government Services." *Governmental Finance*, *11* (March 1982): 3–27.

Gramlich, Edward. "Let's Hear It for User Fees." *Governing*, January 1993, pp. 54–55.

Mushkin, Selma, ed. *Public Prices for Public Products*. Washington, DC: Urban Institute, 1972.

Netzer, Dick. "Differences in Reliance on User Charges by American State and Local Governments." *Public Finance Quarterly*, *20* (October 1992): 499–511.

Sjoquist, David L., and Rayna Stoycheva. "Local Revenue Diversification: User Charges, Sales Taxes, and Income Taxes." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert Ebel and John Petersen, 429–462. Oxford, UK: Oxford University Press, 2012.

9 Intergovernmental grants

Headlines

"On March 11, 2021, President Biden signed the American Rescue Plan Act of 2021 (H.R. 1319) into law. The $1.9 trillion package . . . is intended to combat the COVID-19 pandemic, including the public health and economic impacts."[1]

"The American Rescue Plan provides **$350 billion dollars** in emergency funding for state, local, territorial, and Tribal governments to remedy this mismatch between rising costs and falling revenues. This includes:

- $195 billion for states, (a minimum of $500 million for each State);
- $130 billion for local governments (a minimum of $1.25 billion per state is provided by the statute inclusive of the amounts allocated to local governments within the state);
- $20 billion for tribal governments; and
- $4.5 billion for territories

"In addition to helping these governments address the revenue losses they have experienced as a result of the crisis, it will help them cover the costs incurred due responding to the public health emergency and provide support for a recovery – including through assistance to households, small businesses and nonprofits, aid to impacted industries, and support for essential workers. It will also provide resources for state, local, and Tribal governments to invest in infrastructure, including water, sewer, and broadband services."[2]

Data availability

As is generally the case, the Governments Division of the US Census Bureau is the major source of data about the revenue for state and local governments, including intergovernmental grants. These data are reported annually in several different reports. All state government finances (www.census.gov/data/tables/2019/econ/state/historical-tables.html) and all state and local government finances (www.census.gov/data/datasets/2018/econ/local/public-use-datasets.html) are reported, but with a year or two lag. Data about the magnitude of intergovernmental grants received by specific types of local governments – counties, municipalities and townships, school and other

DOI: 10.4324/9781003030645-12

special districts – are reported in the Census of Governments, which is completed every five years, in years ending in 2 or 7.

The US Office of Management and Budget provides historical data about the federal government budget, including details about federal grants to state and local governments (www.whitehouse.gov/omb/historical-tables/). The Bureau of Economic Analysis in the US Commerce Department provides the national income accounts data, including information about the revenue and spending of both the federal and state-local governments and federal grants to those state-local governments (https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey).

Intergovernmental grants, sometimes called **grants-in-aid**, are transfers of funds from one government to another, most often from a higher-level government in the federal system to a set of lower-level governments. These grants are of many different types and are intended to improve the operation of a federal system of government finance. In this chapter, the purposes for grants, the economic effects of the different types of grants, and then an appropriate policy of grant use are considered.

Grants in the US fiscal system

In 2018, the federal government transferred nearly $740 billion of aid to state and local governments, which represented about 23 percent of state-local government general revenue or about $.30 for every dollar generated by those governments from their own sources. A Congressional Research Service report for 2018 shows about 1,274 different federal grants available to state or local governments. Similarly, state governments transferred nearly $543 billion to local governments, which represented about one-third of local government revenue on average.

As reflected by the data in Figure 9.1, intergovernmental grants from the federal government to states and localities have been a dominant feature of the federal fiscal system in the United States. The relative importance of federal grants is reflected by the share of state and local general revenue from federal aid. For state governments, the importance of federal grants has grown over the past 40 years from about 27 percent of general revenue in 1977 to 32 percent in 2018, although with periods of decline, growth, and stability. Substantial increases occurred associated with national recessions as a result of the federal response. As a result of the Great Recession and the federal response (the American Recovery and Reinvestment Act, ARRA), federal grants increased from 28 percent of state general revenue to more than 35 percent in 2010. In contrast, the role of direct federal grants to local governments decreased in the 1980s and has remained relatively constant since, providing between 4 and 5 percent of local government general revenue.

The real value of federal government grants (after adjusting for price increases) generally has increased over the past 40 years. The major exception is the period from the late 1970s into the 1980s, when grants increased at a slower rate than prices rose. The real value of federal grants then increased until the Great Recession began in 2007. As a response to the recession and financial market crisis, a substantial portion of federal ARRA stimulus support was implemented by increased grants to states. The result was large increases in real federal grants in 2010 and 2011. When data are available, a similar jump in real federal grants will be shown for 2020 and 2021 as a result of the CARES Act and the American Rescue Plan adopted in response to the pandemic.

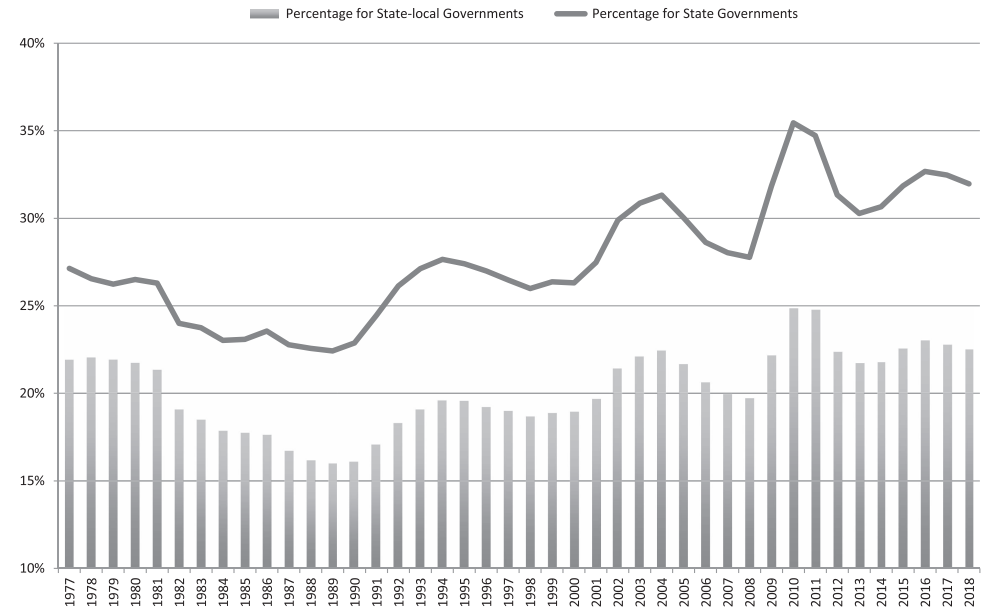


Figure 9.1 Federal grants as a percentage of general revenue

Source: US Census Bureau

Corresponding to the importance of federal aid to states and localities, federal aid increased from less than 9 percent of total federal government current expenditures in the 1960s to about 13 percent by 2019. Federal aid's share of the federal government budget increased to more than 15 percent of federal spending during the period of response to the COVID pandemic and resulting recession.

The pattern of state government grants to local governments is substantially different from that for federal grants. The real magnitude of state grants continually increased until the recession in 2007, which reduced state revenue and contributed to decreases in state aid. In a relative sense, state government grants provided an increasing share of general revenue for local governments from the early 1980s through 2003 (rising from less than 33 percent to almost 36 percent). Since 2003, however, the state aid share of local government general revenue has continually declined, falling to 31 percent in 2018. Essentially, the fiscal problems for state governments from the recession and its aftereffects extended to local governments through decreases in state grants.

Intergovernmental grants are an important source of revenue for nearly all state-local governments, as confirmed by the data in Table 9.1. In 2017, state governments received about 33 percent of their general revenue through federal intergovernmental grants. Federal grants are overwhelmingly directed to state governments. Therefore, state intergovernmental aid is substantially more important than direct federal aid for all types of local governments except special districts, although some of the state aid arises from federal grants to the states, which effectively are "passed on" to localities. Counties and school districts are the types of local governments most reliant on grants, at least on average. The particularly high reliance on state aid by school districts reflects a growing role for state governments in financing local education, a topic discussed more comprehensively in Chapter 17.

Table 9.1 Intergovernmental grants as a percent of general revenue, by type of government, 2017

Government level	*Federal grants*	*State grants*
State	32.5%	NA
County	2.9%	28.4%
Municipality	4.7%	16.7%
Township	0.8%	15.0%
School district	0.9%	52.6%
Special district	13.8%	10.8%

Source: US Census Bureau, State and Local Governmental Finances

Federal aid to states and localities for the budget function of health, a large fraction of which is for Medicaid, accounts for about 60 percent of all federal grant dollars, as shown in Figure 9.2. The other major budget categories for federal aid are public welfare or income security (14 percent), education (8 percent), and transportation (8 percent). What stands out most in this figure is that the health category accounts for an overwhelming amount of the increase in real federal aid since 1990. Federal grants in the health category represented only 32 percent of the total in 1990. Since 1980, nominal federal grants in the health category increased from $44 billion to $493 billion (an increase of $449 billion), whereas federal grants for all other categories together increased from $91 billion to $335 billion (an increase of $337 billion).[3] The increase in federal grants for health or medical assistance

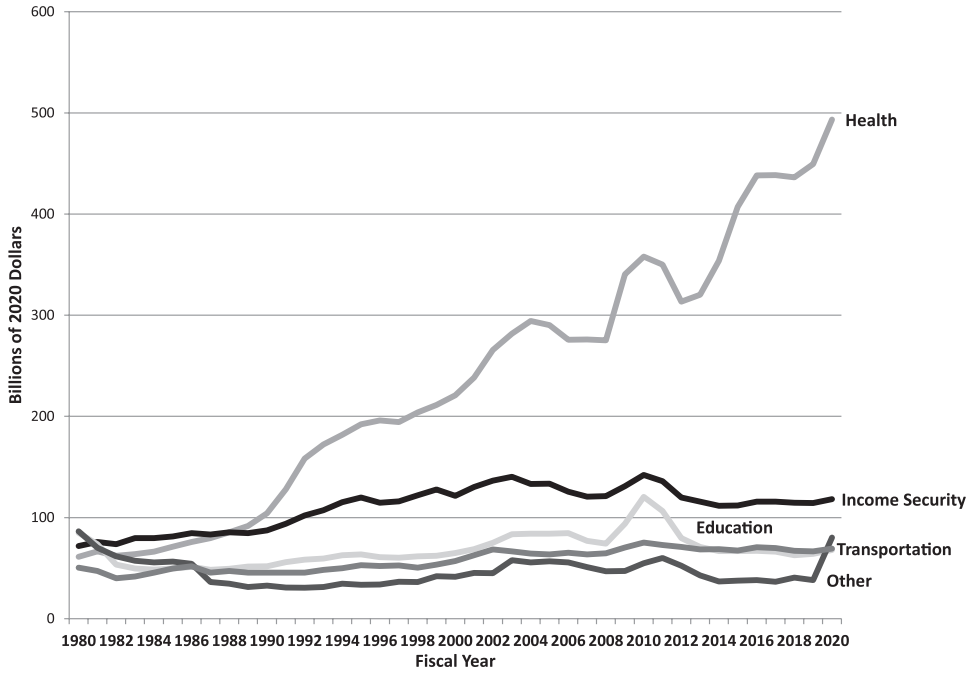


Figure 9.2 Federal grants to state and local governments, by budget function

Source: Office of Management and Budget, Table 12.2 – Total Outlays for Grants to State and Local Governments by Function and Fund Group: 1940–2026

(again dominated by Medicaid, which is discussed in Chapter 19) are principally the result of increases in health-care costs and decisions by state governments and the federal government to expand health-care programs (covering more people and more services). Combining income security and health, much of which is need based, the federal government finances more than half of public welfare expenditures, even though welfare programs are operated directly by states.

In contrast, education is the dominant category of state aid to localities. First, school districts are the recipients of the largest component of state aid by far – $302 billion, or about 56 percent of the total in 2017. In contrast, county governments are the recipients of about 22 percent of state aid (about $119 billion in 2017), whereas municipal and township governments receive about 18 percent of state aid ($93 billion). However, some of the state aid to counties and municipalities also supports education. The state support to counties for education likely represents support for elementary and secondary schools operated by counties (so-called dependent school systems) and for community colleges. The situation for cities and townships is similar, with state aid for dependent elementary and secondary school systems.

Purposes of grants

Traditionally, four potential roles for intergovernmental grants in a federal fiscal system are identified. Grants can improve the efficiency of fiscal decisions of subnational governments by correcting for externalities – service benefits or tax costs that cross or spill over jurisdiction boundaries. In fact, George Break argues "The basic economic justification for federal functional grants-in-aid is provided by the widespread, and ever-increasing, spillover of benefits from some of the most important state and local expenditure programs."[4]

Grants can be used also for explicit redistribution of resources among regions or localities. Grants may be used to substitute one tax structure for another: for instance, to take advantage of scale economies in tax collection. Finally, grants have been considered as a macroeconomic stabilizing mechanism through the subnational government sector.

The existence of interjurisdictional externalities, or spillovers, can cause service decisions by individual subnational governments to be inefficient from society's viewpoint (as discussed in Chapter 2). If nonresidents benefit from a state or local service but those nonresident benefits are not considered in the decision about the amount of the service to provide, social marginal benefits will be underestimated and too little of the service provided. In such a case, an intergovernmental grant can be used to induce the subnational government to provide more of that specific service, as efficiency requires. Moreover, because the grant funds are generated from taxes collected by the granting government, nonresidents who benefit from the service end up paying for part of the service through their state or federal taxes.

Migration among local communities also may involve a type of externality, if that migration imposes costs on the other residents (as discussed in Chapter 5). Individuals may move to avoid subnational taxes or gain services. If the new residents pay less than the average cost of services they consume, existing residents face either service reductions with constant taxes or higher taxes to maintain services. The potential migrants have no incentive to include those costs imposed on other residents in their decision about whether to relocate, so the distribution of population among localities may become inefficient. Again, intergovernmental grants may be used to resolve this difficulty. Grants to high-tax or low-service localities may forestall some of the migration in search of lower taxes or more services and contribute to a more efficient structure of local government.

Intergovernmental grants effectively substitute the granting government's tax revenue for that of the recipient government. If the taxes used by the granting government are more efficient than the ones they replace, this tax substitution is another way that grants may improve the efficiency of the federal system. Because mobility is so much greater among subnational jurisdictions than among nations, a tax levied nationally may generate less inefficiency than a set of similar subnational taxes. The revenue can be generated nationally but spent locally, with a system of intergovernmental grants. This is at least part of the rationale for revenue-sharing programs.

Intergovernmental grants sometimes are suggested as a method of explicit income redistribution for equity reasons. Taxes collected by the federal government or a state may be allocated to lower-level governments inversely proportional to income or property value, resulting in an implicit transfer from governments in higher-income jurisdictions to governments in lower-income jurisdictions. Regional income redistribution of this type is complicated, however, because jurisdictions are seldom completely homogeneous in income and because the local government determines how the grant funds are to be spent. Even jurisdictions that are low income on average may have high-income residents, in some cases a substantial number. If the objective is to assist low-income individuals and families, it seems preferable in most cases to give grants directly to those individuals, rather than the state or local government where they reside.

During each of the last two major recessions, the Great Recession in 2007 to 2009 and the COVID pandemic recession in 2020 and 2021, the federal government provided grants to the subnational government sector as a macroeconomic stabilizing mechanism. Both the American Recovery and Reinvestment Act in 2009 and the American Rescue Plan in 2021 provided funds to state and local governments as a way to stimulate spending relatively quickly. These programs are discussed later in the chapter. When grants are used for macroeconomic stabilization, it seems best if the funds can be used for a wide variety of purposes (not limited categorically) and if the grants are distributed to areas most affected by the recession.

Types of grants

Intergovernmental grants usually are characterized by four factors: whether the grant is intended for a specific service or may be used generally, whether grants automatically are allocated by a formula or require an application associated with a specific project, whether the grant funds must be matched by recipient government funds, and whether the potential size of grant is limited. These characteristics are depicted in Figure 9.3.

Categorical or specific grants are the dominant type, both in number and amount of funds, offered by both the federal and state governments. For instance, the federal government had 578 different categorical grant programs in 1993, representing more than 97 percent of the number of federal grant programs and more than 88 percent of federal aid dollars. The largest state government grant program provides specific grants for local education.

If the amount of these categorical grants does not change as a recipient government changes its taxes or expenditures, then they are said to be **lump-sum** or **nonmatching grants**. The amount of the grant cannot be altered by fiscal decisions of the recipient government. In 1993, about 48 percent of federal categorical grants (280) were nonmatching. **Matching grants**, on the other hand, do require recipient government taxes or spending, with the size of the grant depending on the amount of those taxes or that spending. Typically, a specific matching aid program offers to match each dollar of recipient tax or expenditure on that specific service with R grant dollars, intended to be spent on that service; R is called the matching rate. If $R = 1$, then each local dollar generates one grant dollar, so the

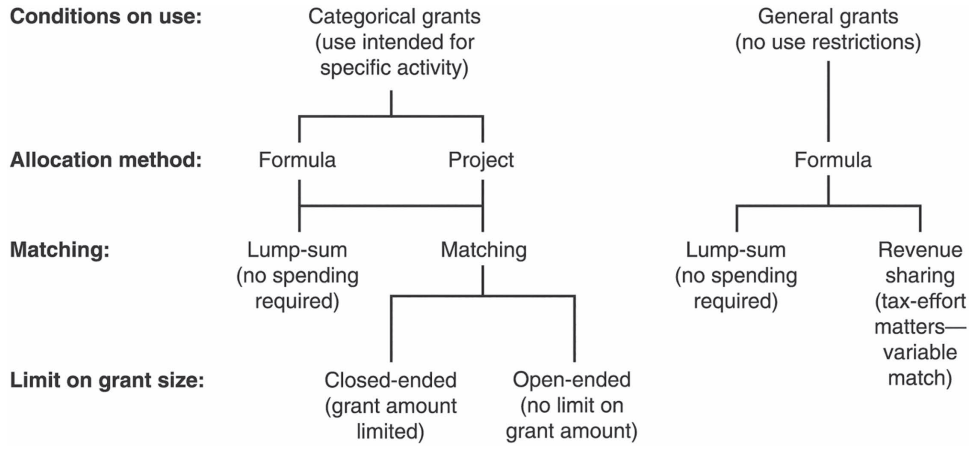


Figure 9.3 Types of intergovernmental grants

grant finances half the expenditure. If R =. 5, then each local dollar generates $.50 in grant funds, and the grant finances one-third of the expenditure ($.50/$1.50). The share of spending in the category financed by the grant (denoted by M), is

$$M = R/(1 + R)$$

An important implication of a matching rate is that the grant reduces the price of additional amounts of the aided service to the recipient government. If R = 1, the grant finances one-half of expenditures, so the cost in local taxes of increasing spending by $1 is only $.50. In general, the local tax price (denoted by P) of an additional dollar of service (the local marginal cost) is

$$P = 1 - M = 1 - [R/(1 + R)] = 1/(1 + R)$$

If R = 1, each additional dollar of service costs local residents $.50 in local taxes. If R = .5, the local tax price of $1's worth of additional service is $.67. If R = .25, the local tax price is $.80; local residents pay $.80 for each additional dollar of expenditure on the specific aided service.

Both matching and nonmatching categorical grants may be allocated either by formula or on a project-by-project basis and may be either open ended (no limit on the grant amount) or closed ended (there is some limit on the grant amount because the funds appropriated for the grant program are fixed). Project categorical grants have outnumbered formula grants by more than two to one, while less than 3 percent of federal categorical grants have been open ended. The class of open-ended, formula, nonmatching categorical grants (of which there are very few) should be clarified. In these cases, the formula allocating subnational government grants implies a fixed payment for factors outside the recipient government's control, such as population or population characteristics, but there is no limit on the amount of aid. Programs in this class include unemployment compensation and some child nutrition grants.

General grants, those without use restrictions (or with only very loose restrictions), are rare among federal government grants, although somewhat more common among state grants. These grants, which are sometimes said to provide general fiscal assistance, almost

always are allocated by formula. If the formula includes factors outside the direct control of the government, such as population or per capita income, the grant is a pure lump sum to the government. On the other hand, if the formula includes factors controlled by the recipient government, such as tax collections or tax effort, then the amount of the grant can be altered by recipient government decisions. This method, used for the federal and some state revenue sharing grants, creates a type of matching grant, although the total amount of grant dollars is fixed, and the matching rate varies, as discussed later in this chapter. Matching, open-ended, general-purpose grants are not a good idea because by redefining all consumption as part of government, all of consumption could be matched. It obviously is impossible for this to happen generally.

The US General Revenue Sharing Program, begun in 1972, initially provided grants totaling about $6 billion annually to state-local governments. The funds first were divided among the states by a formula that included population, per capita income, and tax effort, with one-third of a state's funds allocated to the state government and the remaining two-thirds distributed to local governments in that state, again by formula. The size of the grant fund was increased slightly in 1976; in 1984, state governments were removed from receiving revenue-sharing grants, and the fund decreased proportionately. The federal revenue-sharing program for local governments expired in 1987. Since then, there has been no federal revenue-sharing grant program (providing general formula grants) in the United States, although such grants programs are common internationally.

There is also a class identified as **block grants**. This term is used to describe specific grants in categories that are very broadly or loosely defined. For instance, there are two separate block grants for community development. There is, correspondingly, a long list of approved activities that can be financed with these funds in that general category. The use of block grants has been championed as a way of simplifying grant compliance by recipients without eliminating control by the granting government. The idea is that these fall between narrowly defined categorical grants and ones with no use restrictions at all. As you will learn later in this chapter, in most cases, these block grants are effectively general grants because the categories are broad enough to allow most recipient governments leeway for reallocating other funds.

Fiscal effects of grants: Economic theory

Intergovernmental grants may affect recipient government fiscal decisions either by increasing the resources available to provide government services, called an **income effect**, or by increasing resources and reducing the marginal costs of additional services, called a **price effect**. Either effect may influence the amount of government service demanded, although in different ways. In taking this approach to analyzing intergovernmental grants, economists retain the notion of individual demands for government services, as discussed in Chapter 3, which must be coordinated by a political choice system. If political decisions are made by voting, then the effect of the grant on a government's decisions is determined by the effect of the grant on the decisive voter.

Most economic analyses of the expected effects of intergovernmental grants start with the effects of the grants on individual demands, as shown in Figure 9.4. An increase in available resources, which arises from a lump-sum grant, will cause the demand curve for government services to shift out (assuming that government services are normal goods, as supported by empirical evidence). With the marginal cost of an additional dollar of expenditure remaining at $1, desired expenditure increases from E_0 to E_1. On the other hand, a matching grant reduces the marginal cost (or price) of additional expenditure, which causes an increase in the amount of government service demanded, for instance from E_0 to E_2. In economic

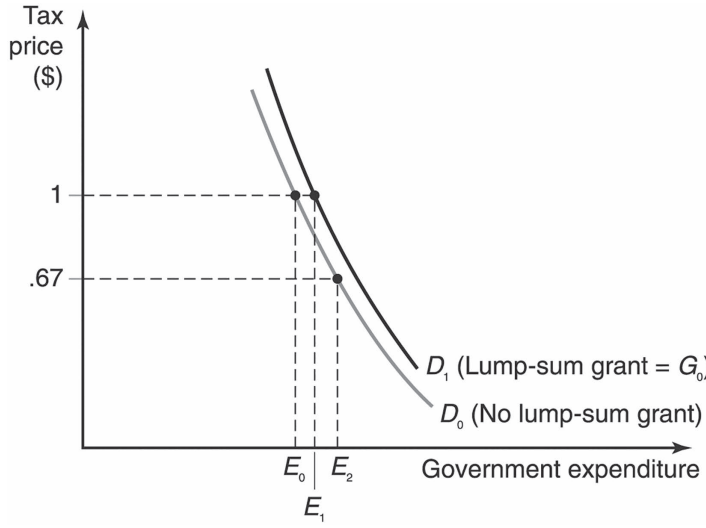


Figure 9.4 Income and price effects of a grant

parlance, lump-sum (nonmatching) grants increase demand via an income effect, whereas matching grants increase the desired amount of service due to a price effect. Given the characteristics of the grant program and the local political choice system, the economic effects of the grant can be predicted. Several general results follow.

Matching grants are more stimulative than lump-sum grants

A fundamental result of microeconomics is that a decrease in price will have a greater effect on consumption than an increase in income, if that increase is large enough to give a consumer the same choices as the price decrease. When the price of a product decreases, whether for hamburgers or education, consumers are influenced by two separate factors. The product whose price has fallen is relatively less expensive compared to other goods than before the price change, *and* the consumer's purchasing power has increased – even with constant income, more of all goods can be afforded. The first is called the "substitution, or price, effect" because it is an incentive for consumers to substitute more of the now relatively less expensive commodity. The second is the "income effect." For normal goods, both of these influences are incentives for consumers to consume more of the product whose price has decreased.

When consumers receive an increase in income, purchasing power rises, but there is no change in the relative price or cost of different products. Therefore, if the income effect that arises from a price decrease is of the same magnitude as the income effect from an increase in income, the price decrease should affect consumption more. The income effects are the same, but the price decrease has an additional substitution effect. In essence, price changes are expected to stimulate greater changes in consumption than equivalent changes in income because price changes alter purchasing power and relative costs, whereas income changes only alter purchasing power (and the two changes in purchasing power are the same size).

The implication of this microeconomic principle is that an open-ended matching grant is expected to increase government expenditure on the aided service by a greater amount than

an "equal size" lump-sum grant, where "equal size" is defined to mean a lump-sum grant large enough to allow the government the same expenditure as selected with the matching grant. Although the government could select the same expenditure in both cases, it does not because of the price incentive. The change depicted in Figure 9.4 represents this principle. A matching grant that provides $.50 for each $1 of locally financed expenditure reduces the local tax price per dollar of expenditure to $.67, thus inducing an increase in government expenditure on the specific service from E_0 to E_2. If a lump-sum grant equal to G_0 were offered instead, which would be large enough to allow the recipient government to select expenditure E_2, the theory argues that the actual expenditure selected would be smaller: for instance, equal to E_1.

The same principle is shown by the numerical illustration in Table 9.2. Assuming initial spending and taxes of $1,000 per capita and a price elasticity of demand for government expenditure equal to –.5, a matching grant providing $.50 for each $1 of local tax reduces the tax price to $.67, a 33 percent decrease, and induces a 16.5 percent increase in spending to $1,165. As a result, the jurisdiction receives a matching grant of $388.33 (one-third of total spending). If this jurisdiction received a lump-sum grant equal to $388.33 per capita and assuming per capita income of $5,000 and an income elasticity of 0.5, income rises by 7.76 percent, and spending rises by 3.88 percent to $1,038.80. The matching grant stimulates a greater increase and level of spending than the equal-size lump-sum grant.

This analysis applies directly to open-ended matching grants but must be modified for closed-ended matching grants. Suppose, for example, that a matching grant of $.50 is offered for each $1 of local expenditure up to a maximum local expenditure of $1,000 per capita. The maximum grant is $500 per capita. The local tax price is $.67 as long as local per capita expenditure is less than $1,000; above $1,000, the local tax price is $1. In other words, this is initially a matching grant for recipient governments that spend less than $1,000 per capita

Table 9.2 Expenditure effects of matching and lump-sum grants

Initial fiscal circumstances			
Per capita expenditure	$1,000		
Per capita local tax	$1,000		
Price elasticity of demand	– 0.5		
Income elasticity of demand	0.5		
Per capita income	$5,000		
Grant conditions and effects			
Matching grants		*Lump-sum grants*	
Matching rate	0.50 ($.50 for each $1.00 of each tax)	Per capita grant amount	$388.33
Tax price with grant	$0.67 ($1.00/$1.00 + $.50)	Percentage increase in per capita income	7.76% ($388.33/$5000)
Percentage decrease in price	33%		
16.5%	Percentage increase in per capita expenditure		3.88%
$1,165.00	Per capita expenditure with grant		$1,038.80
388.33	Per capita grant		388.33
776.67	Per capita local tax		650.47
165.00	Increase in per capita expenditure		38.80
223.33	Decrease in local tax		349.53
388.33	Sum = grant amount		388.33

before the grant program begins, but it is a lump-sum grant for governments that spend $1,000 per capita or more. Equivalently, this is a matching grant for governments that spend less than $1,500 per capita, including the grant. For instance, a government spending $1,350 per capita on the specific aided function (composed of $900 in local money and $450 of grant) can increase per capita expenditure by $1 with an extra $.67 of local money. Once total per capita expenditure reaches $1,500, the grant is at its maximum and is, therefore, a lump-sum grant.

The closed-ended nature of the grant complicates the analysis because (1) it is not possible to determine whether the grant is effectively matching or lump sum without knowing the recipient government's position, and (2) a recipient government's reaction to the grant can move its per capita expenditure across the boundary, transforming an apparent matching grant into a lump-sum one, or vice versa. For governments "near" the expenditure cap on the grant, the full price effect of the grant may never apply. One expects, therefore, that closed-ended matching grants will be more stimulative, in aggregate, than pure lump-sum grants (because some governments feel some price effect) but less stimulative than open-ended matching grants (because some governments reach the maximum).

Matching grants provide tax relief

The preceding analysis shows that matching grants will induce an increase in spending on the aided category, but the increase will not be as large as the grant. As a result, the matching grant also can increase government spending in other budget categories or allow for local tax relief. As long as the demand for government service is price inelastic, a matching grant will increase expenditure by less than the amount of the grant, thus freeing local funds to be spent in other ways. Because the evidence, reported in Chapter 3, shows that demand for most state-local services is price inelastic, matching grants are expected to be used partly for tax relief.

The expenditure and tax effects of matching grants are demonstrated numerically in Table 9.2. The local tax price falls from $1 to $.67, a decrease of 33 percent. If the price elasticity of demand for the aided service is less than one (inelastic), then expenditures will increase by less than 33 percent, and local taxes can decline. In the illustration, spending rises by 16.5 percent to $1,165, to be financed by $776.67 of local money and $388.33 of grant money. The matching grant increases total expenditure but decreases the amount of local funds spent on the category by $223.33. This $223.33 can be spent by the government on other services or on local tax relief.

If demand is price inelastic, matching grants do stimulate increases in total expenditure but do not stimulate increases in locally raised money spent on the service. This has led to some confusion as to whether matching grants are "stimulative," the confusion resulting from just what "stimulative" means.

Categorical lump-sum grants may be no different than general grants

A lump-sum grant of $G that is restricted for use in a specific category may be no different, from the viewpoint of the recipient government, than a grant of $G with no use restrictions; that is, the two grants may have the same effect on a recipient government's fiscal behavior. This issue depends on whether the government can and does reallocate local funds from the specific budget category to others as a result of the grant.

The possibilities are depicted in Figure 9.5, which shows the budget options for a community (or individual) between government expenditures on the aided category and expenditures on all other (government and private) goods. With no grant, this community can

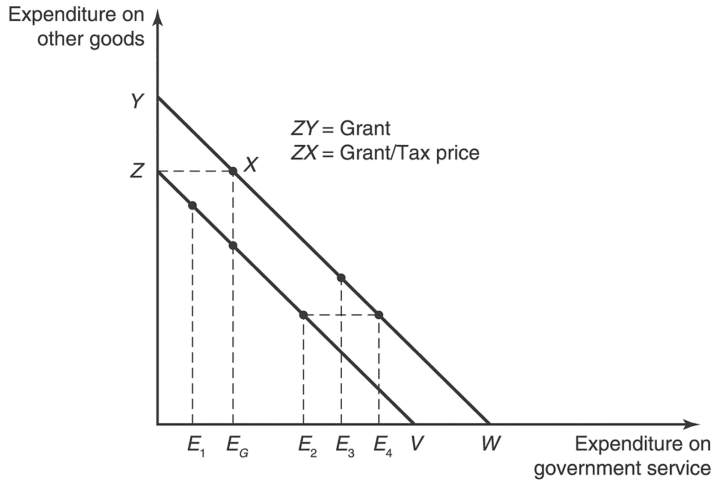


Figure 9.5 Comparison of alternative lump-sum grants

spend a maximum of $\$Z$ on other goods *or* a maximum $\$V$ on the specific service or any combination on the budget line between those two points. A lump-sum grant expands the set of affordable options; that is, it shifts the budget line out. A general lump-sum grant equal to ZY shifts the budget line to YW; the government receives ZY dollars that can be spent on anything, including entirely on "other goods." A lump-sum grant of the same size that must be spent on the aided category shifts the budget line to ZXW; the recipient government must buy ZX units of the aided service, the amount that can be purchased using all the grant funds. Thus, all the grant funds are spent on the intended service.

Two implications follow. First, the restriction on use of the grant will "matter" to the recipient only if intended expenditures on the aided category are less than what the grant will buy: that is, less than E_G. If the recipient government would have spent more than E_G anyway, local funds equal to the amount of the grant can be shifted to other uses. Local funds are said to be **fungible** within the entire budget. Put another way, beyond E_G, the budget choices from the two grant programs are identical. Second, a lump-sum categorical grant does not guarantee that expenditures on the aided category will increase by the full amount of the grant. A government initially spending E_2 on the specific service already spends an amount equal to the grant. Rather than increasing to E_4, the change from increasing expenditures by the full amount of the grant, the government more likely would increase expenditures to some intermediate level like E_3, freeing funds for increased spending in other areas as well.

In the illustration reported in Table 9.2, a lump-sum grant equal to $388.33 per capita is provided. Suppose that per capita income is $5,000 and the income elasticity of demand is .5. The per capita grant of $388.33 increases income by about 7.76 percent, causing an expenditure increase of 3.88 percent. As a result of the grant, per capita expenditure increases by $38.80 to $1,038.80, which is financed with $650.47 of local money and the $388.33 grant.[5] Accordingly, the amount of local funds spent on the category decreases by $349.53, which can be spent on other services or tax relief.

Students are often experts on fungibility. Suppose your parents visit you at school and, as they are leaving, give you a gift of $20, which they insist must be spent on pizza. Even if you always obey your parents, does this mean you will spend $20 *more* on pizza

this week than you usually do? Not necessarily. If you normally spend $25 per week on pizza, you might increase your pizza consumption to $30, including the $20 gift, and shift your own $20 you would have spent on pizza to some other necessity, perhaps books. You satisfied the restriction without having to increase consumption by the amount of the gift. In effect, you behaved the same as you would have if the gift came with no use limitation.

The potential for categorical, lump-sum grant funds to be shifted to other uses has led some to consider other types of use restrictions, particularly a requirement for maintenance of local effort. This restriction requires not only that the grant funds be spent on the aided category but also that local funds spent on the category not be reduced. Even this restriction may not be as severe as it seems because expenditure normally would increase annually without the grant. If a government spends $100 on a specific service in one year and plans to spend $110 in the following year, a $10 lump-sum grant with an effort maintenance restriction is the same as a $10 grant with no restriction. The grant can be spent on the specified service, and the additional $10 the government would have spent on that service can be reallocated to other uses. In general, the effort maintenance restriction is binding only if the grant is larger than the increase in expenditure that would be selected without the grant (which is not observed).

Tax effort grants are matching

One common factor in the allocation formula for revenue-sharing grants, once used for the US Federal Revenue Sharing Program and still for many state revenue sharing programs, is **tax effort**. Tax effort is usually measured either by tax revenue as a fraction of income or, for many local governments, property tax as a fraction of taxable value. In these revenue-sharing programs, a higher tax effort generates a larger grant, given no change in any other allocation factor. A high tax effort can reflect either a great demand for government service in a jurisdiction, a relatively low tax base, or a high production cost for government service. Recipient governments can affect the size of the revenue sharing grant (similar to matching grants) because a subnational government chooses its tax effort.

The operation of a representative state revenue sharing program is demonstrated in Table 9.3, simplified with two equal-size recipient local governments. The state revenue-sharing program divides a fixed amount of state tax collections ($100) between the two localities based on population (POP_i) and tax effort, here defined as the effective property tax rate (T_i/V_i). Both jurisdictions initially collect equal property taxes, but because jurisdiction A's property value is lower, its tax effort is twice as great as jurisdiction B's. Because they have equal populations, A receives 66.7 percent ($66.70) of the revenue-sharing funds, and B receives the remaining 33.3 percent ($33.30).

What happens if one of these governments (B) increases property taxes by 20 percent to $600, while A holds taxes constant? Jurisdiction B's relative tax effort rises, and therefore, its share of the revenue-sharing funds also rises. In this example, because B gains $4.20 in revenue-sharing funds from the $100 increase in taxes, the new local tax price is $.96. Jurisdiction A loses the $4.20 of revenue-sharing funds, a 6.3 percent decrease, even though it made no fiscal changes.

Several implications follow. A recipient jurisdiction can increase its revenue-sharing grant by increasing taxes at a greater rate than its competitor jurisdictions. Even if a jurisdiction does not seek a larger revenue-sharing grant, it will have to increase taxes just to avoid losing grant funds if any other recipient jurisdiction raises its taxes. Each jurisdiction is in competition with all others for the limited revenue-sharing funds. Because all jurisdictions face these same opportunities and because each is uncertain about the behavior of its competitors,

Table 9.3 Sample revenue sharing program

Feature	*Jurisdiction A*	*Jurisdiction B*
Population	50	50
Property tax	$500	$500
Taxable value	$5,000	$10,000
Effective tax rate – tax effort	10%	5%
Relative tax effort	1.50	0.75
$\frac{T_i / V_i}{\Sigma \left(T_i / V_i \right)}$		
Grant share	66.7%	33.3%
$\frac{RTE_i \times POP_i}{\Sigma \left(RTE_i \times POP_i \right)}$		
Grant (fund = $100)	$66.70	$33.30
Effect of property tax change		
New property tax	$500	$600
New relative tax effort	1.36	0.82
New grant share	62.5%	37.5%
New grant amount	$62.50	$37.50
Change in grant	– $ 4.20	+ $4.20
Percentage change in grant	– 6.3%	+ 12.6%
Price of tax increase	NA	$0.96

there is a general incentive for an increase in government expenditures. This program is different from a standard open-ended matching grant because the total amount of grant funds is fixed, and the rate at which local taxes are matched by increased grants changes as all the recipient jurisdictions react to the grant. As one special case, if all the recipient jurisdictions increase taxes at the same rate, no one's revenue-sharing grant changes, although all increase government spending.

Fiscal effects of grants: Evidence

There are hundreds of published studies about the effects of intergovernmental grants on state and local government behavior, which alone makes a summary of the evidence daunting. In addition, generalizations about the estimated effects of intergovernmental grants are difficult because there seems to be substantial variation in how different governments respond to different grants, and the results of different economic studies often vary greatly even for the same grant program. Nevertheless, some conclusions are broadly supported about the general direction and relative magnitude of effects caused by different grants.[6]

First, open-ended, categorical matching grants do seem to increase expenditures on the aided category and do so by a larger amount than equal-size specific lump-sum grants, as predicted by theory. Because the estimated price elasticities for most subnational government services are less than one (in absolute value), the expenditure increase from a matching grant is smaller than the grant, allowing funds to be diverted to other expenditure categories or to tax relief. The numerical example in Table 9.2 is generally representative, therefore, of the statistical evidence.

Although open-ended matching grants are not the most common type of federal grant, as previously noted, they have been used for two well-known programs – Aid to Families with Dependent Children (AFDC) until 1996 and Medicaid. Robert Moffitt's (1984) analysis of state government responses to federal AFDC grants supports the

general conclusions noted here. Through grants to states, the federal government paid a percentage of state AFDC benefits, with that percentage differing by state. Using 1970 data, Moffitt estimated that the elasticity of a state's per capita AFDC benefit with respect to the national subsidy rate is .15; a 10 percent increase in the subsidy rate increases per capita benefits by 1.5 percent. In 1970 the average per capita AFDC benefit was $45, with the federal government paying about 60 percent of the marginal cost (an additional $1 of benefit costs the state $.40). If the subsidy rate were increased to 70 percent, about a 16 percent increase, the per capita benefit would increase by about 2.4 percent (16 × .15), or about $1. The average state would have received approximately $1.20 more in per capita grant, with about $1 going for increased AFDC benefits. More discussion of these types of welfare grants is presented in Chapter 19.

Second, there is some evidence that close-ended categorical matching grants sometimes have greater expenditure effects than open-ended matching grants, which seems contrary to theory. But closed- and open-ended grants are not used for the same services, so the different expenditure effects most likely result from differences in demand for the services. For instance, closed-ended categorical grants, the most common type of federal grant, may be used for services that state-local governments were not providing in large quantities or may include effort maintenance provisions. In either case, the opportunity to use grant funds to shift resources to other budget categories is limited, forcing a larger increase in spending on the aided category. Also, it simply may be that the demands for the services aided by closed-ended grants are more price elastic than those for which open-ended grants are used.[7]

Third, lump-sum grants also cause an increase in government expenditures, which seems in most cases to be smaller than the grant. There is a wide variance in the estimated expenditure effects of lump-sum grants, however, varying from an expenditure increase of $.20 up to $1 per dollar of grant received. Again, two reasons for this are differences in initial spending on the category by subnational governments and different use restrictions among the grants. The majority of the estimates fall in the range of a $.25 to $.50 increase in expenditure per dollar of grant. If those results are representative, then $1 of lump-sum grant provides between $.50 and $.75 for expenditures in other budget areas or for local tax relief.

One illustration of these general results is provided by the work of McCarty and Schmidt (2001), who examine the effect of various types of federal aid on state spending for education, highways, and welfare, including allowing for the spending effects of the grants over a period of years. They report, "In highway and welfare spending, expenditure increases by more than 80 cents in response to a dollar increase in aid, whereas education spending rises by only about 50 cents. The remaining federal aid displaces state spending within the category" (pp. 215–216). The implication is that part of the grants in these categories supports tax reduction or increased spending in categories without grants. Noting that matching grants are used for welfare and highways but not for education, they conclude that this "suggests that matching grants encourage state governments to spend within category more than block grants do."

The evidence that a substantial portion of both matching and lump-sum grants effectively is diverted to uses other than those nominally intended raises the issue of which other budget categories benefit. This "leakage" of grant funds may occur among both different services and different local governments, which overlap in tax authority. As an example of the latter, aid to municipalities is expected to increase municipal expenditures and decrease local municipal taxes. The lower municipal taxes may, therefore, allow local school districts to increase expenditures (by reducing opposition to increased local school taxes). In fact, there is evidence of just this sort of cross-government general-equilibrium effect; aid to either municipalities or independent school districts appears to cause increased spending by both.

The possibility of grant substitution among different budget categories for a single government was examined in detail by Steven Craig and Robert Inman (1985), who studied state government expenditure responses to federal welfare and education grants. Craig and Inman conclude that although federal welfare and education grants to states do increase state expenditures in those categories, both influence expenditures in other areas by a larger amount. For instance, they estimate that an additional $1.21 from open-ended federal welfare grants to states would generate $.34 more in welfare spending, $.54 less in state education expenditures, $.63 less in state taxes, and thus $.78 more on other state services (1.21 − .34 + .54 − .63 = .78). Similarly, they found that $1 of additional lump-sum federal education aid to states increases state education expenditure by $.43, increases state welfare expenditures by $.23 (only $.09 of which is state money due to matching federal welfare aid), decreases state taxes by $.39, and thus allows $.09 to be spent on other state services. Although the specific magnitude of these estimates surely is not precise, it seems clear that intergovernmental grants do have some substantial unintended or unexpected effects on recipient government budgets.

Finally, the results of a large number of varying studies suggest that an additional $1 of lump-sum grant money has a greater effect on recipient government expenditure than a $1 increase in residents' incomes. For instance, some studies show that although $1 of increased income is expected to increase subnational government expenditure by about $.05 to $.10, $1 in lump-sum grant appears to increase expenditure by $.25 to $.50. This result has become known as the **flypaper effect**, reflecting the notion that money paid to a government tends to "stick" in the public sector. If true, this means that a $1 grant will have very different allocation effects than a $1 tax decrease by the granting government (which increases income by $1). These results have generated some controversy about whether they reflect important characteristics of political behavior or are illusory and caused by incorrect or imprecise economic analysis. That debate is presented next.

Is grant money different than tax money?

Do increases in lump-sum grants and private personal incomes affect subnational government expenditures equally? If not, why not? These two issues have received increasing amounts of attention as a result of the empirical results mentioned earlier. The answers seem to fall into two categories. One position is that no flypaper effect really exists – that the empirical results arise from incorrect statistical work or misinterpretation of those results. The other position – that the flypaper effect is real – is then divided on the cause – whether it reflects political power and control by government officials or behavior actually desired by voters, who may be misinformed.

First, why would economists think that grants and income would influence expenditures equally? That view arises from the belief that the public-choice process (voting) works to reflect perfectly the desires of various voters, or at least the decisive voter. The majority-voting/median-voter model so favored by economists is in this category; government selects the expenditures desired by the median voter, and if not, political competition will arise to move the government in that direction. For an individual voter, increases in income or grants to the voter's government are the same because both increase the resources available for consumption. An individual can convert grant funds into personal income through decreased local taxes.

The idea can be demonstrated through an individual's budget, which leads to that individual's demand for government services, as presented in Chapter 3. The budget is

$$Y_i = C_i + t_i(T)$$

Because local taxes must make up the difference between expenditures and grant funds,

$$Y_i = C_i + t_i(E - G) = C_i + t_iE - t_iG$$
$$Y_i + t_iG = C_i + t_iE$$

where
Y_i = income for person i
C_i = private consumption by person i
t_i = the local tax share for person i
T = total tax collected by person i's local government
E = expenditures by person i's government
G = the lump-sum grant to person i's local government.

The left-hand side of the budget equation represents the resources available to be spent on either private consumption or government services. The individual's price for government services is the tax share, t_i. An individual voter's implicit share of lump-sum grants received by the government is the voter's tax share multiplied by the amount of the grant; this is the amount of local taxes the individual would have to pay to generate the same amount of revenue as the grant. Equivalently, if the entire grant were used to lower local taxes, this represents the tax savings to that voter. With this view, it should not matter whether resources arise from an increase in Y_i or an increase in G; both expand the individual's budget and should increase demand for normal goods.[8] The same idea is illustrated by Figure 9.6. An increase of ZY in private income shifts the budget line in exactly the same way as a lump-sum grant equal to ZX.

The key to the argument, of course, is whether individuals do in fact have the option or desire to convert lump-sum grants received by the government into private income through tax reductions. If individuals suffer from some type of fiscal illusion or if budget-maximizing, monopoly government officials create such an illusion, then the grant funds may be treated

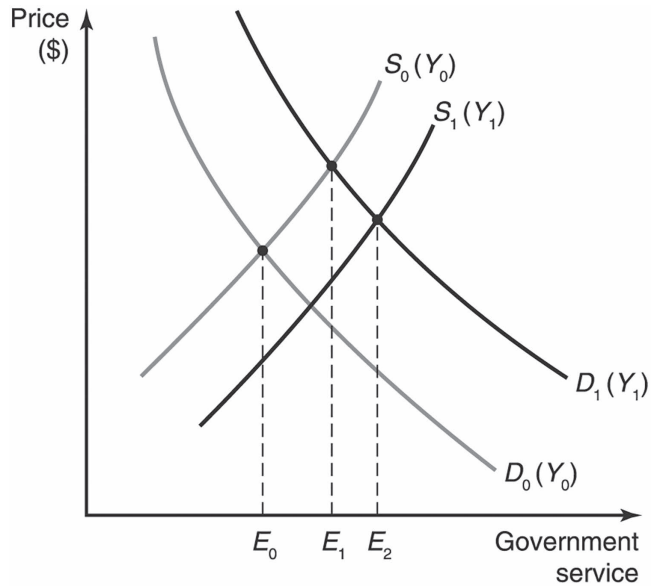


Figure 9.6 Increases in income can affect both demand and cost for government service

differently than income. One possible type of illusion occurs because lump-sum grants reduce the average cost to residents of recipient government spending. A jurisdiction that spends $100 per capita and receives a $30 per capita grant pays only 70 percent of the cost, on average. If individuals believe that this average cost is the price, then it appears that the lump-sum grant has reduced the price of government service similar to a matching grant. As a result, the expenditure effect would be greater than from the income effect alone. This is an illusion because the grant is lump-sum (constant). An increase in spending of $1 would cost the local jurisdiction $1; the marginal cost has not been reduced.

The flypaper effect also could result from the nature of the political process rather than incorrect perceptions by voters. By controlling the set of options from which voters choose, budget-maximizing officials may be able to have voters approve taxes to finance desired expenditures and then also spend the grant funds. The grant funds therefore would cause increased spending rather than tax relief. For this to work requires that voters not give grant funds the same careful consideration they do taxes and that political competitors not arise to give voters a different set of choices.

The competing position holds that the flypaper effect really does not occur, with the apparent evidence caused by statistical and analytical error. One possibility is that in studying grants, analysts may make mistakes in classifying grants as lump-sum or matching. Howard Chernick (1979) has argued, for example, that in choosing among competing projects applying for closed-ended lump-sum funds, officials of the granting government may favor those projects for which the recipient government agrees to spend the largest amount of local funds. This converts a nominally lump-sum grant effectively into a matching one. If an analyst considers the grant lump sum when it is, in fact, matching, it is not surprising to find an unexpectedly large expenditure effect. Brian Knight (2002) provides similar evidence for federal highway grant allocations being related to the preferences for public services. When such connections are controlled for econometrically, his results then show that "federal highway grants crowd out state highway spending" (p. 88).

Another possibility, suggested by Bruce Hamilton (1983), is that residents' income may affect the cost of providing government services as well as demand for them. For instance, it may require less government spending to bring students up to a given test-score level in a higher-income community than a lower-income one, due perhaps to preschool or other educational services purchased privately by the families. If income does affect cost, then increases in income cannot be compared directly to increases in grants. In Figure 9.6, an increase in income increases the demand for service and reduces the cost of providing that service. The increase in expenditure from E_0 to E_1 is due to the income effect on demand, while the increase from E_1 to E_2 reflects the cost reduction. Studies that ignore this possibility underestimate the expenditure effect of income increases, which can be part of the reason for the flypaper effect results.

Whether the flypaper effect is a political fact of life or a figment of imprecise analysis is, as yet, unresolved. In general, those who believe that substantial political competition between potential officials and economic competition among jurisdictions are prevalent tend to believe that the flypaper effect must be small or weak. Those who believe government officials can maintain monopoly power and manipulate public opinion tend to believe that the flypaper effect is real and strong.

Intergovernmental grant policy

Economic theory and evidence of the effects of alternative types of intergovernmental grants lead to three major conclusions about grant policy. First, open-ended categorical matching grants are the best device if the objective is to increase recipient government expenditures

on a specific function. A matching grant with a matching rate equal to the nonresident share of benefits will offset the effects of interjurisdictional externalities by reducing the local tax price. The lower price will induce the increase in expenditures necessary for efficiency. For instance, if the marginal social benefit of additional highway spending is half the total, a matching grant to states that pays $1 for each $1 of state money reduces the state's cost by half and restores efficiency. Although other grants also could be used to increase expenditures, an open-ended matching grant will induce the desired expenditure response with the smallest possible grant; matching grants provide the largest expenditure effect per dollar of grant.

Second, general lump-sum grants are a better mechanism than matching grants to redistribute resources among subnational jurisdictions. Of course, there is no economic reason for such grants to go to all jurisdictions; they should be targeted to low-income or high-cost jurisdictions. These grants should be lump-sum so as not to alter the relative price of government compared to private consumption. Although substantial tax relief is expected to result from such a program, these grants are not equivalent to federal tax reductions if the flypaper effect results are correct.

Third, categorical lump-sum and closed-ended matching grants should generally be avoided. Closed-ended matching grants become lump-sum once the maximum grant is reached, and categorical restrictions do not alter grant effects unless the grant is large compared to recipient government expenditures in the category. Open-ended matching grants are preferred if the objective is to increase expenditures or to induce recipient governments to begin spending on a specific function.

The actual intergovernmental grant system in the United States departs substantially from these rules. Categorical closed-ended grants are the most common form of federal grant (in number, but not in dollars). When matching grants are used, the matching rates often do not seem to correspond to the share of benefits that go to nonresidents. Revenue-sharing grants, the basic general-purpose grant, were given to all general-purpose local governments and included matching grant effects due to tax effort allocation. The specified categories for block grants often are so broad that they effectively are general grants. Consequently, there is continual discussion about "reforming" the federal grant system.

One reform option advanced by a number of economists is to substitute open-ended grants for closed-ended or lump-sum ones and to set matching rates to correspond to nonresident benefits. Gramlich (1985b) and Inman (2010) have suggested that in many cases this would require reducing matching rates for current open-ended matching grants. The reduction in many matching rates for those programs would then free up resources that could be used to fund larger grants for those programs for which there is no matching currently, or there are low caps on matching provisions. As a result of such a policy change, federal grant programs would become more stimulative across a broader set of functional areas. As noted, this policy makes sense if the primary objective of grants is to offset spillovers and establish economic efficiency.

However, research by Robert Inman (1988) suggests that offsetting spillovers may not be an important objective of federal grant policy in practice, even if economists argue it should be. Inman compares the interstate distribution of federal grants to variables that might capture the potential for spillovers – including a measure of outmigration by residents, the number of new housing starts (reflecting immigration), and the number of local governments per square mile – and finds either no relationship between grants and these measures or the wrong relationship. He concludes that "the spillover rationale for aid does little to help us understand the actual distribution of federal assistance" (Inman, 1988, 49).

In contrast, Inman does find support for the idea that a main purpose of federal grants is to further economic equity: that is, to bring about a more equitable distribution of resources and thus, perhaps, a more equitable distribution of public goods. After correcting for other

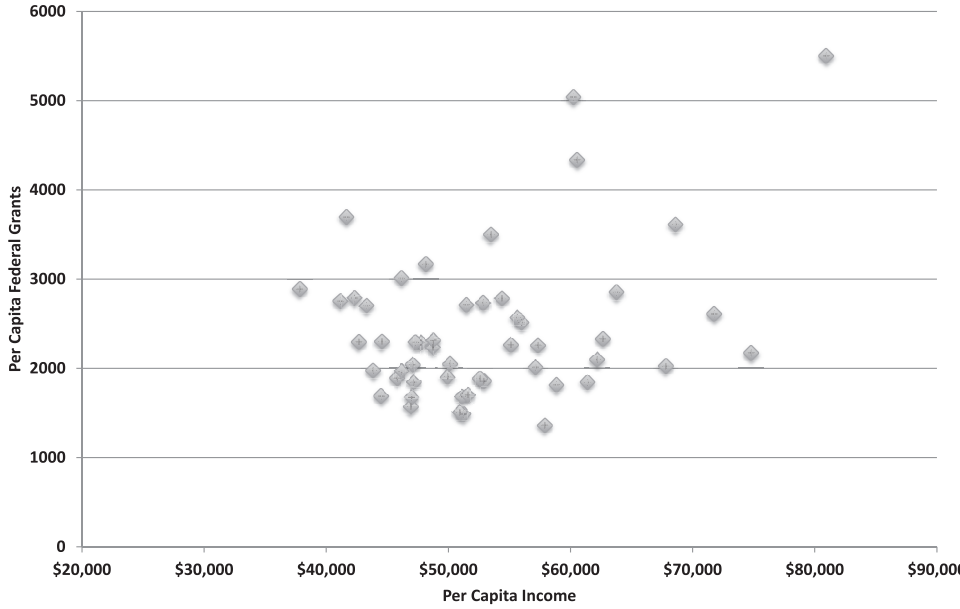


Figure 9.7 Relationship between per capita income and per capita grants

factors, he reports "federal aid is almost always inversely related to the level of state income" and that "almost all federal aid is equalizing" (Inman, 1988, 51). If federal grants are intended to redistribute resources among states, then it is not surprising that they do not seem related to spillovers. If the intention is to redistribute resources, then general block grants may make more sense than matching grants.

The state-by-state distribution of federal grants followed the relationship observed by Inman, although somewhat weaker, until recent years following the Great Recession. For FY 2018, the lowest-income state, Mississippi, received per capita federal grants of $2,888 compared to $2,173 for the highest-income state, Connecticut, consistent with the past pattern. Virginia had the lowest amount of per capita grants and a per capita income that was 6 percent above the national average. However, the state with the largest per capita grant (excluding Alaska) is Wyoming, with a per capita income 11 percent above the national average. Regression of the log of per capita grants on the log of per capita income for 2018 shows no statistically significant relationship – even less when excluding Alaska, the District of Columbia, and Wyoming (all high outliers). The lack of a clear negative relationship between per capita income and per capita federal grants is shown by the scatter diagram in Figure 9.7. This is a change from the negative and significant relationship seen for years before the Great Recession.

Application 9.1: Using state and local governments in recession response

The Great Recession began formally in December 2007 and ended officially in June 2009, but the economic difficulties began before the official recession and persisted well after recovery began. Precipitated by a housing market decline that began in 2006 and the resulting

financial market crisis in 2007, the US unemployment rate began to rise in November 2007 and peaked at 10 percent in October 2009. In addition to the increase in unemployment, the crisis and recession involved substantial decreases in housing and investment values and declines in national and personal incomes.

As the seriousness of the COVID-19 pandemic became apparent in March 2020, changes in individual behavior and government restrictions to reduce illness began to affect the economy. The unemployment rate began to increase in March and peaked at 14.7 percent in April 2020. A number of businesses and schools were closed or operated in a limited way, and a number of workers were laid off, furloughed, had their wages reduced, or changed to a remote work model. In the case of both recent national recessions, a number of steps were taken in an attempt to counter the economic difficulties, including providing new or increased federal grants to state and local governments.

Continuing worsening economic conditions during the Great Recession induced the Obama administration to propose and Congress to adopt the American Recovery and Reinvestment Act (ARRA) in February 2009. ARRA eventually included about $840 billion of federal fiscal stimulus with the goals of spurring economic activity, improving employment, and increasing investment. A major portion of the fiscal stimulus provided through ARRA was accomplished by providing grants and other financial support to state and local governments. The US Government Accountability Office estimates that more than $270 billion of ARRA funds were paid to state and local governments through early 2014. The major provisions affecting state and local governments directly included (1) expanded payments to state governments to fund Medicaid, mostly by increasing the federal government's matching rate ($87 billion); (2) general lump-sum grants from the State Fiscal Stabilization Fund, mostly intended to support education but also available for other high-priority needs ($53.6 billion); (3) increased grants from the Department of Transportation for highways and public transportation investment ($48 billion); (4) the opportunity to issue Build America Bonds, which provided additional opportunities for state and local governments to borrow funds with a direct federal subsidy (discussed in Chapter 10); and (5) a variety of other grants for specific purposes.[9]

In March 2021, the American Rescue Plan was adopted, providing $1.9 trillion in a variety of economic assistance components.[10] As noted in the *Headlines* at the start of this chapter, $350 billion of the total was for grants to state and local governments. Two characteristics of this support seem especially important, in terms of both policy and economic theory. The grants were quite general, with few categorical restrictions. Funds could be used to offset revenue declines, to cover public health costs from COVID-19, to respond to general recession effects, or to invest in water, sewer, and broadband infrastructure. This is quite different than ARRA grants, which were mostly categorical for Medicaid, schools, and transportation infrastructure. In addition, at least the state government grants were targeted and based on unemployment, countering a criticism of ARRA.

How effective are these grants to states and localities during recessions? Simulations conducted by the Congressional Budget Office and the Council of Economic Advisers based on estimated values for multipliers from government spending and tax cuts suggest that ARRA contributed to growth in gross domestic product (GDP) and employment. Academic studies of the employment effects of ARRA all have found positive effects on employment, although there is a rather large range of the estimated employment gains. As an illustration, Chodorow-Reich and colleagues (2012) found that the expansion of Medicaid payments to states generated enough additional employment to keep the cost at $26,000 per job. Leduc and Wilson (2017) examined the influence of the highway grant component of ARRA on state highway spending and reported that each dollar of ARRA highway grants resulted in an increase in state highway spending of $.78 to

$.96. Fisher and Wassmer (2014) studied the effect of the component of ARRA funds targeted to public investment and found that the ARRA investment grants were associated with increases in state and local capital spending greater than expected from other federal grants. Chodorow-Reich (2019) reviewed recent empirical studies and concluded a national cross-sectional multiplier from ARRA spending is about 1.7. She estimates that without the government spending component of ARRA "average output would have been lower by at least 1.5 percent of GDP, and average employment lower by 2.63 million jobs during 2009 and 2010."

The ARP is too recent (as of this writing) for similar studies about the economic effects of the state-local grants. However, two issues arise in general concerning using federal grants as a recession response. First, both ARRA and the ARP were implemented well after the economic difficulty started, and it is expected to take some time for states to use the funds to increase spending. Second, Inman (2010) estimated the relationship between state ARRA grants and economic conditions in the state and found that the stimulus grants were unrelated to state unemployment rates and only partly related to state budget deficits. Instead, grants were essentially related to past state spending, especially on Medicaid and highways. Inman suggests that allocating grants disproportionally to states with the greatest fiscal and economic problems might be more appropriate if the objective is to provide economic stimulus for declining states, although such a policy could create negative incentives in the long run. Of course, this is what was done with the ARP.

The response of state and local governments to grants during recessions might not be characteristic of responses to grants in general because the stimulus funds were unanticipated and temporary and because the subnational governments were dealing with nearly unprecedented fiscal difficulty. Therefore, you should examine and interpret future research about the effects of state support in the context of these special circumstances.

International comparison: Grants in major federal nations

Intergovernmental grants are a common feature of almost all nations regardless of their intergovernmental structure, but they are particularly important and potentially more complicated in federal nations, where there are at least three separate levels of government. Despite the widespread use of grants, the magnitude, main purpose, and structure of intergovernmental grants does vary substantially, even among federal nations.

A major study of the structure and finance of subnational governments in 101 countries, which represented 82 percent of world population, was conducted by the OECD and the organization United Cities and Local Government (OECD/UCLG, 2016). Among the counties in the sample are 17 nations identified as federations or what were called "quasi-federations." In federal governments, there are at least three layers of government (federal state, local), with the subnational sector having independent authority. Those countries are Argentina, Australia, Austria, Belgium, Brazil, Canada, Ethiopia, Germany, India, Malaysia, Mexico, Nigeria, the Russian Federation, South Africa, Spain, Switzerland, and the United States.

The other nations in the sample have "unitary governments" in which the local governments do not have independent authority and exist to provide public services that are decided and largely financed by the national government.

The study identified a category of revenue denoted grants (federal to state-local government and state to local government) and subsidies (international transfers, such as from the European Union, the World Bank, the IMF, or similar). "Grants and subsidies" averaged 7.4 percent of GDP in the federal nations. These "grants and subsidies" accounted for 43 percent of subnational government revenue in federal nations and 55 percent in unitary

Table 9.4 Use of grants in four federal nations, 2016

Nation	*Grants as a percentage of GDP*	*Grants as a percentage of subnational government revenue*
Australia	6.8%	44.4%
Canada	8.5	30.2
Germany	5.5	26.6
United States	3.8	22.1

Source: OECD/UCLG, "Subnational Governments Around the World: Structure and Finance," 2016

countries. Transfers are even more important in unitary nations where local governments often have little revenue authority.

Among four large federal nations, the magnitude of intergovernmental grants is a bit greater in Australia and Canada than in Germany and the United States, as shown in Table 9.4. Total spending for grants is a larger share of the economy in those nations, and grants provide a larger share of revenue for state and local governments there, on average. In Australia, states are the main providers of direct services but have limited tax authority; thus, they are dependent on federal government grants for a large portion of their revenue. In Canada, local governments provide a number of social services that are selected and mandated by the provinces (states), which are then funded by provincial grants to localities. In the United States, the dominant grants received by state governments from the federal government are for health care, and the dominant state grants to local governments are to school districts for K–12 education.

Substantial differences in the purposes and structure of grants in these countries also exist. As you have already seen, grants in the United States are mainly categorical grants intended to affect spending in particular service categories. A main purpose of grants in the other three countries, however, is for regional redistribution and equalization, accomplished in large part by broad-purpose revenue-sharing grants. In Canada, the federal government provides general equalization grants to the provinces based on the ability of the state to generate revenue; states receive an equalization grant if their per capita revenue from a fixed average set of tax rates would be less than the national average revenue yield.

Australia has perhaps the most organized and comprehensive system for intergovernmental aid. Under the Intergovernmental Agreement on Federal Financial Relations that took effect in 2009, federal support to the states and territories has three main components. The Commonwealth Grants Commission, an independent authority established by the federal government, recommends a distribution to share federal tax revenue among the states and territories to equalize the ability of those governments to provide a standard set of services, given their costs and local revenue bases. In 2013, these general equalizing transfers represented about 55 percent of the total federal grants in Australia. In addition, specific-purpose federal grants are provided in five broad categories: health care, schools, skills and workforce development, disability services, and affordable housing. Finally, national partnership grants are for narrower, specific projects with performance measurements. Thus, the Australian system includes general lump-sum equalizing grants, lump-sum block grants for selected functions, and smaller categorical grants for specific projects.

Despite substantial regional economic differences in the United States, general grants with an explicit equalizing objective have been relatively unimportant. The federal government operated general revenue sharing for a few years in the mid-1970s and early 1980s, but its magnitude was always very small. Only about half the state governments provided unrestricted revenue-sharing grants to cities and counties in 2007, and most of those were quite

small in magnitude. Thus, the US Advisory Commission on Intergovernmental Relations (ACIR, 1981, p. 97) notes that "fiscal equalization is less accepted as a goal and consequently is pursued to a lesser extent in the United States than in any of the other three federal nations." However, even if regional redistribution or equalization has not been an explicit objective of US grant policy, it is certainly true that redistribution has occurred and perhaps was implicitly intended.

Application 9.2: A new federal revenue sharing program?

Now with states and localities facing substantial budget problems, just as they did during and immediately after the Great Recession, there is renewed interest in some type of continuing automatic stabilizing program to support states. As the US has no federal equalization program, perhaps a renewed general revenue sharing might be considered.

General revenue sharing operated in the US for 15 years. It began in 1972, initially providing grants totaling about $6 billion annually to state and local governments. The funds first were divided among the states by a formula that included population, per capita income, and tax effort, with one-third of a state's funds allocated to the state government and the remaining two-thirds distributed to local governments in that state, again by formula. In 1984 state governments were removed from receiving revenue-sharing grants, and the amount of funds decreased proportionately. The remaining federal revenue-sharing program for local governments expired in 1987.

The $6 billion in revenue sharing funds distributed annually by the federal government in the 1970s represented about 3 percent of total state and local government revenue and was equivalent to about 5 percent of the total taxes collected by those governments.

GRS had two important fiscal characteristics. First, the grants were unrestricted: that is, the funds could be used by states and localities in different ways in different locations based on the greatest local demands. GRS grants were intended to support the fiscal strength of state and local governments rather than stimulating a particular public service. Second, GRS was redistributive among states both because grants to states were allocated partly inversely proportional to per capita income and because the progressive federal income tax essentially was substituted for less progressive state taxes.

Since GRS ended, there has been no recurring federal revenue-sharing grant program providing general-purpose (i.e., unrestricted) formula grants in the United States, although such grant programs are common in other nations, as described in the *International comparison* section.

How might a new federal general revenue sharing program be structured? One characteristic of the original program likely should be continued – the grants should indeed be general or unrestricted, permitting states to use the funds to meet the most pressing public service or fiscal issue specific to each state. However, two other aspects might be changed. First, allocation among the states might be based on unemployment (rather than tax effort) in addition to population and per capita income, so the GRS funds are distributed to states with the highest economic challenges. Second, rather than having a fixed amount of federal funds to be distributed annually, the amount could be set to vary automatically based on national economic conditions. For example, the new GRS might be established to distribute as a baseline an amount equal to 1 percent of total state-local government revenue annually (about $40 billion currently), but with a formula to increase that ratio during national recessions or serious economic difficulty. Having a continuing program in place eliminates the difficulty of creating a timely political response each time a crisis occurs.[11]

As an illustration, if national GDP growth declines on an annual basis, the GRS amount could increase by 1 percent of state and local expenditure for each 1 percent of GDP decline. So if GDP declined by 5 percent, the new GRS program would distribute grants equal to 6 percent of state and local revenue (which would be about $240 billion currently). The specifics of the formula are just illustrative, but the concept seems clear.

The National Association of State Budget Officers reports that essentially all states now have some type of "rainy day" or budget stabilization fund to provide some financial buffer in the case of an economic and fiscal crisis. With these funds, states had saved in aggregate enough in FY 2020 to cover about 8 percent of state general fund spending.[12] A new federal GRS program would effectively augment the state funds with a type of federal "rainy day" umbrella for state and local governments. By helping maintain crucial public services, employment of millions of workers, and business for private firms, the federal "umbrella" would not only protect the economy from a drenching but also perhaps even help shorten the storm.

Summary

Intergovernmental grants, sometimes called grants-in-aid, are transfers of funds from one government to another, most often from a higher-level government in the federal system to a set of lower-level governments.

In 2018, the US federal government transferred nearly $740 billion of aid to state and local governments, which represented about 23 percent of state-local government general revenue or about $.30 for every dollar generated by those governments from their own sources. State governments transferred nearly $543 billion to local governments, which represented about one-third of local government revenue on average. The relative importance of federal grants went through periods of decline, growth, and stability until the federal response to the Great Recession, when federal aid increased to provide nearly 25 percent of state-local government revenue. The real magnitude of state grants continually increased until the recession in 2007, which reduced state revenue and contributed to decreases in state aid.

More than 80 percent of federal aid to states and localities nominally is directed toward the three budget categories of education, income security, and health (including Medicaid), the last representing 60 percent. In contrast, education is the dominant category of state aid to localities, more than half going to local school districts.

Grants may be used to correct for externalities that arise from the structure of subnational governments and thus can improve the efficiency of fiscal decisions. Grants also can be used for explicit redistribution of resources among regions or localities. Grants also have been used as a macroeconomic stabilizing mechanism for the subnational government sector.

An open-ended matching grant is expected to increase government expenditure on the aided service by a greater amount than an equal-size lump-sum grant, where "equal size" is defined to mean a lump-sum grant large enough to allow the government the same expenditure as selected with the matching grant. If the demand for government service is price inelastic, a matching grant will increase expenditure by less than the amount of the grant, thus freeing local funds to be spent in other ways.

A restriction on use of a lump-sum grant will "matter" to the recipient only if intended expenditures on the aided category are less than what the grant will buy. Effort maintenance restrictions are binding only if the grant is larger than the increase in expenditure that would be selected without the grant (which is not observed).

Lump-sum grants cause an increase in government expenditures, usually in the range of a $.25 to $.50 increase in expenditure per dollar of grant. One dollar of lump-sum grant thus provides between $.50 and $.75 for expenditures in other budget areas or for local tax relief.

Economic theory and evidence of the effects of alternative types of intergovernmental grants lead to three major conclusions about grant policy. A matching grant with a matching rate equal to the nonresident share of benefits is best if the objective is to offset the effects of interjurisdictional externalities. General lump-sum grants are a better mechanism than matching grants to redistribute resources among subnational jurisdictions. Categorical lump-sum and closed-ended matching grants generally should be avoided in favor of the other two types.

Appendix: Indifference curve analysis of grants

One also can demonstrate the effects of different types of grants using the traditional consumer theory tools of indifference curves and budget lines, continuing the presentation in the appendix to Chapter 4. In Figure 9A.1, an individual faces budget constraint *AF* in choosing between governmentally provided good *G* and a composite good *X*, representing consumption on all other goods. The slope of the budget line represents this individual's tax price. At the utility maximizing bundle, this individual consumes G_0 units of good *G* and spends X_0 dollars on all other goods.

If this individual's jurisdiction receives an open-ended matching grant, the tax price is reduced because of the match, so this individual's budget line shifts to *AD*. Each unit of good *G* now costs less in local taxes because of the grant, so this individual can afford more *G*; as more *G* is consumed, the grant increases. At allocation *D*, all this individual's income is being spent on *G*, which is matched with grant funds at the matching rate. The individual's utility maximizing bundle with the matching grant is bundle *C*, involving G_2 units of *G* and X_2 dollars spent on *X*. In this case, the grant has induced an increase in consumption of the aided good *G* and an increase in spending on other goods as well.

Now suppose a lump-sum grant is offered instead of a matching grant, with the lump-sum grant just large enough to allow consumption of the same bundle as selected with the matching grant – that is, bundle *C*. A lump-sum grant equal to *AB* dollars shifts the budget

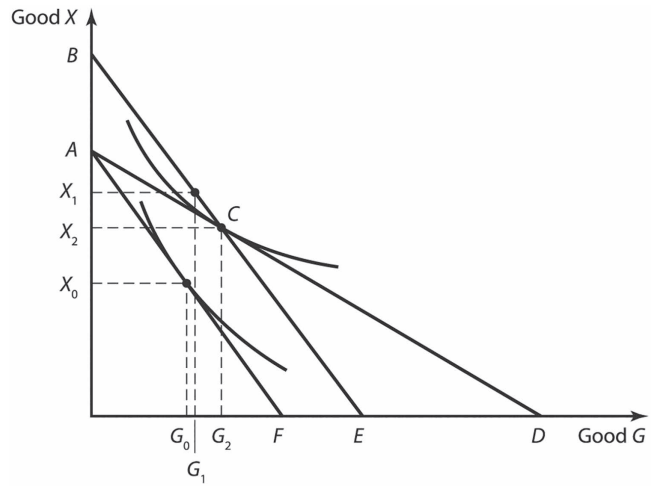


Figure 9A.1 A comparison of matching and lump-sum grants

constraint to *BE*, which goes through bundle *C*. A grant equal to *AB* is just large enough to allow this consumer to select bundle *C*. Because the lump-sum grant does not alter the prices of goods, this new budget line is parallel to the original. Faced with this lump-sum grant and budget line *BE*, this individual's utility maximizing bundle is G_1 and X_1.

The lump-sum grant increases consumption of the government good compared to that with no grant, but the increase in consumption of *G* is smaller with the lump-sum grant than under the matching grant. This occurs, given the usual convex shape of indifference curves, because the bundles on budget line *BE* to the left of bundle *C* provide the consumer higher utility with lower consumption of *G* (but more spending on *X*). The absence of the price reduction on *G* means that fewer resources are allocated to consuming *G*. Therefore, the open-ended matching grant is more effective at increasing consumption of *G* than an equal-size lump-sum grant. The lump-sum grant, however, increases the recipient's utility more because the choice of consumption mix is not distorted by a price change.

Now consider a closed-ended matching grant offered at the same matching rate as before but only applying to the first G_2 units of good *G* purchased with local funds. The budget line facing the consumer is now *ACE*. The matching grant lowers the price up to bundle *C*, which provides the maximum grant. Beyond consumption level G_2, the price of additional units of *G* returns to the original price with no grant. The budget line is thus parallel to the original but shifted out, due to receipt of the maximum grant. If the utility maximizing bundle is less than G_2, the close-ended grant is matching; if it is greater than G_2, the grant is lump-sum. As Figure 9A.1 is drawn, the utility maximizing bundle is at *C*; the consumer takes advantage of the full matching potential of the closed-ended grant.

Discussion questions

1 Because nonresidents benefit from local government public safety services, suppose that the federal government offers localities a matching, categorical grant equal to $1 for $1 of local tax money spent on public safety.

   (a) What is the effect of this grant on the price of spending for public safety to these localities? How might the grant correct for the spillover problem?
   (b) Suppose that Central City currently levies a property tax for public safety at a rate of $10 per $1,000 of taxable value on a base of $10 million of taxable property. If the price elasticity of demand for public safety in Central City is 0.2, calculate and explain the expected effect of the grant on public safety spending, public safety taxes, and tax rates in Central City.

2 Instead of the matching grant in the first problem, suppose Central City received a lump-sum grant of $55,000 that must be spent on public safety. If the total income of Central City residents is $22 million, and the income elasticity of demand for public safety is 0.8, what is the expected effect of this grant on spending and taxes for public safety? Why does the matching grant increase spending more than the lump-sum grant?

3 Suppose that Central City received a lump-sum grant of $55,000 with no restrictions as to how that money must be spent. Do you think the effect spending for public safety would be different than from the specific lump-sum grant in question 2? Why or why not?

4 Periodically, it is proposed that the federal government reduce its role in intergovernmental fiscal relations by eliminating a number of smaller matching intergovernmental grants and simultaneously reducing federal taxes by an equal amount, particularly any that directly finance these grants. This concept is sometimes referred to as "revenue turnbacks," the idea being that individuals will retain the resources and states the option

to tax those resources to continue the programs now financed by the grants. If such a change were made, how do you expect states would respond? Do you expect that state spending on the aided categories could rise or fall if states had to finance that spending from the additional private resources?

Notes

1 www.naco.org/american-rescue-plan-act-funding-breakdown.
2 US Department of the Treasury. FACT SHEET: The American Rescue Plan Will Deliver Immediate Economic Relief to Families, March 18, 2021, https://home.treasury.gov/news/featured-stories/fact-sheet-the-american-rescue-plan-will-deliver-immediate-economic-relief-to-families.
3 These changes in federal grants are discussed in an issue brief by the Pew Charitable Trusts, www.pewtrusts.org/en/research-and-analysis/issue-briefs/2020/02/medicaid-drives-growth-in-federal-grants-to-states.
4 George F. Break, *Intergovernmental Fiscal Relations in the United States* (Washington, DC: Brookings Institution, 1967), 105.
5 Another way to think of the result that arises from this income level and the income elasticity of demand is that $.10 of each additional grant dollar is used to increase government expenditure, so the lump-sum grant of $388.33 increases spending by about $38.83.
6 Shama Gamkhar and Anwar Shah (2007) provide a relatively comprehensive review of the empirical literature, focusing particularly on about 30 specific research papers. They also provide discussion about the research limitations of this type of work.
7 It does appear that demand for state-local welfare expenditures is less price elastic than the demand for state-local services generally.
8 From the budget equation, a $1 increase in Y_i should be precisely equivalent to an increase of $1/t_i$ in G.
9 Other aspects of ARRA that affected state and local governments indirectly included expansion of unemployment insurance payments, the Supplemental Nutrition Assistance Program (SNAP) food stamp program, and earned income tax credits. See Council of Economic Advisers, 2014.
10 This followed the Coronavirus Aid, Relief and Economic Security Act **(**CARES Act) in March 2020, which also provided grants to states and localities, but mostly to cover health costs from COVID.
11 Robert Inman and David Skeel describe a similar option. www.washingtonpost.com/opinions/2020/05/05/heres-fair-approach-calculating-covid-19-specific-aid-states/.
12 *The Fiscal Survey of States*. National Association of State Budget Officers, Washington, DC. Fall 2019.

Selected readings

Break, George. *Financing Government Expenditures in a Federal System*. Washington, DC: Brookings Institution, 1980. See Chapter 3, "The Economics of Intergovernmental Grants," and Chapter 4, "The US Grant System."

Congressional Research Service. "Federal Grants to State and Local Governments: A Historical Perspective on Contemporary Issues." *R40638*, May 22, 2019.

Fisher, Ronald C., and Andrew Bristle. "State Intergovernmental Grant Programs." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert Ebel and John Petersen, 213–245. Oxford, UK: Oxford University Press, 2012.

Gamkhar, Shama, and Anwar Shah. "The Impact of Intergovernmental Fiscal Transfers: A Synthesis of the Conceptual and Empirical Literature." In *Intergovernmental Fiscal Transfers, Principles and Practice*, edited by Robin Boadway and Anwar Shah, 225–258. Washington, DC: World Bank, 2007.

Gramlich, Edward M. "Intergovernmental Grants: A Review of the Empirical Literature." In *The Political Economy of Fiscal Federalism*, edited by Wallace Oates, 219–239. Lexington, MA: Lexington Books, 1977.

Scheppach, Raymond C. "The Intergovernmental Grant System." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert Ebel and John Petersen, 937–957. Oxford: Oxford University Press, 2012.

10 Capital investment, borrowing, and debt

Headlines[1]

ACSE 2021 Report Card for America's Infrastructure

"For the first time in 20 years, our infrastructure GPA is a C-, up from a D+ in 2017. This is good news and an indication we're headed in the right direction, but a lot of work remains.

The 2021 Report Card for America's Infrastructure reveals we've made some incremental progress toward restoring our nation's infrastructure. For the first time in 20 years, our infrastructure is out of the D range. The 2021 grades range from a B in rail to a D- in transit. Five category grades – aviation, drinking water, energy, inland waterways, and ports – went up, while just one category – bridges – went down. And stormwater infrastructure received its first grade: a disappointing D. Overall, eleven category grades were stuck in the D range, a clear signal that our overdue bill on infrastructure is a long way from being paid off.

The most recent analysis reveals that while we've made incremental immediate gains in some of the infrastructure categories, our long-term investment gap continues to grow. We're still just paying about half of our infrastructure bill – and the total investment gap has gone from $2.1 trillion over 10 years to $2.59 trillion over 10 years."

Data availability

This chapter covers capital spending by state and local governments as well as borrowing and the resulting debt. Thus, data about both are of interest.

The Governments Division of the US Census Bureau is the major source of data about expenditure by state and local governments, including capital spending. These

DOI: 10.4324/9781003030645-13

data are reported annually in several different reports. State and aggregate local government spending in various categories is reported annually with a year or two lag (www.census.gov/data/datasets/2018/econ/local/public-use-datasets.html). Capital spending is reported in aggregate and for various specific functions, such as education, transportation, and so on. Data about the magnitude of capital spending by specific types of local governments – counties, municipalities and townships, school and other special districts – are reported in the Census of Governments, which is completed every five years, in years ending in 2 or 7. The Census of Governments is available at www.census.gov/programs-surveys/cog.html.

As noted throughout the book, you may access these data directly from the census or by using the valuable and easy-to-use data tabulation utility maintained by the Urban Institute (https://state-local-finance-data.taxpolicycenter.org//pages.cfm).

Data about borrowing (bond issuance) by state and local governments are available from both the Census Bureau and private organization that monitor financial markets. Census data about bond issuance of various types are available in the sources noted earlier. Information about state and local government borrowing also is available from *The Bond Buyer* (www.bondbuyer.com/broker/bond-buyer-data) and from SIFMA, the Securities Industry and Financial Markets Association (www.sifma.org/resources/research/us-municipal-bonds-statistics/). For *The Bond Buyer*, you can set up a trial account or purchase a subscription. The borrowing data reported by the census and by the market organizations are measured and defined differently, so knowing those definitions is crucial.

Data about the financial debt of state and local governments are reported by the Census Bureau in the sources noted earlier. Information about long-term debt outstanding is provided in aggregate and for various service functional categories.

Capital investment[2]

Magnitude of capital investment

State and local government capital expenditure includes expenditure for construction of buildings and improvements ("production, additions, replacements, or major structural alterations to fixed works"); for purchase of land, equipment, and structures; and for capital leases, as defined by the Governments Division of the Census Bureau. Thus, this annual capital outlay creates the infrastructure discussed in *Headlines*. All this includes schools and public universities, roads and bridges, public transit systems and airports, water and sewer systems, public hospitals, parks and recreation facilities, waste collection equipment, corrections facilities, and general government buildings, among much more.

In FY 2019, state and local governments spent nearly $410 billion or $1,225 per person on capital expenditure. This amount represents about 2.1 percent of personal income, 1.9 percent of GDP, 10 percent of total state-local expenditure, and 12 percent of outstanding long-term debt. Local governments account for nearly two-thirds of subnational capital spending (64 percent), with capital spending representing about 12.3 percent of local government expenditure but only 5.6 percent of state government expenditure.

From 2000 to the end of the Great Recession in 2009, state and local government capital spending was increasing in both nominal and real terms. However, in the years following the

Great Recession, capital spending declined substantially, only beginning to increase again in 2015. The real level of capital spending did not return to prerecession levels until 2017. Importantly, however, these aggregate spending amounts mask declines in real and relative value. State-local capital spending was 2.3 percent of GDP in 2007 but only 1.9 percent in 2019, as shown in Figure 10.1. Capital spending averaged 2.2 percent of GDP in the years before the Great Recession, but only 1.9 percent since. Such a decline amounts to a decrease of about $62 billion in capital spending annually. Adjusting for changes in population and prices, real per capita state-local capital spending (in 2018 dollars) declined from $1,308 in 2007 to $1,225 in 2019. Although capital spending relative to GDP and to population and prices has increased recently, both remained well below the amounts in the pre-recession period.

The pattern shown in Figure 10.1 suggests that state-local capital expenditure increases during national recessions – shown by the growth for FY 2002 and FYs 2008 and 2009. This suggests that state and local governments maintain a consistent pattern of capital expenditure rather than altering amounts wildly from year to year, although capital spending seems to increase around national recessions (at least recently). Part of the apparent increase during a recession happens because GDP falls, but increased federal aid during the recessions often is targeted to infrastructure.

Public capital investment has declined not only because state and local governments are spending less overall in real terms but also because capital investment has become relatively less important in state-local budgets. State and local governments together were spending about 12.4 percent of their budgets on capital investment in 2000, 12.2 percent in 2007, but only 10.3 percent in 2019. Unlike other measures, this magnitude has not increased in the most recent years. Obviously, this trend, if it continues, has serious potential implications for the quality of public infrastructure in the future.

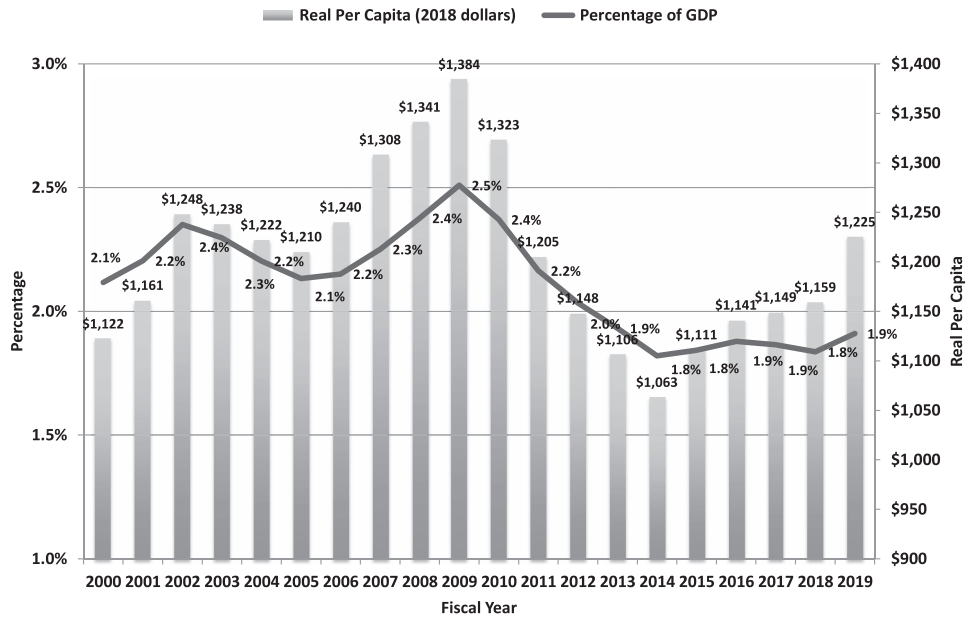


Figure 10.1 State and local government capital outlay

Source: US Census Bureau

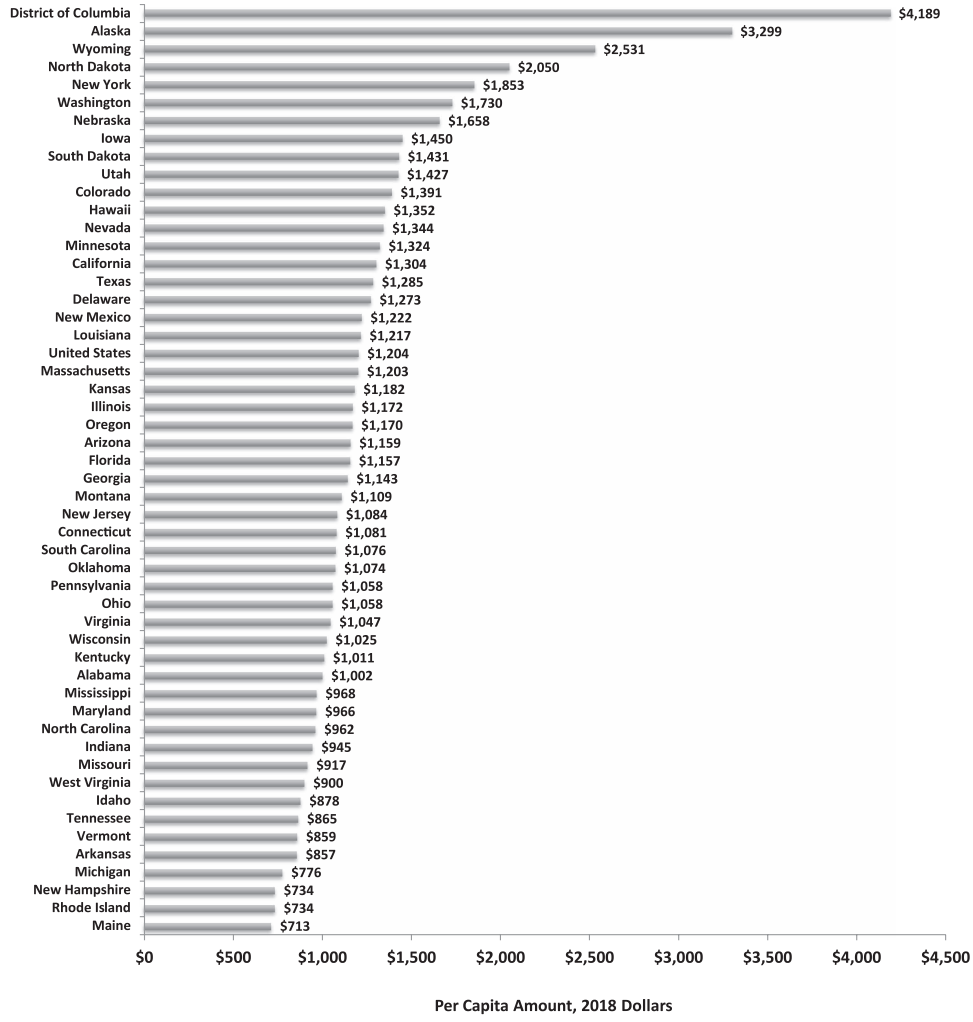


Figure 10.2 Average annual real per capita capital outlay, 2000–2018

Source: US Census Bureau

The magnitude of capital expenditure differs substantially among the states. Because of the "lumpy" nature of capital spending, it could be deceiving to examine interstate differences for a single year or short period. Therefore, interstate differences in capital expenditure are measured over the period 2000 through 2018 by the average annual real per capita amount for those years, shown in Figure 10.2. The District of Columbia ($4,189), Alaska ($3,299), and Wyoming ($2,531) are clear outliers by this measure, all with spending substantially greater than the US average for all states of $1,204. Ignoring these three cases, average real per capita spending still varies from $2,050 (North Dakota) to $713 (Maine). The pattern is quite varied, although a number of Plains states are among those with relatively high spending, whereas the New England states are concentrated in the low spending group.[3]

States also differ substantially in the relative importance of capital expenditure in budgets. For example, in 2018 state-local capital spending varied from 17.8 percent of total state-local

expenditure (in North Dakota) to 5.9 percent (in Rhode Island), with a US average of 19.9 percent. The capital share of total expenditure reflects the choice for a more capital-intensive public sector. New York, for example, has relatively high capital spending, but the capital-spending share of total expenditure is average. The level of capital spending is high in New York simply because total expenditure is relatively high, but New York is not investing in capital disproportionate to overall spending. In contrast, the amount of capital spending in Oklahoma is relatively low compared to other states, although capital spending as a share of the budget in Oklahoma is above average.

Composition of capital investment

Spending on projects related to highways, education, and utilities represents the bulk of state-local government capital expenditure, as shown in Figure 10.3. The utilities category includes capital spending for water systems and public transit systems. Thus, state-local capital expenditure primarily goes to support the infrastructure for highways, K–12 schools, public colleges and universities, public transit, and water and sewer systems.

Substantial differences exist between state and local governments in types of capital spending. For state governments, the categories of highways and higher education account for more than 75 percent of capital spending, as shown in Table 10.1. Among local governments, elementary and secondary education (about 28 percent) and utilities (water and transit, about 18 percent) are the largest categories of capital spending. Local governments also spend on highway infrastructure, but to a much smaller degree than states. The composition of state and local capital spending has been relatively stable over time, with a few exceptions. Capital expenditure for higher education has increased substantially faster than the total, whereas state capital spending for corrections (essentially prison construction) has declined. The share for highway investment has remained essentially unchanged. At the

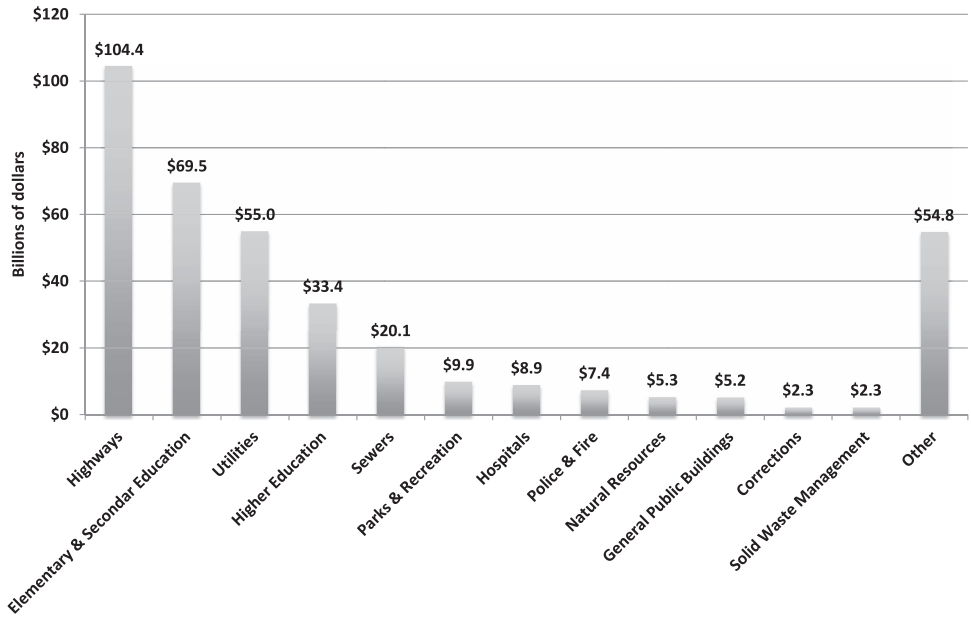


Figure 10.3 State-local capital expenditure by category, 2018

Table 10.1 Major categories of state government and local government capital expenditure, 2018

State governments	*Local governments*
Total capital expenditure = $135.3 billion	Total capital expenditure = $243.2 billion
Highways ($75.5; 55.5%)	Elementary & secondary education ($68.7; 28.2%)
Higher education ($29.0; 21.4%)	Utilities ($44.9; 18.5%)
Utilities ($10.0; 7.4%)	Highways ($29.2; 12.0%)
Hospitals ($3.7; 2.8%)	Sewers ($20.0; 8.2%)
	Parks & recreation ($9.0; 3.7%)
	Police & fire ($6.5; 2.7%)
	Hospitals ($5.2; 2.1%)

Source: US Census Bureau

local government level, the major changes have been a decreased share in capital spending for elementary and secondary education and an increased share of capital spending by public utilities.

Paying for capital investment: Borrowing

The economic importance of the public capital infrastructure and the magnitude of state-local capital spending necessary to develop and maintain that infrastructure creates a revenue need. As Harvey Galper and John Petersen note, "Raising sufficient long-term funds to finance their desired volume of capital outlays is an important part of the fiscal problem of state and local governments."[4] So, how to do that?

Why do state and local governments borrow?

The key economic characteristic of capital goods is that a relatively large initial expenditure is required to provide facilities that then generate benefits over a number of years. State-local governments finance capital purchases using several methods, either by building up a reserve of funds from taxes over several years ("pay-as-you-go") or by borrowing the funds to be repaid with interest from taxes in future years ("pay-as-you-use") or some combination of the two. "Pay-as-you-use" finance recognizes both the irregular nature of capital expenditures and the fact that those who will benefit from the capital facility are the future residents of the jurisdiction. By borrowing the cash for the facility now but effectively paying for the facility with future taxes or fees, those who receive the services from the facility will be paying for them. But "pay-as-you-use" finance is criticized sometimes as creating an incentive for overcapitalization by subnational governments if the individual voters who approve projects do not perceive their future costs. Such an incentive may be larger in jurisdictions where a greater fraction of the voters are temporary residents.

Whichever finance method is used, state and local governments must allocate revenue to the investment. "Pay-as-you-go" finance requires current revenue, whereas "pay-as-you-use" finance requires allocation of future revenue. Traditionally, three sources of revenue have been applied to financed capital expenditures: federal grants, tax revenue, and user fees that may be associated with the infrastructure (highway tolls or parking garage fees, for example). Although expenditures for individual capital projects clearly are "lumpy," many governments do tend to make some capital expenditures annually, if only for maintaining the existing capital stock. Therefore, spending on capital goods is smoother from year to year than one might expect, and some fraction of annual revenues can be spent on capital goods each year.

In addition to financing capital projects such as schools, roads, water and sewer systems, or public facilities, state and local governments also may borrow money to support and subsidize private activities, such as private home mortgages, student loans, and industrial or commercial development, and to provide cash flow for short-term spending or for special projects. In addition, state-local governments may borrow new funds to pay off old debt sooner if interest rates fall (called "refinancing" or "refunding"). In that case, the government is merely replacing one debt with another lower-cost one. In contrast to the federal government, state constitutions or laws often prohibit state-local governments from borrowing to finance deficits in operating budgets.

In recent years, borrowing to subsidize investment by private individuals and firms has become the second major component of state-local borrowing and, in some cases, the leading component. These **private-activity tax-exempt bonds** effectively allow state-local governments to transfer their tax-exempt borrowing authority to private individuals and firms for activities that would otherwise be financed through taxable debt. State-local governments face lower interest rates on borrowed funds than do private individuals and businesses (because the interest income to investors in state-local bonds is not taxed by the federal government, as discussed later in this chapter). Therefore, state-local governments can borrow at relatively low interest rates and then loan those funds to businesses and individuals at the same or slightly higher interest rates, but still lower rates than those private investors face alone. Examples include borrowing for subsidized mortgage and student loan programs, waste treatment facilities, industrial or commercial development loans, and financing sports facilities. This type of borrowing has been facilitated by the proliferation of various state government financing authorities and local economic development corporations, agencies that often carry out this private-activity state-local borrowing. In the case of industrial development bonds, for instance, the funds from the bond sale may be used to help finance construction of a new shopping center or expansion by a manufacturer. The shopping center developer and the manufacturing firm effectively will pay the interest and principal on those bonds, although the funds may be paid through a development authority.

The third primary reason for state-local government borrowing is to even out cash flow between the periods when the governments receive revenue or to correct a short-term budget shortfall as a result of an error in revenue forecasting. State-local governments typically do not receive revenue uniformly over the fiscal year; rather, receipts tend to be concentrated at particular times of the year. Local governments usually collect property taxes only once or twice a year, and those times may not correspond to the start of the localities' fiscal year when spending begins. Although most state government taxes are collected monthly or quarterly (through income withholding, for instance), that pattern of receipts may not match the pattern of state spending. Some states, for instance, make intergovernmental aid payments to localities at the beginning of the state's fiscal year.

Therefore, if a state or local government wants to spend revenue in a fiscal year before that revenue is received, they may borrow for a short period against that revenue to be received later. Similarly, a government might borrow in one fiscal year to cover a revenue shortfall, with the funds made up in the next year. Borrowing for cash-flow purposes is typically for only a three- or six-month period. It is important to understand that this type of borrowing is not to finance deficits on a permanent basis. The budget is balanced, over a one- or two-year cycle, and it is just that the revenue and spending do not occur at the same times in that period. A parallel in personal finance may be the use of bank credit cards to make purchases that are then fully paid at the end of the month when the individual receives a salary payment. The individual is not spending more than is earned but is borrowing to spend before the income is received.

How do state and local governments borrow?

State-local governments borrow money by selling bonds. A **bond** is a financial agreement or promise between a borrower and a lender (sometimes called an "investor"). The lender buys the bond from the borrower now, providing funds to the borrower. In exchange, the lender receives a promise from the borrower to pay a fixed amount of money (or interest rate) per year for a fixed period and to repay the original amount at a future date. For instance, a state or local government might sell a bond with a face value of $10,000 that carries with it annual payments of $500 for 20 years, at which time the loan is repaid. If a lender (investor) pays $10,000 for such a bond, then the lender earns a 5 percent annual return ($500/$10,000 = .05), and the state or local government pays a 5 percent interest cost on borrowing. If the bond sells for less than $10,000, then the investor earns a higher rate of return, and the borrowing government faces higher borrowing costs. For instance, if the bond sells for $9090.91, the effective interest rate is approximately 5.5[5] percent ($500/$9090.91 =. 055).[1]

Different types of state-local government bonds correspond to the different reasons state and local governments borrow. The great majority of bonds issued, and thus the great bulk of state-local government debt, is **long-term debt**, which carries a repayment period of more than a year – typically 10, 20, or even 30 years. Long-term debt historically has accounted for more than 90 percent of state-local debt. Long-term debt is used for nearly every purpose except cash-flow borrowing, which by nature is short-term debt. Long-term borrowing is particularly appropriate in financing capital projects on a "pay-as-you-use" basis because the term of the loan can correspond to the expected life of the asset.

Long-term state-local government bonds are of two types. **General obligation (GO) bonds** pledge the **full faith and credit** of the issuing government as security. This means that the issuing government must use funds from any available source to pay the interest and repay the principal to the investors. The government may use revenue from any tax or charges to repay the debt, and if existing revenue sources are not sufficient for that purpose, then the government pledges to raise taxes or charges to generate the necessary funds. If for some reason a state or local government is unable or unwilling to generate sufficient funds to repay the bondholders, then the government is said to **default** on the bonds. In that case, the government is effectively in bankruptcy, and the bondholders may go to court to seize the assets of the government or agency.

The second type of long-term bond is called a **revenue** or **nonguaranteed bond**. With revenue bonds, the revenues from a particular source are pledged to pay the interest and repay the principal to the investors. If the revenues from that particular source are not sufficient to pay the interest or principal fully, then the bondholders suffer the loss. In general, therefore, revenue bonds are more risky investments than GO bonds from the point of view of investors. As an example, a state or a state transportation agency might issue revenue bonds to finance the building of a bridge, pledging the revenues from bridge tolls to repay the investors. If the actual amount of bridge use is less than forecast and if the difference cannot be made up with higher tolls, the bondholders may suffer a loss. As another example, a state university might issue revenue bonds to build residence halls, pledging the room charges of the students to repay the loan. The security or risk of those bonds depends on the success of the university in filling those residences. (Note that this may be one reason why some colleges and universities require students of particular ages or classes to live on campus.)

Private-purpose tax-exempt bonds are typically revenue bonds, called **private-activity bonds**, with the bondholders to be repaid from proceeds of the underlying private activity. For example, a state government authority might sell revenue bonds and use the proceeds to make home mortgage loans to lower-income families. In that case, the bondholders will be

repaid from the mortgage payments made by the individual homeowners or perhaps from the sale of properties that are mortgaged. Obviously, the security of these bonds depends on the economic conditions of the homeowners and the housing market. If too many individuals do not make their mortgage payments or the value of housing falls, then there may be insufficient revenue to repay the bondholders. The largest categories of these bonds are for small-issue industrial development, which are bonds sold by subnational governments or their development authorities, such as economic development corporations (EDCs), with the funds to support private investment in the subnational jurisdiction; mortgage revenue bonds to provide mortgage loans to individuals for owner-occupied housing; bonds for investment by nonprofit organizations, such as hospitals and educational institutions; and bonds for higher-education student loans, construction of rental housing (particularly for lower-income individuals), and solid waste disposal (Kenyon, 1991, 83). In essence the security of these private-activity revenue bonds depends on the economic success of the private individuals or firms that are subsidized.

It also is useful to understand the procedural details involved in selling state-local government bonds. First, the issuing government will employ the services of a number of intermediaries in the process of selling bonds. These include **bond counsel** (attorneys), who examine the legality of the issue, assure the prospective investors that the government has taken all required and appropriate legal steps in order to sell the bonds, and work to ensure that the interest will be exempt from federal income tax; a **financial advisor and underwriter** (which may be the same or different firms), who advise on the structure of the bonds, prepare the necessary financial documents, and market the bonds to investors. Second, state-local government bonds are usually given a **credit rating** by at least one of the two private rating firms, Moody's Investor Service or Standard & Poor's. The credit rating (denoted AAA, AA, A, BBB, and so forth) is intended to provide information to potential investors about the perceived risk of the bonds and thus depends on both the economic and fiscal health of the issuing government and the specific purpose or project for the borrowed funds.[6]

Finally, there is generally an active market for existing state-local tax-exempt bonds, through mutual funds if no other way. This means that some investors may be able to sell state-local government bonds to other investors, thereby receiving return of the principal before the term of the bond is up. Of course, the price for which owners may sell the bonds will depend on the annual interest payment, current market interest rates, and the remaining term of the bond. In some cases, the issuing government may repurchase the bonds before the planned term. In that instance, it is said that the bonds have a **call provision**, or that they have been called, meaning that the seller may repurchase the bonds at a predetermined maximum price. An issuing government may wish to repurchase the bonds to pay off the debt ahead of time to avoid future interest costs or to refinance the debt if interest rates have declined.

Borrowing magnitudes and trends

In calendar year 2020, state and local governments issued about $531 billion of short-term notes and long-term bonds, according to data reported by *The Bond Buyer* and shown in Figure 10.4. Long-term borrowing of nearly $485 billion accounted for 91 percent of this total. State-local borrowing in 2009 and 2010 was unusually high as states and localities reacted to circumstances resulting from the recession, including historically low interest rates and the special, subsidized borrowing opportunity provided by the federal government. In real (inflation-adjusted) terms, borrowing declined after the Great Recession and remains well below prerecession levels.

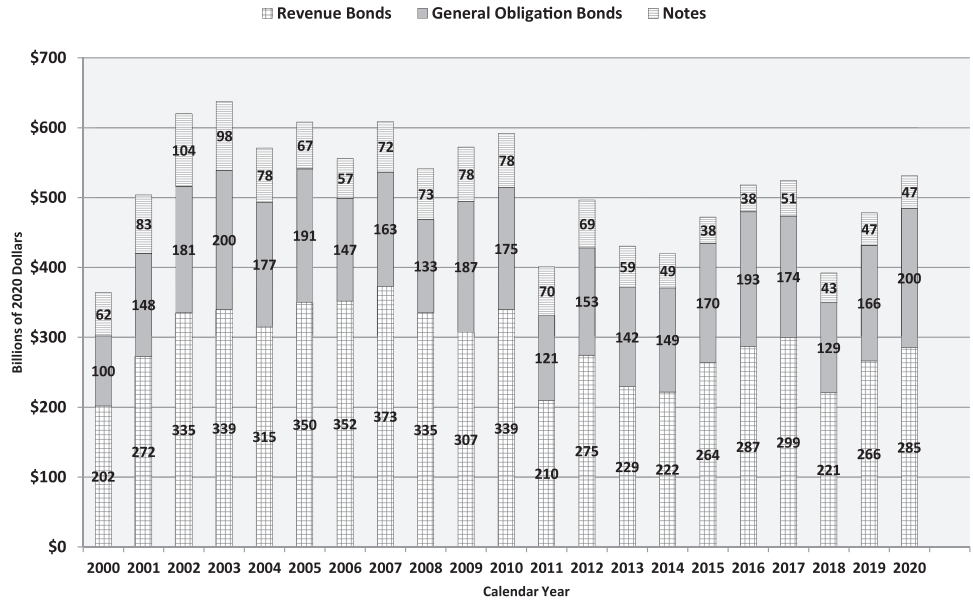


Figure 10.4 Real state-local government bond issues, by type and year

Source: The Bond Buyer

The US Census Bureau also reports data about state and local government borrowing, although it does so for fiscal years and measures it differently than the data reported by *The Bond Buyer*. The census reveals that state and local governments issued $395.5 billion of long-term bonds for FY 2017–2018 (in nominal amount).[7] By either measure, state and local government annual borrowing is substantial, typically between $400 and $500 billion recently. Based on the census data, over the past ten years, state governments issued about 40 percent of long-term bonds and local governments about 60 percent.

Beginning around 1970, use of nonguaranteed or revenue bonds increased substantially as states expanded the purposes for which they borrow into what traditionally had been thought of as private purposes or private activities. About 59 percent of long-term bonds issued in 2020 were revenue bonds, as shown in Figure 10.4. Since 1990, revenue bonds have accounted for between 60 and 70 percent of new long-term issues. In contrast, in the 1950s, 1960s, and 1970s, more than half of state-local debt was for general obligation or full faith and credit bonds. In addition to financing more private activities, this shift toward revenue bonds also may have arisen because state-local governments typically face more restrictions in issuing GO than revenue debt, including state debt limits and often a requirement of voter approval to issue new GO bonds.

The magnitude of state and local government borrowing does not correspond directly with state-local capital investment, as noted previously. First, a substantial part of state-local borrowing in many years is "refunding": that is, issuing new debt at a lower interest rate to replace old debt. Except for the interest cost savings, borrowing to refund debt does not generate additional revenue for capital investment.[8] Since the Great Recession, the share of new long-term borrowing that was for refunding has varied between 20 and 40 percent annually. Second, some state-local borrowing is done to support private activities. Such

borrowing does not support investment in public infrastructure. Private activity bonds are discussed later in the chapter. Third, some states are permitted to borrow for purposes that are not capital investment. For example, some states have borrowed to pay for future pension obligations. Finally, as we have learned, states and localities may finance capital investment directly from current or past tax revenue and federal grants.

Tax exemption for state and local bond interest

The fundamental economic characteristic of state-local government bonds and some private-activity bonds issued by states and localities is that the federal government does not tax the interest income received by investors, either via individual or corporate income taxes. States may tax that interest income, however. Typically, states exempt the interest income paid to residents from bonds issued by that state or its localities but not from bonds issued by other states. Similarly, state income taxes exempt interest income on federal government bonds. Accordingly, state-local government bonds are a type of tax-favored investment for lenders.

The federal tax exemption of state-local bond interest dates from the first federal income tax act of 1913. For many years, some argued that the federal government did not have the constitutional authority to impose a tax on the income from state-local government securities. Beginning with the case of *McCulloch v. Maryland* in 1819, the United States Supreme Court established the doctrine of "reciprocal immunity," holding that both the states and the federal government are immune from tax interference with the other. However, the 16th Amendment to the Constitution established the right of the federal government to collect direct taxes on income "from whatever source derived." The constitutional issue was whether the 16th Amendment gives the federal government authority to tax state-local bond interest. In *South Carolina v. Baker* (1988), the Supreme Court ruled that the federal government does have the authority to tax state-local bond interest. The federal government's decision to exempt certain state and local government bond interest from income taxation, then, is an explicit decision to subsidize those investments.

The primary economic effect of the tax exemption is to allow lower interest rates for state-local bonds than similar taxable bonds. As a result, the tax exemption subsidizes both state and local governments through lower borrowing costs and investors in state-local bonds through higher net or after-tax returns. These effects of the tax exemption are demonstrated in Table 10.2. In this example, a state-local bond with a face value of $10,000 that carries an interest rate (coupon rate) of 3 percent is compared to a corporate bond of the same risk and maturity but paying an 5 percent interest rate. An investor in the nontaxable state-local bond would receive a $300 interest payment annually on which no federal income tax would

Table 10.2 Effect of the tax exemption for state-local bonds on different investors' $10,000 face value bond

Marginal tax rate	*Tax exempt state-local bond – 3% interest rate*			*Taxable corporate bond – 4% interest rate*		
	Annual interest	*Tax*	*Net return*	*Annual interest*	*Tax*	*Net return*
.12	$300	0	3%	$400	$48	3.52%
.22	300	0	3	400	88	3.12
.25	300	0	3	400	100	3.0
.32	300	0	3	400	128	2.72
.35	300	0	3	400	140	2.4
.50	300	0	3	400	200	2.0

be owed and no state income tax if the bond were issued in that state. Therefore, the net or after-tax return to an investor who pays $10,000 for the bond is 3 percent ($300/$10,000).

An investor who buys the taxable corporate bond, in contrast, receives an annual interest payment of $400 and pays federal and state income tax on that amount. The amount of tax to be paid depends on the investor's **marginal income tax rate**: that is, the investor's tax bracket. A taxpayer with a 12 percent marginal tax rate therefore would owe $48 of tax on the $400 of interest income. That taxpayer's net or after-tax return is $352, or 3.52 percent ($352/$10,000). With a 22 percent marginal tax rate, the net return is $312, or 3.12 percent. A taxpayer with a 32 percent tax rate, however, receives only a 2.72 percent net return from the taxable bond (tax equals $128, so the net return is $272). If t = the marginal tax rate and r = the nominal interest rate on the taxable bond, then the net return to an investor in a taxable bond is equal to $(1 - t)r$. Thus, an investor with a 50 percent marginal tax rate earns a net after-tax return of 2 percent by investing in an 4 percent taxable bond.

As shown in Table 10.2, taxpayers with marginal tax rates above 25 percent earn higher net returns by investing in the 3 percent tax-exempt state-local bond than in the 4 percent taxable corporate bond. Taxpayers with a marginal tax rate of 25 percent get exactly the same net return – 3 percent – from either investment. Those with marginal tax rates of less than 25 percent earn higher net returns by investing in the taxable bonds and paying the required income tax. The marginal income tax rate at which an investor gets the same return from both a taxable and nontaxable bond is equal to the percentage difference between the interest rates on the taxable and tax-exempt bonds. Mathematically, this relationship is

$$t^{\star} = (r - s)/r$$

where
$t^{\star}$ = tax rate at which an investor is indifferent between a taxable and tax-exempt bond
r = taxable-bond interest rate
s = tax-exempt bond interest rate.

This is why state-local government bonds can carry lower interest rates than comparable private sector or US government bonds. The yields on the tax-exempt state-local bonds are generally lower than those on taxable corporate bonds, although the yield differential varies from year to year with supply-and-demand conditions for the specific securities. From 2000 to 2019, the annual yield on long-term state-local government bonds averaged 4.2 percent, the yield on AAA-rated corporate bonds averaged 5.0 percent, and the yield on 30-year US Treasury bonds averaged 3.93 percent, The yield differential between taxable corporate bonds and tax-exempt bonds averaged around 20 percent until the Great Recession, but has been only about 12 percent since. This is less than in the 1960s and 1970s when the differential was between 20 and 30 percent. This change resulted partly from the reduction in federal marginal income tax rates.

The yield differential between tax-exempt state-local bonds and taxable US Treasury bonds is generally smaller than that between state-local and corporate bonds, reflecting the perceived lower risk of the US government bonds compared to corporate securities. The yield differential between state-local and treasury bonds is also substantially more variable than that between the state-local and corporate bonds, partly reflecting macroeconomic action by the Federal Reserve to alter treasury bond rates. In some recent years, the rates on taxable treasury bonds have been lower than those for nontaxable state-local bonds, the opposite of what one would expect. The Federal Reserve has kept interest rates unusually low as a stimulus to economic recovery, and the continuing fiscal problems of states and localities have brought uncertainty to the state-local bond market.

The perceived default risk of these various bonds influences their relative yields. Treasury bonds are believed to be the least risky in this regard, but the relative risk of state-local as compared to corporate bonds as a group is not clear. The state or local government's credit rating, which depends in large measure on the economic and fiscal conditions in that jurisdiction, determines the actual rate paid by that government, and defaults occasionally do occur with state-local bonds, as happened in the case of the Washington (State) Public Power System in the mid-1990s and some municipal bankruptcies (such as Detroit and Stockton, California). Of course, corporate bonds are similarly rated based on the economic health of the firm, and corporate defaults and bankruptcies also occur. Perhaps the most accurate characterization is that the degree of default risk varies greatly for both state-local and corporate bonds and is reflected by yield differentials within each category of bond.

Nature of investors

Investors in stocks, bonds, and other ventures seek the highest after-tax return for any given amount of risk. Thus, an investor will find tax-exempt state-local government bonds attractive financially if the investor's marginal income tax rate is greater than the percentage difference in the effective interest rate on the tax-exempt bonds compared to that on alternative taxable securities. In the illustration in Table 10.2 with a tax-exempt interest rate of 3 percent and a taxable interest rate of 4 percent, investors with marginal tax rates greater than 25 percent would get a higher net return from the tax-exempt bond. Such individuals and firms are, therefore, expected to be the suppliers of funds (buyers of bonds) to state-local governments.

Historically, state-local government bonds have been purchased almost entirely by three distinct groups: individuals (both directly and through mutual funds), commercial banks, and property and casualty insurance companies. Since 2000, on average, individuals have owned (bought) about 46 percent of outstanding bonds and another 28 percent through mutual funds. Insurance companies account for about 13 percent of the outstanding bonds and banks for about 10 percent.

Individual investors in state-local bonds come mostly from higher-income households for two reasons. First, when yield differentials were in the range of 30 percent, investors must have had relatively high marginal federal income-tax rates, generally in the 30 to 40 percent range, in order for yields on tax-exempt bonds to be attractive. Second, state-local bonds are sold in relatively large denominations (usually at least $10,000), which historically restricted the set of purchasers to individuals willing to invest at least those amounts. In recent years, this constraint has been eased by the proliferation of tax-exempt bond mutual funds in which a financial intermediary buys the bonds and sells shares in a fund comprised of many different bonds for relatively small amounts. In addition to opening up the tax-exempt bond market to more individual investors, this method also reduces the risk to individuals by increasing the diversity of holdings and makes it easier for individuals to convert bonds into cash before maturity. The recent lower yield differential and the availability and liquidity of tax-exempt mutual funds have increased the attractiveness of state-local bonds to a wider set of individuals.

Analysis of the behavior of banks and insurance companies as investors in state-local bonds is more complicated than that of individuals for several institutional reasons. Commercial banks borrow funds at taxable interest rates, for instance by taking deposits from individuals and selling certificates of deposit (CDs). Until 1987, commercial banks were allowed to deduct these interest costs paid on deposits against their federal corporate income tax, even if the funds were used to buy tax-exempt state-local bonds. As part of the Tax Reform Act of 1986, banks were no longer allowed to deduct interest cost on deposits when the

funds were used to purchase tax-exempt bonds. This reduced banks' interest in holding tax-exempt bonds, and the ownership share of banks declined. Commercial banks do continue to purchase and hold some tax-exempt bonds due to the banks' own tax liability (which can be reduced by earning tax-exempt interest) and as investments matched to some savings deposits that earn very low interest rates for depositors.

Efficiency of the tax exemption

The tax exemption for interest on state-local government bonds is an inefficient subsidy for subnational government borrowing costs. The tax exemption costs the federal government more than $1 of tax revenue for each $1 of interest cost saved by state-local governments. This inefficiency is demonstrated in Table 10.3, in which the interest-cost saving to the state or local government from tax-exempt borrowing is compared to the federal income tax saving of investors. The latter is, of course, also the tax revenue loss to the federal government.

The example in Table 10.3 again concerns a $10,000 bond with a 3 percent interest rate for tax-exempt securities and a 4 percent rate for taxable ones. For each bond sold, the issuing state or local government saves $100 of interest cost per year. The federal tax saving to an investor from the tax-exempt compared to the taxable bond depends on the investor's federal marginal income tax rate. The tax savings is $400 (the interest payment) multiplied by the tax rate, or $128 for taxpayers in the 32 percent tax rate bracket, $140 for taxpayers with a 35 percent marginal tax rate, and $200 if there was a 50 percent tax rate bracket. Investors in tax-exempt state-local government bonds with marginal tax rates greater than 25 percent save more in federal income taxes from buying the tax-exempt bond than the state or local government saves in interest cost. To put it another way, all tax-exempt bond investors with tax rates above $t^{\star}$ – the tax rate at which the after-tax return on both type of bonds is equal – are receiving greater returns than necessary to induce them to buy the state or local bond. The difference between the amount of interest saving to subnational governments and the tax loss of the federal government is a net gain to investors with high tax rates.

In some cases, the state or local government (and, implicitly, their taxpayers) can benefit from the differential in yields on taxable and tax-exempt bonds. If a state or local government sells bonds at the tax-exempt rate and can invest those funds at the higher taxable rates, the government earns profits because it is not liable for any tax on the income from the taxable bonds. This is a type of arbitrage by the subnational governments – effectively profiting from the difference in rates. Internal Revenue Service (IRS) rules restrict the opportunity for subnational governments to earn arbitrage profits in this manner but do not eliminate

Table 10.3 Efficiency of the tax exemption for state-local bonds

Marginal tax rate	*$10,000 face value bond; 3% interest rate on tax-exempt bonds; 4% interest rate on taxable bonds*	
	Interest cost saving to state-local government due to tax exemption	*Federal income tax saving to investor in state-local bond compared to taxable bond*
.12	Not a tax exempt investor	
.22	Not a tax exempt investor	
.25	$100	$100
.32	100	128
.35	100	140
.50	100	200

them. Capital projects require some time to get started, so a government may sell bonds to finance a capital construction project but not face any bills for some subsequent period. If the funds are invested over that period, the government earns arbitrage profits. The Tax Reform Act of 1986 limits the period for such activity to six months, however. In other cases, subnational governments may sell bonds for a specific purpose (for example, student loans or cash flow), even though they have surplus funds on hand. Using the borrowed funds rather than the reserve funds for the projects allows the reserve funds to be invested at the higher taxable interest rates. This, too, is a type of arbitrage and is permitted by the IRS.

Effects of federal income tax changes

Federal income tax changes have substantial effects on both the supply of funds to the tax-exempt bond market – that is, on the behavior of buyers of bonds – and on the demand for funds by state and local governments, the sellers of bonds. By affecting both the supply of and demand for funds, federal tax policy has the potential to affect the interest rate paid on state-local bonds.

Changes in federal marginal tax rates influence the buyers of bonds (supply of funds). The investor's marginal tax rate compared to the percentage difference in yields on taxable and tax-exempt bonds determines the attractiveness of tax-exempt bonds as an investment. For any given difference in yields, a decrease in marginal tax rates will make tax-exempt bonds unattractive to some investors for whom they were previously a good deal. To retain or reattract investors to tax-exempt bonds requires relatively higher yields – that is, a smaller difference in yields between taxable bonds and tax exempts. In Figure 10.5, a reduction in federal marginal income tax rates is expected to reduce the supply of funds to the tax-exempt market to S_1. This change is expected to cause an increase in interest rates for tax exempts from i_1 to i_2 (and a narrowing of the differential).

Changes in federal income tax rates have been common. The Economic Recovery Act of 1981 reduced federal marginal income tax rates across the board over a three-year period, and the maximum personal income tax rate was reduced from 70 to 50 percent. The Tax Reform Act of 1986 reduced marginal income tax rates further – only two personal income tax-rate brackets of 15 and 28 percent remained at that time and the top corporate tax rate was reduced to 34 percent from the previous 46 percent. In 1993, the highest federal marginal income tax rate was increased to 39.6 percent, which remained until 2003, when the

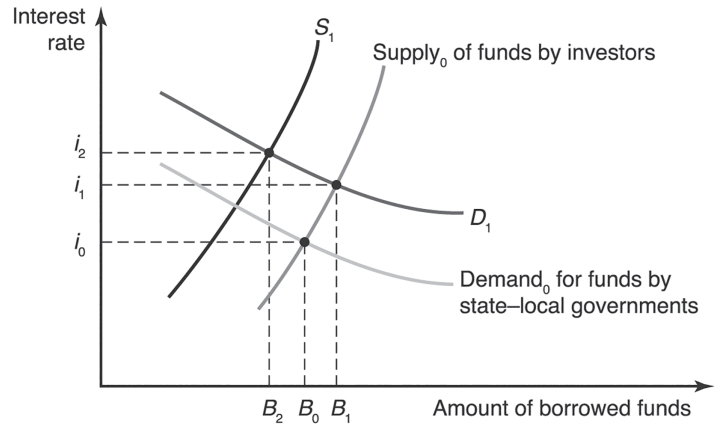


Figure 10.5 The market for state-local borrowing

maximum rate was reduced to 35 percent. In 2013, the maximum rate returned to 39.6 percent, and in 2018 it was reduced to 37 percent. Reductions in marginal federal tax rates make tax-exempt investments less attractive, whereas increases in tax rates have the opposite effect, making tax-exempt bonds somewhat more attractive.

Empirical support for the idea that changes in tax characteristics affect the interest rates on tax-exempt bonds is reported by James Poterba (1986), who statistically related the interest rate differential between taxable and tax-exempt bonds to various tax policy events from 1955 to 1984. Poterba (p. 6) concluded that

> by examining data from four events that substantially altered tax rates – the 1964 Kennedy-Johnson tax cut, the Vietnam War tax surcharge, 1969 Tax Reform Act, and the 1981 tax cut – this study provides new evidence that *both* personal and corporate tax changes affect the relative yields on taxable and tax-free bonds.

Poterba's results suggest that the 1981 tax changes explain one-quarter to one-half of the changes in the interest rate spread from 1980 to 1982. The evidence that personal tax rates matter suggests that corporations do not solely comprise the set of marginal investors.

Federal marginal tax rates have been increased, then decreased, and then changed again. Rules for other tax-favored investments also have been changed. The point is that the market for tax-exempt state and local government bonds (borrowing) is closely connected to the federal income tax laws.

Costs of private-purpose bonds

State and local governments have found tax-exempt bonds an attractive way to attempt to subsidize private investment in an attempt to stimulate economic development. This tool appears to impose no cost on the state-local governments themselves (or their taxpayers), in contrast to direct expenditures or direct state-local tax breaks given to firms or individuals. In fact, if individual state-local governments believe that the cost of private-purpose bonds is imposed nationwide on all payers of federal income tax, then each government believes that part of their economic development costs are exported to residents of other states or localities by selling private-activity bonds. Because a state's taxpayers bear costs from all states' private-purpose bonds in proportion to their federal taxable income, a state can "win" in the game only by issuing more and more tax-exempt bonds. Those states whose share of tax-exempt bond volume is greater than their share of federal taxable income are presumably the "winners" of the interest tax exemption.

However, because of the federal tax exemption, the use of state-local governments' tax-exempt borrowing authority for private purposes creates several economic problems. First, the increase in borrowing by state-local governments for these purposes is expected to increase the interest rate on all long-term state-local tax-exempt bonds. One report suggested that each $1 billion of additional tax-exempt bonds in the entire market increased the tax-exempt interest rate between one and seven basis points. (A **basis point** is one one-hundredth of a percentage point.[9]) Another showed that an additional $6 million of bonds issued by one state increased that state's borrowing costs by 22 basis points.[10] This possibility is demonstrated in Figure 10.5. Given the initial market conditions, the interest rate on long-term tax-exempt bonds is i_0. If state-local governments desire to undertake additional borrowing for these private purposes, then the demand for borrowed funds by state-local governments increases to D_1. If there is no change in the underlying behavior of investors (supply remains the same), then the interest rate rises to i_1. Thus, the use of tax-exempt bonds for private activities increases the cost to state and local governments for

borrowing for traditional public purposes (such as construction of roads, schools, and water and sewer systems).

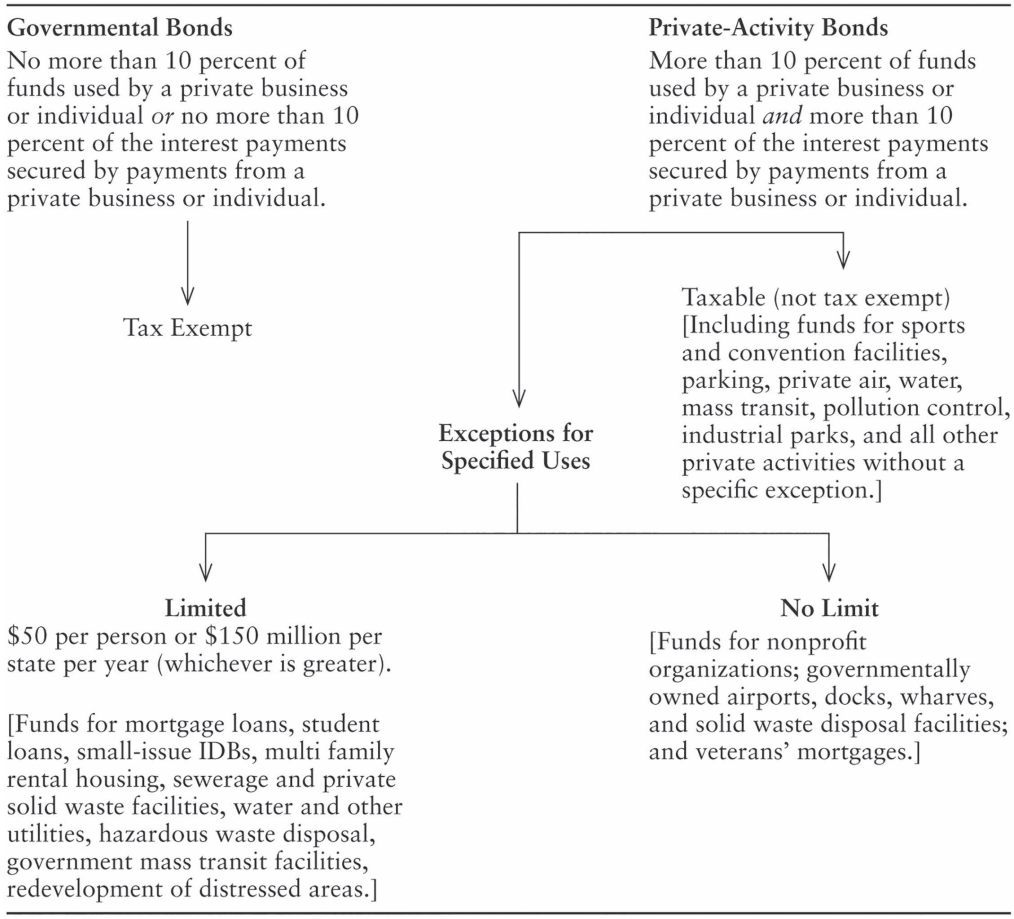
Second, substitution of tax-exempt bonds for taxable debt by individuals and firms reduces the revenue yield of the federal income tax, necessitating higher federal income tax rates, lower federal government expenditures, or larger federal budget deficits. (An estimate prepared for the 2004 federal government budget showed that the income-tax exemption for interest on private-purpose state-local bonds was expected to reduce federal revenue by more than $6 billion in 2005.[11]) This revenue cost to the federal government is greater than the interest-cost savings by the borrowers. Research by the Office of Tax Analysis of the US Department of the Treasury showed that substitution of $10 billion of tax-exempt debt for the same amount of taxable corporate debt increased the federal government budget deficit by $1.31 for each $1 of borrowing costs saved by the corporations.[12] Extension of tax-exempt borrowing rights to private individuals and firms also exacerbates the allocational inefficiency resulting from the exemption: projects selected by state and local governments receive the borrowing subsidy.

As states and localities showed no sign of curtailing the use of tax-exempt borrowing for private activities, the federal government has acted to limit use of those bonds. The Tax Reform Act of 1986 made the most substantial changes to the rules for tax-exempt bonds for what were now to be called "private activities." First, state-local bonds are classified as **private-activity bonds** if more than 10 percent of the bond funds are used by a private business or individual (the business or use test) *and* if more than 10 percent of the principal or interest is secured by payments from a private business or individual (the security interest test). Tax-exempt private-activity bonds are allowed only for purposes specified in the tax law, such as mortgage loans, student loans, small-issue IDBs, nonprofit organizations, and a variety of other purposes. Private-activity bonds for all other purposes are taxable. Second, the use of private-activity tax-exempt bonds for some types of projects – airports, convention centers, sports stadia, parking or private mass transit facilities, and industrial parks – was explicitly prohibited or severely limited. Finally, the act tightened annual maximum limits by state for these allowed tax-exempt private-activity bonds. These "volume caps" initially were set at the greater of $50 per capita or $150 million in 1988 and are increased annually. The rules and process determining whether state-local bonds are tax-exempt are outlined in Table 10.4.

For 2020, the state cap on the use of private-activity bonds was set at $105 per capita or $321.775 million, whichever is greater.[13] The constraint does not treat all states equally. States with fewer than 3.1 million people have an aggregate limit of $321.775 million and a per capita limit that is greater than $95. States with a population greater than 3.1 million have an aggregate limit that equals $105 multiplied by population. To constrain the use of tax-exempt debt, the cap must be less than the amount of debt a state would issue in the absence of the limit. On the other hand, states are allowed to carry forward unused limits to future years. The IRS reports that $142.4 billion of long-term tax-exempt private-activity bonds were issued in 2017, with about $70 billion representing new issues and the remainder refunding. In recent years, states generally have not used all their allocations. For instance, *The Bond Buyer* reported that although all states issued private-activity bonds in 2011, the total dollar amount issued was 41 percent of the total volume cap for the year and only 15 percent of the available issues, including amounts carried forward from past years. Similarly, Wassmer and Fisher (2011) report that state-local debt for private purposes has remained constant at about 4 percent of total long-term debt since 1997, suggesting that use of debt for private activities has not been growing.

Past research by Daphne Kenyon (1991, 1993) and others suggests that the caps on private-activity bond amounts did limit the use of these bonds in the initial years. According

Table 10.4 Defining tax-exempt state-local bonds



to Kenyon (1993), 12 states used at least 80 percent of their allowed amounts in each year from 1989 to 1991 and thus likely were constrained by the limit. Using statistical analysis of state bond use, Kenyon (1991) reported that the tax-exempt volume caps reduced the amount of private-activity bonds nationally by $30 to $36 per person in 1989 and 1990. In recent years, however, private-activity bonds have not been as popular and, thus, the federal caps less important.

Debt: The result of state and local government borrowing

The current debt of state and local governments is the accumulated result of past borrowing (some as much as 20 years ago or more) to fund facilities, programs, or private activities. In 2019, state-local governments in aggregate had total outstanding debt of about $3.2 trillion, which amounts to approximately $9,660 per person. This debt amounted to nearly 15 percent of GDP and 78 percent of the annual revenue for all state and local governments. Long-term debt, debt with more than a one-year term, accounts for 99 percent of total state-local debt and is more meaningful for thinking about capital investment. State governments (or state government authorities) account for about 38 percent of that total

Table 10.5 State and local government long-term debt outstanding

Year	*Total, real billions of 2018 $*	*Per capita, real dollars*	*Percentage of GDP*	*Percentage of revenue*	*State share*	*Interest paid as a percentage of revenue*
2000	$2,082	$7,378	13.9%	73.5%	37.9%	4.1%
2001	$2,172	$7,622	14.5%	81.0%	37.4%	4.5%
2002	$2,287	$7,950	15.0%	90.7%	37.7%	4.8%
2003	$2,419	$8,337	15.5%	86.6%	38.5%	4.3%
2004	$2,577	$8,800	15.9%	79.6%	39.5%	3.8%
2005	$2,641	$8,938	15.8%	81.2%	39.2%	3.6%
2006	$2,704	$9,062	15.7%	79.2%	39.6%	3.6%
2007	$2,874	$9,542	16.4%	77.4%	39.2%	3.5%
2008	$2,938	$9,660	17.1%	96.1%	39.4%	4.3%
2009	$3,133	$10,211	18.5%	127.5%	38.9%	5.6%
2010	$3,223	$10,421	18.7%	88.0%	39.3%	3.8%
2011	$3,224	$10,349	18.6%	84.0%	39.3%	3.6%
2012	$3,179	$10,130	17.9%	97.1%	38.9%	4.2%
2013	$3,167	$10,022	17.5%	85.6%	38.6%	3.7%
2014	$3,125	$9,818	16.8%	81.2%	38.8%	3.4%
2015	$3,129	$9,760	16.2%	86.5%	38.8%	3.6%
2016	$3,126	$9,681	15.9%	87.7%	38.9%	3.6%
2017	$3,102	$9,545	15.5%	77.2%	38.0%	3.1%
2018	$3,100	$9,489	15.0%	76.0%	37.6%	3.1%
2019	$3,170	$9,487	14.8%	77.8%	37.0%	3.2%

Source: US Census Bureau, various years; Bureau of Economic Analysis, National Income Accounts data, various years

subnational government debt, with the remainder the financial responsibility of the wide variety of local governments.

The real (inflation-adjusted) magnitude of total state-local long-term debt was increasing until the Great Recession and has remained relatively constant since, as shown in Table 10.5. However, in real per capita terms, state-local long-term debt has been falling in recent years. The magnitude of state and local government debt remained relatively stable compared to the size of the economy (13–18 percent of GDP) and compared to the annual total revenue of subnational governments (75–90 percent), except for the recession years. Although the magnitude of aggregate state and local debt may seem large, the annual cost of this debt to state and local government budgets is quite modest. In 2019, the annual interest payments on outstanding debt amounted to 3.2 percent of total state and local revenue. The annual interest cost share has been falling from the combination of changes in debt relative to revenue and changes in the interest rates that state and local governments face.

As with many aspects of state and local finance in the United States, states differ substantially in the level and composition of outstanding debt. Per capita long-term debt in 2018 varied from more than $17,800 in New York to about $3,300 in Wyoming, whereas outstanding state-local long-term debt varied from more than 100 percent of annual revenue in four states (Kentucky, Illinois, Connecticut, and Texas) to less than 50 percent of revenue in six states (Wyoming, Idaho, Montana, Mississippi, North Carolina, and Iowa). A number of research studies suggest that interstate differences in the level of debt are related to differences in federal aid, the importance of school-age children in the population, and a variety of institutional and political characteristics. States also differ in the use of traditional nontaxable state-local government bonds to finance so-called private purposes. Federal tax law imposes annual state-specific "caps" on the magnitude of such bonds that may be issued.

The level of existing debt is typically a factor in a government deciding whether, and how much additional, to borrow as that new borrowing may add to debt outstanding. Given that governments often fund infrastructure investment at least partially by borrowing, the level of existing debt can influence investment decisions. Therefore, how should state and local governments evaluate the level of debt to determine whether additional borrowing is fiscally appropriate? In short, how much debt is too much?

Three relative measures of debt are used most often for such an evaluation. Nationally, the overall magnitude of state and local government debt can be compared to national GDP. As noted previously, the ratio has varied between 13 and 18 percent going back to the 1960s. Of course, this ratio depends on both the magnitude of past state-local borrowing and the current level of GDP. Thus, this ratio is often higher during national recessions when GDP declines. Although this measure provides an overall macroeconomic perspective of the magnitude of subnational government debt, it is not as valuable as a guide to individual states or localities.

The two measures used most often by individual state or local governments are total outstanding debt and interest payments on outstanding debt as a fraction of annual total revenue. For both, the implicit question is whether the revenue flow to a government is sufficient for the level of debt. The first, however, compares a value, debt, that was accrued over a number of past years (that is, a stock measure) to the revenue of a single year (a flow variable). In contrast, comparing the current interest payment on that debt to current revenue is a flow-to-flow measure. The annual demand that outstanding debt makes on state and local budgets comes in the form of interest payments made on the borrowed dollars. The equivalent for an individual might be monthly mortgage plus property tax payments relative to income as a measure of home affordability.

Both measure suggest that, as of 2018, state and local governments in aggregate had not incurred long-term debt disproportionate to their annual budgets. In the 1960s, just after and during a time of substantial infrastructure investment, state and local government debt reached a level of more than 115 percent of annual revenue. The ratio declined thereafter and remained generally in a range of 75 to 85 percent, except for several recession years when state-local revenue declined substantially. By 2018, state-local outstanding long-term debt was 76 percent of annual revenue, as shown in Table 10.5. In addition, despite an increase in the magnitude of state and local government debt, annual interest paid on that debt by state and local governments in aggregate decreased substantially compared with annual revenue, from 5.5 percent of revenue in 1992 to 4.5 percent in 1997, 4.8 percent in 2002, 3.5 percent in 2007, and 3.1 percent in 2018. The decrease in the relative magnitude of interest payments reflects decreasing interest rates for borrowing faced by states and localities and the opportunity to refund debt when interest rates decline.

In sum, there is no evidence that state and local government debt, especially since the Great Recession, is high by historical standards or out of line with overall state-local budgets. Indeed, the exceptionally low interest cost that states and localities face suggests an opportunity for additional borrowing.

Policy issues

Why is the quality of public infrastructure so poor?

The primary reason for state and local government borrowing is to help finance capital investment. The role and importance of public capital or physical assets – roads and other transportation facilities, buildings, parks and other public lands, and utility (water, sewer, waste, energy) infrastructure – in the economy is of special interest. It seems clear that

modern life would be very different without these assets (provided publicly or privately) and that many people may take for granted the services provided by such infrastructure. Many of us brush our teeth, take a shower, have a morning coffee or tea, and drive or take public transit to school or work every day, assuming that the clean water, electricity, road, bus, and school will be there. The following excerpt from my city's water system illustrates some of the hidden aspects of state-local infrastructure.

Where does our water come from?

> The water for our communities is . . . drawn from deep wells drilled several hundred feet into the . . . aquifer. Groundwater is pumped to the conditioning plant from 29 wells. . . . Lime is added to the water to remove the excess hardness. . . . Ferric chloride is used to treat very fine particles. The water then passes through sand filters to remove any cloudiness that was not taken out during the chemical treatment. . . . Although the source-water is very pure, we add Chloramine to ensure the water is thoroughly disinfected. . . . We also add Fluoride for the prevention of tooth decay. . . . In 2012, the Authority processed and pumped almost 2.1 billion gallons of treated water.

This process, and similar ones for other basic public services that result from the infrastructure, are carried out daily by thousands of state and local governments, directly or through public-service authorities. (Imagine similar work descriptions from my local sewer agency, the road department, the area transportation authority, the local school district, and my public university – all of which I take for granted every day.) That state and local government capital or infrastructure is valuable seems undeniable. This raises the obvious question of why public capital investment has apparently not been sufficient to maintain the quality of public infrastructure, as noted in *Headlines*.

The post-WWII period of the 1950s and 1960s saw substantial growth of housing, new communities, and state-local government spending. Substantial new state-local public infrastructure was constructed during this period – including highways, schools, and water and sewer systems, among others – which are now 50 to 60 years old, likely approaching or exceeding useful life and requiring replacement or substantial reconstruction. However, recent state-local capital spending has been substantially lower than in the 1950s and 1960s, as shown in Figure 10.6. In the period 1952 to 1967, state-local capital spending averaged more than 2.6 percent of GDP compared to less than 2 percent recently and nearly 25 percent of total state and local government expenditure compared to about 10 percent recently. Capital spending as a percentage of GDP fell during the 1970s, remaining about constant until 2000, then increasing until the Great Recession and falling after. Capital spending relative to GDP seems to increase during recessions, both because GDP falls and because federal countercyclical aid often is targeted to capital investment. The GDP share in 2018 was nearly at a low point and about the same as in the mid-1980s. Thus, one possible answer to the issue of current infrastructure quality is that states and localities are spending much less now than when the infrastructure was built.

The 2021 ACSE report suggests that additional federal and state-local capital expenditure of $2,588 billion (in 2020 dollars) over the ten-year period from 2020 to 2029 is required to offset what ASCE deems the "investment gap" in ten categories of public infrastructure.[14] Put in another relative sense, the ASCR report argues,

> To close the $2.59 trillion 10-year investment gap, meet future needs, and restore our global competitive advantage, we must increase investment from all levels of government and the private sector from 2.5% to 3.5% of US Gross Domestic Product (GDP) by 2025.

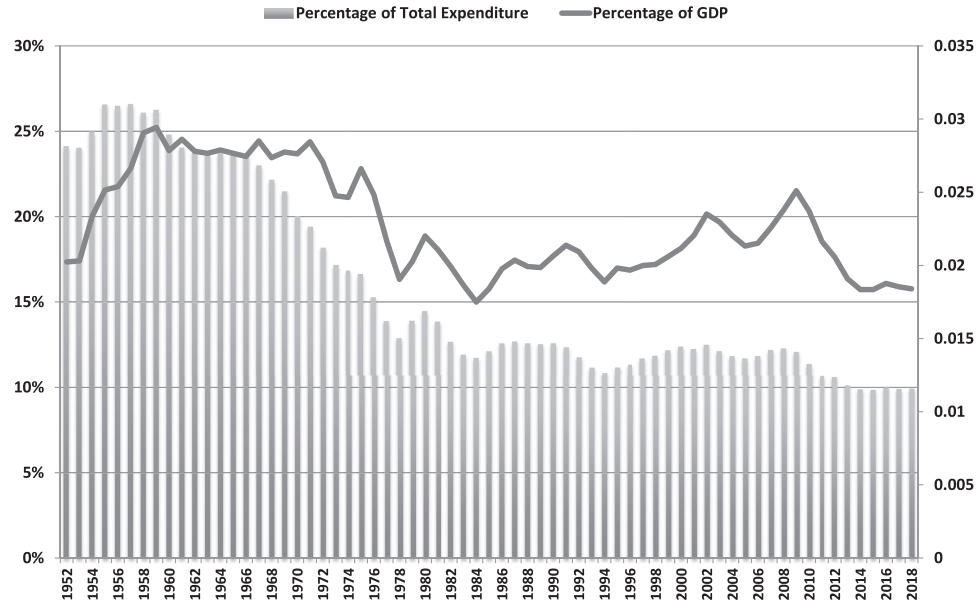


Figure 10.6 State-local capital outlay, 1952–2019

This is *additional* capital spending of about $260 billion per year. In 2018, state and local governments spent $380 billion. A substantial amount, but not all, of the additional capital investment spending would not be the responsibility of states and localities. Perhaps an increase of $200 billion in state-local spending, slightly more than 50 percent, would be required according to the ASCE analysis.

As an alternative to engineering estimates of expenditure required to offset depreciation, the additional capital investment expenditure required to match the investment magnitudes of the 1950s and 1960s can be calculated. State-local capital expenditure averaged 2.57 percent of GDP in 1952, 1957, 1962, and 1967 but was 1.88 percent in 2018. For capital spending in 2018 to have been 2.57 percent of GDP, it would have had to have been about $530 billion, compared to the actual $380 billion, an increase of about $150 billion. Thus, the simple answer to the question of quality of public infrastructure is that society, through state and local governments as well as the federal government, has not allocated sufficient funds for that purpose.

Ronald Fisher and Robert Wassmer (2015) examined state-local capital spending across states in the period from 2000 to 2010, which included two recessions. Consistent with prior research, they report, "Income, density, population growth, the magnitude of federal grants, and the depreciation of public infrastructure all have the expected positive effects." However, they also found that political perspectives influenced capital spending, given the economic characteristics, noting, "[A] more Liberal statewide ideology is associated with higher public capital outlay." Importantly, Fisher and Wassmer also report that a substantial amount of state differences in capital spending could not be explained by the economic and political factors mentioned. Therefore, the process underlying state decisions about capital spending is still not understood fully.

Consequently, a number of reasons have been advanced to help explain why state-local spending has not been sufficient. The fiscal role of states and localities has changed and

expanded, with many new areas of public service demand (Chapter 1). Similarly, there has been a change in the nature of federal government financial support, with health care now the largest category (Chapter 9). Some states have been concerned about the magnitude of debt, not just the financial market debt discussed in this chapter but also outstanding retirement fund obligations (Chapter 7). In some instances, individuals may misunderstand of cost of inaction as well as the personal cost of additional spending (an issue discussed in Chapter 18). Finally, it may just be the unending search for a free lunch – people wanting quality service but unwilling to pay the price.

In 2021, the federal government adopted the Infrastructure and Jobs Act, which provides major new funds, $1.2 trillion over 5 years, for infrastructure investment. The Act includes $110 billion for road and bridge repair, $39 billion for public transit modernization, $66 billion for passenger rail transport systems, $55 billion for improving public water systems, and $65 billion for expanding access to the internet, among many other categories of expenditure.[15] The great bulk of these federal government funds will be grants to state and local governments, which will undertake the actual capital investment. Because the evidence noted here shows that the nature and magnitude of federal aid to states and localities has been a major factor affecting capital spending, this change in federal support has the potential to move toward closing the infrastructure investment "gap" noted in the ASCE report.

Public capital and economic growth

Another issue that has received research attention is whether infrastructure (and the associated services) contributes to economic growth. The idea is that increases in public capital or infrastructure might increase the productivity of private capital or workers, thus providing increases in output or income. Munnell (1992), Gramlich (1994), and Fisher (1997) provide reviews of the literature regarding the issue of public capital investment and economic growth. Gramlich notes particularly that the impact of capital infrastructure can be measured by (1) engineering needs assessments, (2) political voting outcomes, (3) measures of economic rates of return, and (4) economic estimates of direct productivity impact.

In recent years, engineering studies relating the capital structure to safety or costs have been popular and provide one set of evidence about the optimal capital structure. The American Society of Civil Engineers compiles evidence from various sources about the status of infrastructure and reinvestment costs. For instance, in the 2021 Report Card for America's Infrastructure, they report that the average age of bridges in the United States is 44 years, with more than 46,000 being structurally deficient. The Federal Highway Administration estimates that annual expenditure of $20.5 billion through 2028 would be necessary to correct all bridge problems. Similarly, many water-supply pipes are more than 100 years old, with 260,000 water-main breaks each year. Of course, this type of analysis assumes a level of infrastructure quality or safety that is desired.

Statistical studies using cross-state or cross-national data about infrastructure and economic conditions are another type of analysis, although technical issues make this type of analysis particularly difficult. First is how to measure the infrastructure: by a physical measure (miles or lane-miles of road, road carrying capacity, number of computers per student, and so on) or by the monetary value of the infrastructure (construction cost or replacement cost). Second, the time period examined can be crucial because a short period may miss the longer-run effects of public capital investment. Investment in education, for example, may not show any impact immediately but a large effect over 10 or 20 years. Third, the area of impact also seems crucial as some types of public capital may have little local effect but a

greater regional or national effect; a section of interstate highway in one community may have little effect on economic growth in that community but a substantial effect on the region or state. Finally, there are numerous ways of measuring economic growth, such as an effect on employment, wages, or income.

The results of the statistical studies are quite mixed. On the issue of a relationship between the public capital stock and national economic growth, initial results in the early 1990s showed large positive effects from additional investments in public infrastructure. Subsequent analyses using improved econometric methods suggested that the initial research results were overstated or nonexistent. More recently, research by Romp and de Haan (2007), based on international studies, and by Heintz (2010) using US data, seems to show a long-run positive relationship between investment in public capital and national economic growth. Studies of a relationship between the public capital stock and economic conditions at the state level also give mixed results. The research suggests transportation infrastructure, communication facilities, and utility systems are most likely to have positive effects. The research also suggests that an increase in a specific type of public capital investment (such as roads) may increase productivity and output for some private firms but not others, depending on their economic characteristics. This suggests that there may not be a single answer to the question of whether additional investment in public capital contributes to economic growth.

Two other observations are important from a policy perspective. If there are diminishing returns from investment in public infrastructure, then growth of public capital in the past may have contributed substantially to increases in private productivity and economic growth. If the current stock of public capital is high enough, however, additional marginal increases may not be productive. Such a perspective may explain why research shows positive effects of capital investment in some developing nations or some regions where the capital stock has depreciated. Finally, growth in local employment or income may not be the objective of public capital investment and may not even be desired by a local community, as discussed by Paul Courant (1994). As an illustration, a city might improve the quality of local or neighborhood streets. Such a change is not likely to improve the earnings of local employees or attract additional private firms to the city, but it may improve the life of neighborhood residents through improved safety and comfort. The key point is that the public capital stock or infrastructure is an input into the production of consumer services.

Alternative borrowing options: Taxable debt

Because of the problems created by the tax exemption of interest from state-local bonds, economists have long suggested that state-local governments issue taxable bonds with the federal government using a direct subsidy to reduce state-local borrowing costs (Galper and Peterson, 1973). For instance, if a subnational government issued taxable bonds at an 8 percent rate when tax-exempt bonds had been yielding 6 percent, a federal subsidy equal to 25 percent of the state or local government's interest cost would reduce borrowing costs equally to the tax exemption. The prime advantage of this method is that it would cost the federal government $1 for each $1 saved by the subnational governments rather than more than $1, as is the case with the tax exemption. In other words, this direct payment would be a more efficient way for the federal government to subsidize state-local borrowing costs.

As part of the federal government response to the Great Recession, the American Recovery and Reinvestment Act (ARRA) of 2009 established a federally subsidized, taxable bond option for state and local governments denoted Build America Bonds (BABs). Build America Bonds were taxable bonds with a direct federal government subsidy of 35 percent, which had to be issued between April 2009 and December 2010, after which the program expired. This was the first broad application of a directly subsidized taxable bond available to all state

and local governments in the United States. The 35 percent subsidy rate was selected to be equal to the highest federal marginal income tax rate, with two implications. Just before the financial-market crisis and recession, the differential in returns between taxable corporate bonds and nontaxable municipal bonds was about 20 percent. The higher federal subsidy rate meant that state and local governments could (at least initially) borrow at lower cost with BABs than traditional nontaxable bonds. In addition, the higher subsidy rate and the fact that the subsidy could be paid directly to lenders meant that BABs could attract new investors to the state-local bond market, including those without any federal tax liability.

Initial analyses suggest that the BABs program lowered borrowing costs for state and local governments, that in response states and localities increased borrowing beyond what they otherwise would have done, and, thus, that BABs stimulated state-local capital investment at the end of the recession. Given that the federal subsidy rate of 35 percent was larger than the prevailing interest rate differential, analyses by the Treasury Department (2011) and by Ang et al. (2010) show that BABs lowered borrowing costs for subnational governments in comparison to traditional nontaxable municipal bonds by 54 to 84 basis points on a 30-year bond. Luby (2012) describes two case studies of bond sales in Ohio, where BABs provided cost savings of between 6 and 60 basis points, even after higher administration costs. One concern with BABs because of the limited time period is that states simply changed the timing of capital projects to take advantage of the lower cost. However, research by Fisher and Wassmer (2014) shows little substitutability between the use of traditional nontaxable bonds and BABs, suggesting that, as intended, the BABs program likely contributed to the increase in overall state-local borrowing in 2009 and 2010.

Historically, state-local governments had not been very interested in taxable debt with or without a direct federal subsidy. Subnational governments seem to have been wary about substituting a subsidy payment for the tax exemption in part because a direct federal subsidy could be changed by the federal government in the future (although the tax exemption also could be eliminated). The restrictions on the use of tax-exempt state and local government debt for private purposes included in the Tax Reform Act of 1986 seem to have induced states and localities to begin using taxable debt to a greater degree than in the past. As Peers (1986) noted, "Taxable debt is more expensive for municipalities and other issuers, but it can be put to uses that Congress doesn't approve for tax-exempt bonds, such as aid to farmers, pollution control projects and loans to local businesses." Johnson (2004) reported that issuance of taxable state-local bonds grew substantially from less than $10 billion in 1997 to a record $40 billion in 2003.[16] Taxable bond issuance was $146.4 billion in 2020 according to *The Bond Buyer*, substantially higher. Taxable bonds represented about 30 percent of total state-local issues in 2020.

Application 10.1: Financing for sports facilities

It is common for state or local governments to subsidize professional sports facilities through borrowing and/or taxation. In some cases, sports arenas and stadia are owned by the local government and leased to the professional team (sometimes at an unusually low rate), although in other cases, the facility is owned by the team but partly financed by the locality. In the past, local governments or governmental authorities often issued tax-exempt bonds to pay facility construction costs. The various ways that cities subsidize stadium development and the economics of the issue are explored by Zimmerman (1999, 1), who notes that in addition to loans for construction, "billions of state-local taxpayer funds are likely to be expended to finance operating deficits over the life of the stadiums." Governments also sometimes acquire and donate the land for the project, and property taxes are not collected if the facility is publicly owned.

In the Tax Reform Act of 1986, Congress attempted to prevent the use of state-local tax-exempt debt for sports facilities, although state-local governments still could use tax-exempt financing for infrastructure associated with or required because of the facility, such as new or reconstructed roads, expanded utility access, and some auxiliary development. As described in Table 10.4, bonds sold by state-local governments are called "private-activity bonds" if at least 10 percent of the benefits go to a private business, and 10 percent of the interest is paid from a private business. Private-activity bonds can be tax-exempt, up to the limit allowed in the law, if the proceeds are used for specific purposes identified in the law, but those purposes do not include sports facilities. Therefore, state and local governments cannot sell tax-exempt bonds to finance sports facilities if the sports team receives more than 10 percent of the funds, and at least 10 percent of the interest on the bonds is paid from team resources, such as ticket receipts. By all reports, Congress thought this would limit tax-exempt financing of professional sports facilities. However, it did not.

State and local governments have used several mechanisms to get around the limitation in the law and continue to use their tax-exempt borrowing authority to subsidize sports facilities. One option is for a local government to own a stadium or arena and lease it to a team. That way, the borrowed funds are not used for a private firm, but by a local government to construct the facility. In addition, to avoid the bonds being denoted as private-activity bonds, the government that owns the stadium or arena must pay the principal and interest from public sources, not funds from the sports team. Commonly, the local government identifies specific tax revenue to repay the bondholders for the sports facility. Two recent prominent cases illustrate this method.

The District of Columbia was competing with a number of other localities to attract a Major League Baseball (MLB) franchise that had been located in Montreal. The city reached an agreement with MLB for the team to play in a renovated Robert F. Kennedy Stadium for three years beginning in 2005 and then, in 2008, to move into a new stadium that the city would build. After substantial local debate, the city eventually agreed to finance the stadium after MLB threatened to move the team elsewhere. The city sold more than $500 million of tax-exempt bonds to build a stadium that would be owned by the city's Sports and Entertainment Commission, which would lease the stadium to the Washington Nationals. The city established two new taxes – a tax on the gross revenue of businesses in the District and a sales tax on tickets, merchandise, and services sold at stadium events – to repay the bonds, along with rent paid by the team. Because the tax revenue pays most of the bond cost, the bonds are not "private-activity" bonds and thus can be tax-exempt. With this arrangement, state-local tax-exempt borrowing authority is again being used to finance a sports facility.

The construction of a new Yankee Stadium that opened in 2009 illustrates an even more complicated case. New York City sold more than $900 million of tax-exempt bonds to finance construction costs that were to be paid by the Yankees team, although the city owns the stadium. Property taxes are not collected for the stadium because it is publicly owned, but the team makes payments in lieu of taxes (PILOTs) to the city that are theoretically equal to what the property taxes would be.[17] At the time, the IRS determined that these payments are the equivalent of taxes, so the team (a private business) is not using private sources to pay back the bonds. Thus, these are not "private-activity" bonds and can be tax exempt. (Subsequently, the IRS prohibited using PILOTS to avoid the limitations of private-activity bonds.) By one estimate (National Sports Law Institute), the use of tax-exempt borrowing saved the Yankees more than $700 million in interest costs over the life of the bonds. In addition, the city donated the land and borrowed more than $200 million in other tax-exempt funds to build parking garages at the stadium and improve public infrastructure.

Therefore, state and local governments continue to subsidize professional sports facilities and, despite the provisions of federal tax law, have been able to use their tax-exempt

borrowing authority for those subsidies. According to work by Austin Drukker et al. (2020), the use of this tax exempt borrowing authority for stadiums built since 2000 reduced federal government tax revenue by $4.3 billion. Therefore, everyone is paying for the subsidy for professional sports facilities.

Summary

In 2019, state and local governments spent nearly $410 billion or $1,225 per person on capital expenditure, including construction of buildings and roads and purchases or rental of equipment, land, and existing structures. This amount represents about 2.1 percent of personal income, 1.9 percent of GDP, 10 percent of total state-local expenditure, and 12 percent of outstanding long-term debt. Local governments account for nearly two-thirds of subnational capital spending. Spending on projects related to highways, education, and utilities represents the bulk of state-local government capital expenditure. State-local governments finance capital expenditures from intergovernmental grants, with borrowed funds, and with current funds.

In the period 1952 to 1967, state-local capital spending averaged more than 2.6 percent of GDP compared to less than 2 percent recently and nearly 25 percent of total state and local government expenditure compared to about 10 percent recently. Thus, one possible answer to the issue of current infrastructure quality is that states and localities are spending much less now than when the infrastructure was built.

State-local governments borrow money for three primary purposes: to finance capital projects such as schools, roads, water and sewer systems, and power plants; to support and subsidize investment by private individuals and businesses; and to provide cash flow for short-term spending or for special projects.

State-local governments borrow money by selling bonds. A bond is a financial agreement or promise between a borrower and a lender (sometimes called an investor). The lender buys the bond from the borrower now and receives a promise from the borrower to pay a fixed amount of money (or interest rate) per year for a fixed period and to repay the original amount at a future date. Long-term state-local government bonds are either general obligation (GO), which pledge the full faith and credit of the issuing government as security, or revenue bonds, with only the revenues from a particular source pledged to repay the investors.

In calendar year 2020, state and local governments issued about $531 billion of short-term notes and long-term bonds, with long-term borrowing of nearly $485 billion accounting for 91 percent of this total. The cumulative effect of annual borrowing is outstanding debt. In 2019, state-local governments in aggregate had total outstanding debt of about $3.2 trillion, which amounts to approximately $9,660 per person. This debt amounted to nearly 15 percent of GDP and 78 percent of the annual revenue for all state and local governments.

The federal government does not tax the interest income received by investors in state-local government bonds, either via individual or corporate income taxes. The primary economic effect of the exemption is to allow lower interest rates for state-local bonds than for similar taxable bonds.

The marginal income tax rate at which an investor gets the same return from both a taxable and nontaxable bond is equal to the percentage difference between the interest rates on the taxable and tax-exempt bonds. Consequently, individual investors in state-local bonds are expected to have relatively high marginal income tax rates, at least greater than the percentage difference in bond yields. Due to reductions in tax-exempt bond purchases by banks, changes in interest rates, and the growing availability of tax-exempt bond mutual funds, individuals are now the primary buyers and holders of state-local bonds.

The tax exemption for interest on state-local government bonds is an inefficient way to subsidize subnational government borrowing costs because the federal government loses more than $1 of tax revenue for each $1 of interest cost saved by state-local governments.

Discussion questions

1 Suppose that a city must replace aging water pipes in the city system that is expected to cost $50 million. The new pipes are expected to last for about 30 years. The city has an annual budget of about $250 million and is trying to decide whether to finance the pipe replacement out of current revenues; through a one-year, temporary tax increase; or by borrowing the money by selling 30-year bonds at an interest cost of 5 percent. Outline the advantages and disadvantages of each financing method. Which would you recommend? Might there be any reason to combine the methods?

2 The three elementary schools in your school district were built in 1960 and now are 60 years old. The district is considering whether to build new school buildings at a cost of $15 million each. To do so, the district would borrow the funds (sell bonds) and dedicate revenue from a property tax increase to pay the interest and principal on the bonds. Property taxes would increase by $100 per year for a $100,000 home for the 30 years of the loan. How should a taxpayer evaluate this proposal? What information should the district provide to assist in the evaluation? If you were a homeowner/taxpayer in this school district, how would you vote?

3 "Exempting the interest on state-local government bonds from federal income taxation is the lowest-cost way for the federal government to subsidize state-local borrowing costs." Evaluate this statement.

4 Describe and explain the expected effect on state-local bond interest rates of each of the following federal changes:

   (a) Lower the maximum federal personal income-tax rate from 37 to 20 percent.
   (b) Restrict the use of private activity tax-exempt bonds by state-local governments with a federal law.
   (c) Eliminate IRAs, a form of tax-deferred personal savings.
   (d) Increase use of tax-exempt bonds by cities to provide home mortgages.
   (e) Raise the maximum federal personal income tax rate from 30 to 39 percent.

5 State-local governments often use their borrowing authority to provide low-cost loans to the private sector through the sale of tax-exempt revenue bonds. Taking mortgage revenue bonds as an example, what are the costs of this activity to a state that issues such bonds? To the nation? What are the benefits to the state? Do you believe that it would be in an individual state's interest to cut back on the use of these revenue bonds? Explain.

Notes

1 American Society of Civil Engineers, 2021 Report Card for America's Infrastructure, https://infrastructurereportcard.org/wp-content/uploads/2020/12/National_IRC_2021-report.pdf.
2 For details about the process of state capital spending, see NASBO, 2014.
3 Detail about capital spending among the New England states is provided in Fisher and Sullivan, 2016.
4 Harvey Galper and John Petersen, "An Analysis of Subsidy Plans to Support State and Local Borrowing," *National Tax Journal*, *24*, No. 2 (June 1971): 205.
5 The effective interest cost is slightly higher because the borrower must repay the lender $10,000 at maturity.
6 For more detail on the practice of state and local government borrowing, see Denison (2012).

7 For comparison, *The Bond Buyer* reports long-term issues of $448.6 billion in calendar year 2017 and $338.9 billion in calendar year 2018. The census 2017–2018 fiscal year data largely correspond to the period July 2017 through June 2018.
8 Suppose you have a $100,000 mortgage for a home at a 6 percent interest rate. If you "refinance," you essentially take out a new $100,000 mortgage at, say, a 3 percent interest rate and use the $100,000 to pay off the first loan. There is no additional housing investment.
9 Clark (1986, 59).
10 Capeci (1990).
11 See *Analytical Perspectives, Budget of the US Government, Fiscal Year 2004,* Table 6–2.
12 Toder and Neubig (1985, 410).
13 If a state does not use all its allowed private-activity bond amount in one year, the state may carry the unused amount forward for three subsequent years with approval from the IRS.
14 The categories are surface transportation, water/wastewater infrastructure, electricity, airports, inland waterways and marine ports, dams, hazardous and solid waste, levees, public parks and recreation, and schools.
15 www.whitehouse.gov/briefing-room/statements-releases/2021/11/06/fact-sheet-the-bipartisan-infrastructure-deal/.
16 Matthew Johnson, "Despite Lower Volume, Taxables Continue Expansionary Trend," *The Bond Buyer* (December 2, 2004).
17 PILOTs are discussed in Chapter 14.

Selected readings

Fisher, Ronald, and Robert Wassmer. "A (Baker's) Dozen Years of State and Local Government Capital Investment." *State Tax Notes*, April 27, 2015.

Fisher, Ronald, and Robert Wassmer. "Analysis of State and Local Government Capital Expenditure During the 2000s." *Public Budgeting and Finance*, *35*, No. 1 (Spring 2015): 3–28.

Fisher, Ronald, and Robert Wassmer. "The Infrastructure Investment Decline." *State Tax Notes*, November 28, 2016.

Marlowe, Justin. "Capital Budgeting and Spending." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen, 658–681. Oxford, UK: Oxford University Press, 2012.

National Association of State Budget Officers (NASB). *Capital Budgeting in the States*. Washington, DC: National Association of State Budget Officers 2014.

Petersen, John E., and Richard Ciccarone. "Financial Markets and State and Local Governments." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen, 682–726. Oxford, UK: Oxford University Press, 2012.

Poterba, James J. "Explaining the Yield Spread Between Taxable and Tax-Exempt Bonds: The Role of Expected Tax Policy." In *Studies in State and Local Public Finance*, edited by H. Rosen, 5–49. Chicago: University of Chicago Press, 1986.

The U.S. Department of the Treasury. "Treasury Analysis of Build America Bonds Issuance and Savings." Washington, DC: U.S. Department of the Treasury, 2011.

Zimmerman, Dennis. "Tax-Exempt Bonds." In *The Encyclopedia of Taxation and Tax Policy*, edited by Joseph J. Cordes, Robert D. Ebel, and Jane G. Gravelle, *99*, 443–445. Washington, DC: Urban Institute Press, 1999.

Part IV

Revenue for state and local governments

State and local governments generate revenue from a variety of taxes, from government production, and from sale of goods or services (such as electricity, liquor, and gambling), as well as from charges and fees, borrowing, and intergovernmental grants. The last three already have been discussed in the previous section of the book. Taxes and revenue from selling commodities are discussed in detail in Chapters 11 through 16, which focus particularly on analysis of taxation.

We consider the traditional economic revenue issues of efficiency, equity, and administration, by both examining the institutional arrangements for these revenue sources and presenting the economic analysis of their effects. The key features of state and local government analysis – mobility and diversity – will be very much in evidence. The relative ease of moving economic activity among subnational governments creates an additional avenue of escape from taxation that can substantially influence the expected economic effects of taxes. The great diversity of state and local government revenue systems both magnifies the influence of mobility and raises the question of how state and local governments select their revenue structures.

Chapter 11 provides an overview of the basic tools of economic tax analysis, with emphasis on those issues that are most important for the state-local government situation. Although this overview is not intended to substitute for a more intensive study of the economic effects of taxes, it should provide a sufficient framework around which to organize the discussion of each specific revenue source. Thereafter, each revenue source is discussed in turn, beginning with the "big three taxes" – property, income, and sales – and finishing with business taxes and government enterprises such as utilities, lotteries and gambling, and the sale of alcoholic beverages.

DOI: 10.4324/9781003030645-14

11 Principles of tax analysis

Headlines

The Many Faces of State-local Taxes, $1,649 billion in 2017

The big three	*Substantial*	*Smaller*	*Everything else*
Property tax, $526	Corporate income tax, $53	Severance taxes, $9	All other taxes = $78 billion
General sales tax, $389	Motor fuels tax, $47	Amusement taxes, $9	Hotel/motel tax
Individual income tax, $384	Business & personal license taxes, $45	Alcoholic beverage taxes, $7	Rental car tax
	Motor vehicle and operator license taxes, $31	Inheritance & gift taxes, $5	Telephone service taxes
	Public utility tax, $27		Gambling taxes
	Insurance premium tax, $22		Transfer taxes
	Tobacco tax, $19		And many others

Amounts in billions of dollars

Data availability

Information about state and local government taxes is available from a wide variety of sources. A basic list of taxes and tax characteristics (bases and rates) is available from the Federation of Tax Administrators (www.taxadmin.org/current-tax-rates). Information about the magnitude (revenue) of all different state and local government taxes for each state is reported by the Governments Division of the US Census Bureau and is available in a variety of reports and data tables (www.census.gov/govs/). The Tax Policy Center, a joint venture of the Urban Institute and Brookings Institution, has created a state and local finance data query system that provides a clear and convenient utility for accessing the census tax (and expenditure) data (https://state-local-finance-data.taxpolicycenter.org/pages.cfm).

DOI: 10.4324/9781003030645-15

The basic economic issues and tools of tax analysis are introduced in this chapter. You should know and understand the methods and results in this chapter because they will be directly applied to specific taxes in the following chapters. If you have never studied economic analysis of taxation, this should be a sufficient introduction to allow a general analysis of the effects of different subnational government taxes. For others, this chapter may be a review.

Although the tax analysis methods described in this chapter are general and can be applied to all tax cases, there are special aspects of state and local taxation that arise from the geographic and economic character of states and localities, as noted by Charles McLure. "No local, state, or federal government conducts its finances in an economy closed to the outside . . . . So there is little reason to believe either that all taxes are borne by residents of taxing regions or that the ultimate inter-regional distribution of these tax loads is very simple."[1]

The economic issues: Incidence, efficiency, and administration cost

Tax incidence

Tax incidence is the analysis of which individuals bear the ultimate burden of taxes: that is, the burden after the economy has adjusted to any changes caused by the taxes. **Incidence** is usually defined as the change in private real incomes and wealth because of an adoption or change of a tax. Because individuals and firms may change their behavior due to taxes, the taxpayers who bear the ultimate burden of a tax – that is, the economic incidence – may be different than the taxpayers who initially pay the tax, the statutory incidence of a tax. Incidence analysis usually considers the distribution of the amount of revenue generated by a tax, the revenue burden. That burden must be compared to something, so incidence is usually a relative concept. One possibility is to compare the incidence of one tax to the incidence of another tax that generates an equal amount of revenue, the **differential incidence**. A second possibility is to compare the incidence of the revenue of a tax to the incidence of the benefits of the goods and services financed by the tax, the **balanced-budget incidence**.[2]

The first step in doing incidence analysis is to determine which prices change and by how much they change as a result of the tax (or the tax and spending combination). Of course, the prices of both consumer goods and services and factors of production can change, so a tax may affect individuals from both their uses of income (consumer purchases) and their sources of income (factor prices such as wages, rents, and interest). Suppose that such an analysis shows that the price of consumer good *X* rises and the price of factor of production *Y* falls because of a tax change. Thus, consumers of good *X* and suppliers of factor *Y* bear the burden of this tax. With this information, how can one determine the burden on a specific individual or a group of individuals: say, those with incomes between $40,000 and $50,000? One must know the amounts of good *X* consumed and factor *Y* supplied by this individual or group of individuals. Those quantities, multiplied by the change in prices caused by the tax, show the magnitude of the tax burden imposed on each class. For instance, a person may bear none of the tax burden (if that person neither consumes *X* nor supplies *Y*), some of the tax burden (if that person consumes *X* but does not supply *Y*, or vice versa), or the full effect of the tax burden (if the person both consumes *X* and supplies *Y*).[3]

After the burden of a tax change due to the changes in prices of goods and services is determined, the incidence of the tax is used to evaluate the tax on the basis of both **horizontal equity** and **vertical equity**. Horizontal equity refers to the effect of the tax on taxpayers in similar economic circumstances (the same income or same consumption, for example), whereas vertical equity refers to the effect of the tax on taxpayers in different economic circumstances (across the income distribution, for example). Essentially then, horizontal equity refers to "equals being treated equally," whereas vertical equity refers to the pattern of how and whether "unequals are treated differentially."

Vertical equity most commonly is characterized by the effect of the tax incidence on income distribution. The terms *progressive*, *proportional*, and *regressive* are used to describe the effect of a tax on private income distribution. Unfortunately, these terms can have more than one definition and meaning in tax analysis. In this book, we adopt the most common usage of these terms, describing tax burden as a percentage of income (unless a different specific definition is given). Those definitions are as follows:

Progressive tax:	Tax burden/income rises as income rises
Proportional tax:	Tax burden/income constant as income rises
Regressive tax:	Tax burden/income falls as income rises.

A **progressive** tax change therefore imposes a burden that is a greater fraction of income for higher-income persons than lower-income individuals. In contrast, a **regressive** tax change imposes a greater percentage of burden on lower incomes than on higher ones. Continuing the previous example, suppose that the amount spent on good X as a fraction of income is greater for higher-income than lower-income taxpayers while suppliers of input Y are distributed equally throughout the income distribution. A tax change that increases the price of X and decreases the price of Y would be progressive. The definition is still somewhat uncertain, however, because income could be annual income or some longer-term measure such as lifetime income. The importance of these different measures of income will be considered in Chapter 14.

Efficiency

As discussed in Chapter 2, an economy is efficient if marginal social cost equals marginal social benefit for all goods. The efficiency cost from a tax change refers to changes in production and consumption of goods caused by the tax change that, in turn, cause marginal social cost and marginal social benefit to no longer be equal. The tax revenue generated by the tax change does not represent an efficiency cost because that money is simply transferred from one part of the economy to another; the tax revenue is used to provide government goods and services that have benefits. The efficiency cost of a tax arises, rather, because individuals and businesses change their behavior due to the tax. By consuming different goods that are less desirable than those that would be consumed in the absence of the tax and supplying different amounts of factors of production, the economy is moved to a less efficient or lower welfare position by the tax change.

The **efficiency cost of a tax change** refers, therefore, to the lost private welfare beyond that caused by the transfer of private income to tax revenue for the government. This is called the **excess burden** of taxation or **dead-weight loss**, which is the burden over and above the revenue generated. The implicit assumption in this definition is that it may be possible to utilize some tax structure to collect a given amount of revenue at zero efficiency cost. Any other potential tax structure that can be used to generate the same revenue can be evaluated against this standard in terms of the efficiency cost and the welfare burden, in addition to the revenue (which is the same for both tax structures).

Administration cost

The process of collecting and paying taxes is, itself, not costless, creating costs for both the government (administration costs) and for taxpayers (compliance costs) that are in addition to the amount of the tax revenue and the efficiency cost. Administration costs include operating the tax collection apparatus and monitoring and measuring compliance, as well

as auditing and enforcement. Compliance costs refer to the costs incurred by taxpayers in understanding, calculating, and paying the tax. Administration costs effectively reduce the net revenue received by government from a tax, whereas compliance costs increase the net burden of a tax for taxpayers.

The sum of administration and compliance costs relative to the revenue generated by a tax is a commonly used measure of the operational efficiency of a tax structure or system. A tax may be more difficult to administer or comply with if definitions or categories are not clear, if the tax applies in only specific circumstances or to specific individuals or firms, or if options to change or conceal behavior are widespread.

A general rule for tax analysis

There is a general rule for economic analysis of taxes: *The only way to avoid a tax (legally) is to change your behavior.*

For instance, if a tax is imposed on the consumption of cigarettes, consumers can reduce their tax burden only by reducing the number of cigarettes consumed or by purchasing cigarettes in a different (lower-tax) location. And what if a consumer switches to cigarillos? Are they intended to be included in a "cigarette" tax? Similarly, a tax on the sale of gasoline can be avoided or shifted by firms only if producers sell less gasoline or sell it in a lower-tax jurisdiction. The rule also applies to broad-based taxes. An individual can reduce income tax liability only by earning less income or earning income in a lower-tax jurisdiction.[4]

This rule makes clear that tax incidence, tax efficiency, and administration cost are inherently connected. If individuals and businesses do not change their behavior in response to a tax change, then no efficiency cost is created, administration is straightforward, and determination of tax incidence is simple – the tax change is a burden only for those directly taxed. On the other hand, if individuals and businesses change their behavior because of the tax-induced price changes, then the tax change will have an efficiency cost and may make administration more difficult. Determination of tax incidence will be more complicated as individuals and businesses act to shift the tax burden to others.

There is an important corollary to this general rule. If the only way individuals and businesses can avoid tax burdens is by changing their behavior, it makes sense that the more an economic agent is willing to change behavior, the more of the tax burden that can be avoided. For instance, an individual who drives a car but stops driving entirely because of the imposition of a gasoline tax and switches to a bicycle obviously pays less of the gasoline tax than someone who continues to drive exactly the same amount as before the tax. But an efficiency cost may have been created if the bicycle transportation that this individual substitutes for driving is less preferred by that person (such as when it is cold or wet). A person who does not drive a car at all still may bear part of the gasoline tax if that tax is included in the prices of other goods this person consumes.

Single-market tax analysis

The easiest way to illustrate the general principles outlined here is to consider the effect of a tax on only one market – the market in which the tax is directly levied – called **partial-equilibrium analysis**.

A unit excise tax

Suppose that a tax of $\$t$ per gallon is to be imposed on the consumption of gasoline and that gasoline is a commodity provided in a competitive market, as represented in

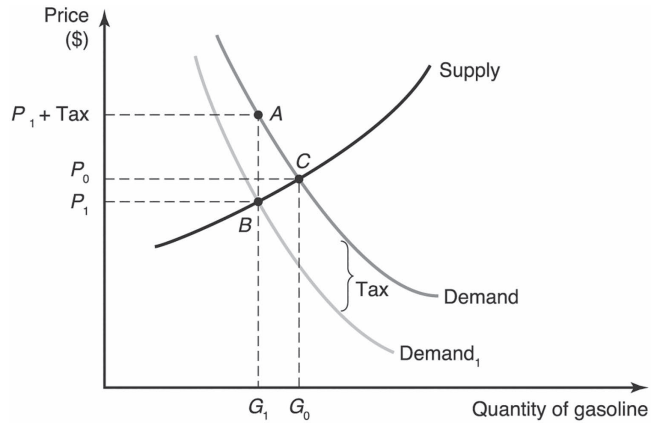


Figure 11.1 Incidence of a unit excise tax by shifting demand

Figure 11.1. Before the tax is imposed, the market is in equilibrium at price P_0 and quantity of gasoline G_0.

The imposition of a specific tax on a commodity can be analyzed by either shifting the demand curve down by the amount of the tax or shifting the supply curve up by the amount of the tax – the methods are equivalent. In this case, because the tax is imposed on the consumers, we analyze the tax by shifting the demand curve down to $Demand_1$. If consumers are to consume the same amount of gasoline once the tax is imposed, the price the seller charges would have to fall by the amount of the tax so that consumers would still pay P_0. That is exactly what demand curve $Demand_1$ represents. In essence, $Demand_1$ shows the amount of gasoline demanded for different prices received by the seller after tax, whereas demand curve D shows the amount demanded for different prices paid by the buyer. The two prices differ by the amount of the tax, so *Demand* and $Demand_1$ also differ by t.[5]

After the tax is imposed, the new market equilibrium is shown by the intersection of supply and $Demand_1$, the demand defined by the seller's price. As a result of the tax, the amount of gasoline sold falls to G_1, and the price charged by sellers falls to P_1. Remember, consumers must pay the seller's price plus pay the tax, so the full price to a consumer is $P_1 + t$, which is shown on the graph as the price from demand curve D at quantity G_1. In summary, the tax causes consumers to pay a higher price for gasoline and thus to buy less, while sellers also receive a lower price for gasoline than they did before the tax.

The same results are obtained if the tax is analyzed by shifting supply. Suppose that a tax of $\$t$ per gallon of gasoline is levied on the sale of gasoline and collected from sellers. Such a tax increases the marginal cost of selling gasoline by exactly $\$t$ and thus can be represented as shifting the supply curve up to $Supply_1$, as shown in Figure 11.2. Because the sale of gasoline is more costly to sellers than previously, less will be offered for sale or supplied at every price. The original supply curve shows the quantity supplied for different prices received by the seller excluding the tax, whereas the new supply curve shows the amount of gasoline supplied for different prices including the tax.

The new market equilibrium is shown by the intersection of *Demand* and $Supply_1$. As before, the amount of gasoline sold falls to G_1, the price paid by consumers rises to P_2 (equivalent to $P_1 + Tax$ in Figure 11.1), and the price received by the seller after paying the tax falls to $P_2 - Tax$ (equivalent to P_1 in Figure 11.1). These results are the same results that were obtained by analyzing this tax with a demand shift. But this illustrates a more important point than just the equivalence of these two analytical methods. In a competitive market, it

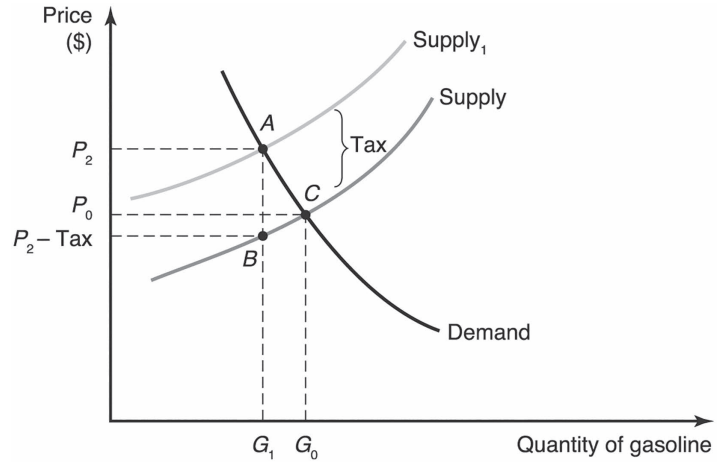


Figure 11.2 Incidence of a unit excise tax by shifting supply

does not matter for incidence and economic effects whether a given unit tax nominally is levied on or collected from sellers or buyers – a unit tax levied on consumers produces the same market effects as the same tax collected from sellers.

Incidence

Who bears the revenue burden of this tax? Both consumers and sellers of gasoline bear the tax burden. Referring to Figure 11.1, the price consumers pay has risen from P_0 to $P_1 + t$, which is less than the amount of the tax. The price sellers receive has fallen from P_0 to P_1. The total tax revenue collected is tG_1, with the consumers' share equal to $(P_1 + t - P_0)G_1$ and the sellers' share equal to $(P_0 - P_1)G_1$. In this particular case, consumers bear a larger portion of the burden than sellers. You should understand, however, that the burden on sellers is a burden on people, not some business entity. The sellers' burden may result in lower profits to the owners, lower wages to employees, or lower prices for other factors of production. How the sellers' burden is divided among factors cannot be determined in single-market analysis.

What determines the division of revenue burden between consumers and sellers? Following the general rule for tax analysis, the agents (consumers or sellers) who are less willing to change their behavior will bear the larger share of the burden. Willingness to change behavior as a tax alters prices is characterized by the price elasticity. If consumers are more willing to change behavior than sellers, then demand will be relatively more price elastic than supply, and sellers will bear the greater burden of any tax. In contrast, if sellers are more willing to change behavior, then supply will be more price elastic than demand, and consumers will bear the greater share of the revenue burden.

Following this rule, two special cases are presented in Figure 11.3. In Figure 11.3a, *supply is perfectly inelastic*, reflecting the fact that the same quantity will be supplied regardless of price; in essence, there is a fixed amount of this product. The imposition of a tax is shown by shifting the demand curve down by the amount of the tax, so price falls from P_0 to P_0 minus tax. Because sellers will not change their behavior – that is, alter production – as the tax changes the price, sellers bear the full burden of this tax. In Figure 11.3b, the opposite situation is depicted. If *demand is perfectly inelastic*, then consumers will not change their

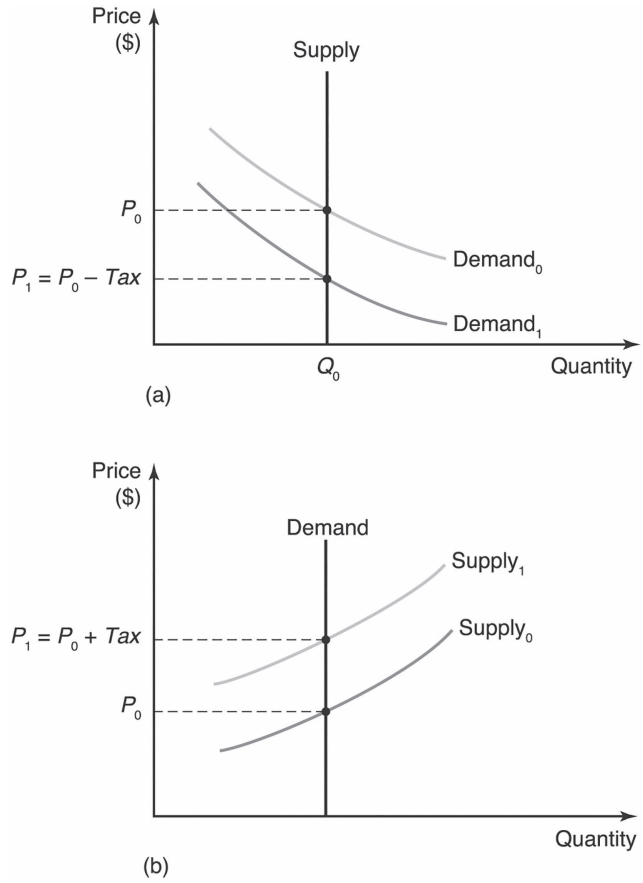


Figure 11.3 Incidence with perfectly inelastic supply and demand

behavior as a tax alters price, so the consumers' price rises by the full amount of the tax, and thus consumers bear the full burden of the tax.

Efficiency

This unit excise tax on gasoline also creates an efficiency cost. When the tax is imposed and the consumers' price rises, consumers move up along their demand curve and purchase less gasoline. Presumably, consumers are substituting more fuel-efficient vehicles, traveling less, walking or biking, or purchasing gasoline in a different market, perhaps from stations in a neighboring locality. In any case, consumers have been induced to switch to less desirable alternatives, creating an efficiency cost. Similarly, as the tax causes the sellers' price to fall, sellers move down along their supply curve and produce less gasoline. Instead, those resources previously used for gasoline production are switched to the production of something else. If those resources cannot be used as efficiently in the production of those other commodities, an additional efficiency cost is created.

Measurement of the efficiency cost due to changes in consumers' behavior for a simplified case is depicted in Figure 11.4. In this case, the market supply curve, which arises from

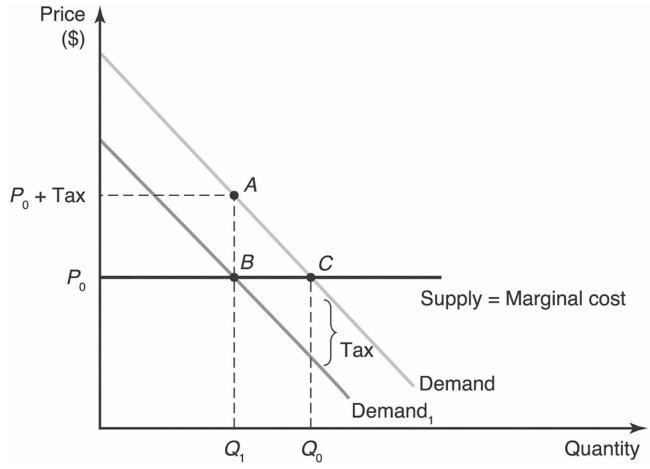


Figure 11.4 Efficiency cost of a unit tax

the firm's marginal cost of production, is perfectly elastic (horizontal). The assumption of perfectly elastic supply means that any amount of the product can be supplied at the market price but that none will be supplied if the price falls below that market equilibrium. One example of such a situation is a product that is sold in many locations but whose price is set in a national or world market according to costs. For instance, once the world price of oil is determined, sellers need not sell oil in any market where the price is below that world price, because they can sell in other markets at the world price. This exact situation is common in the world of state-local government finance, with individual states or localities being small enough that they are price takers for goods sold in national (or world) markets.[6]

The imposition of a tax is analyzed by shifting the demand curve down by the amount of the tax. As a result, the quantity falls from Q_0 to Q_1, the sellers' price remains constant at P_0, and the consumers' price rises by the full amount of the tax to $(P_0 + tax)$.[7]

The efficiency cost is the difference between the benefit to consumers and opportunity cost to society of each unit of the product forgone – that is, the difference between marginal social benefit and marginal social cost. Assuming that one can approximate marginal social benefit by demand, the efficiency cost of the tax is the difference between *Demand* and marginal cost (*MC*) for those units no longer produced due to the tax $(Q_0 - Q_1)$. Thus, the efficiency cost is represented graphically by triangle *ABC* in Figure 11.4. The tax generates revenue of tQ_1. The resources no longer needed to produce as much of this product, equal to $(Q_0 - Q_1)MC$, are shifted to the production of other products at no efficiency loss because marginal cost is constant.

The efficiency cost, which is represented by triangle *ABC*, can be computed with a simple formula. The area of any triangle is equal to ½ × the length × the height. Applying that formula to triangle *ABC*, the area is $^1/_2(AB)(BC)$, which equals $^1/_2t(Q_0 - Q_1)$. Half the tax times the change in quantity can be rewritten to produce the result that

$$\text{Efficiency Cost} = {}^1/_2t^2EQ/P$$

where E = price elasticity of (compensated) demand.[8] In other words, the efficiency cost depends on the price elasticity of demand, the amount purchased, and the tax rate squared.

This last factor is very important because as a tax rate is increased, the efficiency cost rises at a faster quadratic rate.

There are three important warnings about the use of this formula to approximate efficiency costs. First, the formula applies exactly only if the demand curve is linear so that the efficiency cost is represented exactly by a triangle. Second, the formula applies only if the supply function is perfectly elastic (horizontal). If there is some elasticity to supply (the function is upward sloping), then the formula is more complicated and includes the price elasticity of supply. Third, the formula suggests that if the price elasticity of demand is zero (the demand curve is perfectly inelastic or vertical), then the efficiency cost would also be zero. This is generally not correct. The problem arises because this is single-market analysis and thus ignores the behavior of consumers in other markets. Because the price of the taxed product has changed, consumers may alter their behavior in other markets (by purchasing less of some other product or by working less, for example), which would create an efficiency cost. This possibility is examined in the appendix to this chapter.[9]

One other case exists in which a tax may not have any excess burden or efficiency cost. You learned in Chapter 2 that efficiency requires that marginal social cost equal marginal social benefit. The production or consumption of some commodities produces external costs, however, so the social cost of the activity is greater than the private cost and private benefit. Air pollution resulting from gasoline combustion and the use of automobiles is one example. In such a case, a tax can improve economic efficiency by forcing consumers or producers to perceive the full costs of their activity. If automobile use imposes costs on everyone that are not taken into account by drivers, there will be too much auto use and too much air pollution from society's viewpoint. A tax on auto emissions or a tax on gasoline use would make drivers see the full cost of their activity and lead to less use and less pollution. An excise tax used to offset such an externality is often called a **Pigouvian tax**, named after the British economist A. C. Pigou (1877–1959).

How is a percentage tax different?

The analysis of the common percentage or ad valorem tax, such as a sales tax of 5 percent of the price, is only slightly different from the previous analysis for a unit tax: that is, a tax of so many dollars per unit of product, such as $.18 per gallon of gasoline. As before, the tax can be analyzed by shifting the demand curve down by the amount of the tax per unit or by shifting the supply curve up. The difference is that the tax per unit depends on the price. If the tax rate is r percent, then

$$\text{Tax Revenue} = r(\text{Price})(\text{Quantity})$$
$$\text{The tax per unit is Tax Revenue/Quantity} = r(\text{Price})$$

Obviously, the higher the price, the larger the tax per unit in dollars and the more the demand or supply curve must be shifted to reflect the tax. In Figure 11.5, the demand curve is shifted down by the amount of the tax, with the distance being larger the higher the price is.

Although the analysis of the efficiency cost of this tax is exactly the same as for the unit tax, the formula to compute the approximate efficiency cost is different, as shown below:

$$\text{Efficiency Cost} = {}^1/_2 r^2 EPQ$$

As before, the efficiency cost depends on the price elasticity of demand, the amount of the commodity purchased (now measured in dollars), and the tax rate squared.[10]

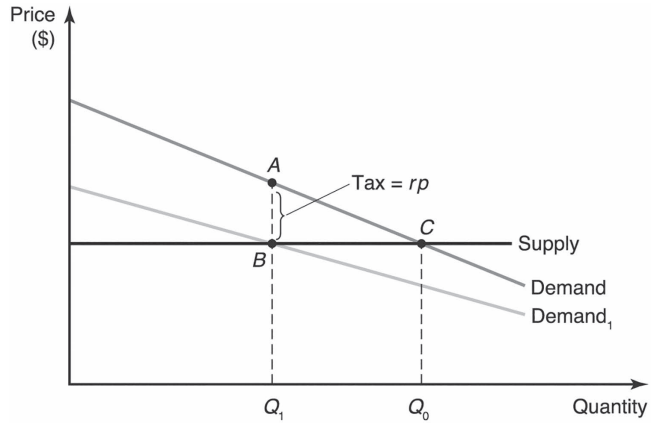


Figure 11.5 Analysis of a percentage tax

Incidence and efficiency of a subsidy

Single-market analysis also can be applied to examine the incidence and efficiency of a subsidy offered in that market. A **subsidy** is a payment from the government that lowers the price or cost of some economic activity to individuals or businesses. Examples among state-local government programs include food or utility subsidies, which reduce the price of purchasing food for eligible households; mortgage revenue bonds sold by states in order to make low-interest housing loans to eligible families, which reduce the price of homeownership; state or local support of higher education, which allows the private price of higher education to fall short of total cost; and perhaps Medicaid, which pays all or part of the cost of health care for certain low-income persons (although some would argue that health care is not sold in a competitive market).

Suppose that the government offers a subsidy of $\$S$ per unit consumed or sold for a commodity sold in a competitive market. For clarity, assume that the supply of this product is perfectly elastic, reflecting the idea that the price is determined in some broader market. As with taxes, the subsidy can be analyzed by adjusting either supply or demand. In Figure 11.6a, the subsidy on units sold reduces the marginal cost of producers and thus is analyzed by shifting supply down by the amount of the subsidy, S. As a result of the subsidy, the price to consumers falls by the amount of the subsidy (from P_0 to $P_0 - S$), and quantity bought and sold rises from Q_0 to Q_1. Because we have assumed that supply is perfectly elastic, the price received by sellers including the subsidy remains at P_0. Thinking about the incidence of the subsidy, then, all the benefits go to consumers, who see the price fall by the full $\$S$.

If the subsidy were offered directly to consumers, an equivalent analysis results from shifting the demand curve up by the amount of the subsidy, as in Figure 11.6b. For the same market conditions, the price to consumers falls to $P_0 - S$ and consumption rises to Q_1.[11]

Continuing the parallel to tax analysis, the benefits of a subsidy are divided between consumers and sellers based on the relative elasticities of demand and supply. If supply is perfectly elastic, as in Figure 11.6, then price is set at a given level and consumers benefit from the full subsidy. Sellers can lower the price to $P_0 - S$ and still receive the world price, P_0, when the subsidy is added. If the quantity supplied is fixed (perfectly inelastic supply), then suppliers get all the benefits from the subsidy. Consumers continue to pay the original price for the fixed amount of the product and sellers pocket the subsidy.

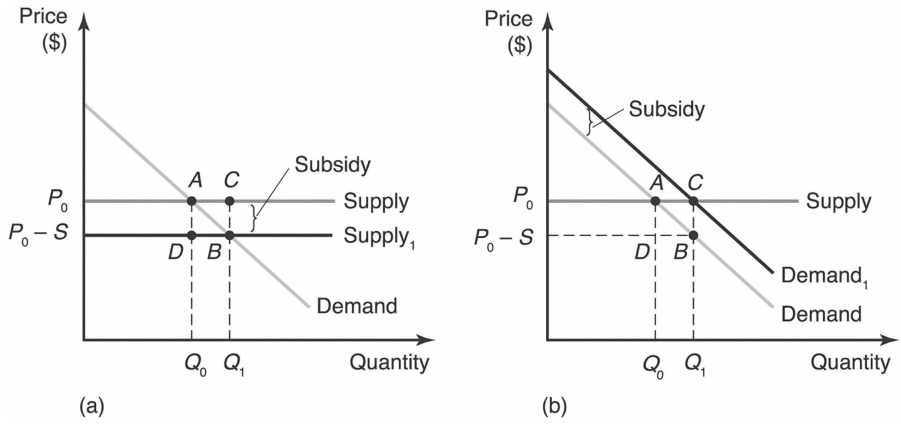


Figure 11.6 Incidence and efficiency effects of a subsidy

In addition to costing the government a direct amount, the subsidy also has an efficiency cost. In Figure 11.6a, the subsidy lowers the price and provides benefits to all those who would have purchased this good without the subsidy (Q_0), and the subsidy provides benefits to those consumers who are induced to consume more of the good (from Q_0 to Q_1) due to its lower price. The magnitude of the benefit to original purchasers is shown graphically by the area $S\ Q_o$ or $P_0ADP_0 - S$, and the benefit to new purchasers is represented by the area ADB, which is the difference between the marginal benefit (demand) to those consumers for each unit from Q_0 to Q_1 and the marginal cost (supply). But the sum of these two benefits, represented by area $P_0ABP_0 - S$, is less than the amount of the subsidy paid, represented by area $P_0CBP_0 - S$. The difference between the two, triangle ABC, represents the efficiency cost or excess burden of the subsidy.

This efficiency cost also can be explained or understood from a different perspective. For each unit from Q_0 to Q_1, the marginal social cost (Supply) is greater than the marginal social benefit (Demand). The subsidy makes it seem that this commodity is cheaper than it really is and thus induces society to allocate too many resources to its production or consumption. For instance, if a state subsidizes the consumption of housing, then consumers ignore the source of the subsidy, believe that housing is now less expensive, and increase consumption of housing. That increase in housing consumption may require that consumers change their behavior elsewhere as well, perhaps consuming less of something else (clothing) or working more. Because consumers made this change due to the subsidy, they really prefer more clothing or leisure. The subsidy has induced consumers to make an inefficient choice.

As with taxes, there is one important qualification to this efficiency analysis. As noted in Chapter 2, if a product provides benefits to other than the direct consumers, which occurs if there are externalities, then a subsidy is called for to offset the external benefits. For instance, if education provides benefits to everyone in society in general, then each person would underestimate the benefits and choose too little education from society's viewpoint. In that case, a subsidy for education corrects an inefficiency rather than creating one.

Limitations of single-market analysis

Single-market analysis is helpful in illustrating the general principles of tax analysis, although it is often not very precise for two reasons. First, the effects in other markets, whether for

other goods or for the same good in a different location, are not considered. Second, the manner in which any sellers' burden gets distributed among the various factors of production is not analyzed explicitly. Although this may not be much of a problem in some cases where intermarket effects are small, it is often the case that intermarket effects can be substantial, particularly in the world of state-local governments with relatively easy mobility among jurisdictions. Therefore, we turn now to multimarket analysis, effectively applying the same type of supply-and-demand analysis not only for the market in which the tax is directly imposed but also for other, closely connected markets.

Multimarket tax analysis

Effects in parallel markets

Here we consider the effects of a tax, including the effects of the tax in the markets for complementary or substitute goods. As an example, we can expand consideration of the effects of a unit tax of $\$t$ on gasoline to include those in the market for motor scooters, assuming that cars and motor scooters are substitutes. That situation is shown in Figure 11.7, with the simplifying assumptions of a perfectly elastic supply of gasoline and motor scooters. Given the national price for Best Unleaded Gasoline and Your Favorite Motor Scooter, sellers will require that price in all markets in the long run. As before, the imposition of the unit tax on gasoline is represented by a downward shift in the demand for gasoline (to $Demand_G^1$). As a result, the quantity of gasoline consumed decreases, and the consumers' price rises, in this case by the full amount of the tax, because of the perfectly elastic supply. Consumers now purchase G_1 units of gasoline at a price of $P_0 + t$.

Because the price of gasoline has increased, consumers will act to reduce consumption, perhaps by substituting 80-mile-per-gallon motor scooters for 20-mile-per-gallon cars. Thus, the demand for motor scooters is expected to increase, shown by the rightward shift of demand from $Demand_M$ to $Demand_M^1$ in the motor scooter market. Given the assumption of perfectly elastic supply, the quantity of motor scooters purchased and produced rises, but the price remains the same in the long run. By consuming less gasoline, consumers have reduced the amount of gasoline tax they pay: consumers pay tG_1 rather than tG_0.

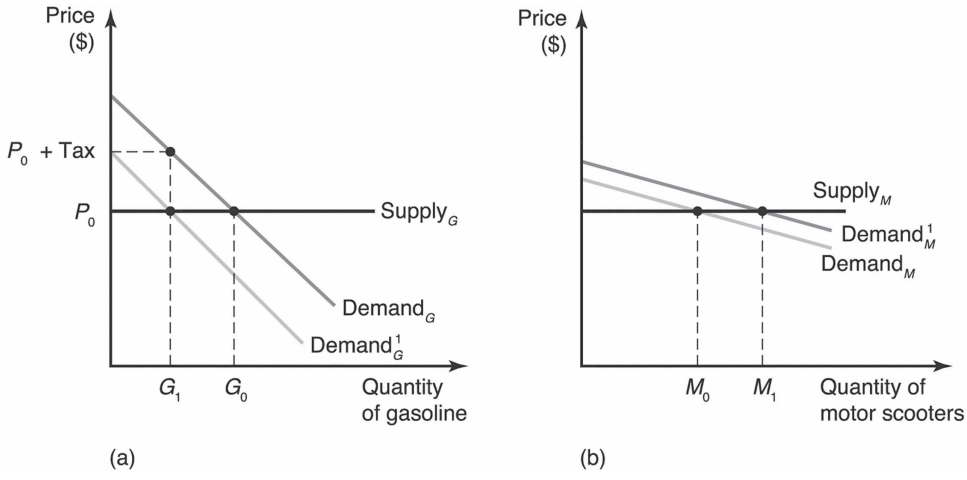


Figure 11.7 Multimarket analysis of a unit excise tax with constant costs

The situation is only slightly more complex if constant costs do not prevail, and the supply curves in both markets are not perfectly elastic but are positively sloped, as depicted in Figure 11.8. In this instance, as previously discussed, the unit tax on gasoline causes both an increase in the consumers' price (but by less than the amount of the tax) and a decrease in the sellers' price. The increase in the consumers' price of gasoline causes an increase in the demand for motor scooters, which now brings about an increase in the price of motor scooters due to the upward-sloping supply. Because additional numbers of scooters cost more to produce than do the previous ones, the price must rise to make that extra production worthwhile.

Because of the scooter price increase, the original motor scooter consumers (those who purchased quantity M_0) also are hurt by the gasoline tax; the higher motor scooter price is charged to all consumers, not just those who switch from cars due to the gasoline price increase. Motor scooter consumers pay an increased amount equal to $(P_1 - P_0)M_0$. But this amount is not transferred revenue to the government, nor is it an efficiency cost lost to the economy. This extra amount consumers pay is transferred to the sellers through the higher price of motor scooters. To complete this multimarket analysis, then, it is also necessary to expand the analysis to the factor markets behind these consumer goods markets.

Effects in factor markets

Changes in consumption away from gasoline and cars and toward motor scooters as a result of an excise tax on gasoline also may have implications for the factors of production used in the production of those goods. Some of those potential implications are shown in Figure 11.9. The decrease in the consumption of gasoline could lead to a decrease in the demand for the services of tanker trucks to carry gasoline to wholesale distributors and retail outlets. The immediate effect, given the number of trucks T_0, is a decrease in their value to P_1. If the long-run supply of tanker trucks is perfectly elastic, as depicted in Figure 11.7a, then the effect will be a reduction in the number of tanker trucks over time, so the value of the trucks or the rental rate for tanker-truck services returns to the previous level. Of course, the reduction in the number of tanker trucks or in the amount of tanker-truck service used may have implications for the drivers or producers of trucks.

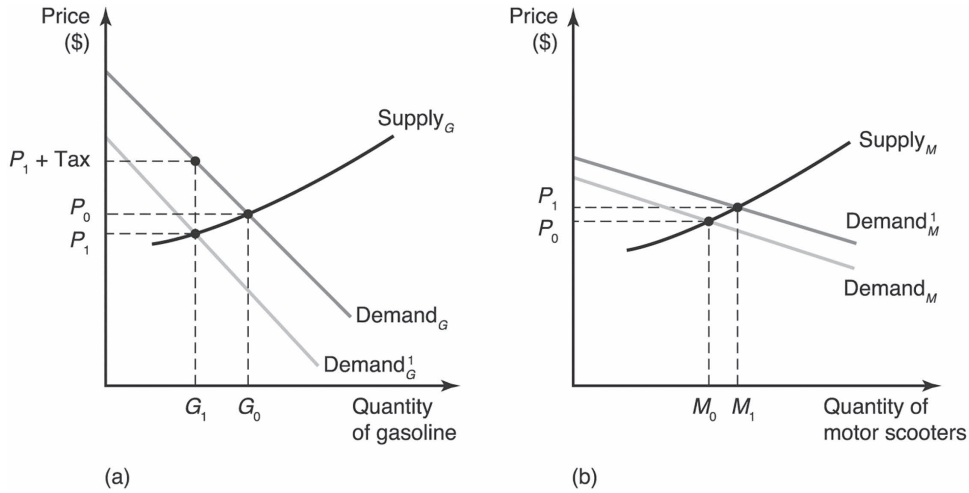


Figure 11.8 Multimarket analysis of a unit excise tax with increasing costs

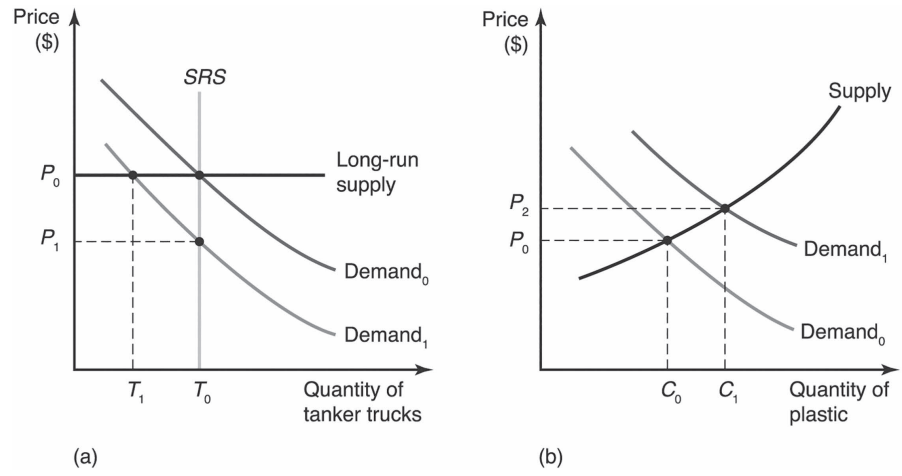


Figure 11.9 Effects of an excise tax on gasoline in factor markets

Similarly, the increase in the demand for motor scooters due to the tax on gasoline may increase the demand for plastic, assuming that motor scooters are constructed primarily from plastic (and little plastic is used in producing cars). In this instance, we assume that the long-run supply of plastic is positively sloped, thus requiring a price increase to induce more production. The tax on gasoline therefore has the effect of increasing the revenue to producers of plastic, who *benefit* from the gasoline tax. Figure 11.8 shows that motor scooter consumers pay an increased amount to motor scooter producers as a result of the gasoline tax. In the example, at least part of that gain to motor scooter producers becomes a gain to plastic producers. The excise tax on gasoline imposed a burden on gasoline consumers but also caused a transfer of resources from consumers to producers of plastic.

Obviously, this story can continue, for instance, by asking whether the gain to the plastic firms ultimately benefits workers in the industry or suppliers of chemicals used in plastic production. One important aspect of multimarket tax analysis is deciding into how many different markets or how many different stages of production to carry the analysis. The appropriate answer depends on the case, including both the economic conditions in a market, which determine how large a price change is expected, and the importance of that market for the equity or efficiency result.

Application to state and local government issues

Multimarket analysis is essential when dealing with state-local government taxes because the focus is often on the effect of a tax levied by one state or locality when there is mobility among states or local jurisdictions. Examples abound. A consumer may purchase from a store in a different location or order through a website. An individual may move his residential and work location to avoid an income tax, or an individual may change residential (but not job) location to reduce the residential property tax. Finally, a business may change its operating location to avoid a state business tax or local property tax. In all these cases, there might very well be economic effects in more than one market or location, both the one that imposes the tax and the one to which the economic activity moves. Multimarket tax analysis is required.

A simple relabeling of Figure 11.7 shows how the models in this chapter can be applied to these types of issues. Rather than thinking of one market for gasoline and one for motor

scooters, it is just as correct to let Figure 11.7a represent the market for gasoline in jurisdiction *G* and Figure 11.7b represent the market for gasoline in jurisdiction *M*. Before there are any taxes, gasoline sells for the same price in both locations. Now *G* imposes a $\$t$ unit tax on gasoline, so consumers in jurisdiction *G* pay a price equal to $P_0 + t$, which is greater than the price in *M*. Consumers in *G* now have the choice not only of switching to motor scooters from cars but also of purchasing gasoline at a station in jurisdiction *M*. Obviously, some consumers from jurisdiction *G* decide to buy their gasoline from a station in *M* where the price is lower because there is no tax.[12]

Why don't all consumers switch their gasoline purchases to a seller in *M*? They would, unless switching was costly or unless they are not aware of the price difference. It could be costly to buy gasoline at a gas station in *M* rather than a station in *G* if one had to drive, say 10 miles from one's house to the nearest gasoline station in *M*. In that case, the cost (both in money and time) of the drive could outweigh the tax savings on gasoline. In contrast, someone who works in jurisdiction *M* but lives in jurisdiction *G* could switch gasoline purchases to *M* at little extra cost.

What is the gain to jurisdiction *M* from more gasoline sales? Possibly, there are now more retailers in *M* and fewer in *G* or at least more employment in *M* and less in *G*. The increased retail sales activity in jurisdiction *M* could also mean that property values in *M* increase. These changes would benefit workers in *M* (regardless of where they live) and property owners in *M*. The increased retail activity could also (although it is not guaranteed) increase the tax revenue to jurisdiction *M* from property taxes or from a local sales or income tax, if one exists.

If the price of gasoline is not determined in a national market (which is shown by the perfectly elastic supply) but rather determined in each local market, then the supply curves in each jurisdiction would be positively sloped, as in Figure 11.8. In that case, as consumers switch their gasoline purchases from jurisdiction *G* to *M*, the price paid by consumers for gasoline in jurisdiction *G* will fall and the price in *M* will rise. The market now creates a natural constraint on the movement of purchases from *G* to *M*; in the absence of costs of changing purchase location, consumers will reallocate their purchases until the consumers' prices in *G* and *M* are again equal.

This analysis of the interjurisdictional effects of taxes using a standard multimarket model is not limited to taxes on consumer goods but can be applied just as easily to taxes on factors of production such as labor, land, and capital. Of course, firms' payments for these factors become the wages, rent, and profits received by individuals, so these factor taxes are sometimes referred to as taxes on the sources (as opposed to uses) of income. One common application applies for subnational government taxes on capital. The rate of return on capital investment is determined in a national (or world) market, so any one jurisdiction is a price taker; that is, the supply of capital to that jurisdiction is perfectly elastic (Figure 11.7). The suppliers of capital are individual investors, whereas the demanders are business firms. If one jurisdiction imposes a tax on capital, then the effect (just as with the gasoline tax in Figure 11.7) is expected to be a decrease in the amount of capital in the taxing jurisdiction and an increase in the other jurisdiction. These changes in the amount of capital are expected to have implications for consumers, workers, and landowners in both jurisdictions, implications that are considered in detail in Chapter 12.

Application 11.1: State sales taxes on food – multimarket analysis in practice

Most states levy general sales taxes on a wide variety of consumer goods, but most of the sales tax states either exempt sales of food (groceries) or tax food at a lower rate (see Chapter 13). Kansas is one exception where sale of food for home consumption is taxed at the

full 6.5 percent state general sales tax rate, with additional county and city taxes in some locations. However, in the neighboring state of Missouri, sales of food are taxed at a lower rate (1.225 percent compared to the state overall rate of 4.225 percent), and sale of food is exempt from sales tax in the neighboring states of Colorado and Nebraska.

Because food is transported easily and the market is worldwide, the supply to any one state is expected to be very elastic (perhaps essentially perfectly elastic). As a result, prices will differ by state due to the state tax differences. Because consumers near state borders may have some flexibility in deciding where to purchase groceries, some price elasticity to demand is expected. Thus, food price differences due to tax differences can affect food sales in multiple states.

Research conducted at the Kansas Public Finance Center at Wichita State University for kchealtykids shows this happening in Kansas, where there are food tax rate differentials between counties and especially along the state border.[13] The research finds "for every 1 unit increase in the tax difference index, food sales volume drops 9.769% per person per year." This translates to a decrease in food purchases of about $100 per person for every one-unit food tax difference. Of course, the decrease in food purchase in a location does not necessarily translate to a similar decrease in food consumption. Rather, consumers are more likely changing the location of food purchases. Indeed, the study concludes, "for bordering counties [in Kansas] consumers appear to readily shift their purchases to lower tax jurisdictions [in other states]."

The Kansas case is illustrated in Figure 11.10. The food tax difference (essentially an increase) is analyzed by shifting the supply up by the amount of the tax difference. Because a perfectly elastic supply is assumed, the price of food rises by the full amount of the tax difference. As a result of that tax and price increase, quantity sold falls. Thus, Kansas consumers shift food purchases to lower-tax-rate counties or to neighboring states where the food tax rate is lower.

In addition to reducing food sales in Kansas, it is easy to trace at least two other effects in other markets due to the relatively high tax rate in Colorado. First, as a result of the changes in behavior of some consumers, demand for and sales of food in neighboring states, particularly Missouri, Colorado, and Nebraska, are expected to increase. Thus, these states receive increased economic activity (employment, property values). Second, if consumers change

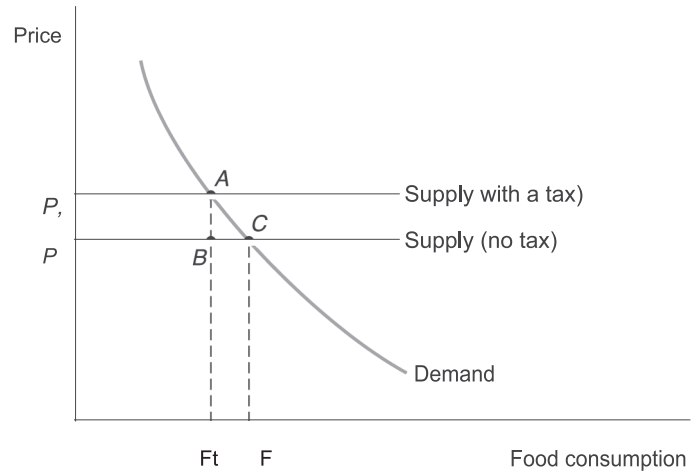


Figure 11.10 Kansas food tax difference

the location of food purchases, they might also change the location of purchases for other goods as well. One can imagine consumers making a single shopping trip for food and other goods. Thus, the decrease in sales because of the food tax difference could spill over to markets for other commodities as well.

The food tax difference also created an excess burden or efficiency cost, represented by area *ABC* in Figure 11.10. In practical terms, this increased efficiency cost arose from the changes in consumer behavior – taking longer shopping trips to avoid the food tax difference, for example.

Summary

Tax incidence is the analysis of which individuals bear the ultimate burden of taxes: that is, the burden after the economy has adjusted to any changes caused by the taxes. Incidence is defined as the change in private real incomes and wealth because of an adoption or change of a tax. This is different from statutory incidence, the actual payments made by taxpayers from whom the tax is collected.

After the burden of a tax change due to the changes in prices of goods and services is determined, the incidence of the tax is evaluated on the basis of both **horizontal equity** and **vertical equity**.

The general rule of tax analysis is that the only way to avoid a tax (legally) is to change behavior. Consumers or sellers who are less willing to change their behavior will bear the larger share of the burden.

The efficiency cost of a tax change arises because consumers or producers change their production or consumption so that marginal social cost no longer equals marginal social benefit.

Tax incidence, tax efficiency, and administration cost are inherently connected. If individuals and businesses do not change their behavior in response to a tax change, then no efficiency cost is created, administration is straightforward, and the tax change is a burden only for those directly taxed. If individuals and businesses do change their behavior, then the tax change will have an efficiency cost, and determination of both tax incidence and tax administration will be more complicated.

Multimarket analysis is essential when dealing with state and local government taxes because the focus is often on the effect of a tax levied by one state or locality when there is mobility among states or local jurisdictions.

Perfectly elastic supply means that any amount of the product can be supplied at the market price, but none will be supplied if the price falls below that market equilibrium. This situation is common in state-local government finance, with individual states or localities being small enough that they are price takers for goods sold in national (or world) markets. With perfectly elastic supply, the full tax burden falls on consumers.

Discussion questions

1 Suppose that the local legislative body in Your College Town (YCT) decides to levy a tax of $.50 for each 12 ounces of beer sold in the city (both by the drink and packages). The city sees the tax as a way to have students pay more for the city services they receive. Suppose that the beer market in YCT is competitive, the long-run industry supply in YCT is perfectly elastic, and the demand for beer in YCT is very price elastic.

   (a) What will the effects of the tax be on the price of beer in YCT, the amount of beer sold, and the number of beer stores and bars in YCT?

(b) Why might the demand for beer in YCT be so price elastic, given that it is known that overall demand for beer is rather inelastic? In view of that, what do you expect the effect of the tax will be on beer sales and the number of stores and bars in surrounding cities?

2 "If supply of a good is perfectly inelastic, then the sellers of that good are expected to bear the full revenue burden of an excise tax on the sale or consumption of that good." Evaluate this statement. Can you think of any examples of goods whose supply is (at least almost) perfectly inelastic?

3 If a unit tax is increased from \$1 per unit sold to \$2, the efficiency cost of the tax more than doubles. Explain.

4 Under what conditions would it be possible for an excise tax to have no efficiency cost and, in fact, increase economic efficiency? Give an example or two.

Appendix: Indifference curve analysis of tax efficiency

The model of consumer demand using indifference curves and budget lines was presented in the appendix to Chapter 3. Those tools can be used to describe more carefully the consumption changes and resulting efficiency cost from taxation than is possible with basic supply-and-demand analysis. Therefore, the consumer theory model is used in this appendix to compare excise taxes on specific commodities with a general lump-sum tax.

Suppose that consumers, who are price takers and have fixed amounts of resources (income), choose between gasoline and other goods. The consumer's budget before any taxes is shown by line *YX* in Figure 11A.1. This consumer can consume \$*Y* of other goods by purchasing no gasoline or can consume a maximum of *X* gallons of gasoline by consuming no other goods. For this consumer, the consumption choice that gives highest utility is bundle B_0, implying that both gasoline and other goods are consumed.

If an excise tax is levied on the consumption or sale of gasoline and thus the price of gasoline rises, the maximum amount of gasoline this consumer could afford, given a fixed income, decreases to *W* gallons. Now the consumer's budget limits choices to those on line

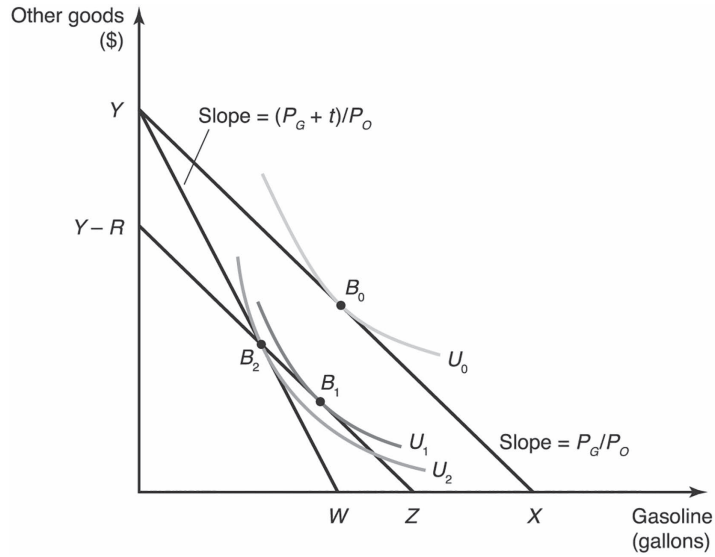


Figure 11A.1 Indifference curve analysis of a unit excise tax

YW. Because the slope of the budget line represents the ratio of the price of gasoline to the price of other goods and because the tax causes an increase in the price of gasoline, the budget line becomes steeper, reflecting the fact that gasoline is now relatively more expensive compared to other goods than before the tax. Given the new budget, the consumption bundle that gives this consumer highest utility is B_2. In this case, the consumer purchases less gasoline and spends less on other goods due to the tax. The amount of tax paid by the consumer is shown as the vertical distance between the two budget lines $[Y - (Y - R)]$, which is the difference between income that would be available to be spent on other goods if there were no tax and that actually spent.

The same amount of tax revenue could have been collected by a lump-sum tax equal to amount *R*, which would create budget line $(Y - R)Z$. Given those consumption choices, this consumer would receive highest utility at bundle B_1. The lump-sum tax also induces this consumer to reduce consumption of gasoline and other goods, but the decrease in gasoline consumption is less than occurs with the gasoline tax because the price of gasoline has not increased. With a lump-sum tax, the change in consumption occurs solely from the reduced available income.

Both taxes reduce this consumer's utility from private consumption (ignoring the utility received from the public services financed by the tax revenue), but the excise tax on gasoline reduces utility more than does the lump-sum tax, even though both taxes raise the same amount of revenue. Although both taxes have the same revenue burden, the excise tax has an **efficiency cost** or **excess burden**. That efficiency cost can be measured by the difference between utility level U_1 and utility level U_2. The efficiency cost of the excise tax arises because the tax alters relative prices and thus causes an extra change in the consumption pattern beyond that caused by the tax revenue.[14]

This efficiency cost will exist regardless of which bundle on budget line *YW* is selected because budget line *YW* is always steeper than line $(Y - R)Z$. In particular, even if the consumption of gasoline is unchanged with the excise tax, an equal-yield lump-sum tax would provide this consumer higher utility than would a gasoline tax. This is shown in Figure 11A.2. When the tax is levied and the budget line shifts to *YW*, a consumer with

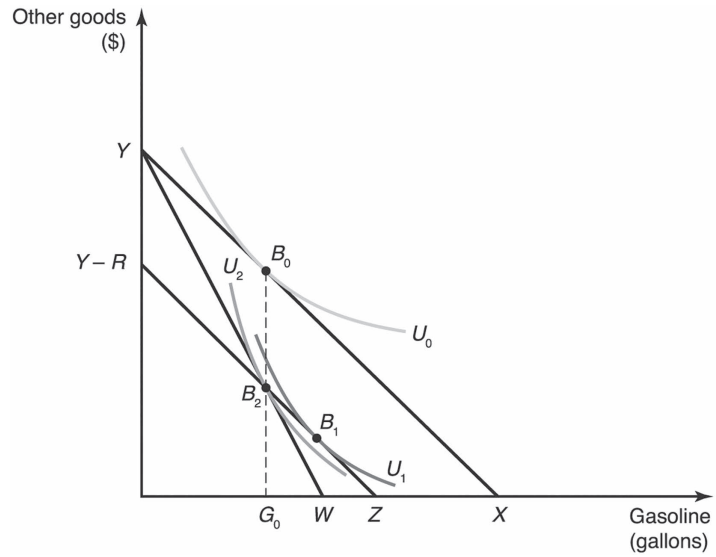


Figure 11A.2 Excess burden of an excise tax with constant consumption

preferences represented by these indifference curves keeps consuming the same quantity of gasoline, G_0, and reduces consumption of other goods. Utility and gasoline consumption would be higher with a lump-sum tax. Thus, to find the source of an excess burden, it is necessary to look at not just changes in behavior in the taxed market but also changes in economic behavior in all other markets.

Notes

1 Charles E. McLure Jr., "Commodity Tax Incidence in Open Economies," *National Tax Journal*, *17* (June 1964): 187.
2 A third possibility is absolute incidence, which is the incidence of a tax change when neither other taxes nor government spending is changed. The tax change would alter the government surplus or deficit and have macroeconomic effects.
3 If input *Y* is also used to produce other products, then the analysis is still more complicated. Consumers of those other products could be affected.
4 It is sometimes argued that businesses also can avoid a tax by raising prices. But higher prices are expected to reduce the amount demanded by consumers, requiring lower output. Thus, the businesses would change production.
5 It is said that demand is shifted *down* (rather than to the left) because the change is of $\$t$, and dollars are measured vertically on this graph.
6 Even for commodities sold in national markets, it is possible that prices may differ by location because of transportation costs, for instance. But for some pricing strategies, firms will bear transportation cost differences and charge equal prices in all locations, such as the single "destination charges" used by automobile manufacturers. For a discussion of the theoretical issues, see Martin Beckmann (1968).
7 Because supply is perfectly elastic, all the tax burden is borne by the consumers. If the sellers' price fell below P_0, none of the product would be offered for sale as the price would be less than marginal cost.
8 The price elasticity of demand, *E*, is the percentage change in quantity/the percentage change in price. That is, $E = [(Q_0 - Q_1)/Q_0]/[t/P_0]$. Solving for $(Q_0 - Q_1)$ and substituting into the equation for area gives the result.
9 For a good discussion, see Harvey Rosen (1999, 285–294).
10 Again, the area of the efficiency cost triangle is $\frac{1}{2}(AB)(BC)$, which equals $\frac{1}{2}rP(Q_0 - Q_1)$. Because $Q_0 - Q_1$ equals rEQ, the efficiency cost area equals $\frac{1}{2}r^2EPQ$.
11 Subsidies can be thought of as negative taxes, and thus the analysis is exactly reversed. A tax increases producers' costs and shifts supply up vertically, while a subsidy reduces costs and shifts supply down. A tax reduces demand (shifting it down), whereas a subsidy increases demand (shifting it up).
12 It is just as correct to think that both *G* and *M* tax gasoline, but the tax in *G* is higher by $\$t$.
13 https://governor.kansas.gov/wp-content/uploads/2019/11/6c_Cross-Border-Shopping-White-Paper-FIN.pdf. The research paper is Arwiphawe Srithongrung, "Consumers' Behavioral Response to Sales Taxes on Food in Kansas." *Public Finance and Management*, Spring 2017.
14 The revenue burden of the tax is the difference between U_0 and U_1.

Selected readings

Gruber, Jonathan. *Public Finance and Public Policy*. New York: Worth Publishers, 2013. See Chapters 19 and 20.

Oates, Wallace E. *Fiscal Federalism*. New York: Harcourt Brace Jovanovich, 1972. See Chapter 4.

Rosen, Harvey S., and Ted Gayer. *Public Finance*. New York: McGraw-Hill/Irwin, 2010. See Chapters 14 and 15.

12 The property tax

Headlines

Property assessments . . . detail the widespread hit to property in Manhattan[1]

"Property tax bills going out this month are revealing the carnage wrought by the pandemic on New York City's commercial real estate market.

From the Empire State Building to the Four Seasons, property owners saw the value of their buildings drop. The lower assessments stand to provide tax relief, but also serve as an ominous reminder of the damage done to commercial buildings as COVID-19 emptied out Manhattan.

All told, New York expects property tax revenue to drop by $1.6 billion, or about 5%, in the coming fiscal year. That's the most significant decline since the early 1990s, and a major blow to the city's largest source of revenue.

Just about every corner of commercial real estate was touched. Office buildings saw their market value for tax purposes drop by 16% citywide, according to data released last month by the Department of Finance. Hotels and retail property sank more than 20%."

Data availability

The Governments Division of the US Census Bureau is the major source of data about the revenue from state and local taxes, including property taxes. These data are reported annually in several different reports. State and local government tax collections are reported quarterly (www.census.gov/data/tables/2020/econ/qtax/historical.Q4.html). Separately, all state and local government finances (www.census.gov/programs-surveys/gov-finances/data/datasets.html) also are reported, but with a year or two lag. As noted throughout the book, you may access these data directly from the census or by using the valuable and easy-to-use data tabulation utility maintained by the Urban Institute (https://state-local-finance-data.taxpolicycenter.org/pages.cfm).

The Lincoln Institute of Land Policy, in cooperation with George Washington University, provides the most detailed information about property taxes at a site called Significant Features of the Property Tax (www.lincolninst.edu/research-data/data-toolkits/significant-features-property-tax). The property tax database

DOI: 10.4324/9781003030645-16

includes fundamental information on a state's property tax rates and tax limits, definitions of what considered "real" and "personal" property, how the value of property for tax purposes is "classified," and property tax relief programs. The State-by-State Property Tax at a Glance section includes brief narratives describing the property tax in each state. Particularly helpful is a visualization tool that allows you to compare differences in property taxation through a map of all 50 states. Census of Governments data related to property taxation and all state/local general revenue also is available at the Lincoln/GWU website for observation or download to a spreadsheet.

The property tax is of tremendous fiscal importance but is also perhaps one of the most confusing and least understood of local fiscal institutions. Indeed, Dick Netzer has written "No major fiscal institution . . . has been criticized at such length and with such vigor; yet no major fiscal institution has changed so little."[2] The property tax differs from most other taxes in that the tax base often must be estimated, multiple governments select a tax rate that is simultaneously applied to that base, and it applies to both individuals and businesses. The complexity and resulting lack of understanding has contributed to popular disapproval of property taxes and proposals to substantially reduce the property tax, substitute alternative revenue sources, or even eliminate the tax entirely.

Taxpayers often perceive the property tax as unfair – unfair to particular groups of taxpayers (homeowners, senior citizens, farmers, and so on), unfair because increases in property value are taxed without income to offset the higher tax, unfair because of inefficient or corrupt administration, and unfair in how burdens are distributed among income groups, and it provides unfair funding for local education because of disparities in property values. Economists and other tax analysts focus on how the tax influences the overall market for property and its effects on housing consumption, location decisions of both households and businesses, and local government decisions about the efficient quantity of public services. In many cases, it seems that many popular perceptions about the property tax are inconsistent with the research evidence and understanding.

Accordingly, after presenting information about the magnitude of property taxes, the first half of this chapter focuses on the mechanics of property taxation: how the base of the tax is defined and measured, what political agents have responsibility for setting tax rates and how those rates are measured, how tax liabilities are determined and change over time, and what policies are used to reduce property taxes overall or to alter the distribution of taxes among different types of properties and taxpayers. In the second half of the chapter, we focus on analyzing the economic effects of property taxes. Those effects include equity issues – that is, the effect on the distribution of the tax burden – and efficiency questions, such as the effects of the tax on the amount, type, and location of property selected.[3]

Reliance on property taxes

In fiscal year 2019, state-local government property taxes generated $577 billion of revenue, representing about 31 percent of total state and local government taxes and about 17 percent of the total general revenue of state-local governments. Property taxes are a larger source of revenue than either general sales taxes or income taxes. For 2019, they amounted to about

$1,760 per person and 3.1 percent of personal income. Preliminary data show that the property tax collections had increased to $628 billion for FY 2020.

There are two ways to think about the magnitude of property taxes. Which government collects the greatest amount of property taxes, and which type of government relies on the tax relatively the most? The property tax is primarily a source of revenue for local government, with about 97 percent of all property tax revenue going to local governments, as shown in Figure 12.1. Independent school districts collect the largest amount of property taxes, 40 percent of the total, with county governments and municipalities (cities) each receiving 23 percent.

In 2017, property taxes provided almost 30 percent of the general revenue of local governments, second only to state aid in importance (Figure 12.2). Property taxes provide more than one-third of general revenue for public schools nationally, about 28 percent of revenue to county governments, and about a quarter of revenue for cities. Townships, many of which provide public services in more rural areas, are most reliant on property taxes where they account for about 62 percent of revenue.

The clear long-run trend is that local government reliance on the property tax declined steadily until the end of the twentieth century. Property taxes provided 48 percent of

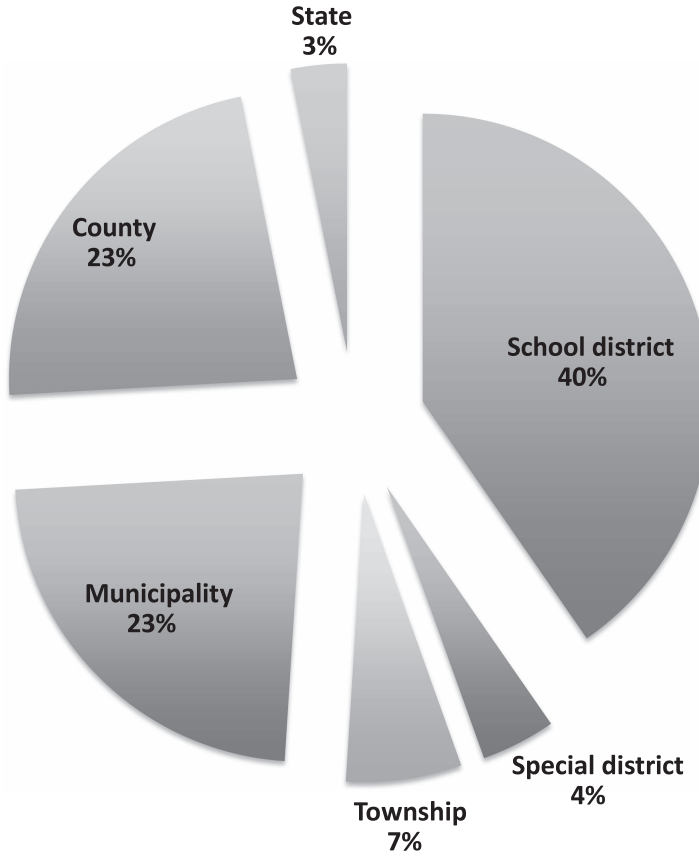


Figure 12.1 Distribution of property tax revenue by type of government, 2017

Source: US Census Bureau

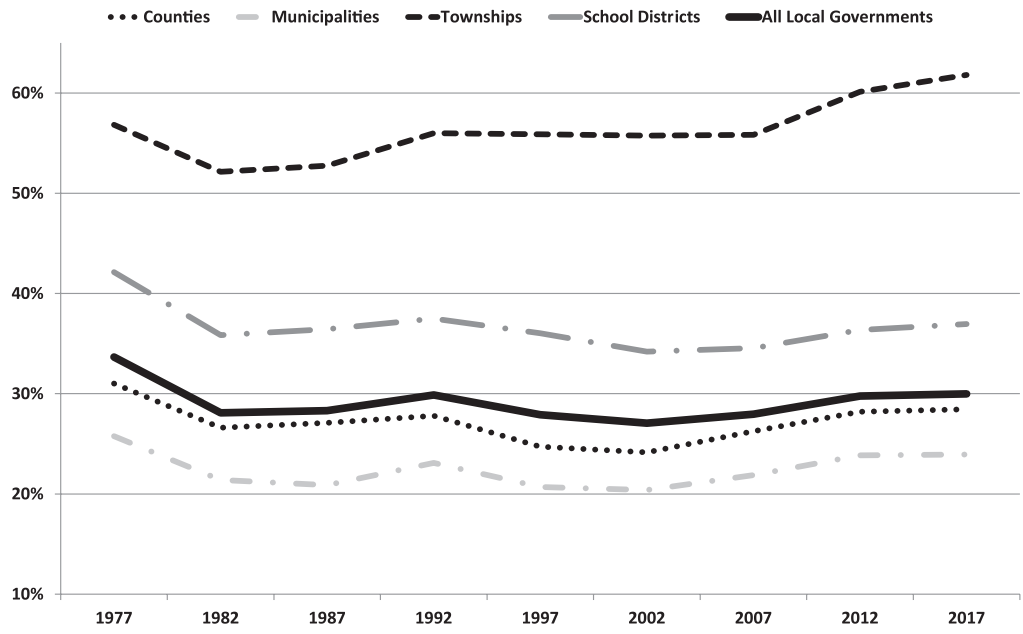


Figure 12.2 Property tax as a percentage of general revenue

Source: US Census Bureau

aggregate local government general revenue in 1962, 34 percent in 1977, and 27 percent in 2002. The decrease in relative property tax reliance resulted from larger increases in state and federal aid than property taxes over the period and from increased use of local government sales and income taxes and user charges. Since the Great Recession, the share of revenue provided by the property tax has increased for all types of local governments.[4]

Local government reliance on the property tax varies substantially among states because of differences in tax rates and differences in the other revenue options available to localities, as shown in Figure 12.3. Property tax reliance is particularly high among the New England states and New Jersey, where it provides more than 50 percent of local general revenue. In contrast, local government reliance on property taxes is relatively low in Arkansas, Alabama, Nevada, Washington, Wyoming, and New Mexico, where it provides less than 20 percent of general revenue.

The property tax process

The property tax is different from other state-local government taxes in at least two important ways. First, government determines not only the tax rate but also the tax base. Unlike an income or sales tax, for which the value of the base (income or sales) is usually identified by private economic activity, the property tax base, which is property value, usually must be estimated because market transactions are unavailable. Therefore, methods and procedures for assessing the value of property for tax purposes must be part of the property tax process. Second, different government agencies, and sometimes even different levels of subnational government, are responsible for different aspects of the property tax process.

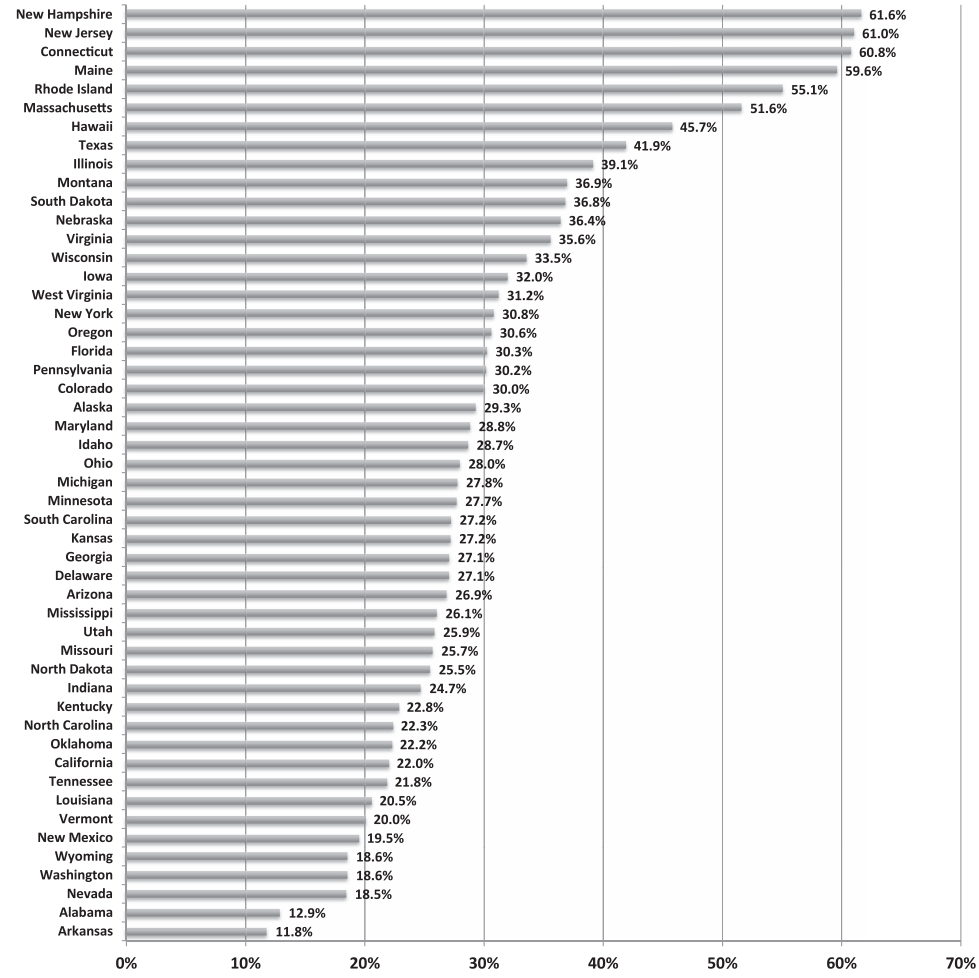


Figure 12.3 Property tax as a percentage of local government general revenue, by state, 2019
Source: US Census Bureau

How the property tax system works

The typical procedure for assessing, levying, and collecting property taxes is outlined in Figure 12.4. First, an assessor determines the market value of each piece of property according to a specific set of procedures, usually established by state law. Given an estimate of market value, the **assessed value** (taxable value) is specified by law or common practice as some specific percentage of market value, called the **assessment ratio rule** (or the assessed value must be within some specified range of percentage of market value). Tax assessors are now most often professional employees of general-purpose local governments such as municipalities or counties, although in some areas, assessors continue to be elected local government officials. In most states, local assessors are constrained by state laws and procedures, and county and/or state officials review local assessments.

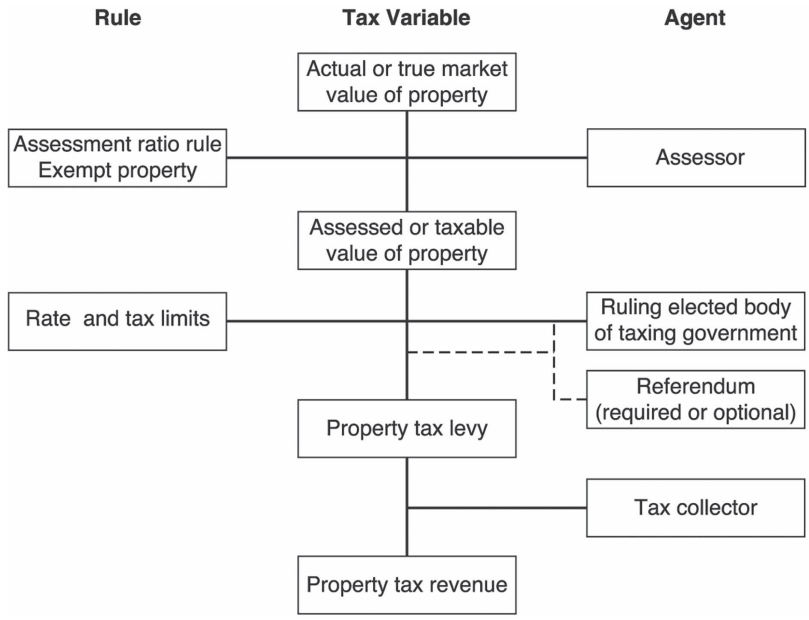


Figure 12.4 Property tax process

If different types or classes of property are assessed according to different assessment ratio rules, the tax is called a **classified property tax**, and the effective rate varies for different types of properties. About half the states have classified taxes of some type, usually with residential property assessed at a lower ratio than commercial and industrial property. For instance, in Tennessee, residential property is assessed at 25 percent of market value, commercial and industrial property at 40 percent of market value, and utilities at 55 percent of value. Classification provides a way to alter the distribution of property tax burden among different types of property. In addition, some types of property may be exempt from property tax. The assessed value of these properties is implicitly set equal to zero, although in practice, assessors usually do not evaluate exempt properties.

The revenue from any tax is computed by multiplying the tax base by a tax rate. Given the total assessed value of all properties in a taxing jurisdiction, therefore, the governing body of each local government – such as the city council, town or county commission, or school district board – sets a tax rate sufficient to generate the desired property tax revenue. In every state, local governments are constrained in setting the property tax rate by state laws limiting the tax rate, property tax revenue, or both. In some cases, a referendum (popular vote) is required to approve or select the property tax rate or revenue.

Property tax rates have been specified in **mills** historically, with the property tax rate referred to as the **millage**. One mill is one-tenth of 1 percent, or $1 of tax for each $1,000 of taxable value. Characterizing the property tax rate as a percentage (similar to other tax rates) or by dollars per unit of taxable value has replaced the term *mills* in some instances. The clearer language may help reduce misunderstanding of and confusion about the property tax.

The property **tax levy** or **tax bill** for each property is determined from the tax rate and the assessed value of each property. A complicating feature of the property tax is that multiple local governments select tax rates to be applied to the same tax base.[5] Sample (but very simplified) annual property tax bills for a homeowner in Michigan and one in California might look like the following:

	MI		*CA*	
Description	*Millage*	*Amount*	*Tax rate ($/$1,000)*	*Amount*
State education tax	3.0	$540.00		NA
County	5.5	990.00	$10	$4,000.00
City	8.5	1,530.00		NA
School district debt	2.5	450.00	0.675	270.00
Transportation authority	2.2	400.00		NA
Community college	1.9	340.00	0.14	55.00
Fire and EMS		NA	0.24	95.00
Total		4,250		4,420

The MI taxpayer receives a property tax bill for $4,250, but that amount is the combined tax from six different governments. The CA homeowner receives a bill for $4,420 covering four different governments. In practice, it may be more common for a property to have as many as ten different property tax rates and levies (a park district, a water or sewer authority, a fire protection district, a lighting authority, and so on might be added to the example). Taxpayers receive property tax bills itemized like this only in some states and localities.

A tax collector, often the municipal or county treasurer, then collects or receives property tax payments. It is common for the total property tax bill on a given piece of property to be collected by a single local government, even though that tax liability reflects rates imposed by several overlapping local governments. The property tax collections are then divided among the taxing jurisdictions proportional to their rates. In most states, property taxes are collected annually or semiannually. Many individual homeowners with mortgages pay a monthly amount to the mortgage lender (with their mortgage interest and principal payment) to cover property taxes; the government then collects the property tax from the financial institution according to the property tax collection schedule.

The following sample property tax computations illustrate the operation of the process. Suppose that state law requires that all properties be assessed at 50 percent of market value and that the tax rate (the sum of tax rates for all the taxing local governments) in the jurisdiction where the single-family house is located is $30 per $1,000 of assessed value, whereas the tax rate in the jurisdiction where the commercial office building is located is $40 per $1,000 of assessed value. After the market values of these properties are estimated, the tax can be computed:

Tax variable	*Single family house*	*Commercial office building*
Market value	$200,000	$5,000,000
Assessed value (AV)	$100,000	$2,500,000
Tax rate	$30 per $1,000 of AV	$40 per $1,000 of AV
Tax	$3,000	$100,000
	($30 × $100)	($40 × $2,500)
Effective rate	1.5%	2.0%
(tax as a % of market value)	($3,000/$200,000)	($100,000/$5,000,000)

The **effective rate** of tax, the ratio of tax to market value, is a useful way to characterize property tax levels on different properties or in different jurisdictions. Because tax is compared to market value, the effective rate corrects for any difference in assessment ratio. Stating that the property tax is 1.5 percent of value, as with the single-family house in the example, is much clearer than explaining the tax rate in mills and the assessment ratio.

Research about effective property tax rates shows that they vary substantially both geographically and by property type. For 2019, there were about 80 million year-round, owner-occupied housing units with a median market value of $230,000 and a median monthly real estate tax of $198, which implies annual property taxes of $2,375 and an effective property tax rate of approximately 1 percent (American Housing Survey, 2019).[6] Jennifer Gravelle (2007) estimated average effective property tax rates on real property (land and buildings) among the states, with the median effective property tax rate equal to 1.68 percent. However, there was wide geographic variation and also large variations by type of property.

More recently, the Lincoln Institute of Land Policy and Minnesota Center for Fiscal Excellence measured the "effective tax rate" on different forms of property in large United States cities for 2019.[7] For the largest city in each state, the average effective tax rate on a median-value home was 1.395 percent. However, effective rates varied substantially across states from 3.3 percent (Aurora, IL) to 0.31percent (Honolulu, HI). The study also measured effective tax rates for commercial property, industrial property, and apartments. Effective tax rates for two of these types of properties were higher than for homes (1.921 percent for commercial and 1.647 for apartments), although again, there was substantial variation among states. Apart from the specific estimates, the point is that effective tax rates are better measures of tax liability than nominal rates or tax amounts.

Property assessment

Assessed property is divided into **real property** – that is, land and buildings – and **personal property**. Real property includes homes, apartments, commercial facilities such as office buildings and retail/wholesale locations, industrial businesses including manufacturing and mining facilities, and agricultural land and buildings as well as vacant land. In most states, all real property is subject to property taxation with the exception of real property owned by governments or by religious or charitable organizations, although the degree of taxation may vary by type of real property. Personal property includes business equipment, inventories, motor vehicles, and household property. There is, however, much less uniformity in the property tax treatment of tangible personal property, although the clear trend is for decreased taxation of personal property. Commercial and industrial personal property, which generally means business equipment and fixtures that are not permanently attached to buildings, is taxed in many states. Business inventories, on the other hand, are included in personal property and fully taxed in only nine states.[8]

Real property accounts for the overwhelming bulk of assessed property, and residential property, especially single-family homes, constitutes both in value and number the largest single class of property subject to property taxes. The best current source of information about the state definitions of taxable property and their magnitudes is the Lincoln Institute of Land Policy's *Significant Features of the Property Tax*. For example, in 2019, residential property was 71 percent of the total in Ohio but only 41 percent in Nebraska, where agricultural property was 38 percent. Similarly, commercial property was 26 percent in Illinois compared to 16 percent in Texas. Interstate differences reflect both differences in the state economies and differences in state rules regarding what types of property are subject to tax and how they are assessed. Different states may in fact have the same amount of all types of property,

but the commercial and industrial share of assessed value will be less in states that assess that property at lower ratios.

Property assessors use three basic methods to estimate market values of properties from which assessed values can be determined. The three approaches, which differ in the data used to estimate value, are (1) the comparative sales approach, which uses data from actual sales and property characteristics to estimate the values for properties that are not sold; (2) the cost approach, which bases the value on historic cost adjusted for depreciation and construction cost changes; and (3) the income approach, which measures value by the present value (sometimes called "capitalized value") of the future net income expected to be generated by the property. In most instances, the comparative sales approach is used for assessing single-family homes and land for which there are often numerous sales, whereas the cost and income approaches are usually used for commercial and industrial properties, which may be unique and for which comparative sales data are not available.

To implement the comparative sales approach, assessors prepare a listing of all properties, including their location and physical characteristics, which is often called a "tax roll." Sale prices for some of those properties can be used to estimate statistically implicit values (sometimes called "shadow prices") for property characteristics. Using standard appraisal techniques, the value of each characteristic is combined with the quantity of those characteristics to provide an estimate of the total value of the whole property. As an illustration, suppose that a statistical analysis of sales prices and property characteristics of single-family homes yields the following regression:

$$V = 10{,}000 + 75\,FT + 18{,}000\,BATH + 4{,}000\,BR + 4{,}500\,GAR$$

where
V = value of the house (observed for sales)
FT = square footage of the house
$BATH$ = number of bathrooms
BR = number of bedrooms, and
GAR = number of stalls in the garage.

These results are simply estimates of the average effect of these characteristics on value. The interpretation is that an additional square foot of space adds $75 to the value, an additional bathroom $18,000, an additional bedroom $4,000, and so forth. These results for houses that actually sold can be used to estimate value for those that do not sell in a particular period if the characteristics of all houses are known. A 2,000 square-foot house with two baths, three bedrooms, and a two-car garage would have an estimated market value of $217,000, whereas a 1,600-square-foot house with one bath, three bedrooms, and a one-car garage would be expected to have a value of $164,500.[9]

Although it is theoretically possible to reassess properties each year, in most cases, assessment of properties based on their specific characteristics is done only at selected intervals: for instance, every ten years. This may be because the characteristics of properties are not updated each year or because the statistical analysis is not done each year. In that case, some method for estimating changes in values in the intervening period is required. One common method is to subdivide an assessing jurisdiction into areas or neighborhoods, measure the percentage change in values each year in that neighborhood based on sales data, and apply that percentage to all properties in the neighborhood. This method will be more accurate the more homogeneous the properties and the less the characteristics of the properties are altered. Some states do reassess annually, however, with the help of computers. If the assessment roll is computerized, changes in characteristics can be entered as they occur (using data

from building permits, for instance) and used with annual estimates of shadow prices to estimate annual values.

The cost approach to assessment is based on the principle that the market value of a property cannot be greater than the cost of constructing that property. If an identical duplicate of an existing structure can be constructed for, say, $100,000, then no informed buyer would pay more than $100,000 for the existing structure. (This refers to the value of the structure only; the land on which the structure sits has a value of its own.) On the other hand, the market value of an existing structure, which depends on the demand for structures of that type, can be less than the construction cost. Of course, one usually doesn't talk about constructing an identical duplicate of an existing structure but rather a replacement for that structure. (It is impossible to construct a 15-year-old factory, for example.) Accordingly, the historic cost of a structure must be adjusted for economic depreciation and any change in construction costs to get an estimate of the maximum potential market value of the existing property. To make these adjustments, assessors use factors specific to location and property type that are provided by state governments or appraisal firms to adjust historic cost. For instance, a factor of .5 for retail stores after ten years implies a 50 percent reduction from cost for that type of property with that age. To implement the cost approach, assessors require up-to-date adjustment factors and detailed data on historic cost for different components of all properties to be assessed.

The income approach to assessment is based on the notion that the value of an asset depends on the demand for that asset and that demand depends on the net income or profit that that asset will generate. Suppose an apartment building with 20 apartments, each renting for $500 per month, generates revenue of $120,000 per year ($500 × 12 × 20). The annual cost of owning and operating the apartment building, including all opportunity costs, is $100,000, so that the annual net income or profit is $20,000. This building is expected to continue to operate in exactly the same way for the next 20 years (although this is unrealistic because costs may rise or rents fall as the building becomes older), and the building is worth $0 at the end of that period. A potential buyer can therefore expect to receive net income of $20,000 per year for the next 20 years from the building.

What is the maximum amount a buyer would be willing to pay now for that stream of future profits? The answer is the present value of the stream, which depends on the buyer's discount rate – that is, the rate that could be earned on alternative investments. If that rate is 8 percent, the present value of $20,000 per year for 20 years is $212,072. That is, $212,072 invested now at 8 percent will generate the same income as receiving $20,000 a year for 20 years. Therefore, the value of the apartment building is the value of the net income the building will generate, or $212,072. (In addition, the land on which the building sits must be valued.)[10]

Implementing the income method requires data for current profits of the business or operation, an assumption about future conditions in the market of this business, the expected future life of the asset, and an appropriate discount rate. Firms may be unwilling to divulge detailed profit information, and the other required factors are issues about which there is likely to be substantial uncertainty. Not surprisingly, different applications of the income method can lead to substantially different value assessments.

Perhaps the preferred method of assessing commercial and industrial properties is to use both the cost and income approaches when feasible and to use a weighted average of the two estimates to determine assessed value. In many cases, however, the absence of solid current and future income data prevents use of the income approach, so assessment based on cost plus depreciation still is the most common approach for business properties.

This basic discussion of property assessment methods does not do justice to the many difficult economic, procedural, and legal problems that can arise in applying these basic ideas

and approaches. Problems can arise in defining types of property, interpreting tax implications of various contractual conditions, acquiring and interpreting economic data, defining the relevant market for a property, and many others areas. Partly for these reasons, property assessment has become a specific profession, regulated by many state governments and with its own professional association, the International Association of Assessing Officers (IAAO).

Considering the complexity of assessing, one certainly could understand if assessors became frustrated in trying to achieve a measure of true market value of taxable properties. But assessors do seem to maintain a sense of humor regarding their many challenges, as reflected in the well-known "Assessor's Poem":

> To find a value good and true
> Here are three things for you to do:
> Consider your replacement cost,
> Determine value that is lost,
> Analyze your sales to see
> What market value really should be.
> Now if these suggestions are not clear,
> Copy the figures you used last year![11]

Evaluating assessment results

Given that property assessment is a difficult task, how can assessment quality be measured, how good a job are assessors actually doing, and what accounts for less-than-perfect assessment? Assessment quality has traditionally been measured by the variation in assessment ratios for different properties within the same assessing jurisdiction, assuming that good assessment involves uniform assessment ratios rather than achieving any specific assessment ratio. The statistic commonly used to measure the variation in assessment ratios within a community is the **coefficient of dispersion**, which is the average percentage deviation from the median assessment ratio. Computation of a sample coefficient of dispersion is shown in Table 12.1.

The actual sales prices of three properties are compared to their assessed values at the time of sale (so the assessor did not have the sales information in making the assessment). Property B is assessed at 50 percent of its actual sales value, which is assumed to be the statutory

Table 12.1 Sample coefficient of dispersion for assessment ratios, single-family houses, one city

Amount or calculation	*Property*		
	A	*B*	*C*
Market value	$ 40,000	$ 60,000	$100,000
Assessed value	$ 25,000	$ 30,000	$ 40,000
Assessment ratio	.625	.50	.40
Median assessment ratio		.50	
Difference from median ratio	.125	0	.10
Average difference		.075 (.125 + .10)/3	
Average percentage difference or coefficient of dispersion		.15 (.075/.50)	

assessment ratio, while Property A is overassessed at 62.5 percent of value, and Property C is underassessed at 40 percent of the market price. Therefore, the median (middle) assessment ratio is .50, and the coefficient of dispersion (the average percentage difference from the median) is .15, which means that, on average, assessment ratios vary 15 percent from the median.

Two types of assessment errors can be noted. In the example, the average assessment ratio in the jurisdiction is equal to the state requirement of 50 percent, so, on average, assessment is accurate. If properties were predominantly incorrectly assessed, the average assessment ratio would be too low or too high. Even if assessment is accurate on average, as in the example, individual properties can be incorrectly assessed. A coefficient of dispersion substantially greater than the .15 in the example would represent relatively poor treatment of different taxpayers in the same community.

Although property taxes primarily are local government taxes, the state government also plays a role in the assessment process to varying degrees in different states. The common model is for initial property assessment to be done locally, although subject to procedures specified by the state, with the state government performing a subsequent review of assessments. In most cases, the review is to ensure that each local government applies the assessment ratio rule in aggregate for all property in the jurisdiction. The approach is to equalize the aggregate assessment ratio for all local governments at the state standard. To accomplish this, the state specifies a proportion by which all property values in a community are multiplied, which increases the assessment ratio to the standard. For instance, if a local government assesses at a ratio of 40 percent of market value when the state standard is 50 percent, the state could impose an equalization factor of 1.25; a 25 percent increase in assessments brings the locality up to the state standard.

State governments have adopted uniform assessment ratio standards primarily for two reasons. First, taxable property value per capita or per student may be used to allocate state aid, with more aid going to less wealthy communities: that is, those with lower per capita assessed values. This creates an obvious incentive for local governments to underassess to be eligible for more state aid. Assessment equalization is an attempt to avoid this problem by ensuring that assessed values are consistent measures across different localities. Second, uniform assessment ratio rules also may serve to improve the equity of assessment within localities, moving toward the objective that all taxpayers in a given community with property of equal market value pay the same tax. For these purposes, it does not matter what assessment ratio is selected, just that it be consistent across properties and communities. Of course, differences in assessments may not lead to differences in taxes if property values adjust in response to the different assessments.

A potential economic reason for the lack of assessment uniformity is that property assessment is costly and therefore competes with all other government services for a share of the available budget resources. For instance, assessment results may be improved by reducing the time between complete reexamination and reevaluation of all properties, but to do so requires more assessing and appraisal personnel. Increasing the use of technology for storing characteristics data about properties and analyzing and applying sales data is another option, but this requires not only more computers but also assessing officials who are appropriately trained. The cost of assessing also is influenced by the nature of the community. Assessing is likely to be more costly in communities with a very heterogeneous property mix than in those with a homogeneous one, assessing of some types of large commercial and industrial properties is more difficult than for houses or land, and maintaining uniformity in assessment will be more difficult in communities with rapid growth and changes than in more stable ones.

Limits on assessed values[12]

Some states limit the changes in the assessed value of properties to restrain property tax growth or to limit assessment of certain types of properties. Typically, the annual growth in the assessed value of each property of a particular type (houses) must be less than a fixed amount: for instance, 5 percent. However, properties may be assessed according to their full market value when they are sold. At that time, the market value is obviously known, and assessed value can be set using the appropriate assessment ratio rule. Selectively reassessing properties at the time of sale may lead to less uniform assessment because different properties sell at different rates. A single-family house that sells three times in 10 years would have an assessed value closer to the nominal assessment ratio than one that is owned and occupied by one family for a longer period – say, 30 years.

The experience of California since the adoption of Proposition 13 in 1978 illustrates that problem. That state constitutional amendment set assessed values of each property equal to market value in 1976 and limited the annual growth from that value to no more than 2 percent, except when a property is sold or added to by new construction. When sold, a property is reassessed at the current market value, and any newly constructed portions of a property are assessed at current value. The assessment ratio for any property that is not sold or altered by new construction will continually decline as long as market prices are rising more than 2 percent. For properties that turn over in the market, the assessed value will reflect the actual market value. As a result, identical properties may be assessed at different amounts and, therefore, have different effective tax rates even if located in the same jurisdiction. Michael Wiseman (1986), studying effective property tax rates in San Francisco, found a much larger coefficient of dispersion in 1984 for assessed values of single-family houses than existed in 1971 and 1978 (the last year before Proposition 13 took effect), showing substantially less uniformity of assessment ratios after Proposition 13 than before. Wiseman concludes, "[I]n 1978 a majority of California voters chose to sacrifice equity in property taxation for certainty regarding year-to-year changes in tax liability" (Wiseman, 1986, 31).

An illustration of the California case is in Table 12.2. Market values are assumed to increase 5 percent per year, but assessed values can increase only 2 percent per year until the property is sold. At sale, the property can be assessed at its market value. House A rises in value from $100,000 to $121,554 over five years, but because it is never sold, assessed value rises from $100,000 to only $108,243. By the fifth year, House A is assessed well below its true market value. Assuming a constant tax rate of $20 per $1,000 of assessed value, tax on House A rises from $2,000 to $2,165. House B is identical to House A, except that House B sells twice in this five-year period. When this house is sold and reassessed in the third year, the assessed value and tax become greater than those for the identical House A. By the fifth year and second sale of House B, the difference is even greater. Even though Houses A and B remain identical, B's assessed value and taxes are much greater. In fact, full reassessment at sale also can cause the taxes on a lower-value house to be greater than those for a higher-value house. House C begins with a value of $90,000, which rises to $109,395 after five years. But because House C is sold in the fifth year, its assessed value and tax ($109,395 and $2,188) are greater than those of House A, assessed at $108,443 but with a market value of more than $121,500.

These types of inequities led some taxpayers to challenge the California law as unconstitutional, arguing that tax differences for similar properties violated the constitutional guarantee of "equal protection under the law." In a 1992 decision (*Nordlinger v. Hahn*), the US Supreme Court ruled that the California assessment is constitutional. By an 8–1 vote (Justice Stevens dissenting), the court argued that this assessment procedure is allowed if it "further[s] a

Table 12.2 Assessment and property tax with assessment limits

(market values increase 5 percent annually; assessed values are limited to maximum 2 percent annual growth until home is sold; at sale, reassessment to market value)

Year	*House A*	*House B*	*House C*
1	V = 100,000 AV = 100,000 T = 2000[a]	V = 100,000 AV = 100,000 T = 2000	V = 90,000 AV = 90,000 T = 1800
2	V = 105,000 AV = 102,000 T = 2040	V = 105,000 AV = 102,000 T = 2040 Sale	V = 94,500 AV = 91,800 T = 1836
3	V = 110,250 AV = 104,040 T = 2081	V = 110,250 AV = 110,250 T = 2205	V = 99,225 AV = 93,636 T = 1873
4	V = 115,763 AV = 106,121 T = 2122	V = 115,763 AV = 112,455 T = 2249 Sale	V = 104,186 AV = 95,509 T = 1910 Sale
5	V = 121,551 AV = 108,243 T = 2165	V = 121,551 AV = 121,551 T = 2431	V = 109,395 AV = 109,395 T = 2188

Note:
a Tax Rate = $20 per $1,000 of assessed value. Tax equals Rate × Assessed Value or $20/$1,000; $100,000 = $2000 in this case.

legitimate state interest" (Barrett, 1992), and the Court believed that the desire of property owners to control property tax increases and the fact that the procedure encourages continuing homeownership were such legitimate interests. The Court also noted that potential homebuyers could calculate what the new property taxes would be once the house was sold, so the tax is not hidden or capricious.

Terri Sexton (2009) reviews a number of studies documenting the horizontal equity that can result from limits with reassessment at sale, similar to the illustration in Table 12.2. She also notes two other potential effects from these limits, both of which are confirmed in a number of studies. First, reassessment at sale creates an incentive not to sell a house. Thus, individuals might not want to take a new (and better) job if it requires changing residential location – that is, selling the current home and buying another, both of which are then reassessed. Or individuals might not change the nature of their housing as their life circumstances change. Often individuals buy a small house to start, switch to a larger house as the family gets bigger, and then change to a smaller or more convenient house (single floor, less land) at retirement. With reassessment at sale, each transaction leads to a higher assessed value and higher taxes. The resulting effect on housing or location choices has implications not only for individual welfare but also for overall economic efficiency. Second, if the limits on assessed value growth reduce revenue, public services may be reduced/eliminated, property tax rates may be increased to offset reductions in the overall taxable property base, or other revenue sources may be increased.

The overall effect of property assessment limits may be different than envisioned when the policy is adopted. Thus, even if limits on assessment increases with reassessment at sale are constitutional, there is still the question of whether it is good policy. The concern about reassessment at sale is partly an equity concern and partly an efficiency issue as this tax policy may change people's behavior to less preferred choices.

Who is responsible for property tax increases?

Separating responsibility for assessing property and setting tax rates can contribute to taxpayer confusion about the source of property tax increases. If property is required to be assessed at a given percentage of market value, then increases in the market value of property (even increases consistent with a general rise in prices) *should* lead to increases in assessed values. However, property tax revenues will increase if assessed values increase, and tax rates remain constant. In other words, a general rise in property values allows local governments to increase property tax collections without increasing tax rates. Not surprisingly, some individuals are led to conclude that the assessment increase *caused* the tax increase.[13]

This perspective is inaccurate because each local government with property tax authority controls and selects, either explicitly or implicitly, the amount of property tax revenue to levy. Typically, the assessed values for a community are determined and known before the local governments adopt budgets for the coming fiscal year. Given those tax bases, the governing bodies can adjust the amount of property tax revenue by adjusting tax rates. A decision to keep tax rates constant when it is known that assessed values have increased is a decision to increase property tax revenue. The announcement by a local government that "taxes will not be increased this year" must be scrutinized to determine whether the tax rate or tax revenue is being held constant. It may be that it is politically easier to increase tax collections by keeping rates constant (with increased assessed values) rather than by increasing rates (when assessed values do not increase), but there is no fiscal difference.

There is some empirical evidence, although a bit inconclusive, that local governments may take advantage of changes in assessed values to increase property tax revenue more than otherwise. Early studies summarized by Justin Ross and Wenli Yan (2013) generally found statistically significant increases in property tax levies following major property reappraisals, although the resulting increase in revenue was partly offset by tax rate decreases. (The revenue increases were smaller proportionally than the assessment increases.) More recently, Ross and Yan examined property tax changes in local governments in Virginia following reassessments and reported very small effects on revenue from growth in assessed values and larger (but still small) effects following mass reappraisals. On balance, the evidence suggests that growth in assessed values provides a small boost to property tax revenue.

The possibility for assessors (rather than elected local government officials) to bear the political responsibility for property tax increases has induced a number of states to adopt what have come to be called "truth in taxation" procedures. Typically, these procedures require local governments to establish the property tax rate that will generate the same amount of revenue in the next fiscal year as was collected in the previous year, given the known change in assessed values. If the local government wishes to set a tax rate greater than this "equal revenue" rate, special procedures are required, usually including advertising of the proposed tax increase, public hearings, and a specific vote of the local governing body on the property tax rate. A sample newspaper advertisement of a proposed increase and the hearings required by Michigan law is shown in Figure 12.5. The purpose of these truth-in-taxation laws is to ensure the appropriate political accountability for property tax decisions.

Alternative responses to rising property values

Increases in property tax amounts can be challenging for individual households. The increased value of a home is not usually realized (cashed out) until the property is sold, so taxpayers may face higher property tax payments without corresponding additional cash to pay the higher taxes. This issue may be a problem, especially for individuals who purchase

INSTRUCTIONS TO NEWSPAPERS

The following notice is required by Act 5, P.A. 1982, which provides:
1. The body of the notice must be set in 12 point type or larger.
2. The headline "Notice of Public Hearing on Increasing Property Taxes" must be set in 18 point type or larger.
3. The notice cannot be smaller than 8 vertical column inches by 4 horizontal inches.
5. The notice cannot be placed in the portion of the newspaper reserved for legal notices or classified advertising.

Notice of Public Hearing on Increasing Property Taxes

The _____
name of governing body

of the _____
name of taxing unit

will hold a public hearing on a proposed

increase of _____ mills in the operating tax
rate

millage rate to be levied in _____.
year

The hearing will be held on _____,
day

_____ at _____
date time

o'clock in the ☐ a.m. ☐ p.m. at

_____
place—address

If adopted, the proposed additional millage will increase operating revenues from ad valorem property taxes % over such revenues generated by levies permitted without holding a hearing.

The taxing unit publishing this notice, and identified below, has complete authority to establish the number of mills to be levied from within its authorized millage rate.

This notice is published by:

name of taxing unit

address

address

telephone no.

Figure 12.5 Truth-in-taxation notice

homes based on the highest monthly total payment that the household could afford. Historically, this concern has been raised particularly with respect to senior citizens, who may no longer work and rely on annual fixed incomes (or income with limited growth potential), but the issue may apply to a broader class of taxpayers, especially if property values (and property taxes) are rising rapidly.

The potential for this effect is illustrated in Table 12.3 A household purchases a home with initial value of $200,000, making a 10 percent down payment and borrowing the remainder through a 30-year fixed-rate mortgage. Household income is $80,000, implying a ratio of housing value to income of 2.5. If the effective property tax rate is 1 percent, the household has a monthly property tax bill of $167 and total housing expenses (principal + interest + property tax) of $1,217, which represents 18 percent of income. Assuming the tax rate remains constant and that market and taxable values of the house increase at a rate of 9 percent per year and income increases at an annual average rate of 3 percent (realistic for the years leading up to the Great Recession), the changes in the household's economic circumstances are illustrated.

Over a five-year period, the value of the house increases to $310,000 (a 55 percent increase), whereas income increases to $92,750 (a 16 percent increase). Assuming constant effective tax rates, property tax liability rises from $2,000 and $167 per month to $3,100 and $258 per month. The household has an unanticipated monthly property tax increase of $91 (which might be blamed on the increase in assessed value). On the other hand, the household's home equity has increased from $20,000 (the initial down payment) to roughly $130,000 representing a $110,000 capital gain, and the ratio of overall housing expense to income has fallen (from 18 percent to 17 percent).

Several factors are important in this illustration. Tax rates may not remain constant. With increasing values, local governments could reduce tax rates and still collect more revenue. Or if demand for public services rises, local governments may have to increase tax rates, exacerbating the growth in property tax bills. Households may face a liquidity problem because their increased wealth is in a physical asset (the house) and is not turned into cash ("realized") until the asset is sold. This factor may be one reason for proposals in several states to reduce or even eliminate the property tax, especially given the rapid rise in housing prices before the Great Recession. On the other hand, these homeowners are wealthier, at least on paper. Indeed, one could argue that many individuals purchased homes with the expectation and desire that the value would increase.

Table 12.3 Illustration of property value and property tax growth

	Initial	*After 5 years*	*Change*
Market value	$200,000	$310,000 (9% annual growth)	$110,000
Household income	$80,000	$92,750 (3% annual growth)	$12,750
Value-to-income ratio	2.5	3.3	0.8
Mortgage amount	$180,000	$180,000	No change
Monthly mortgage payment (principal + interest)	$1,050	$1,050	No change
Effective property tax rate	1.00%	1.00%	No change
Annual property tax	$2,000	$3,100	$1,100
Monthly property tax	$167	$258	$91
Total monthly expense (principal + interest + tax)	$1,217	$1,308	$91
Monthly housing expense/income	0.18	0.17	–0.01

Property tax relief or reduction measures

States use a variety of measures to reduce property taxes for specific types of property or taxpayers. Often, these measures are advocated as a way of making the property tax, and the overall state-local tax structure, more progressive by reducing relative tax burdens for lower-income taxpayers. Four such methods of tax relief are considered here, including exemptions of assessed value for homesteads, state government credits or rebates for local residential property taxes, state and federal individual income tax deductions for property taxes, and special assessment methods for farmland. In most cases, more than one program will apply in each state. Details about these exemptions and credits for each state are available in *Significant Features of the Property Tax*[14] and the 2021 report by Adam Langley and Joan Youngman. Property tax relief also may result from intergovernmental grants (discussed in Chapter 9) and property tax limits (discussed in Chapter 7). Targeted property tax relief for businesses as an economic development tool is discussed in Chapter 20.

Homestead exemptions and credits

The simplest and most widely used tax-relief method for houses is exemption from taxation of a specific amount or percentage of homestead value. Similarly, in some states, a fixed amount or percentage of residential property taxes is credited or rebated. Homestead exemptions or credits of some type are used in 44 states plus the District of Columbia. Typically, eligibility for many exemptions or credits is determined by income or wealth or targeted to specific taxpayers, especially senior citizens or homeowners with special circumstances.

The operation of two simple exemptions is shown by the following examples:

	Without exemption	*With $10,000 exemption*[15]	*With 10% exemption*
Market value	$100,000	$100,000	$100,000
Assessed value	$50,000	$50,000	$50,000
Exemption	$0	$10,000	$5,000
Taxable value	$50,000	$40,000	$45,000
Tax rate	$40 per $1,000 of taxable value		
Tax	$2,000	$1,600	$1,800
New tax rate	$60 per $1,000 of taxable value		
New tax	$3,000	$2,400	$2,700
Increase in tax	$1,000	$800	$900
Percentage change in tax	50%	50%	50%

The exemption reduces the tax by the amount of the exemption times the tax rate. Therefore, a given exemption is more valuable the greater the property tax rate. Also, if assessed value is greater than the exemption, the exemption does not affect tax increases. A 50 percent increase in the tax rate causes a 50 percent increase in tax (although from a smaller base) both with and without the exemption: tax increases from $2,000 to $3,000 if no exemption exists but from $1,600 to $2,400 with the $10,000 assessed value exemption and from $1,800 to $2,700 with the 10 percent exemption.

Homestead exemptions used in Louisiana and Idaho illustrate the variety. In Louisiana, an exemption of $75,000 of assessed value applies for all homeowners (although not for municipal taxes). In Idaho, the exemption similarly applies to all homeowners, but the exemption is 50 percent of assessed value, up to a maximum exemption of $100,000.

Homestead "circuit-breaker" tax credits or rebates[16]

About 34 states plus the District of Columbia provide a state-government-financed credit or rebate for property taxes paid to local governments. Traditionally, property tax relief of this type applies to property taxes that exceed some specified percentage of a taxpayer's income (thus the name "circuit breaker"), usually takes the form of a rebate paid to the taxpayer or a (refundable) credit against the state income tax, and is generally targeted to specific groups of taxpayers. These credits have come to be called "circuit breakers," analogous to use of the term in electrical engineering, because the relief applies only when a taxpayer's income is "overloaded" by property taxes. Indeed, property tax credits, or circuit breakers, were devised as a way of preventing senior citizens with high-valued houses relative to their retirement income from having to sell houses because of the property tax.

As this type of residential property tax relief has evolved, several variations of the original concept have developed. In some cases, the tax relief applies when the property tax exceeds a percentage of the property value (rather than income). In other cases, relief is based on a fixed and specific income threshold – all with income below the threshold get relief, and all above get none. Depending on how "circuit breakers" are defined, these may or may not be included.[17]

Most "circuit breaker" property tax credit/rebate programs (as defined here) are limited to elderly taxpayers (or sometimes elderly and disabled taxpayers). Sixteen of the programs include or apply to renters. All these programs include an income ceiling on eligibility, although that ceiling varies widely (from $5,500 in Arizona to $150,000 in New Jersey in 2018). The credit program in Wisconsin illustrates how the general circuit-breaker idea can be applied.

The Wisconsin program, adopted in 1964, provides a refundable state income tax credit to homeowners and renters who are at least 18 years old and have resided at the property for at least one year. For 2018, the credit applies only to property taxes up to a maximum of $1,460, taxpayers with incomes of $24,680 or more are not eligible, renters use 25 percent of rent as the proxy for property tax paid, and the maximum credit is $1,168. The values in the credit formula are indexed to the inflation rate. The credit rate is 80 percent of the eligible property tax based on income. Mathematically, the formula is

If Income ≤ $8,060
Credit = 80% Tax, Maximum credit of $1,168
If Income > $8,060 and < $24,680
Credit = 80% (Allowable Tax − 8.875% [Income − $8,060])
Allowable Tax = $1,460
Maximum credit of $1,168

In 2016, about 192,000 Wisconsin households received credits from this program, totaling about $98 million, an amount equal to about 1.04 percent of the property taxes collected in the state. The average credit among recipients was about $514.

There are two important differences and three common characteristics of the various state property tax credit plans. First, some of the state plans provide relief for all property taxes above the income threshold, whereas others provide relief for only a portion of taxes above the threshold (80 percent in Wisconsin). Second, some states set the eligibility threshold and ceiling so that a substantial fraction of taxpayers will receive some benefit, whereas other states, such as Wisconsin, limit eligibility to smaller groups, either explicitly or by the threshold and ceiling amounts. There may be something of a tradeoff between providing some

relief to many taxpayers and providing a larger amount of relief to smaller targeted groups of taxpayers.

One common characteristic of these credits is that they reduce the **marginal cost of property taxes** for eligible taxpayers who receive less than the maximum credit or rebate. In Wisconsin, the marginal cost is $.20 up to the maximum because the credit rate is 80 percent. This reduction of marginal property tax cost raises the question of whether these credits might induce taxpayers to support higher property taxes. The second common characteristic of these state programs is that they introduce some progressivity into state tax structures because they are structured to favor lower-income taxpayers. This is done either explicitly by limiting the program to lower-income residents or implicitly by applying a higher income threshold in the relief formula for higher-income taxpayers. The third common characteristic is that because these plans provide state government rebates for local property taxes, they are equivalent to a set of state grants to localities.

An economic issue that arises with any type of property tax relief program targeted to particular homeowners, such as seniors, veterans, or the handicapped, is whether the price of homes adjusts in response. It may be that demand for homes increases among the targeted groups, driving up home prices, a process called tax capitalization. Indeed, Jeremy Moulton and colleagues (2018) found that home prices increased almost immediately after property tax relief programs for the elderly and disabled veterans were approved by voters. If this happens more generally and persists, then homeowners at the time the programs are adopted benefit, but future homeowners do not (the higher price offsets the tax relief).

Special assessment of farmland[18]

Every state uses some method of limiting property taxes on agricultural land, typically by using a different procedure for assessing farmland than other properties. The traditional approach, used by the majority of states, is to assess the value of farmland in its current use, which may be less than the full market value of the land. For instance, the income approach can be used to estimate the value of farmland by capitalizing the profits generated by farming activity on the land. Alternative uses for the land, however, may generate a greater stream of profits and thus a higher value; these alternative uses are referred to as the "highest and best use" of the property.

For instance, farmland on the edge of an urban area might be more valuable if used for residential property, and rural farmland might be converted into recreational use. **Use-value assessment** of farmland, as it is called, serves to prevent increases in property taxes on farmland as these alternative uses become more attractive. The traditional reason for adopting use-value assessment is to reduce the conversion of farmland to these other uses, particularly where urban areas are expanding.

Another variation of use-value assessment allows assessment of farmland according to current use but imposes a deferred tax on the full value for some fixed number of past years if the property is converted to a nonfarm use. In this way, the taxing governments, at least for some number of years, recapture the tax advantage conferred by use-value assessment if the tax advantage does not succeed in preventing conversion.[19]

Several states require a contract between the government and farmland owners in order for the farmland to receive preferential assessment. The contract specifies that the owner will not convert the farmland into other uses for a specific period of years, usually ten, in exchange for use-value assessment or some other tax reduction. If the owner wishes to convert the land to other uses before the contract expires, back taxes at the full value of the property are levied, and sometimes a penalty is also added.

Income tax deductions for property taxes

Another tax feature that can reduce property taxes is the income tax deduction for residential property taxes available to federal income taxpayers who itemize deductions, taxpayers who itemize on state income taxes in 32 states, and businesses for which property taxes are a deductible business expense. A deduction reduces taxes paid by the amount of the deduction multiplied by the taxpayer's marginal tax rate (the income tax rate applying to the last dollar of income), up to any maximum allowed. For instance, if the income tax rate is 30 percent, the taxpayer bears only 70 percent of the cost of the deductible item. If the taxpayer's property tax bill rises by $1, the deduction offsets $.30 of that increase, so the taxpayer bears only $.70 up to the maximum allowed.[20]

Analysis of the deductibility of property taxes is made more complicated because the deduction may be available for both federal and state income taxes because state income taxes also are deductible by itemizers against federal income taxes, federal income taxes are deductible against state taxes in eight states, and the amount of the federal tax deduction is capped. If there is no cap on the amount of the deduction and a property taxpayer deducts property taxes only on the federal income tax, the net cost per dollar of property tax is $(1 - f)$, where f represents the taxpayer's federal marginal income tax rate. If a taxpayer deducts property taxes against the state income tax and both property and state income taxes against the federal income tax, the net cost is $(1 - f)(1 - s)$, where s represents the taxpayer's marginal state income tax rate.[21] The expression for the net property tax price in the case of reciprocal deductibility of state and federal income taxes is still more complicated.[22]

Although historically important, the value of this federal income tax reduction was reduced greatly by the federal income tax reform in 2017, which capped the state-local tax deduction at $10,000 and greatly increased the standard deduction (and thus reduced the number of itemizers). Because the income tax reduction that occurs from a deduction equals the amount deducted times the income tax rate, the value of an income tax deduction of local property taxes depends directly on the magnitude of the income tax rate. If the income tax has a progressive rate structure, the value of the deduction will be greater for higher-income taxpayers. In addition, property taxes are business expenses for firms and may be deducted fully in calculating federal corporate income taxes.

Application 12.1: Payments in lieu of taxes[23]

Brown University, founded in 1764, is a well-known and prestigious Ivy League higher education institution located in Providence, Rhode Island. Brown is a private, nonprofit institution with about 10,000 undergraduate, graduate, and medical students; about 800 faculty members; and more than 4,500 employees in total. The university is also the largest landowner in Providence, with about 225 buildings valued, by one estimate, at approximately $1 billion. In addition to these physical assets, Brown (similar to most universities) has a substantial endowment (financial investments) valued at nearly $5 billion. Yet the university does not owe property taxes to the city (or other Rhode Island localities) for its educational buildings and property.[24] Brown's original colonial charter provided that it be "freed and exempted from all taxes," but that was before the United States was established (1776) and Rhode Island became a state (1790). Brown's tax-exempt status today is because of its classification as a nonprofit, charitable organization.

The case of Brown and Providence illustrates the standard practice in all states that exempts property owned by government, religious institutions, and "charitable" organizations from property taxation (and often other forms of taxation as well). Examples abound. Not only does a city not collect property tax on its own property, but it also does not receive property

tax revenue from property owned by the state government, such as a public state university, or property owned by the federal government, such as a military base. State and local governments exempt property owned by religious organizations and used for religious purposes from property taxation. And every state exempts property used by "charitable" organizations, although the definition varies. Common examples include nonprofit higher education institutions, hospitals, museums, and human services organizations like food banks.

Three arguments commonly are offered as reasons for exempting this type of property from taxation. The case for not taxing the property of religious organizations derives from the constitutional separation of church and state in the United States and the objective that government not interfere with religious freedom or promote any religion. For property owned by "charitable" organizations, the arguments are that the organization serves a broad public (rather than narrow private) purpose, and, at least in some cases, the services provided by a private, nonprofit organization substitute for services that would otherwise be provided by government. For instance, a private nonprofit hospital may serve low-income individuals or reduce the demand for a public (government-owned) hospital.

Even if the arguments for exempting property owned by private charitable organizations are accepted, the nature of or conditions for organizations to be tax exempt must be specified. Organizations can register for federal income tax exemption with the IRS under provision 501(c)(3) of the tax code, which applies to functions that are charitable, religious, educational, scientific, literary, testing for public safety, fostering national or international amateur sports competition, or preventing cruelty to children or animals. The term *charitable* implies relief of the poor or the underprivileged, advancement of education or science, lessening the burdens of government, and so on.

State governments determine the conditions for property tax exemption in a state; federal designation as a 501(c)(3) organization may be a necessary but not sufficient condition for state property tax exemption. Kenyon and Langley (2010) summarize the state rules for granting tax-exempt status. More than two-thirds of states require organizations to provide a general public benefit, and about half require that the service is provided without regard to ability to pay or that it relieves government of a responsibility. As the nonprofit sector has expanded in size and scope, applying such concepts is difficult and controversial and often ends up in litigation. If a private nonprofit university charges fees to park in a parking structure that it owns, is that part of the educational mission (making the structure tax exempt), or is that a commercial venture (meaning that the parking structure should taxed)?

The fiscal impact of these property tax exemptions can be substantial. Bowman et al. (2009) estimate that nationally, an amount equal to 5 percent of property tax revenue is not collected because of the charitable tax exemption (and more if government property is included). In addition to the revenue lost, these organizations may utilize local government services (public safety, transportation, regulations) and, in the process, increase public sector costs. The impact is not uniform, however, because the tax-exempt property tends to be concentrated in a few localities – mostly central cities, college towns, and areas with large federal installations. For example, by one estimate, 30 percent of the assessed value in Baltimore was exempt because of ownership by government and nonprofit organizations. Another estimate suggested that nearly 9 percent of the property value was exempt in Boston just due to nonprofit organizations. The impact is also different for various types of charitable organizations; although hospitals and higher education institutions represent a relatively small fraction of charitable organizations, they account for a large share of property value among this group. By one estimate, hospitals and higher education institutions account for more than 40 percent of the assets of all charitable organizations.

Geoffrey Propheter (2019) studied nonprofit hospitals in New York City to measure whether the social benefits that were provided in accordance with federal regulations for

nonprofit status were worth the tax exemption. Social benefits measured include charity care, subsidized health services, expenses on research and employee education, and cash/in-kind donations. He finds "NPHs [nonprofit hospitals] on average earn their property tax break relative to three out of four definitions of community benefits."

One potential response to the fiscal impact of tax-exempt property is for local governments to enter into agreements with the tax-exempt organizations for **payments in lieu of taxes** (PILOTs), a method by which the organizations maintain exemption from taxation by voluntarily agreeing to make regular payments to the local government to finance services.[25] The Lincoln Institute identified more than 200 such programs operating in more than half the states since 2000. One of the oldest and largest PILOTs is in Boston, where the city received $19.5 million in PILOT payments in 2012 through an expanded program being pursued by the city, with the largest component from Boston University. In Providence, the city and Brown University first entered into an agreement in 2003 for voluntary payments to the city and then a new additional agreement in 2012, through which the university agreed to make additional new payments to the city of $31.5 million over 11 years. As part of that agreement, Brown received rights to 250 parking spaces previously owned by the city and was granted ownership of several streets adjacent to the campus.[26]

The advantage of PILOTs is that they provide a certain flow of revenue to local governments to pay for services without formally eliminating the tax-exempt status of the charitable organizations. On the other hand, PILOTs usually require the voluntary cooperation of the organizations and may be inconsistent in the treatment of various charities. They are not the only option for local governments seeking revenue associated with the economic activity of tax-exempt organizations. Localities might consider alternative taxes or fees for the use of government services or even challenge the tax-exempt status of some organizations. Sometimes consideration of an alternative provides an incentive for a PILOT agreement. Cities, especially college towns, may consider local payroll taxes that tax the earnings of workers (including students and other employees of tax-exempt organizations). As an even more inventive option, Baltimore reportedly considered a "bed" tax that would especially target hospitals and colleges with residence systems. With continuing growth in the nonprofit sector, increasing variety of the activities of nonprofit organizations, and perpetual fiscal challenges for many local governments, this is certain to be a significant public finance issue into the future.

Economic analysis of the property tax

Property taxes as capital taxes

Modern economic analysis considers property taxes as one of several taxes levied on the income from or value of capital, which is one of the major inputs (with labor and materials) into the production of goods and services. Other capital taxes include the federal corporate income tax and state-local government corporate income or general business taxes. This characterization is important because it suggests thinking about property taxes as taxes on production, or specifically on one factor of production, rather than as a tax on consumption or consumer goods.

The characterization seems straightforward enough when thinking about commercial and industrial property – the tax is on the plant, land, and equipment, not the value of the product – but may seem unusual when applied to housing as people tend to think of a house as a consumer good. However, the physical residential housing unit is only one input into the production of the consumer good "housing services," a fact most clearly demonstrated by rental housing. The producer (the owner and landlord) combines land, labor, and a

housing unit to provide housing service to the tenant or consumer. The only difference in the case of owner-occupied housing is that the producer and consumer are the same person. Therefore, the approach in this chapter is to consider first the effect of various property tax structures on the price and amount of capital and then the effect of changes in the price and amount of capital on the prices and quantities of other inputs (such as labor) and consumer goods (particularly housing services).

A uniform national property tax

The first implication of this approach is that a uniform national tax on all property at a single rate imposes a burden on all property owners that cannot be shifted, at least in the short run. The simple rule of tax analysis is this: the only way to avoid or shift a tax is to change behavior. If all property is taxed at the same rate in all jurisdictions, changes in the type of property owned by an investor or the location of the property will not reduce the tax liability. The only option to avoid the tax is to reduce the amount of property owned: that is, to reduce investment. A property owner would not be able to avoid the tax by selling the property to another investor. After the tax is imposed and known, any potential buyer would be willing to offer less for the property because the future after-tax return is lower because of the tax.

This situation is depicted in Figure 12.6, which shows a perfectly inelastic supply of capital at quantity C_0, which would be the case if the amount of capital investment is fixed in the long run. The property tax is represented by a shift down in the demand curve, and the net or after-tax return on capital falls from P_0 to $P_0(1 - t)$, where t is the property tax rate. The rate of return earned by property owners falls by the full amount of the tax simply because at the time the tax is levied, those owners have no options to change behavior in ways to avoid the tax.

Differential taxation of different types of property

This example of a uniform national property tax is not realistic, so adjustments are necessary. Suppose that some types of property are exempt from taxation (or taxed at a zero rate), with all other property taxed everywhere at a uniform rate. In that instance, investors can avoid the tax by decreasing their investment in taxable property and increasing investment in exempt property. That investor reaction will cause additional changes to the prices (and rates

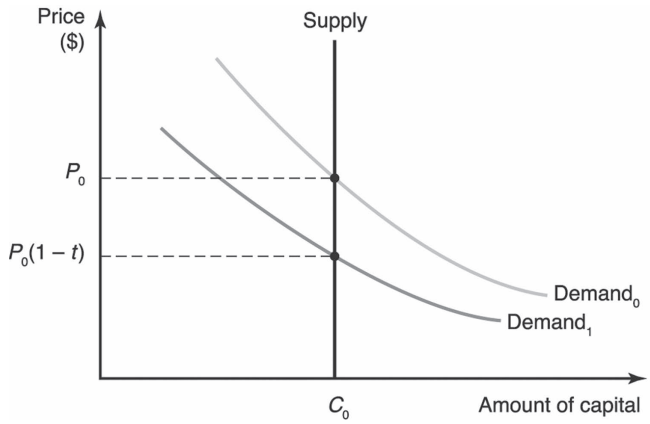


Figure 12.6 Incidence with perfectly inelastic supply

of return) of property. As investors reduce the amount (supply) of taxable property, the price of and investor return from such property will increase, offsetting the tax burden, whereas increases in the supply of exempt property will reduce the price and rate of return for those investments, mitigating the incentive to switch to nontaxable property. Equilibrium is reached when the net-of-tax rates of return available from both types of property are equal.

This case is represented in Figure 12.7, showing an initial equilibrium at rate of return R_0 for two types of property (A and B) when there are no taxes (or both are taxed equally). Investors are presumably indifferent between the two types of investments because the (risk-adjusted) returns available from each are equal. If a property tax is imposed on type A only, the immediate effect is a reduction in the rate of return from type A property to R_1, as reflected by $Demand_{A1}$, which includes the tax. An investor in type A property earns a return of R_0, pays tax of $(R_0 - R_1)$, and retains a return of R_1. Because the tax has reduced the rate of return from type A property compared to that available from investing in type B property, investors are expected to switch from A to B.

As the amount of type A property falls below A_0, the rates of return from type A property rise, and as the supply of type B property rises, the price of or rate of return from that property falls. From another perspective, potential investors in type B property need not be offered as high a return as previously, because the property tax on type A has made investment in B relatively more attractive. In Figure 12.7, equilibrium is reached at quantities A_1 and B_1, with a net-of-tax rate of return in both markets equal to R_2. Owners of type A property still have to pay the tax; to earn a net (after-tax) rate of return equal to R_2, they must receive a gross (before-tax) return of R_3. For instance, the income from investing in A property might provide a 10 percent return before taxes are considered but only 7 percent after taxes are paid. In that case, an investor in type B property would receive a 7 percent return and pay no tax. In contrast, when there were no taxes, all investors received return R_0, perhaps 9 percent to continue the numerical example.

Another way to view this case is to consider the rent that would be charged for those properties. Once the tax is imposed, the rent from property A is higher than the rent from property B (R_3 compared to R_2), so the owners of both properties earn equal net-of-tax rent of R_2. This is less than the rent received by the owners before taxes were imposed (R_0).

An important implication is that owners of both taxable and exempt property bear an ultimate tax burden, even though taxes are nominally collected only from owners of type A (taxable) property. Part of the tax levied on type A property is shifted to type B property

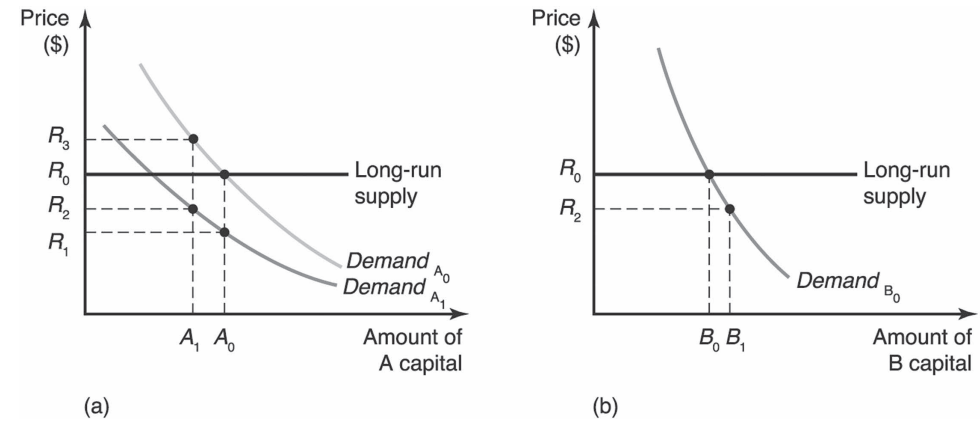


Figure 12.7 Effect of a property tax differential in the allocation of capital

through the market effects caused by the behavioral change of investors. The reason to change behavior (in this case, switch from investing in A to B property) is to avoid or shift the tax – in this instance, to owners of exempt property.

The analysis in Figure 12.7 shows that the differential taxation of types of property creates economic inefficiency. The inefficiency arises because the tax differential creates an incentive unrelated to its productivity for more of the untaxed property. If the initial long-run supply R_0 represents the marginal social cost for both types of capital and initial demand represents the marginal social benefit, the tax differential induces an increase in the amount of type B capital so that marginal cost is greater than benefit. Similarly, the reduction in the amount of type A capital causes its marginal benefit to be greater than marginal cost. Because marginal social cost no longer equals marginal social benefit in each market, the change has reduced economic welfare or created an efficiency cost. The economy is supplying too much type B capital and too little type A.

In this discussion, it is assumed that capital is perfectly mobile, whereas consumers of these capital services are immobile. This implies that profit-maximizing investors will attempt to earn the highest possible return or profit, but consumers are unable to shift between the two types of properties. What happens if these assumptions are incorrect? If investors do not or are prevented from altering their investment types in response to the tax, then the tax burden falls on owners of taxed property. Essentially, the situation is again that represented in Figure 12.6.

If users of capital can switch from one to the other, then the "equilibrium" we have identified is temporary. Because the consumer's price for type A property is now greater than that for type B property, the demand for type A property is expected to decrease and the demand for type B property to increase. As a result, the price charged for type A property will decline, and the price charged for type B property will increase until the prices are equal again, meaning that investors in type A property will earn lower net returns than investors in type B property. It is impossible for investors in both types of property to earn equal net returns *and* for users of both types to be charged the same price. Economists usually assume that it is easier for investors to move investments among different types of capital than it is for users of capital to change demand. For instance, if capital owned by profit-making businesses is taxed while capital used by nonprofit entities is exempt, the tax treatment of the property depends on its use, not any inherent characteristic of the property. To avoid the higher prices, profit-making firms would have to become nonprofit entities to consume type B property.

Differential tax rates by location

Taxing property at a uniform rate is also unrealistic. The next step is to extend the analysis to taxation of identical property at different tax rates by different jurisdictions. This extension is easy because it is analytically identical to the case just considered and represented in Figure 12.7, with type A capital now representing property in jurisdiction A and type B capital representing property in lower-tax jurisdiction B. Although the example reflects some tax in A and no tax in B, it is just as applicable to a situation where there is some tax in B, say $30 per thousand of assessed value, and a higher tax in A, perhaps $35 per thousand. Only the *differential in tax rates* will influence movement between the localities.

The initial effect of the higher tax in A is to lower the rate of return received by owners/investors in A compared to that available in B. If capital is mobile, investors are expected to shift their investments from jurisdiction A to jurisdiction B. The resulting reduction in the supply of property in A raises the value of, or return from, that property whereas the increase in supply of property in B reduces the return from that property. Equilibrium is

reached when the net-of-tax returns available to investors in both jurisdictions are equal. For that to happen, the user's cost of capital must be greater in jurisdiction A than in B; users of capital face higher costs in A, the higher-tax jurisdiction. The effect of the differential in tax rates between the jurisdictions is therefore to reduce the amount of property and increase the user's price for property in the higher-tax jurisdiction, with just the opposite effects in lower-tax jurisdiction B.

Some of the tax burden from the higher-tax jurisdiction is shifted to property owners in the lower-tax jurisdiction through the decrease in the rate of return, which is caused by the increased supply. If users of capital also are mobile, the story continues. Because the price (rental charge) for capital is greater in A than in B, some users of capital might move their operations to B in an attempt to enjoy those lower prices. That shift of demand would reduce prices in A, the higher-tax jurisdiction, and raise them in B. The outcome of this chase depends on the relative mobility of suppliers compared to demanders. Capital or property is considered an input into production, so the users of capital are firms that produce goods and services and households who own their residences and are thus "producers" of their housing services. Therefore, one additional step is necessary to determine the effect of the differential capital (property) tax on prices of other goods and services. This step is to consider what happens to the return to suppliers of other factors of production and to the prices of consumer goods.

Labor

If capital is mobile, the higher tax rate in jurisdiction A causes less capital to be invested in that jurisdiction, which is expected to affect the demand for labor in jurisdiction A. If labor and capital are complementary, then the reduced amount of capital investment also will reduce the demand for labor, causing wages in jurisdiction A to fall. Just the opposite happens in jurisdiction B, where increased capital investment causes an increase in demand for labor and an increase in wages. If workers do not or cannot change jobs in response to these wage changes, the story stops; part of the differential property tax burden in A has been shifted to workers in A. If workers are mobile and do respond to the change in relative wages, the supply of labor will fall in A (driving wages back up), and the supply in B will rise (driving wages down). In that case, the effect of the property tax differential in A is a reduction in employment rather than a change in wages.[27]

Local consumer goods (housing)

The changes in the user prices of capital in jurisdictions A and B, caused by the difference in property tax, also are expected to affect the prices of goods produced and consumed locally that use capital in the production process. One expects that the prices of local goods that are capital intensive also will rise in jurisdiction A because the user's price of capital (the rental rate) has increased. Chief among these goods is housing. One expects that the price of housing service in A – that is, the consumer's cost of living in a house or apartment – will rise. In contrast, the decrease in the consumer's price of capital in jurisdiction B is expected to reduce the price of housing services in B.[28]

The changes in jurisdiction A are depicted in Figure 12.8, with the shift of the supply curve resulting from the increased cost of producing housing services due to the higher property tax. The tax differential causes the cost of living in a housing unit in jurisdiction A to rise from P_0 to P_1. If there is some elasticity to demand, the net return to the owner of the housing unit also falls, from P_0 to P_2, implying that this unit will now command a lower selling price. How can the cost of living in a house go up at the same time that its market

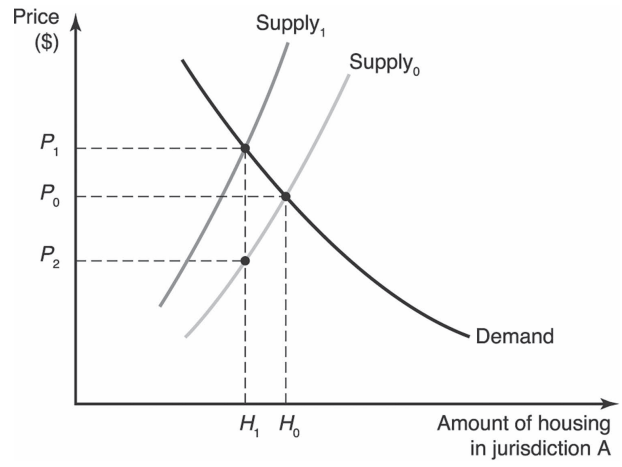


Figure 12.8 Effect of a capital tax on housing prices

price falls? Market price falls by less than the amount of the tax, so the total cost of the house plus tax rises. Of course, if this is an owner-occupied house, the distinction is irrelevant because the owner and consumer are the same person.

Whether the story stops or continues depends on whether housing consumers respond to the change in the relative price of housing services between the two jurisdictions. If consumers are aware of the differences and are mobile, then more consumers are expected to seek housing in B, where the price has decreased, and fewer in A. The increase in housing demand in B will increase housing prices again, whereas the decrease in housing demand in jurisdiction A will bring housing prices down. If consumers are perfectly mobile, the resulting effect of the property tax differential, then, is a decrease in the amount of housing in A and an increase in the amount in B, but no change in the relative prices.

Land

The amount of capital investment in A is expected to fall because of the positive property tax rate differential in jurisdiction A, which is expected to decrease the demand for the complementary input land. If housing consumers react to the increased housing service price by leaving for other jurisdictions, the demand for land will decline further. These decreases in the demand for land will reduce the price (value) of land in A. Landowners do not have the option, available to owners of other types of capital, of moving their investment (land) to a lower-tax jurisdiction; the supply of land in jurisdiction A is fixed, as represented in Figure 12.6. If all other capital, other inputs, and consumers are all mobile, then the burden of the tax differential that remains is reflected in a decreased value of land. If land is the only immobile commodity or agent, then all the burden of the tax differential is capitalized into land values in the higher-tax jurisdiction (A in the example). Those hurt by the tax differential are the landowners in jurisdiction A at the time the tax was increased (while landowners in B benefit).

Putting the analysis together

The overall burden of a property tax is the combined result of the capital tax and excise tax effects. Part of the burden arises because of the national average rate of property taxation and

part because of the differences in effective rates among jurisdictions and uses. An important implication is that it may not make great sense to think of the incidence of a property tax because the incidence (or distribution of burden) depends on the nature of the tax (uniform or differential) or the nature of any property tax change. Similarly, it is not possible to identify unambiguously the effect of lowering (or raising) property taxes, as the expected result depends on both what all jurisdictions are doing simultaneously and how individuals respond.

An example illustrates the different components of property tax burden or effects. Suppose one-third of all jurisdictions tax property at an effective rate of 2 percent, another third at 3 percent, and the final third at 4 percent (and all have equal amounts of property), so the average effective rate is 3 percent. This is equivalent to a national tax at a 3 percent rate combined with an additional 1 percent tax levied by one-third of the subnational jurisdictions and a 1 percent subsidy (a negative tax) provided by another third. The effect of the average property tax rate is a reduction in the return (income) from capital ownership and is thus a burden imposed on all owners of capital or property, as discussed earlier and depicted in Figure 12.6. This conclusion changes if the overall amount of capital in the society (that is, from savings and investment) is reduced by the fall in the rate of return from capital, in which case the average property tax rate imposes a burden on consumers and workers as well as capital owners in the long run.

The one percentage point property tax rate differential is expected to cause changes in the prices of some consumer goods, labor, and land in the different jurisdictions, the nature of which depends on the relative mobility of capital, labor, and consumers, as described earlier. If capital is perfectly mobile, whereas workers and consumers are perfectly immobile (workers and consumers do not move their economic activity across jurisdiction boundaries because of tax-induced price differences), the effect of the tax rate differential is to cause lower wages and land values and higher prices for locally produced consumer goods (housing) in the higher-tax jurisdictions than in the lower-tax ones. This set of assumptions may be an adequate approximation for analyzing interstate tax differentials because individuals may not be aware of price differences available in other states and face substantial costs to change both their work and residential locations.

In one study, Robert Wassmer (1993) analyzed the effect of differences in effective property tax rates compared to the national average rate on property values and the quantity of property for 62 large US cities for the period 1966 through 1981. Wassmer reports that a 1 percent change in the difference between the city and national average tax rate is associated with a 13 percent decline in the value of property units in the city. Similarly, there is evidence of a decline in the number of property units in the above-average-rate cities. Thus, as suggested by the theory, the excise effects from property tax rate differences serve to impose burdens on immobile factors in the higher-tax jurisdictions.

The opposite set of extreme assumptions – that workers and consumers as well as capital are perfectly mobile – leads to very different results. Because price differences cause and are ultimately removed by economic mobility, the remaining effect of the tax rate differential is to lower the value of land in the higher-tax jurisdictions compared to that in the lower-tax jurisdictions. This set of assumptions is often applied to analyzing tax differentials *within* states or metropolitan areas. Individuals are often aware of price differences within their area and can change their job or residential location without changing both. In this case, the burden of any tax differential is likely to fall on landowners of the higher-tax jurisdictions (who may or may not be residents of those jurisdictions).

A study by Robert Carroll and John Yinger (1994) of rental housing in the Boston metropolitan area illustrates that exact point. The authors estimate the incidence on both landlords and tenants of a $1.00 increase in city property taxes used to provide an additional dollar of

city services that benefit tenants. On average, landlords bear $.91 of the $1.00 tax increase, with a range among the cities from $.98 to $.70. Thus, the greater relative mobility of tenants (consumers) compared to landlords (suppliers) prevents the landlords from shifting a large share of the property tax burden to renters.

One important policy implication is that the effects of a property tax reduction depend on how that reduction is carried out, as explained in Table 12.4. If a national program is used to reduce property taxes in all states and localities, the effect is a reduction in the average rate of tax, which would increase the return to all capital owners and provide a benefit proportional to the amount of capital owned. Example 1 in Table 12.5, in which all four taxing jurisdictions reduce the tax rate by 25 percent, illustrates this case. A uniform property tax reduction would have no effect on the tax differences between communities; jurisdiction A has low taxes and jurisdiction D high taxes both before and after the property tax change. What does change is the average rate of tax, which reduces the tax burden on all capital owners.

On the other hand, if one (relatively small) state acted to reduce property taxes uniformly within that state, the effect on the national average rate of tax would be insignificant, and there would be no change in the tax differentials among localities within the state. The relative position of that state compared to others would be altered, however, with the expected theoretical effect of raising wages and land values and decreasing housing prices in that state. If only one city lowered property taxes (holding services constant), only the differential between this city and others in its area would be altered. The main expected result is an increase in land values in the city. The more advantageous tax differential is capitalized into

Table 12.4 Summary of property tax effects

Tax change	*Method(s)*	*Economic result*	*Distributional effect*
National reduction in property tax	Federal grant to states for property tax relief or national program requiring/encouraging states to substitute a different tax for the property tax	Increase in the rate of return to capital	Benefit proportional to capital ownership; relatively greater benefit to higher-income individuals
One state reduces property tax uniformly within the state	State grant program to all localities or uniform tax substitution in the state	Increase in capital investment, assuming some interstate mobility of capital; increase in wages and land values; decrease in housing costs	Depends on the economic characteristics of landowners, workers, and housing consumers in the state; for a lower-income state, the effect obviously would be proportionally greater for lower-income individuals; if some landowners and workers are nonresidents, then some of the benefit is exported
One locality in one state reduces property tax	Switch to a different local revenue source (not a reduction in local services) or state government payment to one locality	Increase in investment and employment (assuming mobility of capital and labor); increase in land values	Depends on the economic characteristics of landowners in the city, who may or may not be residents; for a lower-income city, this may provide relative benefits to lower-income individuals (except for high-income nonresident landowners)

Table 12.5 Examples of property tax changes

	Jurisdiction A	*Jurisdiction B*	*Jurisdiction C*	*Jurisdiction D*	*Aggregate*
Effective property tax rate	1.50%	2.00%	2.00%	2.50%	2.00%
Tax change, example 1 (25% uniform reduction)					
Effective property tax rate	1.125%	1.50%	1.50%	1.875%	1.50%
Economic effects	No change in relative position or excise effects		No change in relative position or excise effects		Decrease in burden on capital owners
Tax change, example 2 (25% reduction in D only)					
Effective property tax rate	1.50%	2.00%	2.00%	1.875%	1.84%
Economic effects				Improvement in relative position Capital inflow Landowners benefit Possible benefit to consumers & workers	Small decrease in burden on capital owners

higher land values, benefiting those who own land in the city at the time the tax is reduced. Example 2 in Table 12.5 illustrates the latter two possibilities. A property tax reduction in one jurisdiction (D) is expected to benefit landowners and possibly workers and consumers. There is little benefit to capital owners overall because the average rate of tax (in the nation or a single state) changes minimally.

Is the property tax regressive?

In his classic analysis of the property tax, published in 1966, Dick Netzer (1966, 23, 40) wrote:

> In the past forty years, there has been little theoretical controversy over the incidence of the American property tax. By and large, the "conventional wisdom" is accepted. . . . In general, the results [of Netzer's analysis with 1957 data] conform with the conventional wisdom: the property tax is on balance somewhat regressive when compared to current money income.

Writing just nine years later, Henry Aaron (1975, 19) offered a very different view:

> Economic analysis of differential tax incidence has undergone massive revision in the last decade. As a result, opinions among economists engaged in the study of tax incidence bear little resemblance to views generally held even a few years ago. The main contribution of recent research has been to show that the patterns of gains and losses generated

> when a single state or locality changes property taxes will differ markedly from that appearing after a change in the nationwide use of property taxes, and that none of these patterns resembles the profile of burdens from property taxes that economists formerly described.

The analysis to which Aaron refers is what you have read in the previous part of this chapter. The analysis that underlies Netzer's comment was the so-called traditional view of property tax effects. Although the viewpoint articulated by Netzer was held by economists and policy makers for more than 50 years, the analysis in this chapter – the so-called capital tax view – is now the predominant new conventional wisdom about the property tax among many economists and, increasingly, among policy makers as well.

The long-standing notion that property taxes are regressive (that is, impose a more than proportionate burden on lower-income families and individuals) arose from a simple theoretical proposition and two statistical observations. It was assumed that property taxes operated as excise taxes on commodities and increased the price of the taxed goods. Residential property taxes were therefore assumed to increase the price of housing services and thus impose a burden in proportion to the amount spent on housing consumption. Nonresidential property taxes were assumed to increase the prices of goods produced with that property, thereby imposing a burden in proportion to the amount spent on consumption of goods, excluding housing. Because it is known that both annual consumption and housing expenditures are a greater proportion of annual income for lower- than higher-income individuals, the conclusion clearly followed that property tax burdens were a greater proportion of income for lower-income taxpayers than for higher-income ones. The property tax was perceived to be regressive.

By thinking of the property tax as a tax on capital rather than on consumer goods, it became clearer that property tax burdens could be imposed on profits, wages, or land rents in addition to consumption, making the incidence conclusions more ambiguous. One conclusion was that the burden that arises from the average rate of property tax in the nation is imposed on owners of capital in proportion to the amount owned, at least in the short run. Because capital is more than proportionally owned by higher-income families and individuals, the burden of this part of the property tax is expected to be progressive (more than proportionally borne by higher-income taxpayers).

What of the tax burden that arises from the differences in property tax rates around that national average? The theory suggests that these burdens will fall on workers, landowners, and consumers in the higher-tax rate jurisdictions, with the division of the burden among these groups depending on relative mobility. One must know something about which jurisdictions have above-average tax rates in order to evaluate these burdens. If the high-tax rate jurisdictions are high-income jurisdictions, on average, then mostly high-income taxpayers will experience the decreased wages and land values and increased housing prices that result from the tax differential. The relationship between effective property tax rates and income is crucial to this evaluation.

Aaron (1975) reports that there is a positive correlation among the states between per capita income and effective property tax rates; states with high tax rates tend also to be the high-income states. Because the effect of the property tax rate differentials among the states is to hurt those with the higher rates, these burdens seem to be progressive. Aaron also reports a positive relationship between income and property tax rates among counties within states, although that relationship is not as strong as that among the states. In contrast, Aaron found a negative relationship between property tax rates and income among localities within counties in New Jersey, suggesting that the tax burdens that arise from property tax rate differentials within counties or metropolitan areas may be regressive. Of course, this conclusion

can vary by state or even for different areas within a state, so the facts need to be examined for specific cases. Aaron suggests that when these factors are combined, a conclusion of general property tax regressivity is certainly not supported.

An analysis by Plummer (2003) of residential property tax burdens in Dallas County, Texas, finds that "after allowing for the federal income tax deduction of property taxes, total [residential] property taxes combined are approximately proportional." This aggregate result arises because she finds that county and school taxes are proportional or slightly progressive, whereas city property taxes are regressive. Plummer explains, "Tax rates contribute to the regressivity of city taxes because lower-income cities tend to have relatively high tax rates" (p. 752).

A comprehensive examination of the excise tax effects that arise from interstate property tax differentials by Gravelle (2007) estimates that the excise tax effects (the incidence that results because of interstate differences in effective tax rates) account for 30 to 40 percent of the aggregate property tax burden. States with above-average tax rates incur tax burdens, whereas states with below-average tax rates enjoy tax subsidies or benefits. She suggests that between 35 and 49 percent of the benefits of lower tax rates went to states with per capita income lower than the national average, and 35 to 40 percent of the excise tax burden of high tax rates also went to low-income states. This suggests that the excise taxes and subsidies for lower-income states almost offset each other, implying that the excise effects from interstate property tax rate differentials have little impact on overall progressivity.

Several studies examining the overall distributional effect of property taxes are reported in Table 12.6. The analyses differ in the assumptions made about incidence, the year and source of data, and the method used to measure tax burden (household, family, individual; annual income or income over some longer period). If one assumes that tax burdens fall on owners of capital (a national uniform property tax or only the capital tax effect) and

Table 12.6 Summary of property tax incidence studies

Author	*Data year*	*Incidence assumption*	*Distributional measure*	*Incidence result*
Phares (1980)	1975–76	Owner-occupied housing: owners (proportional to value); business: 2/3 to consumers and 1/3 to owners	Annual family income	Regressive bottom 60% of families; proportional for next 35%; progressive for top 5%
		Capital owners	Annual family income	Regressive bottom 40%; proportional next 40%; progressive top 20%
Pechman (1985)	1980	Consumers	Annual family income	Regressive bottom 40%; proportional top 60%
		Capital owners	Annual family income	Regressive bottom 20%; proportional for the next 75%; progressive top 5%
Metcalf (1994)	1989	Capital owners	Annual household expenditure (lifetime income)	Proportional
		Capital owners	Annual household income	Progressive bottom 30%; regressive next 60%; progressive top 10%
McIntyre et al. (2003)	2002	Owner-occupied housing: owners; rental housing: half tenants, half owners	Annual income, married couples	Regressive for bottom 20%; proportional for the remaining 80%

compare tax burden to current annual income, the tax distribution is U shaped with respect to income – regressive for the bottom 30 to 40 percent of households and proportional for the remaining great majority of households, with a progressive pattern at the top of the income distribution (top 5 to 10 percent). With the same incidence assumption, but comparing tax burden to some measure of permanent or lifetime income, the overall tax burden is essentially proportional. If one assumes that property tax burdens fall on consumers (homeowners, renters, consumers of other goods), which represents only the excise tax effect, and compare to current annual income, then tax burdens are regressive for the bottom 20 to 40 percent of taxpayers and proportional for the remainder. The overall distribution of the property tax burden seems roughly proportional to income for middle-income taxpayers. Property tax burden seems regressive among the lowest-income taxpayers (roughly the bottom 20 percent) and progressive or proportional for the highest-income taxpayers (the top 5 to 10 percent).

Because choices about the value of residence to purchase or own are long-run decisions, depending not just on current income but also on expected future income, it may not make sense to compare property tax burdens to annual income. If housing choices are based on average long-run incomes, then comparing property tax burdens to that same long-run income gives a more accurate picture of the true income distribution of the burden. If property tax burdens are compared to average lifetime income rather than annual or current income, the distribution is less regressive or more progressive.

An alternative perspective: The benefit view

Recall from Chapter 5 that property taxes may serve as benefit taxes. If consumers choose residential locations based on the property tax and service package offered by the local government and if some mechanism arises to maintain the equilibrium (such as zoning rules), consumers who desire the same fiscal package are grouped together. The property tax is the "price" for consuming local services, with all consumers paying the costs that their consumption imposes on the government. In that case, it does not make sense to discuss the incidence of the tax separate from the provision of public services because the tax simply reflects the demand for services. For instance, a high-income community may have high taxes because residents demand a relatively large quantity of public service. The correlation between income and tax rates does not reflect any redistribution from higher-income taxpayers because individuals simply are paying for the services they demand.

If property taxes serve as benefit taxes or fees, then there is no incentive for reallocation of capital between jurisdictions or between uses. Whether to think of property taxes as taxes on mobile capital or as fees for residing in a particular jurisdiction and benefiting from the services provided in that jurisdiction remains a controversial issue among some public finance analysts.[29]

To reduce the controversy, under certain conditions, the outcome of the capital tax approach may be similar to that of the benefit tax (Zodrow, 2001). If local consumers and workers are not mobile (but capital is), then a local property tax imposes burdens on local residents. Because they are the same people who presumably benefit from the services financed by the higher property tax, this is similar to (but not exactly the same as) that envisioned by those thinking of property taxes as benefit taxes. Advocates of the benefit tax approach, such as Fischel (2001, 2005, 2014), generally do not accept that the concept of benefit taxation can be subsumed in the capital tax approach. Rather, these advocates envision an entirely different structure of local fiscal decision making. One way to think of or better understand the controversy is to focus on the mobility of capital. It is the mobility of capital in response to different tax rates that drives the results with the capital tax approach. From a benefit tax

or Tiebout perspective, property taxes may create little or no incentive for capital mobility if the tax burdens are precisely matched by service benefits.

Which view or perspective comes closer to describing the actual process that results from property tax changes is an empirical question, but there are no definitive empirical studies so far. Supporters of the benefit tax view point to studies showing the predominance of Tiebout-type sorting among localities – that is, having many varied but relatively homogeneous localities in a metropolitan area – and to the popularity of complicated zoning rules that may serve to maintain community homogeneity. Supporters of the capital tax view point to the need for a very large number of separate homogeneous communities in any metropolitan area to make the benefit tax view work and to the concern that many zoning rules are not binding or not sufficiently tied to housing.

Wallace Oates and William Fischel (2016) provide a comprehensive discussion of the comparison among these alternative perspectives on how to think about property tax incidence. Clearly with some uncertainties, they suggest,

> As a first approach, we might take the benefit view as a working model for thinking about property tax incidence for jurisdictions within urbanized areas in the United States. In contrast, the capital-tax view seems more applicable to jurisdictions outside the suburban ring, where there is more potential for the movement of capital in the form of new housing investment.

Therefore, this issue remains an important one for continuing additional research, perhaps even by some readers of this book.

Land value taxation[30]

Most property tax rates are applied to the aggregate value of a property, effectively applying the rate equally to both the land and structure component of that property value. It is possible, however, for the value of the land to be determined separately from the value of the structure (building) on that land and to apply different property tax rates to those two values.[31] Such a tax is called a **two-rate**, **split-rate** or **graded property tax**. In 1879, Henry George advocated a special version of the two-rate tax, arguing for zero tax on structures and high tax rates on land (high enough to generate the desired revenue). Recent attention has focused on a less extreme option of levying a tax rate on land that is perhaps twice as great as that on structures.

The potential advantage of a two-rate tax is that it encourages more intensive use of land, essentially encouraging greater investment in property and housing and discouraging the holding of vacant land (especially for speculative purposes). In addition, because the supply of land is fixed (perfectly inelastic), it is argued that higher land taxes do not affect the behavior of landowners and thus create no efficiency cost or excess burden.

These effects are illustrated graphically in Figure 12.9. Suppose that the tax rate on land is increased, which is analyzed by shifting the demand curve down by the amount of the tax increase. As a result, the quantity of land remains constant, and the user's cost (rental price) of land remains at R_0, but the owner's after-tax return or rent falls to R_1. Because the owner cannot reduce the amount of land, the burden of the tax is on the landowner. The additional revenue from the higher tax on land allows lower tax rates on structures (holding government spending constant), which is shown by a shift down in the supply of structures (reflecting lower cost of structures due to the tax decrease). As a result, the quantity of structures rises. In total, then, there is more physical structure on the same amount of land – land is used more intensively, which Oates and Schwab (1997) call the capital-intensity effect.[32]

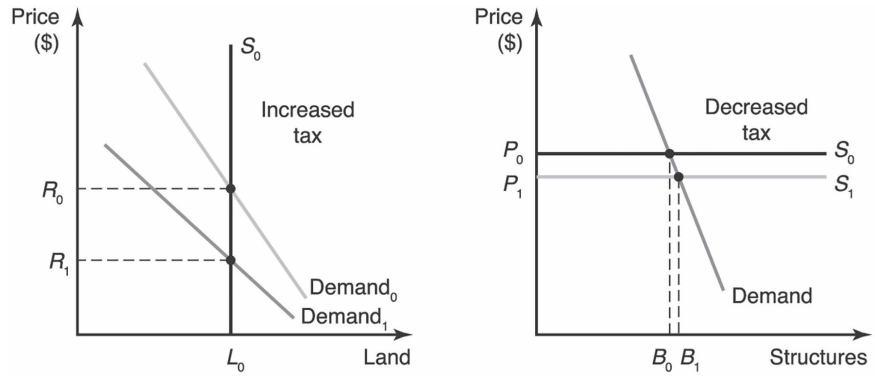


Figure 12.9 Effects of increased land taxes and decreased taxes on structures

This capital-intensity effect also can be illustrated with a numerical example. Suppose a landowner purchased a parcel of land for $10,000, which is leased for an annual rent of $1,000. This landowner thus earns a 10 percent rate of return annually. Suppose a tax of 2 percent of the value of the land is levied each year, which amounts to an annual tax of $200 (.02 × $10,000). This landowner now earns a net, after-tax return of $800 per year (the $1,000 rent minus the $200 tax), which provides an annual rate of return of 8 percent. How could the landowner reclaim the lost rent or return? One option is to lease the land to a developer who will put a larger, more valuable structure on the land. With a larger structure, the rent also can be greater. If the rent rises to $1,250 per year, the value of the property rises to $12,500, the annual tax is $250, and the net return to the landowner returns to $1,000.

There are two potential difficulties with such two-rate property taxes. The first is simply the mechanics of separately assessing land and the structures on that land, as both together produce the income from that property. Part of the problem concerns valuing land based on how it is being used currently as opposed to determining its value if the land were in its "highest and best" use. The other potential problem is that depending on how land is assessed, the higher tax on land may induce development of land sooner or at a faster pace than is efficient. Because of the high tax on vacant (or underused) land, an owner may be induced to develop the land now, even if waiting would allow a socially preferred different use later. In this case, the land tax is inefficient and does create an excess burden.

How have two-part property taxes worked in practice? In the United States, a few municipalities in Pennsylvania and a couple of other states have used two-part taxes with higher rates on land, and this form of taxation is also used in several other countries, most notably Australia and New Zealand. The experience in Pittsburgh, Pennsylvania, has received the most careful analysis among the US experiences. Before 1979, Pittsburgh taxed land at twice the rate of structures; beginning in 1979, the city changed to taxing land at about five times the rate of structures. At the same time, however, the city began a program of granting generous property tax abatements for new construction of commercial and residential property, effectively reducing the tax on structures. Finally, there apparently was a serious shortage of commercial office space in the city in 1980 (occupancy rates were about 99 percent) that resulted from increased demand.

In a careful analysis, Wallace Oates and Robert M. Schwab (1997) examined building activity in Pittsburgh in the ten years after the property tax change and compared Pittsburgh's experience to those of other cities in that region that did not use this tax system.

Indeed, Pittsburgh did enjoy a construction boom in that decade, which was quite different from most other cities in the sample. Oates and Schwab conclude that the most important factors in stimulating construction in the city were the increased demand for commercial office space and the reduced taxes on structures. They note, however, that these two factors together do not explain all the increased construction. Thus, the higher tax on land alone also must have had an effect. They argue as follows: "What the Pittsburgh experience suggests to us is that the movement to a graded tax system can, in the right setting, provide some stimulus to local building activity" (Oates and Schwab, 1995, 10).[33]

Pittsburgh repealed its two-part property tax in 2001, apparently because of political opposition tied to inappropriate assessment practices for property in general that led to subsequent large tax increases. This reiterates the important policy fact that any property tax system (including a two-rate tax) is dependent on effective property assessment. Because two-rate property taxes have been used in only a few locations, and there is limited analysis or understanding of those cases, there still is substantial uncertainty about whether and to what degree two-rate taxes can stimulate property investment in practice.

Summary

The property tax is different from most other taxes, partly because methods and procedures for assessing the value of property for tax purposes must be part of the property tax structure.

In the typical procedure for assessing, levying, and collecting property taxes, the assessed value (taxable value) of each piece of property is first computed by an assessor from an estimate of the market value of the property. The assessed value is specified by law as a percentage of market value, called the assessment ratio rule. The governing body of each local government sets a tax rate sufficient to generate the desired property tax revenue. Property tax rates historically have been specified in mills, equal to $1 of tax per each $1,000 of taxable value. The property tax levy or bill for each property is determined from the tax rate and the assessed value of each property.

Real property – that is, land and buildings – represents the great bulk of total assessed value and is further subdivided into (at the least) residential, commercial (office buildings, stores, warehouses, equipment), industrial (manufacturing plants, equipment), agricultural, and utility property. Single-family homes constitute, both in value and number, the largest single class of property subject to property taxes.

Property assessors use three basic methods to estimate market and assessed values of properties: (1) the comparative sales approach, which uses data from actual sales and property characteristics to estimate the value of properties that are not sold; (2) the cost approach, which bases the value on historic cost adjusted for depreciation; and (3) the income approach, which measures value by the present value (sometimes called capitalized value) of the future net income expected to be generated by the property.

Several states limit annual increases in assessed values but allow properties to be fully reassessed to market value when they are sold. Such a procedure leads to property tax inequities and creates an incentive for owners to retain their properties.

The simplest and most widely used tax-relief method for houses is exemption from taxation of a specific amount of homestead value or tax. A second major property tax relief mechanism is a state-government-financed credit or rebate for property taxes.

Every state uses some method of limiting property taxes on agricultural land, usually by using a different procedure for assessing farmland than other property.

The modern economic analysis of property taxes considers them as one of several taxes levied on the income from or value of capital, which is one of the major inputs (with labor and materials) into the production of goods and services.

The first implication of this approach is that a uniform national tax on all property at a single rate would impose a burden – which cannot be shifted, at least in the short run – on all property owners. A second implication is that owners of both taxable and exempt property will bear an ultimate tax burden. The effect of the average national property tax rate is a reduction in the return (income) from capital ownership and is thus a burden imposed on all owners of capital or property.

Any differential in tax rates between jurisdictions will reduce the amount of property and increase the user's price for property in the higher-tax jurisdictions, with just the opposite effects in the lower-tax jurisdictions. Thus, property tax burdens can be imposed on profits, wages, or land rents in addition to consumption. If capital is perfectly mobile, whereas workers and consumers are perfectly immobile, the effect of the tax rate differential is to cause lower wages and land values and higher prices for locally produced consumer goods (housing) in the higher-tax jurisdictions than in the lower-tax ones. If workers, consumers, and capital are perfectly mobile, the effect of any tax rate differential is to lower the value of land in the higher-tax jurisdictions as compared to that in the lower-tax jurisdictions.

When these factors are combined, a conclusion of general property tax regressivity is not supported. Increases in the average use of property taxes nationwide particularly will introduce more progressivity into the state-local government tax structure.

Discussion questions

1 The magnitude of property tax and the distribution of types of property vary from state to state. Use the Lincoln Institute's Significant Features of the Property Tax (https://www.lincolninst.edu/research-data/data-toolkits/significant-features-property-tax) to find the amount of property taxes collected, the importance of property taxes to local and state government budgets, how property taxes have been changing over time, and the distribution of taxable property values in your state among the three main types of property – residential, commercial, and industrial.

2 One thing that makes the property tax different from other taxes is that the government must estimate each taxpayer's tax base: that is, the value of the property. This assessment process is handled differently in various states. Use the Lincoln Institute site to find out how property assessment is handled in your jurisdiction. Consider which level of government does the assessment, how assessors are selected, what assessment ratio(s) is used, how often assessments are redone or how annual adjustments are made, whether local assessment is subject to state review or correction, and the procedure for taxpayers to appeal a property assessment.

3 In an annual budget message, one city's mayor remarked, "I am particularly pleased that due to our sound financial planning and careful budgeting, no property tax increase is needed this year." Yet a careful examination of the detailed budget submitted by the mayor showed expected property tax revenue in the coming year to be 10 percent greater than in the previous year. How can you explain the apparent contradiction in the mayor's statement and proposed budget?

4 Suppose that you live in a house with a market and taxable value of $100,000 in a community with a property tax rate of $30 per $1,000 of taxable value.

   (a) What is your property tax amount?
   (b) What happens to your property tax bill if the market value of your property rises by 10 percent, and the assessment ratio is kept constant? What if the tax rate were increased by 10 percent along with the value?

(c) Suppose your community allows an exemption of the first $20,000 of taxable value. How much would the exemption reduce your property tax bill? What happens to your tax savings from the exemption as value increases? As the tax rate increases?
(d) Suppose instead of the exemption that you are allowed a credit equal to one-half the amount of property tax that is greater than 5 percent of your income. If your annual income is $40,000, how much does the credit reduce your property tax? What happens to your tax savings from the credit as value increases? As the tax rate increases?

5 Suppose you are assigned to assess a 50,000-square-foot office building that is currently fully leased at $10 per square foot. The owner's annual costs of operation for the building (interest, maintenance, insurance) are $400,000. The building is 10 years old and is expected to have an additional 20 years of useful life. Assuming these market conditions will continue, estimate the current market value of the building under the income approach if the discount rate is 10 percent. How does the estimate differ if the discount rate is 5 percent?
6 "If one city lowers property taxes, then most of the benefits will go to landowners in that city when taxes are reduced." Evaluate this statement in terms of economics by analyzing first the effects of the tax decrease on the amount of capital in the city and then on the markets for land, labor, and housing in the city. Under what conditions is the statement correct?
7 Suppose that the national government creates a grant program to provide funds to all local governments and, as a result, that all local governments nationally reduce property taxes proportionally. Discuss the economic effects of this property tax change. Which types of individuals are expected to benefit? Will the property tax change lead to a more or less progressive tax structure?
8 Suppose that all types of property are assessed equally in a given state with taxable value equal to market value. Now suppose that a change is made to assess industrial property at 0 percent of market value, so effectively, no property tax is levied on industrial properties in the state.

(a) If the other types of property are commercial and residential, analyze the expected effect of this change on the amount, prices, and rate of return of industrial and other property in the state. Does it make any difference whether this tax change attracts any new investment from outside the state?
(b) How would the analysis and results be different if the state reduced industrial property taxes but required that total property tax revenue remain the same?

Notes

1 Noah Buhayar, Tom Maloney, and Natalie Wong, "New York's Tax Bills Show Lasting Damage to Real Estate," *Bloomberg*, June 9, 2020, www.bloomberg.com/graphics/2021-ny-property-tax/.
2 Dick Netzer, *Economics of the Property Tax* (Washington, DC: The Brookings Institution, 1966), 1.
3 For a brief, less detailed discussion all these property tax issues, see Ronald C. Fisher, *Property Taxes: What Everybody Needs to Know* (Cambridge, MA: Lincoln Institute of Land Policy, 2021).
4 See Ronald C. Fisher and Robert W. Wassmer, "The Resurgence of Property Taxes," *Tax Notes State*, October 14, 2019, www.taxnotes.com/tax-notes-state/property-taxation/resurgence-property-taxes/2019/10/14/29z9n.
5 An additional complication is that different tax rates may be applied to different classes (types) of property.
6 https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html?s_areas=00000&s_year=2019&s_tablename=TABLE1&s_bygroup1=1&s_bygroup2=1&s_filtergroup1=1&s_filtergroup2=1
7 50-State Property Tax Comparison Study, www.lincolninst.edu/publications/other/50-state-property-tax-comparison-study-2019.

8 https://taxfoundation.org/tangible-personal-property-tax/.
9 For the 2,000-square-foot house, the computation is \$10,000 + \$75 • 2000 + \$18,000 • 2 + \$4,000 • 3 + \$4,500 • 2. The computation for the smaller house is similar.
10 The formula for the present value of \$1 to be received or paid t years in the future is $PV = 1/(1+i)t$, where i = discount rate, usually the interest rate available on alternative investments or projects. The present value of the 20-year stream of profits is

$$\sum_{t=0}^{19} 20{,}000/(1.08)\text{t}$$

11 I thank Professor William Bogart for suggesting this "real world" insight.
12 For recent summary of research, see Terri Sexton, "Assessment Limits as a Means of Limiting Homeowner Property Taxes," in *Erosion of the Property Tax Base*, ed. Nancy Augustine et al.
13 The same process happens with any other tax; for instance, income tax revenues increase as incomes increase. However, with property taxes, unlike the others, a government official sets the base.
14 https://www.lincolninst.edu/research-data/data-toolkits/significant-features-property-tax/access-property-tax-database/residential-property-tax-relief-programs.
15 This assumes that the exemption does not affect market values, correct at least in the very short run.
16 For a detailed analysis of circuit breakers, see Langley and Youngman, 2021.
17 This is one reason various lists of state circuit-breaker programs may not correspond exactly.
18 For program details, see the Tax Treatment of Agricultural Property section of Significant Features of the Property Tax, www.lincolninst.edu/research-data/data-toolkits/significant-features-property-tax/access-property-tax-database/tax-treatment-agricultural-property. For a recent summary of research, see Woods Bowman et al., "Preferential Treatment of Property Used for Social Purposes: Fiscal Impacts and Public Policy Implications," in *Erosion of the Property Tax Base*, ed. Nancy Augustine et al.
19 Some states have options for both use value assessment and deferred taxation that apply in differing circumstances. Therefore, the sum of states with each policy is greater than 50.
20 This assumes that none of the forgone income tax revenue is made up by higher income tax rates, which is a reasonable assumption for any single taxpayer to make because the increase to offset only that taxpayer's deduction would be insignificant.
21 In this example, f percent of the property tax is offset by the federal deduction and s percent by the state deduction. But the reduction of state income taxes equal to s also reduces the federal deduction by s, which *increases* federal tax by fs. The net cost is therefore $1 - f - s + fs$, which equals $(1 - f)(1 - s)$.
22 See Fisher (1978, 399).
23 For a detailed analysis of PILOTs, see Daphne A. Kenyon and Adam H. Langley, *Payments in Lieu of Taxes*.
24 Brown does pay property tax on property it owns that is not used for educational purposes.
25 In addition, in at least two cases, the state government provides grants to local governments to offset forgone property tax revenue, and the federal government also makes payments to localities with some federal properties.
26 In 2020, Brown University paid Providence \$6.2 million in voluntary payments based on the agreements and taxes on noneducational property, www.brown.edu/gcr/economic-benefits.
27 If labor and capital are substituted, then the story is reversed: the decreased capital investment increases the demand for labor.
28 This analysis applies to locally produced and consumed goods. Goods that are sold on a national market presumably trade at a uniform price everywhere, except for differences caused by transportation cost and the consumer's cost of discovering any arbitrage opportunities. Even for local goods, the analysis is somewhat more complicated. For instance, the price of some labor-intensive local goods could even fall if the price of labor falls.
29 For a debate on this question, see the "Forum on the Incidence of the Property Tax" in the March 2001 issue of the *National Tax Journal*. George Zodrow, a leading proponent of the capital tax view, and William Fischel, perhaps the leading proponent of the benefit tax view, each outline their positions in separate papers.
30 For a summary of research regarding this issue, see Richard F. Dye and Richard W. England, eds., *Land Value Taxation: Theory, Evidence, and Practice* (Cambridge, MA: Lincoln Institute of Land Policy, 2009).
31 In some cases, the owner of the structure is different than the owner of the land. In the case of commercial property, and sometimes even with housing, the owner of a structure leases the land on which the structure is located.
32 When this analysis is put in a spatial model, sometimes the effect is a smaller urban area. Essentially, the quantity of structures is squeezed into a smaller geographic area.

33 For a review of research about land value taxation, see John E. Anderson, "A Review of the Evidence on Land Value Taxation," in *Land Value Taxation: Theory, Evidence, and Practice*, eds. Richard F. Dye and Richard W. England (Cambridge, MA: Lincoln Institute of Land Policy, 2009), 99–128.

Selected readings

Aaron, Henry J. *Who Pays the Property Tax? A New View*. Washington, DC: Brookings Institution, 1975.

Bell, Michael E. "Real Property Tax." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen, 271–299. Oxford, UK: Oxford University Press, 2012.

Fischel, William A. "Fiscal Zoning and Economists' Views of the Property Tax." *Working Paper*, Lincoln Institute of Land Policy, February 2014.

Fisher, Ronald C. "Property Taxes: What Everybody Should Know." *Introduction to the Property Tax*, Lincoln Institute of Land Policy, June 2021.

Hamilton, Bruce W. "A Review: Is the Property Tax a Benefit Tax?" In *Local Provision of Public Services: The Tiebout Model after Twenty-Five Years*, edited by George R. Zodrow, 85–107. New York: Academic Press, 1983.

Kenyon, Daphne A., and Adam H. Langley. *Payments in Lieu of Taxes: Balancing Municipal and Nonprofit Interests*. Cambridge, MA: Lincoln Institute of Land Policy, 2010.

Langley, Adam, and Joan Youngman. "Property Tax Relief for Homeowners." Lincoln Institute of Land Policy, forthcoming, October 2021.

McGuire, Therese J., Leslie E. Papke, and Andrew Reschovsky. "Local Funding of Schools: The Property Tax and Its Alternatives." In *Handbook of Research in Education Finance and Policy*, Second Edition, edited by Helen F. Ladd and Margaret E. Goertz. New York: Routledge, 2015.

McLure, Charles E. Jr. "The 'New View' of the Property Tax: A Caveat." *National Tax Journal*, *30* (March 1977): 69–75.

Mieszkowski, Peter. "The Property Tax: An Excise Tax or a Profits Tax?" *Journal of Public Economics*, *1*, No. 1 (April 1972): 73–96.

Oates, Wallace, ed. *Property Taxation and Local Government Finance*. Cambridge, MA: Lincoln Institute of Land Policy, 2001.

Wallis, John J. "A History of the Property Tax in America." In *Property Taxation and Local Government Finance*, edited by Wallace Oates, 123–147. Cambridge, MA: Lincoln Institute of Land Policy, 2001.

Youngman, Joan. *A Good Tax: Legal and Policy Issues for the Property Tax in the United States*. Cambridge, MA: Lincoln Institute of Land Policy, 2016.

Zodrow, George R. "The Property Tax as a Capital Tax: A Room with Three Views." *National Tax Journal*, *54*, No. 1 (March 2001): 139–156.

13 Sales and excise taxes

Headlines[1]

SUPREME COURT OF THE UNITED STATES
SOUTH DAKOTA v. WAYFAIR, INC., ET AL.
CERTIORARI TO THE SUPREME COURT OF SOUTH DAKOTA
No. 17–494. Argued April 17, 2018 – Decided June 21, 2018

South Dakota, like many States, taxes the retail sales of goods and services in the State. Sellers are required to collect and remit the tax to the State, but if they do not then in-state consumers are responsible for paying a use tax at the same rate. Under *National Bellas Hess, Inc. v. Department of Revenue of Ill.*, 386 U. S. 753, and *Quill Corp. v. North Dakota*, 504 U. S. 298, South Dakota may not require a business that has no physical presence in the State to collect its sales tax. Consumer compliance rates are notoriously low, however, and it is estimated that *Bellas Hess* and *Quill* cause South Dakota to lose between $48 and $58 million annually. Concerned about the erosion of its sales tax base and corresponding loss of critical funding for state and local services, the South Dakota Legislature enacted a law requiring out-of-state sellers to collect and remit sales tax "as if the seller had a physical presence in the State." The Act covers only sellers that, on an annual basis, deliver more than $100,000 of goods or services into the State or engage in 200 or more separate transactions for the delivery of goods or services into the State. Respondents, top online retailers with no employees or real estate in South Dakota, each meet the Act's minimum sales or transactions requirement, but do not collect the State's sales tax. South Dakota filed suit in state court, seeking a declaration that the Act's requirements are valid and applicable to respondents and an injunction requiring respondents to register for licenses to collect and remit the sales tax. Respondents sought summary judgment, arguing that the Act is unconstitutional. The trial court granted their motion. The State Supreme Court affirmed on the ground that *Quill* is controlling precedent.

Held: Because the physical presence rule of *Quill* is unsound and incorrect, *Quill Corp. v. North Dakota*, 504 U. S. 298, and *National Bellas*, are overruled. Pp. 5–24.

KENNEDY, J., delivered the opinion of the Court, in which THOMAS, GINSBURG, ALITO, and GORSUCH, JJ., joined. THOMAS, J., and GORSUCH, J., filed concurring opinions. ROBERTS, C. J., filed a dissenting opinion, in which BREYER, SOTOMAYOR, and KAGAN, JJ., joined.

DOI: 10.4324/9781003030645-17

Data Availability

As is generally the case, the Governments Division of the US Census Bureau is the major source of data about the revenue from state and local taxes, including sales taxes. These data are reported annually in several different reports. State and local government tax collections are reported quarterly, state government data for each state and local government data nationally (www.census.gov/data/tables/2020/econ/qtax/historical.Q4.html). These data are the most current. Separately, all state government finances (www.census.gov/data/tables/2019/econ/state/historical-tables.html) and all state and local government finances (https://www.census.gov/programs-surveys/gov-finances/data/datasets.html) also are reported, but with a year or two lag.

The Federation of Tax Administrators (www.taxadmin.org/current-tax-rates), the Tax Policy Center (www.taxpolicycenter.org/statistics/state-corporate-income-tax-rates), and the Tax Foundation (https://taxfoundation.org/publications/state-corporate-income-tax-rates-and-brackets/) all provide detailed information about the structure (tax rates and bases) of state sales and excise taxes.

State-local governments use three major types of taxes to tax consumption by residents: general sales taxes levied on retail sales, companion use taxes on resident purchases made in other jurisdictions, and excise taxes on specific goods or services. Examples of the latter are taxes on tobacco products, motor fuels, alcoholic beverages, hotel accommodations and restaurant meals, some utility services, and others. These taxes are a distinctive feature of taxation in the U.S. because, as John Due noted, "The most extensive use of retail sales taxation in any country is to be found in the states of the United States."[2] After reviewing recent trends in the use of these taxes and some important institutional details about their structure, we discuss the principal economic issues about the incidence and efficiency implications of these taxes.

Reliance on consumption taxes

State and local general sales taxes and excise taxes together generated nearly $611 billion of revenue in 2018, representing 3.4 percent of personal income and about $1,871 per capita. Sales taxes and excise taxes on specific purchases are the largest source of own-source revenue to state governments, providing about 23 percent of aggregate state government general revenue in 2018, second in magnitude only to federal aid. Sales and excise taxes provided about 7.5 percent of local government general revenue. Of this total, general sales taxes were $411 billion, with $316 billion of that collected by state governments and $95 billion by local governments. The remainder, about $200 billion, is revenue from selective excise taxes, including taxes on the sale of motor fuels, alcoholic beverages, tobacco products, public utility services, hotel rooms, and others.

General sales taxes are (and have been since 1969) used by 45 states and the District of Columbia, (see Table 13.1). Current rates vary from a low of 2.9 percent in Colorado to a high of 7.25 percent (in California), with 4 other states (Indiana, Mississippi, Rhode Island, and Tennessee) collecting a 7 percent sales tax.[3] A group of 10 states have tax rates between 6 and 7 percent, with another 10 states at 6 percent. The interstate variation in tax rates can be somewhat misleading, however, because there is also substantial interstate variation in sales tax bases (described in the next section).

Table 13.1 Characteristics of state and local general sales taxes, 2021

	State government taxes	*Local government taxes*
Number of states	45 states + DC	37 states
Range of tax rates	2.9%–7.25%	0.5%–9.75%
Exempt food	33 states + DC	
Exempt prescription drugs	44 states + DC	
Exempt non-prescription drugs	9 states + DC	
Exempt residential electricity/natural gas	22 states	

Source: Tax Foundation, https://taxfoundation.org/publications/state-and-local-sales-tax-rates/#Table

State government reliance on general sales taxes has declined over the 40 years, as shown in panel a of Figure 13.1 General sales taxes provided 18 percent of state government revenue in 1977 compared to 15 percent in 2017. Sales tax revenue reliance decreased despite increases in sales tax rates because of a shrinking tax base due to increased consumer purchases of services relative to goods, increased internet and mail-order sales, and expansion of exemptions.

Although about 77 percent of total general sales tax revenue went to state governments in 2018, approximately 8,000 local jurisdictions spread among 37 states collect local government general sales taxes. Local sales taxes are used mostly by counties, where they accounted for 6.8 percent of general revenue in 2017, and by municipalities, where they provided 8.8 percent of general revenue. In one special case, many boroughs (counties) and municipalities in Alaska collect a sales tax even though the state government does not use a general sales tax. The combined state and local sales tax rate can become quite high in some locations – for instance, 10.25 percent in Chicago and Seattle; 10 percent in Birmingham and Montgomery, Alabama; 9.75 in Memphis and 9.25 in Knoxville, Tennessee; 9.679 percent in St Louis; 9.45 percent in New Orleans; 8.9 percent in Atlanta; 8.6 percent in Phoenix, and 8.7 percent in Tucson.

In contrast to state governments, the importance of local government general sales taxes generally has risen in the past 40 years as more localities were given authority to adopt, and then adopted, local sales taxes (see panel a of Figure 13.1). Among counties, sales taxes grew from about 4 percent of revenue to nearly 7 percent, while the sales tax share of revenue for municipalities increased from 5.8 to 8.8 percent.

State and local governments also collect a number of "selective" sales or excise taxes on the purchase of various goods and services. These selective sales taxes amounted to about $200 billion in 2018, about $613 per capita or 1.2 percent of personal income. These excise taxes accounted for about 7.8 percent of state government general revenue and 2.0 percent of aggregate local government general revenue in 2018. Selective sales taxes may be unit taxes, as with gasoline and cigarettes, or ad valorem (percentage) taxes, as are commonly used for hotel accommodations or telephone services. In many cases, these selective sales taxes are imposed in addition to the general sales tax on the sale of some goods or services.

The share of state government revenue provided by selective excise taxes has declined over the past 40 years, from 12.7 percent in 1977 to 8 percent in 2017 (see panel b of Figure 13.1). This decrease in relative importance has partly been the result of a decrease in tobacco use and increased fuel efficiency of vehicles. Among local governments overall, the importance of selective excise taxes has remained relatively constant at only about 2 percent of revenue. They have increased in fiscal importance for municipalities and counties but declined for townships.

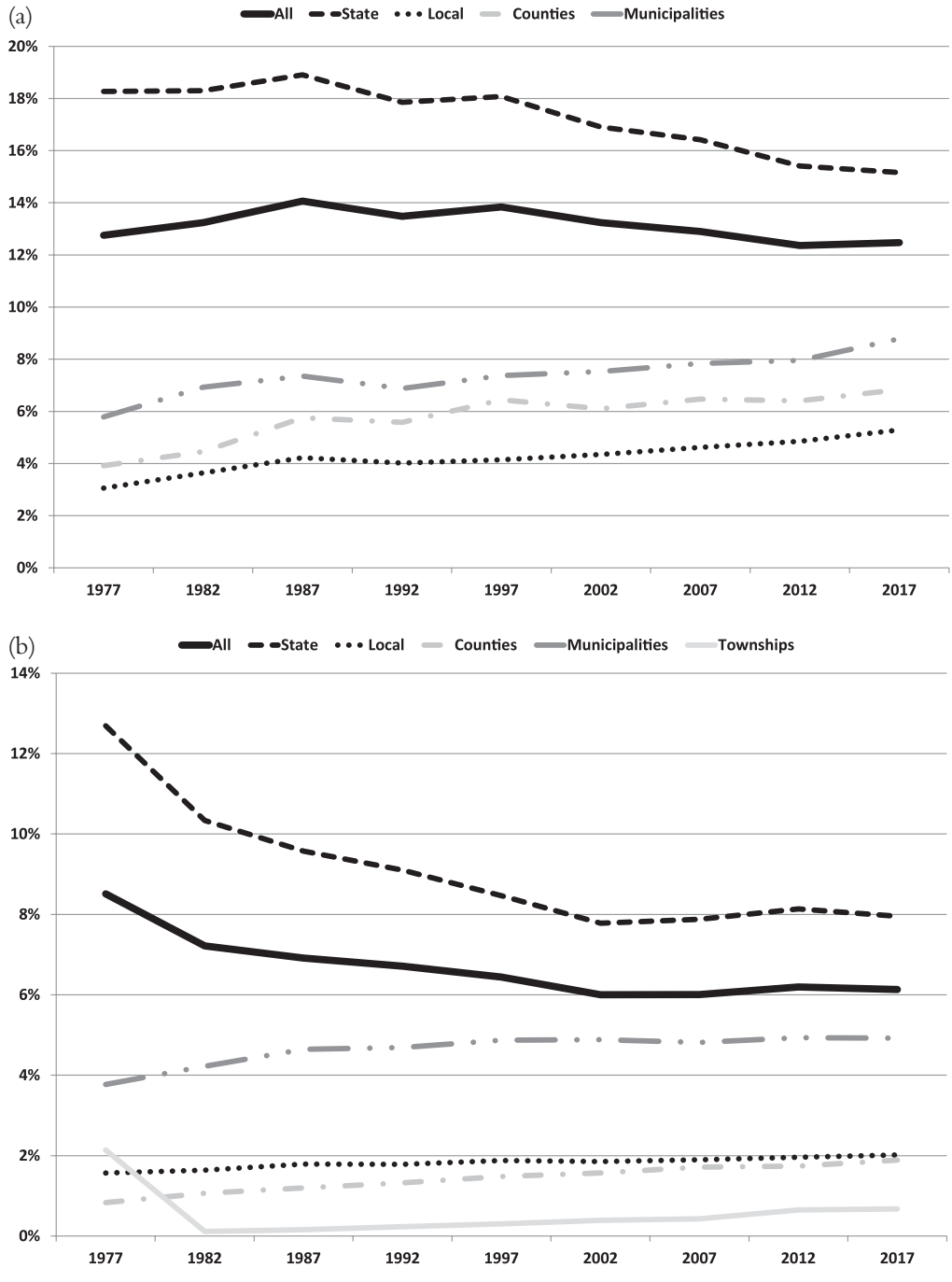


Figure 13.1 Sales taxes as a percentage of general revenue

Consumption tax structure issues

General sales and use taxes

In principle, a truly general sales tax would be levied on the final personal consumption of the residents of jurisdictions levying the tax. In practice, state general sales taxes fall short of this principle because (1) a substantial amount of personal consumption is statutorily exempt from taxation, making these taxes somewhat less than "general"; (2) the taxes apply to sales of some intermediate goods (goods used in production of final consumer goods) in addition to consumer goods because final (retail) consumption is difficult to define; and (3) states historically faced inherent administrative difficulties in collecting taxes on purchases of consumer goods made by residents in other jurisdictions. These deviations from the principle correspond to the three traditional features that characterize a sales tax structure: the *base* on which the tax is to be applied, the *stage(s) of production* at which the tax is to be collected, and the *location* at which the activity is to be taxed.

Tax base

For sales taxes to be truly general consumption taxes, they would apply to total personal consumption – that is, all uses of income except for investment (saving by individuals) and purchase of government services.[4] In fact, no state's sales tax base approaches total personal consumption; all states exempt major categories of consumption from sales taxation, although the use of these exemptions also varies greatly among the 45 sales tax states, as shown in Table 13.1. First, state sales taxes typically apply more commonly to consumption of goods than services (see Application 13.1 later in this chapter). Sale of housing services, for instance, whether from owner-occupied houses or rental housing, is exempt from direct sales taxation in all states. Generally, sales of professional services (medical, legal, financial) are not taxed, whereas sales of personal services (laundry, grooming) and repair services are partially taxed only in some states. The states that include many services in their sales tax base are Hawaii, New Mexico, South Dakota, and West Virginia. Second, sales of certain categories of goods also are exempt. Sale of prescription drugs is exempt in 44 of the 45 sales tax states (Illinois is the exception) plus Washington, DC; sale of food for home consumption (groceries) is exempt in 33 states and DC; and sale of electricity and natural gas to residential consumers is exempt in 22 states.[5]

The net effect of these exemptions is that state general sales taxes apply directly to only 40 to 60 percent of personal consumption in aggregate, with obvious substantial variation among the states, depending on the degree of exemptions used.[6] Cline and Neubig (1999) estimate that only about 34 percent of consumption spending is subject to sales and use taxation. Mazerov (2003) shows that purchases of durable goods plus purchases of nondurable goods, excluding food, account for only about 33 percent of household expenditure. The data in Table 13.2 illustrate how much the sales tax base can be eroded by even a few exemptions. In 2019, food purchases accounted for 7 percent of personal consumption, expenditures for housing services for 16 percent, and medical care services for another 17 percent. For illustration, if purchases of all services and food are excluded from the sales tax, the remaining base is only about 27 percent of total personal consumption. If only purchases of food, electricity and natural gas, and housing and medical care services are exempt, the remaining base represents about 58 percent of personal consumption. Even if only housing and medical care services were exempt from the sales tax, the sales tax base would represent only about 67 percent of personal consumption.

This suggests that distinguishing between "general" and "selective" sales taxes is an illusion to some degree. Both apply only to some consumer purchases of goods and services,

Table 13.2 Potential sales tax bases, 2019

Category	*Amount (billions of dollars)*	*Percentage of personal consumption*
Personal income	$18,551.5	127.5%
Disposable personal income	16,348.6	112.4
Personal consumption	14,554.6	100.0
Consumption expenditures on		
Food	1,025.7	7.1
Clothing	403.5	2.8
All services	8,593.2	66.0
Housing	2,330.6	16.0
Medical care	2,450.8	16.9
Household gas and electric	350.6	2.4
Consumption less expenditures on food and all services	3,925.7	27.0
Consumption less expenditures on food, housing, medical care, and household gas and electric	8,386.9	57.7
Consumption less expenditure on housing and medical care	9,763.2	67.1

Source: Bureau of Economic Analysis

although the general sales tax base is still broader than even the sum of purchases to which selective sales taxes are applied. One interesting economic implication of the general sales tax exemptions is that they provide consumers a way to avoid sales taxes by shifting consumption toward goods and services that are not directly taxed. Of course, such a change in behavior due solely to the sales tax creates efficiency costs for the economy. In that sense, analysis of general and selective sales taxes is similar.

Stage of production

Sales taxes can be levied at any and all stages of production of goods and services, although three options are generally considered. At one end of the spectrum, the tax is levied only on the final sale of goods and services for private consumption, at the so-called retail level. In this case, sale of intermediate goods – that is, goods to be used in the production of consumer goods and services – is not subject to the tax. Because the tax is levied only at the last or final stage of production, it is clear that the total or effective tax rate faced by consumers is the nominal rate.

At the opposite end of the spectrum, a sales tax is levied on *all* sales or transactions: that is, at all stages of production. Such a tax is often called a **multistage gross receipts tax** because it applies to the gross receipts or sales of all firms. For instance, if a 1 percent gross receipts tax is applied to the production of bread, 1 percent would be levied on the sale of wheat by farmers to millers, 1 percent would be levied on the sale of flour by millers to bakers, 1 percent would be levied on the sale of equipment by manufacturers to bakers, 1 percent would be levied on the sale of bread by bakers to retailers, and, ultimately, 1 percent would be levied on the sale of bread by retailers to consumers. The taxes levied at the stages of production before final retail sale become part of the costs of production and are therefore imbedded in the retail price charged to the consumer. The gross receipts tax is said to **cascade** or **pyramid** through the various stages of production, and therefore the total or effective rate of tax paid by the consumer is greater than the nominal rate levied on the retail sale.

Multistage taxes of this type generate a number of equity and efficiency problems. Part of the tax burden is implicit or hidden, and because that implicit tax burden will vary for different types of goods, the effective tax rate also will vary among different goods. Because intrafirm transactions are not taxed, there is an incentive for firms to integrate vertically to

reduce taxes. If only some producer inputs are subject to sales tax, the change in the relative cost of inputs creates an incentive for firms to alter production techniques. These issues are discussed in detail in Chapter 15 (because gross receipts taxes have been used by some states as general business taxes).

A sales tax also can be levied at one stage of production but before final retail sale. For instance, the tax might be levied on the sale of goods from wholesalers to retailers, with no additional tax then collected on the sale from the retailer to the consumer. Or a sales tax might be levied only on the sale of a product by the manufacturer to a distributor, wholesaler, or retailer, often called a manufacturer's sales tax. This tax structure avoids some but not all of the problems created by multistage sales taxes. There is no cascading of the tax – that is, no tax imposed on prior tax – because the tax is levied only at one stage of production. However, the effective tax rate paid by consumers will vary by product and producer, depending on the relative importance of the taxed stage in the final cost of the product. For instance, a wholesale sales tax would apply only to the cost of goods purchased by retailers to resell. The retailer's business costs also include the labor and capital costs of the retail business. The wholesale sales tax would be a larger fraction of total retailer cost for retailers with lower labor and capital costs. Similarly, the larger the manufacturing costs of a good (compared to distribution, marketing, and sales costs), the greater the effective rate to the consumer of a sales tax imposed only at the manufacturing stage.

If state sales taxes are to be retail taxes on the final sale of consumer goods and services, then sales of all goods used in production would have to be exempt, but no state goes that far. Nearly all states provide sales tax exemptions for goods that are to be resold and then taxed and for sales of materials used in production that become a physical ingredient of the final product, the **physical ingredient rule**. States diverge in their sales tax treatment of equipment and machinery, materials that are used in production but that do not become an ingredient of the product (fuels, for example), and materials and supplies used in business but not in production (computers, for example). Regarding equipment and machinery, John Due and John Mikesell (1994) report that 25 of the 45 sales tax states fully exempt capital assets used in production, with a common requirement that the machinery and equipment must be directly used in production. Another 15 states provide a partial exemption or tax machinery and equipment purchases at a lower rate. Regarding materials that do not become an ingredient of the final product, Due and Mikesell report that 24 states have general exemptions, and a few other states provide limited exemptions. Two estimates suggest that at least 40 percent of sales tax revenue is generated from taxation of intermediate goods (business purchases).[7] Accordingly, state sales taxes are not exclusively retail taxes but apply to at least some purchases of intermediate goods (including capital goods) by businesses.

State sales tax treatment of business purchases often also varies depending on whether the sale of the business's product is taxed. It is fairly common sales tax practice for firms that produce or sell nontaxable goods or services to be treated as the final consumers of taxable goods or services used in the business. Thus, these firms must pay sales tax on those purchases. For instance, if the sale of a house is not taxed, the builder may have to pay sales tax on purchases of materials and supplies used in constructing the house. (Sale of material to contractors is taxable in 42 states.) The economic effect of this treatment is equivalent to that from a direct sales tax on the goods or services produced by such firms, although at a lower rate than the general rate. If a firm providing a tax-exempt service spends 20 percent of its total costs on purchases of taxable materials and supplies (the other 80 percent being purchases of labor, real property, and utilities that are not taxed) at a sales tax rate of 5 percent, the tax raises the firm's costs by 1 percent. If fully passed on to consumers, this is equivalent economically to a 1 percent tax on the sale of the firm's service. Consumers of goods or services that are not taxed at the retail sale may still bear a sales tax burden, therefore, if sales tax is paid by the businesses producing those goods or services.[8]

States often exempt business purchases by issuing exemption certificates or exemption numbers to businesses that regularly purchase otherwise taxable goods or services that are to be used for production. It is sometimes difficult to distinguish at the time of sale whether the good will be consumed or used in the production of other goods, which depends on the nature of the buyer rather than on the nature of the good. For instance, a truck purchased by an individual for private use is private consumption, and the sale should be taxed under a retail sales tax. A truck purchased by a manufacturer and used in production (to transport parts, perhaps), however, is an intermediate good, with that sale ideally not to be taxed under a retail sales tax. With the presentation of the certificate or number, a seller does not collect sales tax on sales of otherwise taxable goods or services to these businesses. The use of exemption certificates and numbers does create some administrative problems and the potential for fraud, however; a business owner may purchase items for personal use but represent them as for use in the business, or counterfeit exemption certificates may be used.

Tax location and use taxes

Consumption taxes may be based either on the **origin principle**, with tax based on the location of the sale, or on the **destination principle**, with tax based on the location of consumption or of the consumer. In theory, state sales taxes are intended to be destination taxes, taxing consumption where it occurs, and the common presumption is that consumption occurs where the buyer receives the good. Accordingly, state sales taxes are not collected on purchases of otherwise taxable goods if those goods are to be delivered to a consumer in a different state. For this reason, consumers may not be charged sales tax on mail order or internet purchases if the selling company is located in a different state from the purchaser. On the other hand, sales tax is charged on purchases by nonresidents if the buyer takes possession of the good in the state where the purchase occurred.

To implement the destination principle, however, a state's residents must be taxed on all taxable consumption, regardless of where the good was purchased. Buyers may pay no sales tax on purchases that are delivered to the state of residence from other states, and the buyer's state government cannot impose a sales tax because no sale occurred in that state. To correct this difficulty, all states with general sales taxes also impose a companion **use tax** on the use (consumption) of taxable goods and services at the same rate as the sales tax. The use tax is collected only if the sales tax is not. An individual who avoids sales tax by purchasing a good in another state, therefore, owes **use tax** to his state of residence instead, equal to what the sales tax would have been. Although most consumers are well aware of sales taxes, many often do not know about the use tax. Mikesell and Ross (2019) report that use taxes represented about 8 percent of sales tax revenue in 2017.

In Michigan, use taxes are reported and collected at the same time as the individual income tax. The instructions from the Michigan form are as follows:

2013 Michigan MI-1040 individual income tax

Forms and instructions

Use tax

Every state that has a sales tax has a companion tax for purchases made outside that state by catalog, telephone, or Internet. In Michigan, that companion tax is called 'use tax,' but might be described more accurately as a remote sales tax because it is a

6 percent tax owed on purchases made outside of Michigan. Use tax is due on catalog, telephone, or Internet purchases made from out-of-state sellers as well as purchases while traveling in foreign countries when the items are to be brought into Michigan. Use tax must be paid on the total price (including shipping and handling charges).

How to report use tax

Use Worksheet 1 below to calculate your use tax and enter the amount of use tax due on MI-1040, line 23.

The collection of use taxes is difficult administratively, however, which limits the degree to which the destination principle is achieved. Simply put, the collection of use taxes is often prohibitively expensive. In past practice, retail businesses were required to collect use tax for other states on sales to residents of those other states if that firm also has establishments (*nexus* is the legal term) in those other states. Otherwise, the collection of use taxes generally is limited to large purchases (such as taxable business equipment) and those that can be tracked through a state government's regulatory authority (such as automobiles, boats, airplanes). Some states, as shown in the Michigan case, some states tried various ways to get taxpayers to pay use taxes voluntarily, either through increased information and enforcement or by including use-tax forms or calculation along with or as part of income tax forms (as with the Michigan example). These efforts made little progress.

Interstate sales over the internet (or by mail order in earlier times) create a difficult tax administration and collection problem for states with sales and use taxes, a coordination problem inherent in federalism. States do not levy sales tax on purchases for delivery to other states because of the destination principle. Buyers owe use tax on those purchases in their state of residence (if the state has a sales/use tax that taxes the commodity). A past series of court decisions prohibited states from requiring the firms selling over the internet (or by mail) to collect those use taxes if the firm has no business presence in the state.[9] However, a 2018 US Supreme Court decision, which is shown in the *Headlines* section beginning this chapter, changed the circumstances completely.[10]

In a 1967 decision (*National Bellas Hess v. Illinois Department of Revenue*) the US Supreme Court held, largely on the basis of the Interstate Commerce Clause of the Constitution, that states could not require out-of-state firms to collect state use taxes if the firm's business in the state is limited to the sending of catalogs and similar advertising. However, if a mail-order firm also has a "business presence" in a state, such as retail outlets, then that state government can require the mail-order firm to collect sales or use tax on mail-order purchases for delivery in that state. For instance, most states (excluding Connecticut, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, and Virginia, where L. L. Bean had retail stores) could not require L. L. Bean Inc. to collect use taxes on sales. In contrast, most if not all states could require Walmart to collect use taxes on orders, given that Walmart has retail outlets in most states.

In the latter 1980s, a number of states changed state use-tax laws in an attempt to avoid the limitations of *Bellas Hess*. States attempted to define a business presence in a state (nexus) as including "regular or systematic solicitation in a state that is substantial and recurring" in addition to the traditional idea of property or employees. States argued both that technology (involving computers, the internet, cable video transmission, and telephone) had changed the concept of business presence and that the sales firms benefited from state-local services

(refuse collection and disposal of catalogs, security protection of goods in transit, etc.). In a 1992 decision (*Quill Corp. v. North Dakota*), the US Supreme Court found again that such state rules interfere with interstate commerce, so only companies with a physical presence in a state are subject to use tax rules. However, the Court also found that because the Constitution gives Congress the authority to regulate interstate commerce, Congress could authorize or permit states to require such firms to collect state use taxes through a change in federal law. Such requirements authorized by Congress would be constitutional and would not violate the firm's rights to "due process."

In 2000, a group of state and local governments along with some private sector entities (under the umbrella of the Federation of Tax Administrators and the Multistate Tax Commission) instituted an effort first to simplify state and local sales taxes and then to encourage the federal government to adopt legislation requiring e-commerce and mail-order firms to collect the simplified state-local sales and use taxes. The Streamlined Sales Tax Project proposed that states would (1) agree to uniform tax base definitions; (2) have only one state tax rate per state, with the possibility of a second rate for certain exemptions (e.g., food and drugs); (3) have a single local government sales tax rate per state; (4) use a common tax base for both the state and local sales tax in a single state; (5) use state government administration of both state and local sales taxes; (6) agree that all sales taxes would be destination based (so that the rate that applies is the rate in the jurisdiction where the product is delivered or used); and (7) provide state funding for the technology needed to implement tax collection of such a streamlined system. Although a number of states signed on to the agreement, it would still have required voluntary participation by businesses or a new law.

A number of states adopted laws requiring sales or use tax collection based on different definitions of "physical presence" in a state. Initially, states adopted so-called "Amazon laws," arguing that "affiliates," separate firms that provided products sold on Amazon.com, created nexus for Amazon in every state where an affiliate firm was located. Amazon (and other similar sellers) dropped some affiliates in some cases and challenged the law in court in others. Some e-commerce sellers, especially Amazon.com, utilize warehouses and distribution centers in various states. States argued that such centers created nexus in the state, but the online sellers often had the distribution centers owned by subsidiaries and thus argued they were not part of the firm.

As states continued to explore these legal approaches, fast delivery time was becoming a competitive factor in e-commerce, requiring firms like Amazon to have more dispersed warehouses and distribution centers. As a result, Amazon made agreements with most states to collect sales tax on Amazon.com sales to residents of those states. One catch was that Amazon.com set up Amazon Marketplace, through which independent sellers use Amazon's website, billing, and distribution network to sell products, and Amazon did not collect sales tax on sales through Amazon Marketplace by these independent businesses.[11] Some other internet sellers followed Amazon's lead, but many did not.

Some states adopted laws defining *nexus* more broadly as economic presence that required out-of-state sellers to collect state sales or use tax on transactions. One such case was South Dakota, which adopted a law in 2016 requiring large online sellers to collect the state sales tax on sales in South Dakota, even if they did not have a physical presence in the state. Three large online sellers – Wayfair, Overstock, and Newegg – challenged the law in court, a case that eventually was heard by the US Supreme Court. In 2018, by a 5–4 decision, the Supreme Court reversed course, overturned the *Quill* and *Bellas Hess* decisions, and open the door to states requiring collection of state sales tax by out-of-state retailers (part of the text of the Court's decision is in the *Headlines* at the start of the chapter).

By 2021, all but two of the sales tax states had adopted laws requiring e-commerce firms to collect sales tax, which have come to be called "economic nexus" laws: that is, economic

activity or sales over some threshold in a state creates *nexus* for tax purposes. In addition, all but three of the sales tax states have adopted so-called "marketplace facilitator laws," which require firms that host various third-party sellers on their websites – called marketplace facilitators – to collect sales tax on sales by the firms they host.[12] As a result, almost all remote sales now are subject to tax in the states or local governments with sales taxes. This became especially important in 2020 and 2021, when ordering goods increased substantially as a result of the COVID-19 pandemic.

The major reason states sought to tax remote sales is the amount of potential revenue involved is substantial. Donald Bruce and William Fox (2004) estimated that the loss to state and local sales tax revenue in 2003 from e-commerce activity that would otherwise be taxed was about $15.5 billion – or about 6 to 7 percent of sales tax collections. In a 2009 paper, Bruce, Fox, and LeAnn Luna updated their estimating procedure and, based on a forecast of $4 trillion of e-commerce sales in 2012, calculated the potential revenue loss at about $12 billion. This amount represents the difference between the revenue that would be generated if all *taxable*[13] e-commerce transactions were taxed and the revenue already being collected on taxable e-commerce sales.[14] The US Census Bureau reports that actual e-commerce sales in 2012 were about $5.4 trillion, 35 percent greater than the authors' forecast, which suggests the revenue loss could be closer to $16 billion.

The estimates reported by Bruce, Fox, and Luna based on census data utilize the underlying census definition of e-commerce, which does not include remote sales finalized by telephone, mail, or in person. The authors estimate that the uncollected tax on these other taxable remote transactions would have generated an additional $7 billion in 2012. By the nature of the data and assumptions involved, such estimates cannot be totally precise. However, an amount between $20 and $25 billion seems a perfectly reasonable approximation of the annual state revenue forgone because of the inability to collect sales and use taxes on sales solely because they occur remotely. Such an amount represents about 8 percent of actual state-local general sales tax revenue.

One important economic issue about differential tax treatment of local and remote or e-commerce sales is the inefficiency created by consumer responses. Several research studies (Goolsbee, 2000; Ellison and Ellison, 2006) have shown that the sales tax differences cause consumers to substitute nontaxable purchases for taxable ones. This has the effect of disadvantaging local retailers who invest in capital and employees in various states and localities. To the extent that the change in purchasing location is made solely because of tax differences and not any substantive difference in quality or service, an efficiency cost or excess burden is created. Consistent with this demand elasticity, research by Brian Baugh et al. (2014) shows that sales on Amazon.com declined when the online retailer began collecting sales tax in a specific state and that purchases by consumers in that state increased with local retailers and other e-commerce sellers that do not collect the tax (including Amazon Marketplace).

One reason e-commerce firms objected to collecting state-local government sales or use taxes is that it could create substantial administrative costs for those firms. There are wide differences in the tax bases and rates of both state and local sales taxes – a commodity sent to one city in state X might be taxed at a different rate than the same commodity sent to a different city in the same state, or a commodity might be taxed in one state but exempt in another. States also sometimes define taxable products differently; for instance, what does an exemption for "food" purchases mean? It could, therefore, be difficult and expensive for an e-commerce firm to determine the appropriate tax on all sales. To deal with this issue, most states exempt remote sellers with relatively small sales from having to collect the tax.

Application 13.1: Sales taxes on services

When most state general sales taxes were adopted in the 1930s and 1940s, the idea was to tax the sale or exchange of a tangible item, essentially broadening the concept of excise taxes on specific commodities. Services were less important economically than goods, with expenditures on services accounting for less than one-third of purchases in the 1940s and those for goods about two-thirds. By 2017 the situation was reversed, with expenditures on services representing two-thirds of consumption and those on goods only one-third (shown previously in Table 13.2). Indeed, research by David Merriman and Mark Skidmore (2000) suggests that the absence of taxation of many services induces consumers to substitute services for goods, thereby exacerbating the shift in consumption patterns and increasing the efficiency cost from the tax. As consumption of services continues to grow faster than spending on goods, the inclusion of broad sets of services in state sales tax bases has become an important and controversial state-local tax issue.

Although states have added some specific services to sales tax bases, the bulk of services remain untaxed. Services that commonly are taxed by state sales taxes include hotel/motel lodging, automobile renting, materials (but not labor) used in repairs, telephone service, software and photocopying, and admission to some activities. Professional services such as medical, legal, financial, and insurance services are taxed in only a very few states. In addition, housing service is not taxed directly (as noted previously, construction usually is not taxed, but the sale of materials that go into construction is).

The number of states taxing other consumer services is illustrated in Table 13A.1. Some types of admissions, laundry and dry cleaning, the labor component of repairs, parking, landscaping service, and downloads are taxed by about half the states. On the other hand, taxi use, barber and beauty service, internet service, and streaming are included in sales taxes in few states.

There is some pattern and economic logic to these state service tax decisions. Most states tax rentals of personal property because most of the service involves the exchange of property (much as would occur if someone bought the item and then resold it later). When the sale of property and service can be separated, as with some repairs, many states tax the good but not the service. And many services that involve tangible property substantially, such as photofinishing or photocopying, are taxed. On the other hand, services that do not involve substantial exchange of tangible property, such as beauty, financial, legal, or medical services, are not taxed generally. Recognizing the concept that the general sales tax is intended as a tax

Table 13A.1 States taxing selected consumer services, 2017

Service	*Number of states taxing*
Admission to professional sports events	36
Admission to college sports events	21
Amusement park admission/rides	36
Repairs, labor component	25
Parking	21
Taxi service	9
Barber and beauty services	6
Laundry and dry cleaning	21
Landscape services	21
Internet service	9
Book, music, movie downloads	28
Streaming services (video, music)	17

Source: Federation of Tax Administrators

on final sales to consumers, states usually avoid taxes on services that are purchased mostly as intermediate goods by businesses.

Strange results often arise even if this general pattern is followed. Almost all the sales tax states tax the sale of packaged software, but only 20 tax the sale of custom-made software. Apparently the idea is that packaged software is a good while the custom-designed software is a service. Similarly, cable television service is taxed in only 26 jurisdictions, admission to theaters in 31, and downloading in 17. Laundry and dry cleaning (for clothes) is taxed in 21 instances and pet cleaning in 20. Barber and beauty services (what one might think of as personal cleaning) are taxed in only 6 states. Car parking in lots and garages is taxed in 21 states, limousine rental in 16, and taxi service in only 9. Other anomalies result from specific public policy decisions. For instance, 41 states include local residential telephone services in the sales tax base, but only 22 include residential electricity or natural gas service, and 36 states tax admissions to professional sporting events, whereas only 21 tax admissions to college/school sports events.

The case of entertainment admissions is particularly illustrative of the issues policy makers face. States do not treat all admissions similarly, as 36 states tax admission to professional sports events, 36 tax admission to amusement parks, 31 tax admission to cultural events (concerts, theaters, museums), and 21 tax admission to college and school sports events. Major college sports events (such as those at Michigan State University) are similar in nature and cost to professional sports events, but typical high school events (sports or plays) are not, and prices are so low as to make the potential sales tax revenue small relative to collection costs. Taxation of admissions would not impose relative burdens on low-income consumers because data reported in the Consumer Expenditure Survey show that more than half of admissions expenditures are made by the top 20 percent of richest households. Finally, it seems unlikely that large efficiency costs would result. Consumers are not expected to switch admission to events in other states (many other states already tax these purchases, and changing one's team allegiance because of a small ticket sales tax seems unlike most fans), and many states already tax substitutes (cable or satellite TV service and movie/music purchases or downloads). Yet expanding the sales tax to this "fun" activity often faces substantial political opposition from the businesses and consumers.

Federal law has restricted state taxation of one particular service: internet access. The Internet Tax Freedom Act of 1998 effectively prohibited the adoption of any new taxes on internet access services for a three-year period. That moratorium subsequently was extended until November 2003, then was extended by Congress until 2007, and then extended again until November 2014. The Internet Tax Freedom Act became permanent in 2016. The act allowed states to continue taxing internet access if they already had a tax on internet access in force before October 1, 1998. Initially 13 states did so, but some states have eliminated their internet access taxes subsequently (only 9 currently).

What alternative policy might states follow regarding sales taxation of services, and what would the resulting economic effects be? Although it has been suggested that states tax all services, such a policy would not be in keeping with the traditional sales tax idea of taxing final sales to consumers. Sales of services to businesses – for example legal, accounting, engineering, computer, or advertising services – should remain tax exempt if the final sale of goods or services produced using those inputs is taxed.[15] In some instances, this principle will require that sales of particular services (such as legal) to final consumers be taxed while sales of that same service to businesses are exempt (as is done currently with the sale of some goods). Of course, if sales taxation of services is limited to final sales to consumers of currently untaxed services, the revenue potential is much smaller than if all services were taxed.

Fox and Murray (1988) report that if all services were taxed, sales tax revenue could increase by more than 46 percent. Almost half that increase would come from taxing construction,

much of which represents an intermediate purchase by businesses. More recently Mazerov (2009) estimates that full sales taxation of services purchased by households – excluding medical, legal, housing, education, banking, insurance, and public transit services – has the potential to increase total state sales tax revenue by a maximum of $87 billion (in 2007 dollars), which represents a 20 to 40 percent increase in sales tax revenue for three-fourths of the sales tax states. For example, my home state of Michigan has the potential to increase sales tax revenue by up to 36 percent, revenue that could be used to improve transportation, increase funding to universities, or reduce the sales tax rate from the current 6 percent to 4 or 5 percent.

These are at least three other major factors to note. First, consumption expenditures on some services vary substantially as economic conditions change. For instance, Dye and McGuire (1991) report that expenditures on residential utilities and personal services are highly variable, which could increase the business-cycle variability of state sales taxes. On the other hand, consumption of some other services has less volatility than purchases of some goods (expensive durable goods) that are currently part of sales tax bases. Second, state sales taxation of consumer services is not expected to cause much relocation of economic activity among states. The local nature of most services implies that any changes in location of sales should be minor. (It seems unlikely people would go to other states to purchase utility services, repairs, or personal services; watch movies; or receive medical care to avoid state sales taxes.) Finally, the evidence suggests that the effect of taxing services on the distribution of overall tax burden depends on which services are taxed, but it should be small in aggregate. Siegfried and Smith (1991) report that sales taxes on electric and gas utilities and hospital services are highly regressive, but taxes on services by banks, hotels, and educational institutions are progressive. The broad Florida sales tax on services adopted and then repealed in 1986–1987 (which included almost all services including intermediate goods but excluding health and educational services) was reported to be regressive for the bottom 20 percent of the income distribution, but nearly proportional after that.

Broader taxation of consumer services seems almost necessary if state general sales taxes are to be thought of as state taxes on final consumption. Without including the increasing component of consumer spending in the tax base, the viability of sales taxes as a revenue source is likely to continue to diminish.[16] Such taxes should not apply to intermediate purchases of services by business, but exempting business purchases complicates the tax (as it does with goods). Extending state sales taxes to consumer services will require more sellers to participate in sales tax collection (increasing compliance and administration costs) and may alter the variability and progressivity of state tax structures to a small degree. By applying broadly to consumer purchases, the tax will not create an incentive to purchase services over goods and will continue to reflect consumer expenditures as consumer decisions continue to change in the future. Some suggest the issue is having a sales tax for the twenty-first-century economy.

Given the strong economic reasons for including services in the sales tax base, why have states largely failed at doing so? Elaine Povich (2017) suggests four common explanations often used in policy debate: (1) a general opposition to new taxes or tax increases; (2) an argument that adding services to sales taxes would hurt small businesses, such as barbers, plumbers, and attorneys; (3) identifying specific services generates concentrated opposition, suggesting that it may be better to tax broad categories of services rather than listing specific ones; and (4) the argument that some service use arises from personal loss or difficulty (medical, legal, funeral service, snow removal, and so on). David Agrawal and William Fox (2021) argue that in light of the *Wayfair* decision, the use of economic nexus, and the broader collection of sales/use taxes on remote sales, states may see the value of expanding

sales tax bases even further, particularly given the growth in use of a variety of digital services. They suggest,

> [R]ecent years may provide such a policy window for governments to broaden their tax bases. Although it is likely that this broadening will be incremental, even small amounts of tax base broadening may generate substantial revenues for state and local governments and lessen distortions from uneven taxation.[17]

Selective sales taxes

State-local governments also collect sales taxes on sales of a number of specific commodities, usually including tobacco products, motor fuels, alcoholic beverages (in the bottle and/or by the glass), hotel and motel accommodations, restaurant meals, and some utility services (often telephone service). Unlike general sales taxes, for which both the tax rate and tax base typically differ among the states, excise tax bases vary little among the states, although tax rates vary substantially. Sample rates for common state excise taxes are shown in Table 13.3.

Cigarette excise taxes vary from $.17 per pack of 20 (in Missouri) to a median of $1.78 per pack to a high of $4.35 per pack (in Connecticut and New York). Nearly all states with general sales taxes also collect the sales tax on cigarette purchases in addition to the excise tax, and some local governments (Alabama, Illinois, Missouri, New York, Tennessee, and Virginia) levy additional cigarette taxes. In addition, the federal government collects an excise tax of $1.00 per pack (increased from $.39 in 2009). Substantial increases in cigarette taxes have been common in recent years. The Campaign for Tobacco-Free Kids reports that 47 states and the District of Columbia increased cigarette excise tax rates 110 times since 2002. The median state tax rate of $1.78 in 2021 is more than double what it was in 2005 ($.695).

State gasoline excise taxes vary from $.08 per gallon (in Alaska) to a median of $.24 per gallon to a high of $.576 per gallon (in Pennsylvania). Eight of the states with general sales taxes also collect the sales tax on gasoline purchases in addition to the excise tax. (In California, Florida, Georgia, and West Virginia, it is added to the excise tax rather than collected separately). Local government option gasoline taxes are collected in addition in eight states (Alabama, Hawaii, Illinois, Nevada, Oregon, South Dakota, Tennessee, and Virginia). The federal government excise tax on gasoline purchases is $.183 per gallon. Excise taxes on diesel fuel generally parallel those on gasoline. Perhaps surprisingly, there is more interstate variation in tax rates on cigarettes than gasoline, an issue we turn to later in considering the incentive for changes in the location of purchases caused by sales taxes.

Besides generating revenue, excise taxes can serve two other purposes. One is to change consumer behavior, reducing consumption of goods that create consumption externalities or those that are otherwise determined to be socially undesirable. Excise taxes with this purpose are sometimes called **sumptuary taxes** and are intended to increase economic efficiency by offsetting negative externalities. For example, cigarette excise taxes have been used partly to

Table 13.3 Selected state excise taxes, 2021

Commodity	*Range of tax rates*
Gasoline (per gallon)	$.08 (AK) – $.505 (CA)
Diesel fuel (per gallon)	$.08 (AK) – $.741 (PA)
Cigarettes (per pack)	$0.17 (MO) – $4.35 (CT, NY)
Beer (per gallon)	$.02 (WY) – $1.29 (TN)

Source: Federation of Tax Administrators

reduce cigarette use, particularly among young people. Evidence shows that these taxes have been effective in reducing teen cigarette use. But if cigarette use is reduced, does consumption of substitutes increase? Anderson et al. (2020) found that marijuana use among teens was not sensitive to cigarette taxes; rather, evidence suggests that cigarettes and marijuana are complements rather than substitutes.

Excise taxes also can be used for equity reasons, to alter the distribution of tax burden. For instance, excise taxes on goods consumed relatively more by higher-income individuals will increase the progressivity or reduce the regressivity of the state and local tax structure.

Economic analysis: Efficiency

Sales taxes can influence economic decisions in three major ways. First, the tax reduces consumers' disposable incomes and thus induces changes in consumption of all goods. This **income effect** arises because the tax transfers resources from private consumption to government (which would occur with any revenue source used to generate equal amounts). Second, if the sales tax is at least partly paid by consumers, it raises the relative price of taxed compared to untaxed goods, which may induce some consumers to substitute exempt commodities for taxable ones. Third, if some states or localities do not tax a commodity as heavily as other jurisdictions and if use taxes cannot be collected effectively, consumers may be induced to substitute purchases in other jurisdictions for purchases in their own. These latter results, called **substitution** or **price effects**, arise because sales taxes affect prices. These price effects are the sources of the potential efficiency costs of sales and excise taxes.

Optimal sales tax structure

Sales and excise taxes alter the relative prices of some goods, creating incentives for consumers and producers (to the extent sales of intermediate goods are taxed) to change their behavior. Thus, the tax can result in a loss of economic efficiency or creation of an excess burden. It is important to consider what sales tax structure will minimize this efficiency loss for any given revenue yield – that is, what sales tax structure is optimal, where structure refers to the effective tax rate levied on consumption of various goods and services. As a policy matter, the question is usually phrased in terms of whether it is preferable to apply the sales tax to the broadest possible base of consumer goods and services all taxed at one rate as opposed to allowing numerous exemptions, effectively taxing some goods at lower or even zero rates.

The general theoretical rule for optimal commodity taxation, usually attributed to Frank Ramsey (1927), is deceptively simple. **The optimal set of sales taxes should cause an equal proportionate decrease in the compensated quantity demanded of all commodities.** (The compensated demand is the demand after the consumer is compensated for the income effect of the tax.)[18] If all consumer goods, including leisure, can be taxed, then the rule implies that an equal proportionate tax is best. With an equal percentage tax on all commodities, the relative prices of all goods are not changed, and consequently, there are no substitution effects. The tax only has an income effect and is equivalent to a lump-sum tax.

What if it is infeasible to levy a sales tax on all commodities, especially leisure (inherently, time)? In that case, the rule becomes more complicated, and it is no longer the case that a uniform proportionate tax is most efficient. The intuition behind this notion is illustrated in Figure 13.2. $Demand_A$ and $Demand_B$ are the compensated demand curves for the only two taxable commodities, A and B (assume leisure is the other good). Before any taxes, the prices of both are equal to P_0, which reflects the social marginal cost of each, with consumption equal to A_0 and B_0. Suppose a tax rate of t_A is levied on consumption of A and a lower rate of t_B is levied on B so that the consumption of both goods decreases by 20 percent, to A_1

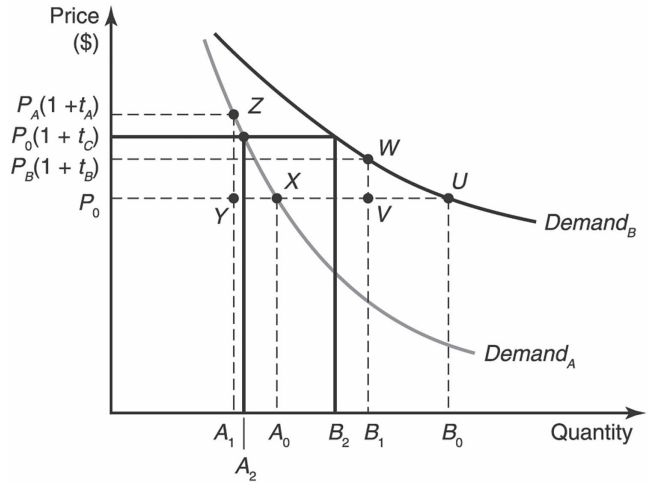


Figure 13.2 Efficiency costs of alternative sales tax rates

and B_1. The efficiency cost of these taxes is represented by the loss of consumer surplus in both markets, equal to the sum of areas *ZYX* and *WVU* in Figure 13.2. If the same tax rate was levied on consumption of both goods sufficient to generate the same revenue, shown as t_C in the figure, the resulting efficiency loss is greater. In essence, the somewhat smaller efficiency cost in consumption of A (because of the lower tax rate) is more than offset by the much larger efficiency cost in consumption of B (from tax rate t_C compared to t_B). Given the conditions of the illustration, the differential rates t_A and t_B generate a given amount of revenue with smaller excess burden than the single rate t_C.[19]

On pure economic efficiency grounds, then, this result contradicts what has often been the conventional policy wisdom favoring broad coverage. The illustration shows that differential rates may be more efficient than a single rate. Moreover, the optimal rate on some commodities could be zero – that is, having sales tax exemptions could be optimal. (Economic efficiency is not the only criterion to evaluate a tax structure; equity and administration cost should also be considered.)

In general, the optimal sales tax rule depends on whether it is feasible to set tax rates based on the price elasticity of demand and supply for those goods and on the cross-price effects among commodities. Unfortunately, this economic research often has been more successful at characterizing nonoptimal tax structures than identifying feasible rules to guide policy decisions. David Bradford and Harvey Rosen (1976, 96) have stated, "the extensive . . . work [on optimal taxation] has shown how difficult it is to sustain any simple rules for commodity taxation." Nevertheless, the optimal tax rules for some conditions can be a guide to policy.

First, if the demands for different commodities are unrelated – that is, if they are neither substitutes nor complements – then the Ramsey optimal tax rule implies that commodities should be taxed inversely proportional to their price elasticity of demand; higher tax rates should apply to commodities with relatively less elastic demand. The intuition behind such a rule is simple. Because inefficiency results from consumers' changing behavior in response to the tax-induced price increase, inefficiency is minimized by imposing relatively higher taxes on consumers who will change behavior relatively little. In fact, this is exactly the case shown in Figure 13.2 because the demand for both A and B is not affected by changes in the

price of the other good. The efficient tax structure required a higher tax rate on commodity A, the one with the less price-elastic demand.

Second, if taxing leisure directly with sales taxes is not feasible, efficiency may be increased by imposing relatively high tax rates on commodities that are complementary to or jointly consumed with leisure. Certainly, these commodities should not be exempt from tax. By imposing taxes on those commodities consumed with leisure, one effectively imposes an indirect tax on the consumption of leisure. This argument can be used to support sales taxation of admissions to sporting events and other types of entertainment and of club dues, as well as selective excise taxes on goods used for leisure-time activities, such as boats or other recreational equipment.

Although there has been no research attempting to measure the efficiency consequences of state sales tax exemptions in the United States directly, Charles Ballard and John Shoven (1985) estimated efficiency effects of a uniform value-added tax (VAT) imposed by the national government in the United States compared to a VAT with exemptions and differential rates. A VAT of the type they consider is a type of national sales tax (although collected through businesses at each stage of production). They compare a tax at a flat rate on all personal consumption to one that exempts housing and services and imposes a lower rate on food, which is very similar to the typical state sales tax base. Ballard and Shoven (1985, 17) base their estimates on a simulation model of the US economy and conclude

> the rate differentiation reduces the efficiency gain offered by a consumption-type VAT [compared to the US income tax] by an enormous amount. . . . The welfare sacrifice caused by rate differentiation is 17 percent of GNP [in 1973 dollars], and about. 46 percent of the present value of future welfare (including leisure)."

If these results are accurate, they suggest that the current exemptions from state sales taxes do reduce economic efficiency compared to more complete coverage. However, a different sales tax structure of exemptions and differential rates might not be more efficient than a uniform tax. For policy purposes, evaluation of sales tax exemptions and the use of differential tax rates often depend on more easily quantifiable factors such as the border effects from sales taxes and administrative cost considerations. Each of those issues is now considered.

Border effects

Individuals also may be able to avoid or reduce sales taxes by changing the location of their purchases, generally by making purchases in jurisdictions different than the one in which they reside. Two different opportunities for avoiding the tax are available. First, individuals may purchase goods in one state or locality for delivery to a different location, presumably the state or locality where the individual lives. The individual is not subject to sales tax in the jurisdiction of the purchase but is subject to any use tax levied by the jurisdiction of residence. If that use tax is not or cannot be collected, no state or local consumption tax is levied on the purchase. Second, if purchases of goods or services are taxed at a lower rate in one jurisdiction than in another, an individual may make purchases and take possession in the lower-tax jurisdiction and thus pay the lower sales tax rate. Again, this individual may be liable for a use tax equal to the difference between the tax rates, but that tax may not be feasible to collect.

These options may be a particular concern along borders between states or between localities where local sales taxes are used, although they are not limited to border areas as the illustration about internet and mail order sales in Application 13.2 makes clear. The option to purchase in a jurisdiction with a lower tax arises from a difference in tax rates or sales tax

bases. The option to purchase in one location (over the internet) for delivery to another location arises because of the difficulty in collecting use taxes. The magnitude of both effects depends on the size of transportation costs (of goods and/or consumers) compared to the potential tax savings, the variety of different goods or shops available in different locations, consumer awareness of tax differences and goods availability, and the effectiveness of administrative arrangements to collect use taxes.

Assuming that net-of-tax prices of commodities sold in national markets are equal at all locations (implying horizontal supply curves at each location equal to the national price), then the economic effects of a sales tax rate differential between jurisdictions are straightforward. The consumer's price for any given commodity will vary between high- and low-tax jurisdictions by the full amount of the tax difference. For instance, Levi's jeans are sold in a national market and thus are expected to have the same net-of-tax price everywhere. Differences in sales tax rates would cause the consumer price for Levi's to vary. This difference in prices, which is assumed to persist, induces consumers to substitute purchases in the lower-rate jurisdiction for those in the higher-rate jurisdiction. Accordingly, retail sales increase in the lower-tax jurisdiction and decrease in the higher-tax one. With these conditions, the tax rate differential can never be eliminated by changes in demand until all purchases occur in the lower-tax jurisdiction.

For many practical tax rate differential cases, it may be more reasonable to assume that the retail sector is characterized by increasing costs (upward-sloping, long-run supply curves), as shown in Figure 13.3. The positively sloped supply curves result, for instance, if expansion of the retail sector in any area or state causes an increase in factor prices, perhaps an increase in land values or higher wages required to attract additional employees. In the figure, good X is sold at price P_0 in both locations without any tax differential (either no tax or equal taxes in both locations). Any tax rate differential that arises (either because one taxes while the other does not or because one taxes at a higher rate) can be reflected by an upward shift in the supply curve equal to the amount of tax differential. As a result of that tax differential, the quantity of good X sold in the higher-tax jurisdiction falls because the price rises, while the demand for good X in the lower-tax jurisdiction rises. As a result of that increase in demand, the amount of good X sold in the lower-tax jurisdiction rises, and the price of good X in the lower-tax jurisdiction also rises. A price differential between the two jurisdictions may remain due to transportation or information costs (for instance, P_1 compared to P_2), although that price differential is less than the tax rate differential. Although the lower-tax

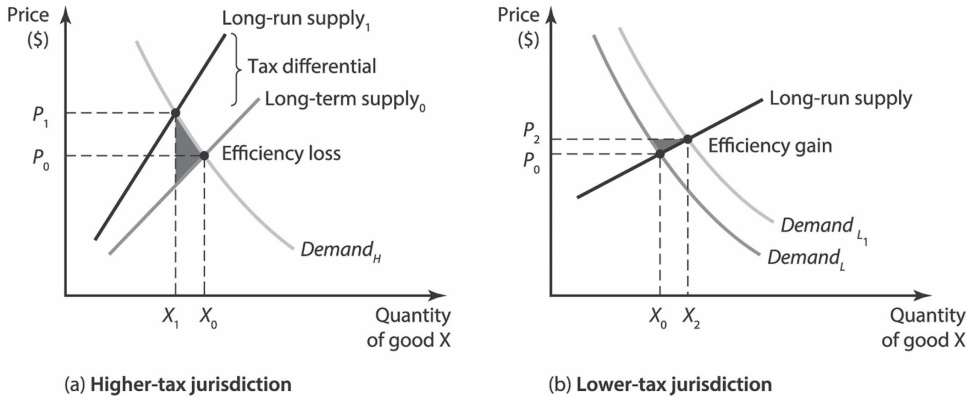


Figure 13.3 Effect of sales tax rate differential

jurisdiction has gained additional sales of good X, consumers who always made purchases in that jurisdiction now face higher prices.

The efficiency cost of the additional tax in the one jurisdiction is also shown in Figure 13.3. The efficiency loss from reduced consumption of X in the higher-tax jurisdiction is the difference between the marginal value of the good to consumers and the marginal social cost of production, shown as the shaded triangular-shaped area in Figure 13.3a. This loss is partially but not completely offset by an efficiency gain (shown in Figure 13.3b) due to the increased sale of X in the lower-tax jurisdiction (the price paid by consumers, which reflects their value, is greater than marginal cost). The tax rate differential results in a net efficiency cost even if total consumption of X remains the same because consumers incur extra costs or inconvenience to purchase the commodity in the different location.

The effects of a tax rate differential on consumption are not expected to be the same for all commodities. Tax savings per purchase is directly related to the price of the product and the quantity to be purchased: that is, proposed expenditure. Transportation cost (or delivery cost) incurred in making a purchase in a different location is usually related to distance and travel time rather than the amount spent. One expects therefore that the tax differential effect will be more important for commodities purchased with a relatively large expenditure at one time, unless use tax can be collected on purchases (such as automobiles or commodities sold by firms with establishments in both locations). Another exception is if consumers can change the location of purchases without incurring any extra transportation cost. In addition to internet and mail-order purchases, that may be easy for individuals who work and reside in different locations with different sales tax rates. Those individuals can often transfer purchases from their residential to their work location without additional cost.

There have been quite a number of studies examining the degree to which sales tax rate differentials actually induce consumers to change the location of purchases, most of which examine the experience in specific geographic areas, although one is a general cross-section analysis of all large metropolitan areas in the United States.[20] These studies are quite consistent in finding that a disadvantageous sales tax rate differential leads to a statistically significant but relatively small reduction in sales in the higher-tax jurisdictions.

For instance, this author examined the effect of sales tax differentials between the District of Columbia (DC) and the surrounding Maryland and Virginia suburbs on retail sales in DC over the period from 1962 to 1976 (Fisher, 1980b). The District had a higher general tax rate than in the suburbs, including a higher tax rate on food than in Maryland but a lower rate on food than in Virginia. The study found no significant effect of the tax rate differential on aggregate sales in the District but a significant negative effect on food sales. With respect to food, the analysis showed that a one percentage point increase in the tax rate differential (holding DC's rate constant) led to a 7 percent decrease in DC sales tax revenue from food. The effect on food sales but not on sales of other commodities apparently arose because the food tax rate differences were greater than the differences in the general rates and because DC had effective agreements with many retail firms with both suburban and DC locations to collect DC use taxes, at least for purchases of durable goods delivered to a DC location.

John Mikesell and Kurt Zorn (1985) examined the effect of a temporary (three and one-half years) one-half percentage point sales tax differential in the small (population 7,891) city of Bay St. Louis, Mississippi. Over the period 1979 to 1982, the sales tax rate was 5.5 percent in Bay St. Louis and 5.0 percent in surrounding areas. Their analysis showed that the rate difference did reduce retail sales in the city (a one percentage point rate differential lowers sales by about 2.3 percent), primarily from lower sales per seller on average rather than a decrease in the number of sellers. This rate difference was planned and announced to be temporary, so city retail sales returned to the prior level after the rate difference was ended.

Results of this magnitude imply that increases in sales tax rates in individual cities are expected to increase revenue even with the small reduction in city sales. The increase in the tax rate more than offsets the small reduction in the sales tax base. In the District of Columbia case, an increase in DC's food rate from 2 to 3 percent (a 50 percent increase in tax rate) was estimated to increase sales tax revenue from food purchases by about 35 percent. In the Bay St. Louis case, an increase in the tax rate from 5.0 percent to 5.5 percent (a 10 percent increase) was estimated to increase sales tax revenue by about 8.8 percent.

These economic effects of sales tax rate differentials and the resulting attempts by state tax administrators to enforce use taxes raise several difficult issues inherent in fiscal federalism. States (and the local governments they create) have autonomy in the selection of tax structures, including sales tax bases and rates. Because state and local governments encompass substantially open economies, tax decisions by individual states can influence interstate economic activity, regulation of which is reserved for the federal government by the Constitution. For states to levy taxes indirectly on that interstate activity requires either the cooperation of other states or intervention by the federal government, which may impinge on the autonomy of the states. Two policy cases concerning internet (mail-order) sales and state cigarette taxes show some of the options available for resolving this issue and how the federal government decided to take opposite positions in the two cases.

Application 13.2: Cigarette taxes, smuggling, and use[21]

States levy widely differing excise taxes on the sale of cigarettes, as shown in Table 13.4. Because cigarettes are easily transportable, these tax differences create the possibility for individuals to purchase cigarettes in low-tax states for use or resale in higher-tax states, avoiding the state tax in the latter. This problem became particularly acute in the mid-1970s, leading to the adoption of a federal law restricting this possibility. As a result of requests by the states and a recommendation by the US ACIR, the federal government adopted the Contraband Cigarette Act in 1978, which made it a federal crime to transport, receive, ship, possess,

Table 13.4 Pechman's estimates of sales and excise tax incidence, 1980

(Effective rates: tax burden as percent of family income)			*Effective rate*
Family income[a]	*Effective rate*	*Population decile*[b]	
0–5	17.9%	First	8.4%
5–10	7.7	Second	7.0
10–15	6.2	Third	5.9
15–20	5.6	Fourth	5.5
20–25	5.2	Fifth	5.1
25–30	4.9	Sixth	4.9
30–50	4.5	Seventh	4.6
50–100	3.3	Eighth	4.5
100–500	1.6	Ninth	3.9
500–1,000	0.7	Tenth	2.1
1,000+	0.6		
All classes	4.0	All deciles	4.0

Source: Pechman (1985, Tables 4.9 and 4.10)

Notes:
a Thousands of dollars.
b Percentages of the population grouped by income from lowest to highest. The income classes and population deciles do not correspond.

distribute, or purchase more than 60,000 cigarettes (3,000 packs or 300 cartons) without paying the state tax of the state in which the cigarettes are located. The Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF or BAFTE), a branch of the US Department of Justice, enforces this law.

In addition, federal law prohibits state governments from levying excise taxes on sales of cigarettes on military bases, and various federal agreements and treaties similarly prevent state taxation of cigarette sales on Indian reservations. These two exemptions not only mean that cigarette consumption by military personnel and residents of Indian reservations escapes state taxation but also create another opportunity for evading tax on sales to other state residents. Presumably, the higher the state cigarette tax, the greater the incentive for illegal sales from these sources to avoid the tax.

While there has always been some variation in state cigarette taxes, those differences have increased greatly over time. State cigarette excise taxes varied from $0 to $.08 in 1960, from $.02 to $.18 by 1970, and from $.02 to $.21 in 1980. In 2021, cigarette excise taxes vary from $.17 (Missouri) to $4.35 (New York).[22] ACIR estimated that states were losing about 10 percent of potential cigarette excise tax revenue in 1975 due to cigarette smuggling across state boundaries and from sales on military bases and reservations, with the losses being particularly large in 14 states. That magnitude of revenue loss skyrocketed, however. The ATF estimated the revenue loss from smuggling across state boundaries at about $5 billion in 2009 or about 25 percent of potential cigarette excise tax revenue. Davis et al., 2013 examined the situation in five cities in the Northeast (Boston, New York, Philadelphia, Providence, and Washington, DC) and found that more than half of cigarette packs did not have the proper local tax stamp, with 30 to 40 percent of cigarettes apparently smuggled from other states.

The substantial increases in cigarette taxes have been intended more to discourage tobacco use than to raise revenue, at least in most cases. Research shows that price increases resulting from tax increases do reduce consumption, although demand is price inelastic. The Campaign for Tobacco-Free Kids[23] summarizes the results by noting,

> The general consensus is that every 10 percent increase in the real price of cigarettes reduces overall cigarette consumption by approximately three to five percent, reduces the number of young-adult smokers by 3.5 percent, and reduces the number of kids who smoke by six or seven percent.

In addition, research by Benjamin Hansen et al. (2013) shows that cigarette taxes reduce consumption by underage smokers because older buyers who acquire cigarettes for them pass on the price increases. Thus, avoiding the tax by smuggling not only reduces revenue to the governments but also mitigates the intended effect on use by keeping prices lower.

Several recent studies (Merriman, 2010; Chernick and Merriman, 2013; Davis et al., 2013) utilize the clever research idea to examine the tax stamp (or absence thereof) on littered cigarette packs to estimate the magnitude of illegal trafficking in cigarettes. Howard Chernick and David Merriman (2013) collected random samples of littered packs both before and just after New York state increased the tax by $1.25 in 2008. Before the tax increase, 14 percent of the packs had come from another state, and 15 percent had no tax stamp at all (suggesting they may have been acquired from a nearby Native American reservation). After the tax increase, about 40 percent of packs did not have New York tax stamps, implying that tax avoidance (smuggling) increased. Legal cigarette sales also decreased after the tax increase (although revenue still rose). Chernick and Merriman estimate that two-thirds of the sales decrease was due to a decline in cigarette use and one-third to tax avoidance (smuggling). The tax avoidance reduced the effect on consumption. Increased enforcement by both state

and federal authorities, therefore, has the potential both to increase tax revenue and to assist in reducing tobacco consumption.

Although state laws make such transport and sale of cigarettes illegal, states have not been very effective in enforcing those laws, at least partly due to the inherent interstate nature of the activity. By some accounts, federal intervention helped curtail interstate cigarette sales to avoid state taxes initially, as a subsequent study by ACIR showed that state revenue losses from illegal and exempt sales of cigarettes declined by 1983. Subsequent estimates clearly show the difficulty is expanding, although federal criminal enforcement continues. Recently, there is some evidence that organized crime, including, in some instances, individuals with potential terrorist links, may be involved with interstate cigarette smuggling. Horwitz (2004) reports about two such cases in which it was alleged that the profits from interstate cigarette smuggling were being used to purchase weapons or explosives or otherwise support terrorist activity. In 2013, the FBI and state police agencies arrested a number of people in Maryland, New York, and Rhode Island for cigarette smuggling allegedly connected to funding militant activities in the Middle East.

Cigarette bootlegging to avoid taxes or regulations has not been confined to the United States but also occurs internationally. The *Observer* reported in 2013 about illegal cigarette smuggling in North Africa involving both trade in true popular brands and faked brands, sometimes linked to terrorist organizations. In Australia, the federal government increased cigarette taxes substantially, with increases of 12.5 percent per year beginning in 2013.[24] A pack of cigarettes cost AUS$24 in 2020, which was the highest price in the world. The Australian Broadcasting Corporation (Bavas, 2014) reported that Australian police had already intercepted substantial smuggling attempts from Indonesia and the Middle East, noting, "So far this financial year, more than 208 tonnes have been seized in 66 separate cases, and Customs are poised to snare more hauls."

Expecting this problem to worsen as tax rates continue to increase, the Australian government formed the Illicit Tobacco Taskforce, combining several government agencies to disrupt the illicit tobacco trade, particularly related to crime. "The ITTF was established to investigate, prosecute and dismantle international organised crime groups who use the proceeds of illicit tobacco to fund other criminal activity."[25] The Australian Border Force reported that tobacco smuggling cost the nation AUS$800 million in lost revenue yearly.

Economic analysis: Equity

Tax incidence

A truly general sales tax on all personal consumption would impose burdens on consumers in proportion to their amount of consumption. Consumers would be limited in their ability to shift the tax because the tax would apply to all consumer goods and services, although one remaining option for consumers would be to increase consumption of leisure, which is presumably untaxed. An increase in consumption of leisure is equivalent to a decrease in the supply of labor; individuals may be able to shift a general consumption tax, then, by working less, earning less income, and consuming fewer taxable goods and services in aggregate. These possible long-run effects may be minor, however, if the aggregate supply of labor is relatively price inelastic, as is usually assumed.

The typical incidence assumption about a general sales tax, then, is that it imposes tax burdens in proportion to the amount of consumption. Several research studies (Poterba, 1996; Besley and Rosen, 1999) have shown that sales tax burdens are borne fully by consumers; consumer prices increase by the full amount of the taxes. Because the share of income represented by personal consumption tends to be smaller for higher-income than

lower-income individuals (higher-income individuals do more saving), the conclusion is that general sales taxes are regressive. Sales tax burdens as a proportion of income decline as one moves up the income distribution. For instance, if a family with a $60,000 income spends $48,000 on consumption, a 1 percent tax equals $480 or .8 percent of income; if a family with a $30,000 income spends $27,000 on consumption, the tax is $270, which represents .9 percent of income.

Empirical studies of sales tax incidence confirm these expectations. For instance, Pechman (1985) estimated effective rates for federal, state, and local taxes for selected years between 1966 and 1985 arranged by both income class and population decile. Assuming that sales and excise taxes impose burdens proportional to consumption, the results for federal, state, and local sales and excise taxes together for 1980, shown in Table 13.4, confirm the expected regressive pattern. For the upper middle half of the population in the fourth through eighth deciles, the burden is nearly proportional, however, falling between 4.5 and 5.5 percent of income.

Exemptions

This perception of sales tax regressivity is the primary reason for most sales tax exemptions of consumer goods and services. Exemptions of goods and services that are relatively more important in the budgets of lower-income individuals – often thought of as necessities – are used to alter this distributional pattern. This is the rationale usually used to support such exemptions as food consumed at home, prescription drugs, housing, residential electric and gas utilities, clothing, and medical services.

Consumer spending on various categories of personal consumption as a fraction of income is reported in Table 13.5. As suggested, expenditures on food for home consumption, residential electric and gas services, housing, and medical care decline as a fraction of income as income rises. Note also that total consumption decreases as a fraction of income as income rises, with consumption being greater than income at the lower-income classes. Following the preceding reasoning, exempting food and residential electric and gas sales from the sales tax would reduce regressivity of the tax.[26]

Donald Phares (1980) estimated the distribution of tax burden for each tax in each state and concluded, "There is little question about [the general sales tax's] regressive incidence," although "state-by-state data on general sales effective rates do suggest a less regressive pattern in states that exempt food" (p. 96). Although this analysis shows the sales tax to be regressive over the entire income distribution, it also shows that the tax is nearly proportional in the middle-income range between $6,000 and $25,000 (measured in 1976 dollars).

This conventional wisdom about sales tax incidence can be reconsidered from at least three perspectives. First, general sales taxes used by states really are not very general, typically

Table 13.5 Personal consumption expenditures as a percentage of income, 2019

Income class	*Total personal consumption*	*Food at home*	*Utilities and fuel*	*Housing*	*Health care*
All consumer units	76.1%	5.6%	4.9%	25.0%	6.3%
Lowest 20 percent	238.4	23.2	20.9	95.9	23.7
Second 20 percent	123.5	11.2	10.4	45.2	12.1
Third 20 percent	93.4	7.8	6.9	31.8	8.3
Fourth 20 percent	76.2	5.6	4.9	24.2	6.5
Highest 20 percent	55.6	3.3	2.7	16.6	3.8

Source: Consumer Expenditure Survey

exempting about half of private consumption. As a result, consumers may be induced to shift consumption from taxed to untaxed goods as depicted in Figure 13.2. As a result of those consumption shifts, the sales tax may impose burdens on suppliers of factors of production. In essence, the demand for factors used to produce taxable goods and services may decrease and the demand for factors used to produce nontaxable commodities increase. Although these burdens could theoretically alter the overall distribution of sales tax burdens by income, they typically are ignored on the grounds that there is no reason to expect that higher- or lower-income individuals are more likely to produce taxable goods than nontaxable ones.

Second, even if consumers do not shift consumption between taxed and untaxed commodities, it is generally not correct to assume that the effective tax rate on untaxed commodities is zero. In many cases, purchasers of exempt commodities bear an indirect sales tax burden because the producers of exempt commodities may have paid sales taxes on purchases of materials, supplies, or services used in their business. As previously noted, no state exempts all purchases of intermediate goods from sales tax. For example, although states exempt the retail sale of food from sales tax, many of those states levy sales tax on purchases of display equipment by food retailers, the purchase of trucks and gasoline used to transport food, or sometimes the equipment and supplies used in agriculture. These sales tax burdens are part of the cost of producing food commodities and are imbedded in the retail price of those food commodities. Similarly, all states (except Hawaii) exempt medical care services from the retail sales tax, but many do levy sales tax on the purchase of medical equipment and supplies by medical care providers. It is more correct to state, therefore, that purchasers of exempt commodities bear a sales tax burden but at a rate less than the nominal general sales tax on taxed commodities.[27]

These indirect sales tax burdens that arise from taxation of intermediate goods purchases also have an important implication for interstate comparison of sales tax burdens. Among states with the same nominal rate and identical sets of exempt consumer goods, the effective rate is expected to be greater in those states that levy the tax on a broader set of intermediate goods purchases. Similarly, it is entirely possible that the effective rate could be lower in a state with a 5 percent nominal rate and little taxation of intermediate goods (such as West Virginia) than in another state with a 4 percent rate but broad taxation of intermediate goods.

Finally, annual income may not be the best measure of a taxpayer's ability to pay taxes and may lead to inaccurate perceptions about tax incidence. Alternatively, some measure of lifetime or permanent income may give a more accurate, or at least different, picture of tax incidence. Over an individual's lifetime, all income is either consumed or transferred to subsequent generations for consumption. Given the assumption that sales tax burdens are proportional to total consumption and from the view that all income is eventually consumed, sales taxes can be thought of as proportional taxes. An intermediate approach between these two views is to measure sales tax incidence by consumption of taxed commodities only relative to some estimate of permanent or lifetime income. Such an analysis by Daniel Davies (1969) shows that sales taxes are indeed less regressive with respect to lifetime income than annual income and confirms that exemption of food for home consumption and utility services from the sales tax base makes the sales tax burden even less regressive. An analysis by Metcalf (1994) goes even further in showing that under certain restrictive assumptions about consumption and lifetime income, state sales taxes might even be progressive or proportional.

Sales tax credits compared to exemptions

The major alternative to exemptions to reduce the expected regressivity of sales tax burdens is a tax credit, usually taken against the state income tax, to offset sales tax liability on some

commodities for at least some taxpayers. In practice, these credits are most often used as an alternative to an exemption for sales of food. According to the Federation of Tax Administrators, five states that tax food purchases (Hawaii, Idaho, Kansas, Oklahoma, and South Dakota) provided income tax credits to offset sales tax liability in 2014. These credits often apply only to lower-income taxpayers or to senior citizens. If the tax credits apply only to a subset of taxpayers, they can achieve the desired increase in progressivity at lower revenue cost than through general exemptions applying to all taxpayers.

Although both sales tax exemptions and income tax credits can serve to alter the distribution of the tax burden, they are not expected to influence consumer behavior in the same way. An exemption eliminates the tax on all purchases of an exempt commodity and thus effectively reduces the price of that commodity relative to those who are taxed. Therefore, besides reducing the regressivity of the sales tax, exemptions also create an incentive for consumers to increase purchases of exempt commodities. When income tax credits are used to offset sales tax liability on some commodities, however, the credit is usually set as a flat amount per person or per household, sometimes declining as income increases. The amount of the credit for any individual is usually not related to the actual amount spent on the taxed item. Therefore, the credit does not reduce the price of the taxed commodity but changes the overall tax burden and distribution. The effect of a credit program is to make the state's overall tax structure more progressive (or less regressive).

Consequently, it is not necessarily poor policy for a state to use both sales tax exemptions and an income tax credit. If a state has two policy objectives, to make food less expensive and to increase the overall progressivity of the state's tax structure, both tools may be used simultaneously (although the reason a state would want to decrease food prices may be problematical). In other words, tax credits may be used to offset any regressive elements of the tax structure, not just those that arise from the sales tax. Note that income tax credits are typically restricted to state residents, whereas sales tax exemptions apply to all purchasers regardless of residence. Of course, those exemptions may induce nonresidents to make additional purchases in the state or residents not to make purchases in other states.

Sales tax exemptions and income tax credits also may differ in their administration and compliance costs. Exemptions increase collection costs for sellers, particularly those who sell both taxable and exempt commodities, and audit costs for the state. On the other hand, tax credits require that taxpayers be informed about the credit and make the effort to file the required forms. State experience with these credits usually suggests that these compliance costs prevent some taxpayers, often those with lowest incomes or those who do not have a state income tax liability, from receiving the intended benefit.

Summary

State-local governments use general sales taxes levied on retail sales, companion use taxes to tax resident purchases made in other jurisdictions, and excise taxes on specific goods or services. Sales or consumption taxes remain the largest source of own-source revenue to state governments. Although about 80 percent of total general sales tax revenue went to state governments in 2018, local government general sales taxes were also used by local jurisdictions in 37 states.

General sales taxes usually are thought of as taxes on the final personal consumption of the residents of jurisdictions levying the tax. In practice, state general sales taxes fall short of this principle because (1) a substantial amount of personal consumption is statutorily exempt from taxation, (2) the taxes end up applying to sales of some intermediate goods in addition to consumer goods, and (3) states face inherent administrative difficulties in collecting use taxes.

The net effect of exemptions is that state general sales taxes apply to perhaps only 40 to 60 percent of personal consumption in aggregate, with obvious substantial variation among the states.

Sales and excise taxes can result in a loss of economic efficiency because they alter the relative prices of some goods, creating incentives for consumers and producers (to the extent sales of intermediate goods are taxed) to change their behavior. The general theoretical rule for optimal commodity taxation is deceptively simple: The optimal set of sales taxes should cause an equal proportionate decrease in the compensated quantity demanded of all commodities.

Individuals may be able to avoid or reduce sales taxes by making purchases in jurisdictions different than the one in which they reside. Individuals may purchase goods in one state or locality for delivery to a different location or make purchases and take possession in a lower-tax jurisdiction and thus pay the lower sales tax rate. A number of studies are consistent in finding that a disadvantageous sales tax rate differential leads to a statistically significant but relatively small reduction in sales in the higher-tax jurisdictions.

The typical incidence assumption about a general sales tax is that it is regressive. Exemptions of goods and services that are relatively more important in the budgets of lower-income individuals are commonly used to alter this distributional pattern. The major alternative to exemptions to reduce the expected regressivity of sales tax burdens is a tax credit. Exemptions effectively reduce the price of that commodity relative to those that are taxed and create an incentive for consumers to increase purchases of exempt commodities. Credits do not reduce prices but make the state's overall tax structure more progressive (or less regressive).

Discussion questions

1 Suppose that a state government levies an ad valorem sales tax on the purchase of all goods at retail but not on the purchases of services. The tax is levied only on final sales of goods and not on sales of any intermediate goods. The state has a companion use tax but makes little effort to collect that tax for consumer purchases except for automobiles. Discuss the various ways (there are at least four) an individual consumer could change behavior to avoid or reduce liability for the state sales tax. What economic costs could arise from each type of action?

2 "It would be unfair to tax the sale of medical or legal services because effectively that would be taxing people's misfortune." Discuss this viewpoint. Would the same principle apply to the sale of car repairs? What about the purchase of a fire extinguisher or a child's car seat?

3 The sales tax treatment of consumer services is quite controversial, as discussed in the chapter. Does your state include services in the sales tax? What are common services that are taxed in your state, and what are some not taxed? How much does the opportunity to avoid sales tax influence your decision to purchase services over equivalent goods (say, lawn service versus lawnmower or TV versus ticket)? Is it fair?

4 Only about half the states include most admissions to entertainment events as part of the state sales tax; the other half include only a few or no admissions in the tax base. Explain why the sale of admission tickets for entertainment events should be taxed as part of state sales taxes (compare to TV purchases, cable TV service, and movie rentals). If admissions (movies, sports, concerts, and so on) are to be taxed, do you think college sports events should be included? High school sports events and shows?

5 "Sales taxes are fairer than income taxes because sales taxes cannot be avoided by the rich." Evaluate this idea. Describe the evidence about the distribution of sales tax burdens among different income taxpayers. Would it be possible to design a sales tax that is more progressive than an income tax?

Notes

1 www.supremecourt.gov/opinions/17pdf/17-494_j4el.pdf.
2 John F. Due, *Sales Taxation* (Urbana: University of Illinois Press, 1957), 290.
3 The states without a general sales tax are Alaska, Delaware, Montana, New Hampshire, and Oregon. The most recent sales tax adoption was by Vermont in 1969.
4 In simple macroeconomic models, national income comprises personal consumption, investment, and purchases of government goods and services: that is, $Y = C + I + G$.
5 In addition, some states that tax the sale of these goods apply a lower rate than the general sales tax rate.
6 In 2019, state government general sales tax revenue was about $337 billion, whereas total personal consumption was $14,545 billion. At the median state sales tax rate of 6.0 percent, this implies a state government sales tax base equal to about 38 percent of personal consumption.
7 Ring (1999) estimates about 41 percent of sales tax revenue is from intermediate goods purchases; Fox (2012) reports that an Ernst & Young analysis suggests about 44 percent.
8 Although states do not apply sales taxes to the purchase of an owner-occupied house or to housing rent, the price of the housing unit already includes any sales tax collected from the builder. Thus, housing service is not totally exempt from sales taxation in practice.
9 If you order a computer from Big Byte Inc. in New York, which is Big Byte's only store, the computer is shipped to you in your state (other than New York), and your state taxes computer purchases, then you owe use tax to your state based on the purchase price.
10 For historical background about these issues, see ACIR, *State and Local Taxation of Out-of-State Mail Order Sales* (1986).
11 See Lemov (2013) and Mandelbaum (2013).
12 https://www.taxnotes.com/tax-notes-state/online-sales-taxation/preparing-sales-tax-changes-2021/2021/03/15/38wl4?highlight=marketplace%20facilitator%20laws.
13 Only some e-commerce and remote sales would be taxable based on current law. For instance, about 90 percent of e-commerce sales are business-to-business sales, only some of which would be taxable under current state sales tax laws. Overall, the authors estimate that something less than 20 percent of all e-commerce transactions would be taxable.
14 States already collect sales or use tax on many e-commerce sales: for example, if the firm has a physical presence in the state or the business or consumer reports the purchase.
15 Exempting the sale of steel to an automobile manufacturer and then taxing the sale of the car to the consumer is equivalent to not taxing the sale of advertising service to the manufacturer but taxing the sale of the car. The sales price of the car includes all the manufacturer's costs, including for the steel and the advertising.
16 See Fisher and Wassmer, "Will the Decline in Sales Tax Revenue Continue?" 2017
17 Mikesell et al. (2021) and Nellen (2020) similarly argue that recent circumstances create an opportunity to expand the sales tax base.
18 The compensated demand curve represents how consumers change quantity purchased when price changes if the consumers' real income is held constant. The reason for looking at compensated demand curves is that the issue is the structure of the tax, not the level; presumably, the same revenue is to be collected from consumers whatever tax structure is utilized.
19 In this illustration, the demand for these two goods is independent; changes in the price of one do not affect the demand for the other. The price changes caused by the taxes may, however, affect the demand for the other commodity, leisure. The Ramsey rule applies as well if commodities are substitutes or complements.
20 For a general review, see Fisher (1980b). More recent analyses are Mikesell and Zorn (1985), Fox (1986), and Walsh (1986).
21 See ACIR (1985a), Horowitz (2004), Merriman (2010), Chernick and Merriman (2013), and Davis et al. (2013).
22 New York City levies an additional $1.50 tax in addition to the state tax. As a result, the price of a "legal" pack of cigarettes in New York City is typically $12.00 to $14.00.
23 Campaign for Tobacco-Free Kids, "Raising Cigarette Taxes Reduces Smoking, Especially Among Kids (and the Cigarette Companies Know It)," accessed October 3, 2014, www.tobaccofreekids.org/research/factsheets/pdf/0146.pdf.
24 Detail about the Australian tax rates is here: www.ato.gov.au/Business/Excise-on-tobacco/Excise-obligations-for-tobacco/Excise-duty-rates-for-tobacco/.
25 https://newsroom.abf.gov.au/releases/725f2896-8376-41a3-81f5-0ab50e8e81c3.
26 Of course, not all exemptions are made purely for these distributional reasons; other political factors often come into play. For instance, most states exempt sales of newspapers and magazines from the sales

tax. Often defended on the grounds of not interfering with public information and free speech, these exemptions also might be related to the old axiom "Don't pick a fight with someone who buys ink by the barrel" (or, in the modern equivalent, operates large websites).

27 Siegfried and Smith (1991, 41) report that "the main effect of . . . taxes levied on intermediate products is to move the overall distributional effect of a sales tax more toward proportionality, because the wide variety of uses for most intermediate products spreads the impact of a tax on them throughout the economy."

Selected readings

Agrawal, David, and William Fox. "Taxing Goods and Services in a Digital Era." *National Tax Journal*, *74*, No. 1 (March 2021).

Dadayan, Lucy. "States' Addiction to Sins: Sin Tax Fallacy." *National Tax Journal*, *72*, No. 4 (2019): 723–754.

Due, John F., and John L. Mikesell. *Sales Taxation: State and Local Structure and Administration*. Washington, DC: Urban Institute Press, 1994.

Fisher, Ronald C. and Robert Wassmer. "Will the Decline in Sales Tax Revenue Continue?". *State Tax Notes*, August 21, 2017.

Fisher, Ronald C. "Understanding State-Local Revenue: A Taxing Exercise." *Tax Notes State*, January 11, 2021, pp. 137–143.

Fox, William F. "Can the Sales Tax Survive a Future Like Its Past?" In *The Future of State Taxation*, edited by David Brunori. Washington, DC: Urban Institute Press, 1998.

Fox, William F. "Retail Sales and Use Taxation. In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen. Oxford, UK: Oxford University Press, 2012.

Mazerov, Michael. *Expanding Sales Taxation of Services: Options and Issues*. Washington, DC: Center on Budget and Policy Priorities, 2009.

Mikesell, John L. "Reversing 85 Years of Bad State Retail Sales Tax Policy." *Tax Notes State*, December 23, 2019.

Mikesell, John L. "The Future of American Sales and Use Taxation." In *The Future of State Taxation*, edited by David Brunori. Washington, DC: Urban Institute Press, 1998.

Mikesell, John L. "State Retail Sales Taxes in 2018." *Tax Notes State*, September 30, 2019.

Mikesell, John L., Daniel R. Mullins, and Sharon N. Kioko. "How Does the Depression-Designed Retail Sales Tax Cope with the New Economy? A Tax for the New and a Tax for the Old." *National Tax Journal*, *74*, No. 1 (March 2021).

Nellen, Annette. "Now is a Good Time to State Fixing the Sales Tax Base." *Tax Notes State*, 2020.

14 Individual income taxes

Headlines

Arizona[1]

"Arizona voters have approved Proposition 208, a measure that would raise money for educator salaries by taxing the state's highest earners.

The measure, also known as the Invest in Education Act, will raise revenue primarily for educator salaries by adding a 3.5% tax surcharge on taxable income over $250,000 for individuals and $500,000 for couples."

208 – Increase Income Tax

Choices	Total Votes	% Votes
Yes	1,675,810	51.7%
No	1,562,639	48.3%

Illinois[2]

"The Illinois Allow for Graduated Income Tax Amendment was on the ballot in Illinois as a legislatively referred constitutional amendment on November 3, 2020. The ballot measure was defeated.

A 'yes' vote supported repealing the state's constitutional requirement that the state personal income tax be a flat rate and instead allow the state to enact legislation for a graduated income tax.

A 'no' vote opposed this constitutional amendment, thus continuing to require that the state personal income tax be a flat rate and prohibit a graduated income tax."

Illinois Allow for Graduated Income Tax Amendment (2020)

Result	Votes	Percentage
Yes	2,683,490	46.73%
No	3,059,411	53.27%

Massachusetts[3]

"A proposed tax hike on Massachusetts millionaires will be on the 2022 ballot after state lawmakers Wednesday approved putting the 'Fair Share' constitutional amendment up for a public vote.

If residents vote in favor next year, the state government in 2023 will impose a 4 percent surtax on household income exceeding $1 million. Massachusetts has long had a flat income tax rate of about 5 percent."

DOI: 10.4324/9781003030645-18

Data availability

As is generally the case, the Governments Division of the US Census Bureau is the major source of data about the revenue from state and local taxes, including individual income taxes. These data are reported annually in several different reports. State and local government tax collections are reported quarterly, state government data for each state and local government data nationally (www.census.gov/data/tables/2020/econ/qtax/historical.Q4.html). These data are the most current. Separately, all state government finances (www.census.gov/data/tables/2019/econ/state/historical-tables.html) and all state and local government finances (https://www.census.gov/programs-surveys/gov-finances/data/datasets.html) also are reported, but with a year or two lag.

The Federation of Tax Administrators ((www.taxadmin.org/current-tax-rates) provides the most complete and detailed information about the structure (tax rates and bases) of state individual income taxes. The Tax Foundation (https://taxfoundation.org/state-tax/corporate-income-taxes/) also provides information about state government individual income taxes. In addition, the Tax Foundation issues a report providing data for all local government income taxes (https://taxfoundation.org/local-income-taxes-2019/).

"The Fiscal Survey of States," a report from the National Association of State Budget Officers, provides information about state-by-state changes in income tax structure, both for the current fiscal year and as proposed by states for the following year. The latest is available at https://www.nasbo.org/mainsite/reports-data/fiscal-survey-of-states.

The use of individual (personal) income taxes by state and local governments is considered in this chapter. The history of reliance on income taxes by states and localities, the alternative bases for these income taxes, and the patterns of tax rates are considered first. Then attention turns toward two main issues of income taxation, as noted by George Break. "A Federal Fiscal System faces two kinds of tax coordination problems. The first arises when two or more different levels of government use the same tax base, as when the federal government and a state government tax the same income; . . . the second appears when . . . mobile individuals carry out economic activities in many different taxing jurisdictions at the same level of government."[4]

Thus, the first issue is coordinating income taxes both among subnational governments and between the federal government and the states. The relationship between the federal and state income taxes is particularly important, including both the effect of one on the other and how together they affect economic decisions by individuals and firms.

Reliance on income taxes

State-government individual income taxes generated $410.1 billion, and local income taxes provided an additional $37.6 billion in 2019. Together, state-local income taxes represent a payment of about $1,364 per person, or 2.4 percent of personal income on average. Individual income taxes have become an increasingly important source of revenue for state-local governments. In 2019, income taxes provided 18.6 percent of state government revenue on average, more than double the share provided by that tax in 1962. Local governments, in aggregate, generated only 2.0 percent of revenue from income taxes, which reflects the fact that only a small fraction of local governments use this tax. However, municipalities in aggregate rely on income taxes for nearly 5 percent of revenue.

The relative importance of individual income tax revenue to state governments peaked at nearly 20 percent in 2001 (see Figure 14.1). State income tax revenue is a bit unstable, falling substantially during or after recessions (in 2001 and the Great Recession in 2007–2009), and then increasing as the economy recovers. Since the Great Recession, the share of general revenue provided by the income tax has remained essentially constant. State-local individual income tax revenue did decline in FY 2020 as a result of the pandemic-related recession but recovered substantially in the last two quarters of calendar year 2020, partly because of federal government income support.

Currently, 41 state governments and the District of Columbia collect broad-based individual income taxes, and 1 state, New Hampshire, collects income tax on a narrow base of capital income only (Table 14.1). Individual income taxes are also used by about 5,000 local

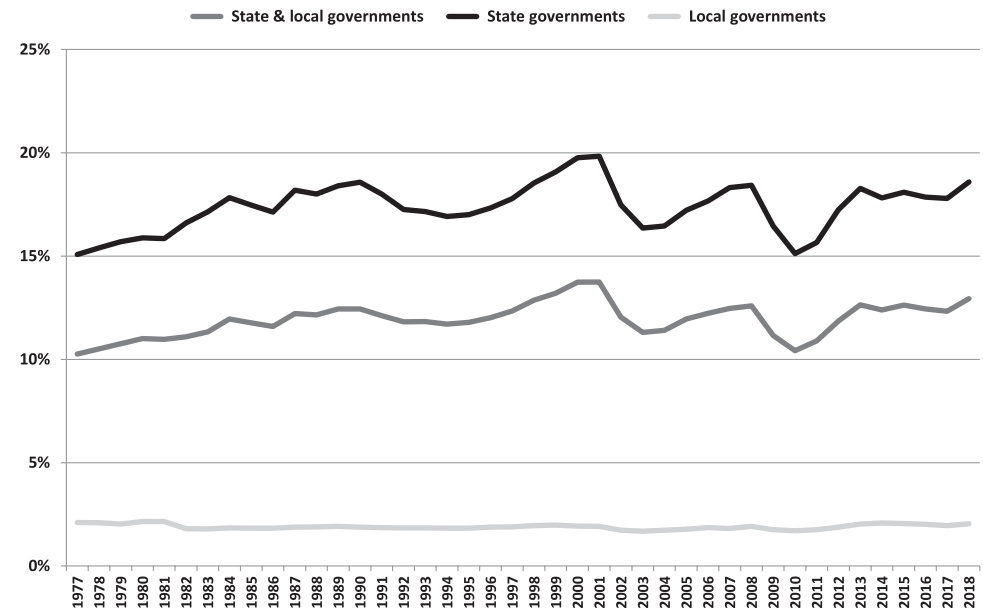


Figure 14.1 Individual income tax as a percentage of general revenue

Table 14.1 State individual income tax characteristics, 2021

	Number of states	*Highest rate*
State tax and rates		
None	8 (AK, FL, NV, SD, TN, TX, WA, WY)	
Limited tax	1 (NH)	
Flat rate	9 (CO, IL, IN, KY, MA, MI, NC, PA, UT)	5.25% in NC
Progressive rates	32	13.3% in CA, income > $1 million
Relation to federal tax		
Federal AGI	31	
Federal TI	5 (CO, ID, ND, OR, SC)	
No federal connection	5 (AL, AR, MS, NJ, PA)	

Source: Federation of Tax Administrators

governments spread over 17 states, although more than 2,900 of these local governments are in the state of Pennsylvania alone.[5] In 1962, only 32 states used broad-based income taxes, but a number of new adoptions occurred in the late 1960s and 1970s: Michigan and Nebraska in 1967; Illinois and Maine in 1969; Ohio, Pennsylvania, and Rhode Island in 1971; and New Jersey in 1976. Most recently, in 1991, Connecticut expanded a limited tax on capital income only that had existed since 1969 to a broad-based tax on all income including wages and salaries, whereas Alaska repealed its state income tax in 1979 and Tennessee ended a limited tax on capital income in 2021.

It is interesting that in a number of the states with individual income taxes, the absolute and relative importance of those taxes have decreased since 2000.[6] The effective rate of state and local income taxes – that is, income tax revenue as a percentage of personal income – decreased in more than half these states. Particularly large decreases occurred in Wisconsin, Ohio, Idaho, and Oklahoma. Similarly, the share of general revenue provided by individual income taxes declined in 35 states, again with especially large decreases in Ohio, Idaho, Massachusetts, and Wisconsin. There does not seem to be any single reason for this pattern of declining importance for individual income taxes. And income tax rates were increasing in other states (New York, West Virginia, Delaware, and Illinois, for example) at the same time. The point is that a number of economic and political factors influence tax choice, as discussed in this chapter.

Income tax structure issues

Before focusing on the specific income tax issues that arise from applying the tax at the state and local levels, it is useful to have some understanding of the fundamental concepts underlying income taxation as well as the overall structure of income taxes in general. Income taxes are related to *ability to pay* rather than benefit from or use of government services, so it is crucial to begin by attempting to define what *ability to pay* means.

If ability to pay taxes is to be measured by income, then income should be defined as broadly as possible to include all resources that contribute to a taxpayer's welfare and thus, their ability to pay taxes. One definition of income proposed by two economists, which has been widely used to evaluate income taxes, is **Haig-Simons income**, defined as consumption plus change in net wealth. (The term is named after Robert Haig and Henry Simons, who did much of their research in the 1930s.) By this definition, anything that provides consumption benefits to taxpayers or contributes to an increase in wealth (net of costs) is considered to increase welfare and ability to pay.

The use of the Haig-Simons concept of total income has a number of implications. Consumption may result from money used to purchase goods or services or from the receipt of goods or services directly. Thus, both money received and payments to individuals in kind rather than money, such as an employer-provided automobile or health insurance, represent consumption and should be included in such a broadly defined tax base. Essentially, the argument is that in-kind benefits substitute for money receipts and allow taxpayers to spend more on other things. Thus, ability to pay is greater, and tax payments should be, too. Similarly, anything that increases net wealth, such as income that is saved rather than spent or increases in the value of assets owned by a taxpayer, represents potential spending and thus is part of ability to pay. Again, these should be included in the broad tax base.

The Haig-Simons concept of income has been advanced as a way of achieving **horizontal equity** in taxation: that is, treating taxpayers with an equal ability to pay (income) in equal ways. Taxpayers may receive their Haig-Simons income in different ways, but if that total

income is the same, then the concept of horizontal equity argues that the tax system also should treat them equally. If the Haig-Simons concept of income taxation is implemented, however, a number of adjustments to the tax base often are made to account for different taxpayer circumstances in recognition of other equity objectives or the efficiency implications of the tax. The common structure of those income tax features is considered next.

A general structure for income taxes and common income tax terms are shown in Table 14.2. The starting point is defining **Adjusted Gross Income (AGI)**, the types and amounts of income that are deemed to represent ability to pay and that are to be taxed. Taxpayers may be allowed to subtract **personal exemptions** and various types of **deductions** from AGI. Exemptions are per person amounts, perhaps to account for necessary subsistence spending, that are subtracted from income before tax is calculated. Deductions may be fixed amounts per household (called a **standard deduction**), or they may be amounts of expenditures on specific goods and services (called **itemized deductions**). Adjusted Gross Income minus exemptions and deductions is called **taxable income**, which is the tax base to which rates are applied to calculate the tax.

Tax is calculated by multiplying the tax rates, the percentage of the tax base that will be charged as tax, by the tax base (or segments of the tax base). A flat rate or proportional rate tax applies one rate to the entire base, whereas a progressive rate tax applies greater tax rates as the tax base increases. In a progressive rate tax, the marginal tax rate is the tax rate that is collected from the last dollar of the tax base. For instance, if the tax rates are 5 percent

Table 14.2 Income tax terminology and structure

The general form of an income tax is
Tax = {(Income – Exclusions – Personal Exemptions – Deductions) × Rates} – Credits

Definitions of terms:
Exclusions are types of income that are not taxed: that is, excluded from tax.
Adjusted Gross Income = (Income – Exclusions), which represents income that can be taxed.
Personal exemptions are per person amounts that can be subtracted from income before tax is calculated – amounts that are exempt from tax.
Deductions are personal expenditures that can be subtracted from income before tax is calculated – expenditures that are deducted.
Taxable income = (Adjusted Gross Income – Exemptions – Deductions), which is the tax base that is multiplied by the tax rates.
Tax rates are the percentage of the tax base that will be owed as tax. A flat rate tax applies one rate to the entire tax base, whereas in a progressive rate tax, greater tax rates are applied as the tax base increases. In a progressive rate tax, the marginal tax rate is the tax rate that is collected from the last dollar of tax base.
Credits are amounts that are subtracted from tax owed. Credits may be per person amounts, may be related to specific expenditures, or may relate to other taxpayer circumstances.
Average Effective Tax Rate = Tax/Income

Example:
Income = $80,000
Exclusions = $100 of tax-exempt bond interest
Personal Exemption = $3,000 per person, with three people in the household
Deductions = $12,000 per household
Adjusted Gross Income = $79,900 [$80,000 – $100]
Taxable Income = $58,900 [$79,900 – ($3,000 × 3) – $12,000]
Tax Rate = 10 percent
Tax = $5,890 [$58,900 × .1]
Credit = $290 for child-care expenses
Tax Payment = $5,600 [$5,890 – $290]
Average Effective Tax Rate = .07 (7 percent) [$5,600/$80,000]

for AGI up to $20,000 and 10 percent for amounts of AGI greater than $20,000, the tax is calculated as follows:

AGI	$16,000	$30,000
Tax amount	$800 = $16,000 ×. 05	$2,000 = ($20,000 ×. 05) + ($10,000 ×. 1)
Marginal tax rate	.05 or 5 percent	.1 or 10 percent
Average tax rate	.05 or 5 percent	.067 or 6.67 percent

Finally, **tax credits** are amounts that are subtracted from the amount of tax due. Credits may be fixed amounts per person or per household, or they may be related to specific taxpayer circumstances, such as particular expenditures (as with a child-care credit or credits for contributions) or even income (as with the earned income credit). Because credits are subtracted from the tax amount (after rates have been applied) rather than from taxable income, a given credit reduces tax equally for all taxpayers eligible for the credit.

A numerical example using these concepts and terms to illustrate how income tax is determined is shown at the bottom of Table 14.2. The example easily can be used to illustrate how a tax structure can be changed. Suppose no personal exemptions are allowed, the standard deduction is still $12,000, and there is a $900 credit per child. Now AGI = $67,900, tax = $6,790, and credits are $1,190. The net tax payment remains at $5,600. With this general understanding of income tax structure, we turn now to the specific issues of defining the tax base and tax rates for state and local income taxes.

Tax base

The two principal issues states must consider in selecting an appropriate income tax base are (1) the degree of coordination between the federal and state income tax definitions and (2) the treatment of income that crosses jurisdiction boundaries. In the first case, states can parallel the federal government to varying degrees in determining what income base is to be taxed, or they can adopt an entirely different definition of taxable income. In the second, states must determine how to treat both income earned in other states by residents and income earned in this state by nonresidents (including the treatment of taxes paid to other states).

Federal–state tax base coordination

Similar state and federal definitions of the individual income tax base provide advantages both to taxpayers, by reducing record keeping and making it easier to compute the tax, and to state tax administrators, by making it easier to check for income tax compliance. If states substantially adopt the same income tax definitions as the federal government, changes in those rules and definitions by the federal government may generate automatic changes in the state taxes, unless the state governments explicitly act to offset the federal action. State income taxes can be grouped into three general categories of tax base conformance with the federal individual income tax, as shown in Tables 14.1 and 14.3.

The most common way to determine the state income tax base – used by 31 states and the District of Columbia – is to start with federal Adjusted Gross Income (gross income less exclusions) and then apply state-defined personal exemptions and deductions (Case 3 in Table 14.3). The state tax is computed from this base using a state rate structure and state income tax credits. States using this method may allow taxpayers the same number of exemptions as the federal tax but apply a different value to the exemptions or both different

Table 14.3 Alternative state income tax base conformance with the federal income tax

Federal Base = I – X – (N × E) – D
Where
I = Income
X = Income excluded from tax
N = Number of personal exemptions
E = Value per exemption
D = Deductions, standard or itemized
Federal Tax = Federal Base (Federal Rate Structure) – Federal Credits
Case 1: State tax is a percentage of federal tax
State Tax = State Rate (Federal Tax)
Case 2: State tax base equals federal taxable income
State Tax = Federal Base (State Rate Structure) – State Credits
State Tax = (I – X – N × E – D)(State Rate Structure) – State Credits
Case 3: State tax base equals federal Adjusted Gross Income
State Tax = (I – X – State Exemptions and Deductions) (State Rate Structure) – State Credits
Case 4: State tax base is unrelated to the federal tax
State Tax = (State Defined Base)(State Rate Structure) – State Credits

exemption numbers and values. These states also may allow deductions, either choosing which of the various federal deductions they wish to allow or adopting specific state deduction definitions or both. States taking this approach will have compliance and administrative advantages if they follow federal rules determining the number of exemptions and the federal definitions for deductions the states wish to provide. Computing state tax requires similar record keeping and follows the same pattern as the federal, with different values for the exemption and tax-rate parameters.

The next closest conformance to the federal tax occurs if the state tax base equals federal taxable income, again with some minor adjustments, illustrated by Case 2 in Table 14.3. The five states using this approach effectively accept federal income exclusions, personal exemptions, and deductions but apply their own tax rate structure and tax credits. In this case, state income taxes are sensitive to changes in the definition of the federal tax base but not to changes in federal tax rates. Moreover, taxpayers and tax officials have substantial compliance and administrative advantages with this system.

Five states make no specific attempt to relate the state income tax to the federal tax, opting instead for specific state definitions and rules regarding income exclusions, personal exemptions, deductions, credits, and rate structure (Case 4 in Table 14.3). Three of the five states using this approach are in the Southeast (Alabama, Arkansas, and Mississippi) and the other two in the Mideast (New Jersey and Pennsylvania). This dual income tax system potentially complicates matters for both taxpayers and tax administrators, although it leaves state government fully insulated from any direct effects of changes to the federal income tax.

For Case 1, a taxpayer's state income tax liability is a percentage of the federal income tax. In this case, a state adopts the income exclusions, deductions, exemptions, credits, and overall tax rate progressivity used by the federal government, although additional state income tax credits could be applied as well. Discretionary changes in state income tax revenue are accomplished by adjusting the state percentage rate that is applied to federal liability. Other minor adjustments for itemized deduction of the state income tax (included in the base), interest earned on federal government securities (excluded from tax), or interest from other states' securities (included in the base) might be made. Although used in the past, no state takes this approach currently.

Deductions for state or federal income taxes

Besides common definitions of income for tax purposes, state and federal income taxes also are related by deductions for income taxes paid to the other type of government. In computing itemized deductions for the federal individual income tax, taxpayers are allowed to include deductions for state and local government taxes up to a maximum of $10,000.[7] If the total value of all itemized deductions for a taxpayer exceeds the standard deduction for that filing class ($24,800 for married taxpayers filing jointly and $12,400 for single taxpayers in 2020), the itemized deductions are claimed. In that case, the federal individual income tax base is income net of state and local taxes (and other itemized deductions). Therefore, part of the taxpayer's state and local government income taxes are offset by a lower federal income tax liability. In 2018, only about 12 percent of federal income taxpayers itemized deductions, compared to more than 30 percent before 2017. The share itemizing fell dramatically as a result of the federal income tax changes in the Tax Cuts and Jobs Act of 2017.

In addition to these federal deductions for state and local taxes, six states allow a deduction for federal individual income taxes in computing the state tax. This **reciprocal deductibility** means not only that the federal tax base is income minus state and local income taxes but also that the state income tax base is income minus federal tax. This substantial narrowing of the state tax base may therefore necessitate higher tax rates.

Typically, the rationale for providing income tax deductions for income taxes levied by another level of government is to prevent tax rates from becoming too high through their cumulative effect. Theoretically at least, it is possible for the sum of federal, state, and local income tax rates to approach or even exceed 100 percent if those various governments set rates independently and without regard for the others. Such confiscatory rates would be counterproductive for all those taxing governments. Deductibility softens this effect.[8]

It is also sometimes suggested that income net of other governments' taxes is theoretically a better measure of "ability to pay," on the assumption that those other governments' taxes are not direct charges for service and thus equivalent to expenditures on any consumer good. This argument seems tenuous at best because individuals select their state and local government tax/service package through voting or their choice of residential location. The economic effects of income tax deductibility are considered later in this chapter.

Coordination among different states

The final intergovernmental tax-base issue, which applies to local as well as state taxes, concerns the treatment of income that crosses jurisdiction boundaries, including income earned by the residents of a taxing jurisdiction for services performed in another jurisdiction (residents' income earned in other states) and income earned in a given taxing jurisdiction by residents of another jurisdiction (nonresidents' income earned in the state). Four possibilities exist: (1) income could be taxed only in the jurisdiction where it is earned, (2) income could be taxed only by the jurisdiction where the earner resides, (3) income could be taxed in both places, or (4) income could be taxed in neither jurisdiction.

In practice, most state governments tax all the income of residents, regardless of where it is earned, and all income earned in that state by nonresidents. However, residents are allowed a credit for taxes paid to other states. In that way, state income taxes are based on the origin of the income. If all states followed this practice, the effect would be to tax income where it is earned, with two exceptions. Income earned in a state that does not have an income tax would be taxed in the earner's state of residence. Second, if the income tax rate is greater in an individual's state of residence than in the state where the income is earned, the state of residence would collect tax on that income proportional to the difference in rates. These rules typically apply among states that enter into agreements with each other to ensure

consistent treatment of each other's residents. In the absence of these agreements, individuals may be subject to tax on such income by more than one state or by neither state.

The practice regarding local government income taxes is somewhat more confusing, if only because there is more variability as to which rules are applied. First, many local "income" taxes exclude property income and apply only to so-called earned income. These are often referred to as "wage taxes." In some cases, local income taxes are residence based (obviously, if the tax applies only to residents). In contrast, the tax of the jurisdiction where the income is earned has preference in other cases.

The practice in Pennsylvania is particularly confusing because different rules apply to Philadelphia as opposed to other jurisdictions in the state. Philadelphia has first claim to tax the income earned by nonresidents in the city. And because the tax rate in Philadelphia is greater than that allowed in the surrounding jurisdictions, these jurisdictions can effectively collect no tax on income earned by their residents in Philadelphia. Therefore, as James Rodgers (1981) notes, many of those surrounding jurisdictions have not adopted income taxes. In other parts of the state, the jurisdiction of residence has first claim to residents' income earned in other jurisdictions. Consequently, Rodgers reports that after Pittsburgh adopted a local income tax, most of the surrounding jurisdictions followed immediately in order to retain that income tax base for themselves.

George Break (1980) has suggested that the sensible treatment of nonresident income by local government income taxes depends on the nature of the service to be financed with the revenue. If the benefits of a service primarily accrue to residents of a jurisdiction, then a residence-based rule seems most appropriate. Break argues that this situation applies if the income tax is used to finance local schools (given that state government revenue is also provided to schools to account for the external or social benefits of education). On the other hand, if the tax is to finance general city or county services, then Break argues that at least part of the tax should be origin based to offset the service benefits received by nonresidents who work in the jurisdiction (such as local police protection, traffic control, or local parks). In the absence of user charges for such services, the local income tax may be the most effective way of reaching those nonresident commuters.

Tax rates

Not only do state income taxes differ widely in the definition of the tax base and somewhat in the treatment of nonresident income, but they also involve a wide variety of rate structures, as shown in Table 14.1. Only 9 of the 41 states with broad-based taxes used flat rates in 2021. In the other states, the rate structure is progressive, although again to widely differing degrees. For example, in Alabama, the tax rates vary from 2 to 5 percent, but the highest rate applies to all taxable income above $3,001 ($6,001 for married filing jointly); consequently, this is nearly a flat rate tax for many, if not most, taxpayers.[9] In contrast, 2021 tax rates in California varied from 1.0 to 12.3 percent, with single taxpayers with taxable income of about $599,000 ($1,198,000 for joint filers) reaching the maximum rate.[10] Thus, the progression in the rate structure affects a substantial number of taxpayers in California. Of course, comparing state tax rates is often very misleading because of differences in tax bases. For income taxes, this includes differences in the starting point for computing the base and in the allowed exemptions, deductions, and credits.

Application 14.1: State income taxation of nonresidents: Two special cases

As you have learned, state income taxes are, in principle, taxes levied at the origin of income – where the income is earned – rather than the destination of that income – where

the worker resides. Of course, for most people who earn income only in the state where they reside, this is of no consequence. For workers who earn substantial amounts of income in more than one state, this practice has important implications. Such taxpayers may be required to file tax returns and pay taxes in every state (and perhaps city) where they work or live – an income allocation that burdens them and their employers. In addition, tax authorities face questions of how to monitor and collect these taxes. Two significant examples of this situation are discussed next.

First, the case of professional athletes has received special attention.[11] This attention follows from the very nature of professional athletics, in which teams compete in multiple states, as well as the exceptionally high level of salaries now common in many professional sports leagues. Hawkins et al. (2002, 551) reported that focus on this case began in 1991 when "California began aggressively pursuing taxation of visiting athletes (including players for the Chicago Bulls). In return, the Illinois legislature approved legislation that would in turn tax visiting athletes in that state. The law was dubbed 'Michael Jordan's revenge.'" Today, most states with professional sports teams and state income taxes pursue collecting tax on the earnings of visiting pro athletes, what has come to be referred to the "jock tax."

Of course, a similar situation may affect a variety of individuals, such as entertainers, speakers, lawyers, and even professors; however the case of professional athletes has received special attention. One major question is whether professional athletes (and perhaps entertainers, as well) are being singled out for special tax treatment or enforcement among all nonresident income earners. Currently, most states allocate professional athlete income for tax purposes based on "duty days," the number of days in the visiting state compared to the total number of days for which the athlete is being paid. For example, if a member of the NY Yankees is paid $5 million for 200 days, and the Yankees are in Detroit to play the Tigers for 10 days, then 5 percent of the athlete's earnings or $250,000 is subject to taxation by Michigan.

Because most pro athletes compete in a large number of states, the process of tax calculation and payment is complicated. One option to simplify the situation is to permit consolidated filing, through which all players on a team could file a single return with states they visit. Another option, proposed by the major professional sports leagues and related player associations, is that all of a player's income be allocated to his home team's state. The player would file just one state return, unless he lived in another taxing state. The plan may be particularly appropriate for team sports because of the almost perfect reciprocity involved – every game is at home for one team and away for the other. So far, neither of these alternatives has been adopted.

Second, a less exciting but much more common case concerns people who reside in one state but work in a neighboring state, a typical occurrence in many metropolitan areas or cities near state boundaries. For example, many people who work in New York City may live in Connecticut or New Jersey. In normal times, the income tax implications of this situation are well known and something that becomes standard for such workers. They may pay income tax to NY state on income earned working in NY and tax to their state of residence (CT or NJ) on other income. Such workers typically receive an exemption or credit in resident state tax for tax paid to the nonresident state.[12]

Of course, the normal situation changes if the work pattern is disrupted, as happened for many workers as a result of the COVID-19 pandemic. Some workers chose or were required to "work from home." A NJ resident who normally worked in an office in New York City now was working for and being paid by the same employer but performing the work in New Jersey. This reduces the amount of income earned by working in NY and reduces the amount of income tax NY might collect.

Massachusetts has an income tax that applies to nonresidents working in Massachusetts, but the neighboring state of New Hampshire, where many MA workers reside, does not have an income tax. The state of Massachusetts declared a state of emergency as a result of the pandemic, and the state's Department of Revenue issued a regulation that individuals who have jobs in MA but are working remotely outside the state must continue to pay income tax to MA on income earned working remotely. New Hampshire asked the US Supreme Court to order that MA not enforce the regulation and refund any tax revenue collected as a result of the regulation.

In fact, the case involves a number of legal and constitutional issues as well as economic ones.[13] The Court asked the US Solicitor General to offer an opinion about these issues, and in May 2021, the US Solicitor General recommended to the Court that it not hear the case involving original litigation (as opposed to appeal) between states.[14] The opinion was based on the idea that NH had not suffered serious injury, that NH could first pursue the case in MA courts, and the pandemic was a special circumstance.[15] In late June 2021, the Supreme Court announced that it would not hear the case.[16]

Other states and localities followed this case closely, as it had the potential to change the nature of state income taxation. There is no dispute that an origin-based state (or local) individual income tax can tax income earned in a jurisdiction by nonresidents. However, the MA emergency regulation essentially redefined the location of work as the location of the employer or the previous place an employee was located rather than the actual location of the work. As noted, such a change in work location occurred in many different states and localities during the pandemic, with resulting tax revenue gains (where the work from home was located) and potential losses (where the workers were located previously). Although this was undoubtedly a special circumstance, whether a state can (or should) redefine the definition of work location is a broader matter. Some hoped that a Supreme Court decision in the NH case would clarify this policy issue.

Remote work was becoming more common even before the pandemic, and it is possible that the experience during the pandemic will contribute to an expansion of remote jobs or work from home. Before the pandemic, six states had established rules taxing income based on the location of the office or employer if the remote work was being done for "the convenience of the employer."[17] However, "convenience" is not easily defined and could be interpreted differently in different businesses or states. Therefore, the question of which state (or local government in some cases) has, or should have, authority to tax earnings remains unresolved. In some ways, this issue is similar to the business nexus issue for sales tax collection, discussed in Chapter 13. Nonresident workers physically present in a state clearly benefit from public services provided by the state or local government. However, it is less clear whether remote workers benefit from public services provided at the "office" location. Stay tuned as this important policy issue evolves.

Economic analysis: Efficiency and equity

Incentive effects of state and federal income taxes combined

Any income tax creates incentives for individuals to change their behavior. Individuals may react to income taxes by changing the amount that they work (and thus the amount of income earned), by changing the amount of income they save, or by changing how they spend their income in response to various tax deductions. The income tax characteristic that determines the magnitude of these incentives is the **marginal tax rate**: that is, the tax rate that applies to the last dollar earned. The marginal tax rate determines how much the tax can be reduced by working one less hour or by making a charitable contribution and taking

that amount as a deduction. For instance, if a taxpayer faces a marginal tax rate of 50 percent, then an extra hour's work at $30 per hour would increase after-tax or take-home pay by only $15, and an extra $20 charitable contribution would reduce taxes by $10.

The marginal tax rate facing any taxpayer depends on the combined effect of all income taxes – federal, state, and local – paid by that taxpayer. Therefore, the relevant item is the aggregate marginal tax rate from all income taxes that applies to a given income or deductible expenditure amount. The marginal tax rate that results from a set of income taxes depends not only on the separate tax rates but also on any deductibility of one tax against the other.

The effect of intergovernmental income tax deductibility on marginal tax rates is demonstrated in Table 14.4. The illustration assumes that a taxpayer faces a federal marginal tax rate of 32 percent and a state tax with a marginal tax rate of either 5 or 10 percent. With no deductibility of one tax against the other, the combined marginal tax rate is simply the sum of the two individual rates, either 37 percent or 42 percent, depending on the state tax. Deductibility of the state tax against the federal tax reduces the combined marginal tax rate as long as the amount deducted is less than any maximum allowed. If f represents the federal rate and s the state rate, the combined rate is $f + s - sf$ because the increase in state tax of s per dollar of income becomes a federal deduction equal to s, which reduces federal tax by sf. In the numerical example, the combined marginal rate is 35 percent if the state rate is 5 percent (compared to 37 percent with no deductibility) and 39 percent if the state rate is 10 percent (compared to 42 percent without deductibility). Thus, federal deductibility of the state tax not only reduces marginal tax rates but also narrows the difference in marginal rates between low-rate and high-rate state taxes.

Reciprocal deductibility – that is, simultaneous federal deductibility of the state tax and state deductibility of the federal tax – has much the same effect on marginal rates, although to a greater magnitude. In this case, the combined rate of $f + s$ is reduced by sf due to the federal deduction for the state tax and by fs due to the state deduction for the federal tax. However, it is then increased by f^2s due to a smaller state tax deduction against the federal and by s^2f due to a smaller federal deduction against the state tax, and so on. In Table 14.4, the combined marginal rates are 34 percent when the state rate is 5 percent and 37 percent when the state rate is 10 percent. Again, the marginal tax rate is lowered, and the difference between the states is narrowed by reciprocal deductibility, both compared to no deductibility and federal deductibility of the state tax alone. One way this table may be a bit misleading is that although it shows the effect of deductibility on a given rate structure, it ignores changes in the rates that may be required if deductibility is allowed. Because state deductibility of the federal tax reduces the state tax base, higher average state tax rates are required to generate the same revenue as would be collected without that deductibility. Thus, those states that now allow deductibility of the federal tax may have adopted higher income tax rates than

Table 14.4 Combined marginal tax rates from federal and state income taxation

Tax structure characteristic	*General case*	*Example one*	*Example two*
Federal marginal tax rate	f	.32	.32
State marginal tax rate	s	.05	.10
Combined marginal tax rate if no deductibility	f + s	.37	.42
Combined marginal tax rate if state tax deducted against federal only	f + s(1 – f)	.35	.39
Combined marginal tax rate with reciprocal deductibility	$\frac{\left[f + s\left(1-2f\right)\right]}{1-fs}$	.34	.37

otherwise, but given those rates, the difference in rates between that state and others is less than nominally appears. In terms of this example, the choice for a state may be between a 5 percent rate with no deduction for the federal tax and the 10 percent rate with the deduction. The difference in combined marginal rates is 34 percent compared to 37 percent, less than the difference in the state rates alone.

An example of the effect of a charitable contribution on taxes based on Table 14.4 shows the importance and usefulness of these combined marginal tax rates. Suppose an individual who itemizes deductions for federal taxes and whose state income tax has a 10 percent rate and also allows a deduction for a charitable contribution makes a new $100 contribution to an eligible charity. The after-tax "price" or "cost" of the contribution to the taxpayer per dollar is 1 − marginal tax rate. If there is no reciprocal deductibility (only the state tax is deductible against the federal and not the converse), then the contribution reduces total taxes by $39 and "costs" the taxpayer $61 [$100 × (1 − $f - s + fs$)]. With reciprocal deductibility, the contribution costs the taxpayer $63 (the marginal rate is 37 percent). In both cases, the contribution costs more than the $58, which appears to be the cost from analyzing the state and federal taxes separately and ignoring intergovernmental tax deductibility.

Federal deductibility and progressivity

Intergovernmental income tax deductibility also reduces the progressivity of the tax structure, with implications both for the choice of a tax structure within a subnational government and intergovernmental tax competition. The general effect of income tax deductibility on tax liabilities is shown in Table 14.5. In the example, the federal tax has a 22 percent tax rate, no personal exemption, and a $15,000 standard deduction plus the state tax; the state tax has a $1,500 personal exemption, no deductions except the federal tax (for the reciprocal deductibility case), and either a 5 or 10 percent rate. Taxes are computed for a family with four exemptions and income equal to $80,000 (approximately median family income in 2019).

Table 14.5 The effects of income tax deductibility on tax liability

Tax structure	*Federal tax*	*State tax*	*Total tax*	*Effective rate*
Assumptions: Family of four with $80,000 income Federal personal exemption is $0; federal standard deduction is $15,000 State personal exemption is $1,500				
Case A: federal tax rate = .22; state tax rate = .05				
No deductibility	$14,300	$3,700	$18,000	.225
State tax deducted from federal	13,486	3,700	17,186	.215
Reciprocal deductibility	13,636	3,018	16,654	.208
Case B: federal tax rate = .22; state tax rate = .10				
No deductibility	14,300	7,400	21,700	.271
State tax deducted from federal	12,672	7,400	20,072	.251
Reciprocal deductibility	12,957	6,104	19,061	.238
Implications	Total tax in case B / Total tax in case A			
No deductibility		1.21		
State tax deducted from federal		1.17		
Reciprocal deductibility		1.14		

As expected, deductibility reduces both total tax liability and the effective tax rate with either state tax rate. More importantly, the difference in tax liability between the 5 and 10 percent tax rates also is reduced by deductibility. Taxes are 21 percent higher with the 10 percent rate rather than the 5 percent rate given no deductibility, but only 17 percent higher when the state tax is deducted against the federal tax and 14 percent higher with reciprocal deductibility. Put another way, although the state income tax is $3,700 greater with the 10 percent than the 5 percent rate, the deduction of that additional state tax against the federal reduces the federal tax by $814 (.22 × $3,700). As a result, the total tax liability is greater only by $2,886. With reciprocal deductibility, the difference in total tax liability between a 5 and 10 percent state tax rate is only $2,407. Thus, intergovernmental income tax deductibility mitigates the effect of a higher state-local income tax rate, effectively reducing the progressivity of state income taxes compared to the statutory rates.

One implication of this effect is that states may choose more progressive income tax rate structures due to federal deductibility of their tax than they would without those deductions. Higher-income taxpayers who could be affected by a more progressive state income tax structure are likely to itemize deductions for their federal tax and thus deduct the state tax. Therefore, part of those taxpayers' state income tax liability is offset by a lower federal liability; in essence, part of those taxpayers' state tax is paid by all taxpayers in the United States, perhaps in the form of higher federal rates necessitated by the lower federal tax collections. In a report prepared for the Minnesota Tax Study Commission, Joel Slemrod (1986, 130–131) notes the following:

> Because the proportion of itemizing-households increases with income, in general the more progressive is the state income tax, the greater will be the degree of tax exporting. In a sense, by loading the tax burden onto those high-income taxpayers who tend to be itemizers and also have high marginal federal income tax rates, the total net tax burden borne by Minnesotans declines.

Similarly, in a study of state-local tax incidence for 1976, 1985, and 1991, Howard Chernick (2005) reports that intergovernmental tax deductibility does induce states and localities to adopt more progressive tax structures than otherwise, so much so that federal deductibility increases the overall progressivity of state-local tax systems. Chernick (2005, 105) notes that

> a one percentage point increase in the percentage itemizing [and thus deducting state-local taxes from the federal tax base] would increase net progressivity by about one percentage point . . . This strong result suggests that eliminating the deductibility of state and local taxes . . . would substantially reduce the progressivity of state and local tax systems.

A related implication of deductibility is that states may be able to have higher average tax rates than without deductibility. Again from Table 14.5, if a state increases its tax rate from 5 to 10 percent, the state government's revenue from this $80,000 income family rises by $3,700 (from $3,700 to $7,400), but the family's total tax bill (federal plus state) rises by only $2,886. In essence this family can "buy" another $3,700 worth of state government services by paying only $2,886. Deductibility may therefore induce some voters to support higher state taxes and expenditures than otherwise. For taxpayers who itemize deductions, the incentive will be of greater importance the greater the federal marginal tax rate, so the incentive is expected to be more significant for higher-income taxpayers. Whether the change in the voters' positions will translate into a change in state behavior depends on the political system. In the median-voter framework, for instance, the issue is whether deductibility influences the median voter or changes the median voter's identity.

Equivalently, interstate differences in taxes are less than suggested by differences in income tax rates because of federal deductibility. Returning to the example in Table 14.5, if one state has a 5 percent tax rate and another a 10 percent rate, the difference in tax for a $80,000 family is $2,886 rather than $3,700, if the state tax is deducted against the federal income tax. Deductibility therefore reduces the incentive for taxpayers who itemize federal deductions to move to lower-tax states or localities. Moreover, because the effect of deductibility is proportional to the federal income tax rate, this mitigating effect of deductibility on state taxes becomes stronger as the taxpayer's income increases.

The combined result of these implications is likely to be more progressive state-local tax structures and possibly higher state-local expenditures in at least some states due to the federal deductibility of state income taxes. Again, this result is expected to be most prevalent in those states where a relatively large fraction of taxpayers itemize federal deductions and have higher incomes (thus facing the higher marginal federal tax rates).

Application 14.2: State income taxation and changes in the federal income tax

We have learned about the potential interaction between the federal and state-local individual income taxes. Federal tax reform can affect state income taxes in two ways: (1) changes in federal definitions of income, exemptions, and deductions alter the base of state taxes that use those definitions, leading to changes in state income tax revenue if the state adopts the federal changes; and (2) changes in itemized deductions and tax rates alter the value of the federal deduction for state taxes, which changes the net cost of state taxes for those who itemize federal deductions.

Both occurred with the major revisions to the federal income tax in 1986. Marginal federal income tax rates were reduced substantially, and a number of exclusions, deductions, and credits were altered to expand the federal tax base in aggregate. The net effect was a small decrease in federal personal income taxes. There were five particularly important changes: (1) increases in the personal exemption, standard deduction, and earned income credit (all of which lowered federal and conforming state taxes); (2) full taxation of all capital gains; (3) restrictions on the use of tax shelters to offset income; (4) ending of the deduction for individual retirement accounts (IRAs) for many taxpayers; and (5) reductions in itemized deductions, including eliminating the federal itemized deduction for state-local sales taxes. These latter four elements increased the federal and potential state tax bases.

In aggregate, states tended to follow the federal government in reducing marginal income tax rates and broadening the tax base, particularly in accepting the federal changes that taxed capital gains fully and limited deductions for certain types of investments. Many states also took action to reduce revenue windfalls, often by raising personal exemptions and/or standard deductions. This had the effect of reducing or eliminating income taxes for low-income taxpayers, as had the equivalent federal changes. In the end, then, state income taxes fell in many states and rose in some, but by less than they would have if structural changes had not offset some of the federal tax base changes.

Not surprisingly, state income taxes seem in aggregate to have become less progressive as a result of these structural changes. The reduction in the value of the federal deduction made it difficult for states to maintain the prior level of progressivity. Marcus Berliant and Robert Strauss (1993, 35) report, "Between 1985 and 1987, the . . . progressivity of thirty-seven states' personal income taxes declined." Apparently, decreases in marginal tax rates offset the higher personal exemptions and standard deductions.[18]

The federal income tax changes in the 2017 Tax Cuts and Jobs Act (TCJA) were more substantial and had an even greater impact on state taxation. There were a number of

particularly important changes, including: (1) personal exemptions were eliminated, (2) the standard deduction was nearly doubled and continued to be indexed to inflation, (3) the itemized deduction for state and local government taxes was capped at $10,000, (4) some other itemized deductions were eliminated and the maximum amounts for others changed, (5) income tax rates were reduced, and (6) the child tax credit was doubled and a larger fraction made refundable, with most of the new tax regulations to expire after 2025.

One response to TCJA involves the definition of the state income tax base. As we learned, most states use federal AGI or federal taxable income as the starting point for determining state taxes. If state laws link to the current federal definitions, then the federal changes that had the effect of increasing the tax base, in aggregate, would increase state income taxes unless states reduced tax rates. The Tax Foundation reports that "By the end of 2019, all but four states with individual or corporate income taxes (or, in one case, a gross receipts tax that uses IRC definitions) conformed to a post-TCJA version of the IRC."[19] That is, nearly all states had adopted the tax base definitions from TCJA.

A second states response to TCJA arises because the number of taxpayers who choose itemized deductions decreased dramatically. And among those who still itemize deductions, the amount of state-local taxes that can be counted is limited to $10,000. Because most taxpayers who continue to itemize deductions have higher incomes, the $10,000 SALT cap is clearly binding: that is, the sum of their state-local income and property taxes is likely more than the limit. Finally, a given amount of itemized deductions is less valuable than previously – that is, reduces tax liability less – because tax rates are lower. As a result, the net burden or amount of state-local taxes is greater than before TCJA for many taxpayers.

With so much less of state-local taxes now deductible, states sought new ways to allow state-local taxes to be deducted in determining the federal tax. An initial proposal was to encourage taxpayers to make voluntary contributions to states or to nonprofit entities set up by states. In exchange, these taxpayers would receive a credit for those contributions against the state income tax. Charitable contributions remain deductible for the federal income tax. This mechanism would effectively substitute a charitable contribution deduction for the state tax deduction. For example, suppose a taxpayer's state income and local property tax liability is $14,000, consisting of $10,000 in state income tax and $4,000 of property tax. If this individual makes a $4,000 donation to the state and receives a $4,000 state income tax credit, the individual is paying the same amount total, the state-local government still collects the same amount, but the full $14,000 is now deductible for the federal tax ($10,000 in state-local tax and $4,000 as a charitable contribution). However, the Internal Revenue Service disallowed such a mechanism.

A number of states have pursued a second option that applies to some owners of businesses. For businesses that are solely owned, partnerships, or organized legally as S-corporations, the business income or profits is normally taxed as individual income to the owners. These businesses often are referred to as "pass-through entities," because the business net income passes through to the owners for tax purposes. These states have changed their tax laws to permit such businesses to pay federal income tax directly from the business rather than as individual income. In calculating business profits, taxes paid are a business expense and thus tax deductible. Because there is no cap on the amount of state-local taxes that can be deducted by businesses, this mechanism permits the full state-local tax to be deducted. To date, the IRS is permitting this approach.

Application 14.3: State income taxation, progressivity, and mobility

Income taxes are the predominant source of progressivity in state-local tax structures. The evidence shows that sales taxes (Chapter 13) tend to be regressive (or at best proportional

over some range of incomes), and the overall distribution of property tax burden (Chapter 12) seems roughly proportional for middle-income taxpayers and progressive for the highest-income taxpayers (the top 5–10 percent). In contrast, the progressivity of state-local income taxes results from the combination of (1) personal exemptions and deductions, (2) progressive rate structures in most states, and (3) income-based credits for property taxes or sales taxes.

Howard Chernick (2005) used the ratio of tax burden for the top 20 percent of taxpayers to the bottom 20 percent as a measure of overall state-local tax progressivity. Over the period 1976 through 1995, he reported that overall tax structures were regressive (by this measure), that the degree of regressivity on average for all the states was relatively stable, and that there were substantial variations among the states. Joseph Cordes and Jason Juffras (2012) note that state personal income taxes tended to become less progressive during the 1988–2008 period.

Since then, however, a number of states have acted to increase income tax progressivity, particularly by increasing marginal tax rates that apply to higher-income taxpayers. Cordes and Juffras report that, for the first time, in 2011, three states (California, Hawaii, and Oregon) had top marginal tax rates greater than 10 percent (although the rate in Oregon has since declined to 9.9 percent, whereas New Jersey now has a top rate above 10 percent). Between 2000 and 2011, 12 states established new top income tax brackets at more than $100,000. Cristobal Young and Charles Varner (2011) report that eight states have adopted additional taxes (surtaxes) levied on very high-income individuals since 2004. New Jersey was one of the first to act, increasing the marginal tax rate in 2004 by 2.6 percentage points (to a total of 8.97 percent) for taxable income above $500,000. In 2009, New York adopted a surtax for incomes above $500,000 that increased the overall marginal tax rate for that group to 8.97 percent. California levies an additional 1 percent tax on taxable income greater than $1 million, bringing the marginal tax rate to 13.3 percent for such individuals. As noted in the *Headlines*, in 2020 Arizona voters approved a proposal for a 3.5 percent income tax surcharge on incomes over $500,000, whereas Illinois voters rejected a proposal to move from a flat-rate tax to progressive rates. Massachusetts voters will decide in 2022 about a 4 percent surcharge on incomes over $1 million.

You read in Chapter 1 about the conventional wisdom that state and local governments are limited in conducting redistribution policies, including "millionaire taxes," because of the possibility of individuals moving to a different state or locality. Thus, these recent policy actions by several states naturally raise the question of whether high-income individuals have moved to avoid the higher tax rates. The cases of New Jersey and California have received the most direct research attention, although there is also some evidence about the case of New York City.

Research into overall state taxation has identified some movement of individuals or income related to tax differences, although the general conclusion is that actual migration in response to tax differences is small. The research does suggest, however, that high-income individuals may be more sensitive to tax changes than other taxpayers, which is particularly relevant to these state actions. Of course, taxpayers may react to income tax changes in ways short of complete migration. Donald Bruce et al. (2010) examine the effect of marginal state tax rates for several types of income on measures of state AGI and taxable income over the period from 1989 to 2006. They report that state rates have no or very small effects on measures of Adjusted Gross Income (gross income minus excluded income) in states but larger negative effects on state taxable income (AGI minus exemptions and deductions). The authors hypothesize that the effect on taxable income but not full income suggests individuals may be engaging in "tax planning" to move some income to lower-tax states. For instance, workers near state borders might work in high-tax states and live on the low-tax

side of the border. Or individuals might live in high-tax states but find ways to reduce tax liability by moving income or taking advantage of tax exclusions or deductions.

The state of Washington has adopted an unusual tax relevant to the issue of adjusting or moving some types of income. Washington does not have an income tax, and in the past, voters have rejected proposals to create an income tax. Washington relies on sales and excise taxes heavily. The new tax adopted in 2021 to take effect in 2022 is an "excise tax" at a 7 percent rate on capital gains, with a $250,000 exemption. The tax is based on the federal tax definition of capital gains with several exclusions (real estate) and adjustments. In essence, Washington residents will pay a 7 percent tax on gains from the sales of assets (stocks and bonds, for instance) that are more than $250,000.[20]

Why was this exacted into law as an excise tax? The Washington constitution includes a provision that a tax on "property" must be uniform (not tax some types of property at different rates than others) and that a tax on "property" cannot exceed one percent. In a 1933 case, the Washington Supreme Court found that income is "property" in the meaning of the state constitution. But the constitutional provision does not apply to excise or sales taxes. The issue of whether income is "property," which is not the typical meaning in other states, is one of the main issues in legal challenges to the new law.

The economic issues are a bit different. First, the new tax excludes capital gains from the sale of real estate, so it creates a tax advantage for investing in real estate rather than in financial assets. Second, taxpayers may be able to establish residence outside of Washington state with a second home, for example, or by living outside the state and working remotely. The law includes detailed conditions determining whether taxpayers may do this, but the incentive exists. Therefore, this is another example of a state trying to make its tax system more progressive, which creates a taxpayer incentive for "tax planning" or residential relocation.

Cristobal Young and Charles Varner (2011, 2012) have studied the result of tax increases for high-income individuals in both New Jersey (the increase in the top tax rate in 2004) and California (a 1 percent tax on taxable income above $1 million in 2005). Their results show little if any migration of millionaires in response to the tax changes. In fact, the evidence is that net migration, in or out, is exceedingly small for millionaires in these states. As you learned in Chapter 5, only about 14 percent of all the people who move change states (which amounts to less than 5 percent of the population). Obviously, migration of the set of millionaires is even smaller. One important reason for the results observed by Young and Varner is that having a million-dollar annual income (relevant for the taxes) is often temporary; individuals may have such income only in some years, so the set of people with million-dollar incomes varies annually. The results do suggest that certain types of very high-income individuals – those of retirement age, people who earn income solely from investments, and those who become divorced – migrate more, but not necessarily (or at all) because of tax factors compared to other influences. With only very small outmigration in response to tax rate increases at the most, the rate change clearly increases revenue.

New York City levies a tax of between 3.078 and 3.876 percent in addition to the state tax rate of nearly 9 percent for high-income taxpayers. A study by the New York City Independent Budget Office (not a part of the city's government) examined the destinations of people who moved from the city in 2012 and identified two key results. First, most high-income households (income of at least $500,000) that moved did not move to tax havens: 24 percent moved within New York state, 22 percent moved to New Jersey, 12 percent to Connecticut, and 9 percent to California, all states with substantial state income taxes. Only 4 percent moved to Texas and 2 percent to Florida, states without an income tax. In fact, few households moved out of the city at all, and high-income households were no more likely to leave than others.[21] Former New York City mayor Michael Bloomberg, a billionaire, was

quoted as saying "I can only tell you, among my friends, I've never heard one person say, 'I'm going to move out of the city because of the taxes.'"[22]

Although these results remain somewhat controversial, and research continues, the consistent evidence suggests that states may have more opportunity to engage in progressive taxation or redistribute income than the conventional wisdom suggests. The simple fact just may be that moving, especially among states, is difficult (even for millionaires). Reacting to the latest millionaire surtax in California, Professor Young noted,

> Moving out of state is actually one of the most costly responses they [millionaires] could make. . . . Moving to Nevada or Texas or Florida is a very big life change, and means leaving family, friends, colleagues and business connections" (Nagourney, 2013).

The choice of state taxes

The diversity of state-local fiscal systems is continually stressed in this book, and the different state choices about tax structure are simply another example. Examples of substantial differences in tax structure for states that seem otherwise similar abound. Oregon has no sales tax and relies on a state income tax, whereas neighboring Washington has no state income tax and relies heavily on sales taxes. Texas and Florida have no income tax but a relatively high reliance on property taxes, but Oklahoma and Georgia make much more balanced used of all three major taxes (income, sales, and property); New Hampshire has neither a state sales nor broad individual income tax but very high property taxes, whereas all the other New England states use both state sales and income taxes.

Researchers have attempted to understand and explain these and similar different choices by analyzing how states make tax policy decisions. Nearly all the basic models of this choice assume that government needs to select a set of taxes that will generate a fixed amount of revenue (to finance services) and that the government wants to find the set of taxes that imposes the lowest costs on residents. At least four types of costs can be considered. First, as explained in Chapter 11, excess burden or the efficiency cost of taxes arises because individuals or firms change their behavior in response to the tax. One change in behavior that concerns many states is relocation of economic activity, which is movement of firms or employment out of the state. So states want tax structures that minimize the incentives for residents to change behavior (except for taxes designed to alter behavior, such as cigarette taxes perhaps). Second, administrative costs for some taxes can be high, so states want to avoid tax choices that have high collection costs in that state's situation. Third, finding the set of taxes that minimizes direct revenue costs to residents is equivalent to maximizing the exporting of tax burden to nonresidents. Finally, revenue stability avoids the cost of having to make policy choices repeatedly as the economy evolves.

States can export tax burden in several ways, although some that might look like exporting really are not. First, some taxes are exported directly to the extent they are levied on nonresidents and cannot be shifted. This might include sales or excise taxes paid by visitors, property taxes paid by nonresident property owners, and income taxes on nonresident workers. Second, as we have learned, federal tax deductibility (for both persons and corporations) of state-local taxes transfers part of the burden of deductible state-local taxes to all taxpayers nationally (by reducing federal revenue, which requires higher federal tax rates or cuts in federal services). Third, in some cases, taxes levied on businesses or business activities in a state may be shifted to consumers or suppliers in other states as a result of price changes.

This last possibility is somewhat limited, however. A state must have some unique feature or a monopoly position in some industry in order for a state's taxes to be shifted to consumers and firms in other states. Otherwise, consumers might simply switch to

buying at lower prices from suppliers in lower-tax states, and if that happens, producers in the state have the incentive to move their operations to the lower-tax states as well. For instance, states with some relatively unique features (sunshine and warmth in Florida and Hawaii or minerals in Alaska and North Dakota) may be able to export taxes on those features (or economic activity related to those features) because the features themselves are immobile, and consumers may have limited substitutes. On the other hand, taxes on manufacturing or commercial activity in a state may not be able to be exported if the producers easily can change the location of production to other states or if consumers have the option of buying from other suppliers (which prevents price increases by producers from the high-tax state).

Empirical studies of state tax policy decisions suggest that the idea of exporting as much state tax burden as possible goes a long way toward explaining many (but clearly not all) differences in state tax structures. In one such study, Daphne Kenyon (1988) examined the determinants of the mix of state taxes using fiscal year 1981 data, paying particular attention to whether differences among states in the average federal marginal income tax rate and the percentage of a state's taxpayers who itemize federal deductions influence a state's use of different taxes. The federal tax influences are captured by the **burden price** of the state income tax, which is defined as the cost of a $1 increase in state income tax after subtracting the amount offset by the federal deduction. Kenyon reports that a 1 percent increase in the net burden of state income taxes (for instance, from a lower-value federal deduction) leads to an 11 percent decrease in per capita state income taxes.

Mary Gade and Lee Adkins (1990) also examine the influence of tax exporting on the choice of state tax mix. In their model, state officials choose a state tax structure to minimize the net burden on residents (thus, maximize exporting), and given that structure, the state's median voter determines the level of state taxes and spending. Gade and Adkins find that shares for major state taxes are negatively related to the burden prices for those taxes and positively related to the prices for the other taxes. They conclude,

> as the . . . burden price associated with a particular tax rises [so that residents bear a larger fraction of that tax], states are expected to reduce their use of the offending tax and increase their reliance on substitute taxes.
>
> (p. 50)

Importantly, Gade and Adkins also report that the relative size of a state's manufacturing base has no effect on state use of business (corporate income and severance) taxes but that the relative importance of mining in a state's economy is associated with increasing use of severance, license, and selected excise taxes. Apparently, states believe that they can export taxes on mining activity (which is immobile) while they cannot export taxes on manufacturing activity, which is likely to be mobile in the long run.

Gilbert Metcalf (1993) reports results similar to those of Gade and Adkins with two important differences. First, Metcalf finds that income taxes are sensitive to burden prices but that sales taxes are not. In that case, changes in deductions, credits, or other features that allow a larger fraction of state income taxes to be exported would lead to more use of that tax, but deductions and credits for sales taxes have no effect. Second, Metcalf finds that use of sales and corporate income taxes is greater in states that have relatively more purchases by nonresidents, suggesting that direct exporting may be important for decisions about use of sales and business taxes.

More recent research by Gilbert Metcalf (2011) again shows the estimated sensitivity of state tax structure to the federal income tax deductibility of state-local taxes. Relating state tax revenue to tax prices net of federal deductibility over the period 1979 to 2001, Metcalf

finds that deductibility leads to greater reliance on the deductible income and property taxes but has no effect on nondeductible taxes and fees. Consequently, deductibility contributes to higher state-local revenue and spending. In addition, the results support the contention that deductibility leads to more progressive state and local income taxes.

Another important factor that can influence state tax policy choices is revenue stability. Research by John Anderson and Shafiun Shimul (2018) suggests that property taxes are most stable and income taxes the least, with sales taxes somewhere between. They report, "[T]he income tax system is the most responsive when state GDP changes, with an estimated elasticity in excess of unity: 1.064. Positive GDP shocks result in greater than proportional changes in revenue, whereas negative shocks result in larger reductions." Thus, states that rely relatively more on income taxes will gain substantial revenue when the economy is growing but have substantial decreases when the economy declines. Such instability may require continual state policy action.

As a result of the federal tax changes in 1997, state-local income and property taxes still were deductible, although fewer taxpayers were expected to deduct income and property taxes because of the larger standard deduction, and the lower federal marginal tax rates reduced the value of that deduction for those taxpayers who still use it. The 1987 reform lowered marginal tax rates substantially for higher-income taxpayers (to 38.5 percent), so the value and incentive effects of federal income tax deductibility of state-local income taxes were lessened greatly.

The combined effect of this and the ending of the deduction for sales taxes was an increase in the net burden of state income, sales, and property taxes – that is, the burden after the federal deduction – for many taxpayers, particularly higher-income taxpayers for whom the decrease in the value of the deduction was greatest. Many predicted that as a response to these changes, state governments might reduce reliance on general sales taxes (which were no longer deductible), reduce reliance on all deductible taxes (sales, income, and property) compared to other revenue sources, and/or reduce the progressivity of their state tax structures.

What actually happened? In the 10 years after the major federal tax changes, the mix of state-local taxes changed very little. Sales and property tax reliance declined by a very small amount, whereas reliance on individual income taxes rose. The major changes in state-local revenue sources were increases in federal grants and user charges. During the next 20 years, from 1997 to 2017, reliance on sales taxes continued to decline, largely because of a declining tax base (see Chapter 13). Reliance on property and individual income taxes remained essentially constant. And reliance on federal grants and user charges continued to grow.

The federal tax changes in 2017, detailed in Application 14.2, further reduced the value of the deduction for state-local taxes, thus increasing the net price or cost of those taxes for some individuals. Now again there is speculation about whether the federal tax change will cause changes in the mix or level of state-local taxes. In fact, there has been little dramatic change in aggregate state tax structures over the past 30 years, as shown in Figure 14.2. Given continuing changes in all the economic and fiscal influences, the stability really is quite remarkable. And the changes that have happened (decline in sales tax and individual income tax) seem to have been caused by things other than federal deductibility and net burden prices.

This suggests that other "exporting" mechanisms and the underlying conditions of a state's economy may have the greatest influence on state tax mix. Although none of the studies about choice of tax structure by states and localities is conclusive, indeed all suggest that states take into account their specific economic situation in selecting a tax structure best for that state. If so, trying to identify a "best" tax structure for all states or to compare one state's

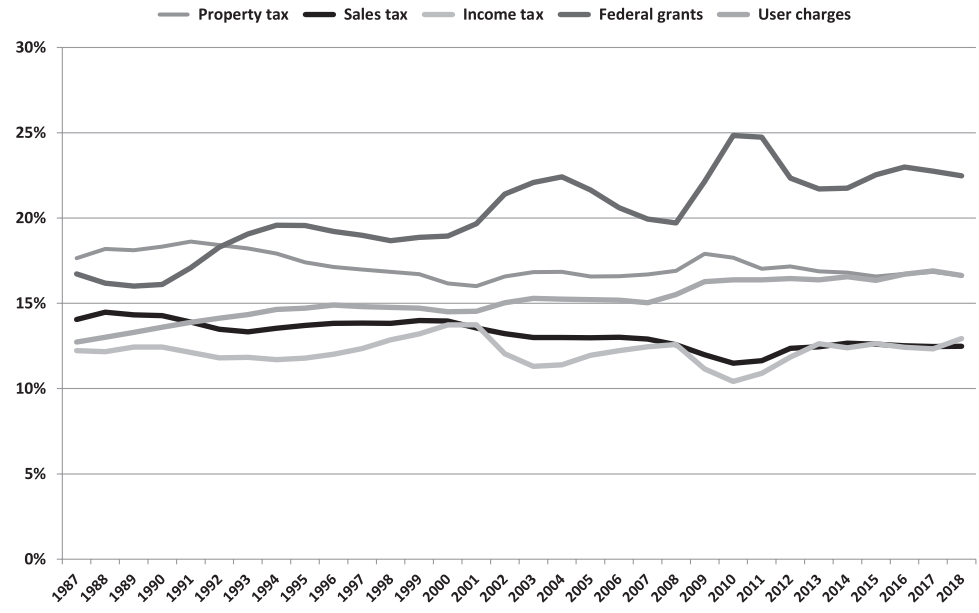


Figure 14.2 Percentage of general revenue, state and local governments

taxes to the average tax structure in all others is unproductive. Different tax structures may be optimal for different states, at least in the sense of minimizing costs to residents.

International comparison: Types of subnational government taxation

Although governments in different nations use basically the same types of taxes, the importance of those various taxes differs substantially. The shares of tax revenue from various sources for state governments and for local governments in 2018 for eight federal nations are shown in Table 14.6. States in all these nations except Mexico use income, sales, and property taxes, although the type of income tax used by Australian states is a payroll tax (a tax on wages only, rather than on all types of income). State governments differ substantially in their use of sales and property taxes. For example, property taxes are relatively important for states in Australia and Belgium.

At the local level, property taxes are the most important tax in most of these nations and the only local tax in Australia. Property taxes are clearly the dominant local government tax in Australia, Canada, Mexico, and the United States. The exception is the set of Austria, Germany, and Switzerland. Local governments in Germany and Switzerland rely heavily on income taxes, whereas Austria, Belgium, and the United States are the nations where localities make substantial use of sales taxes.

Substantially different subnational tax patterns apply in other sets of nations that have unitary governments. Income taxes are the dominant local government tax in the Scandinavian nations (Denmark, Finland, Norway, Sweden), whereas property taxes are the dominant local tax in Belgium, Greece, Ireland, Israel, New Zealand, and the United Kingdom. Most other nations use at least two subnational taxes. The subnational tax pattern in Japan, for instance, is not substantially different from that in Germany; income taxes dominate, with Japan using property taxes a bit more and sales taxes a bit less than Germany does.

Table 14.6 Percentage of tax revenue by type of tax, federal nations, 2018

	States				*Local governments*			
	Income	*Goods & services*	*Property*	*Other*	*Income*	*Goods & services*	*Property*	*Other*
Australia	0	30.4%	39.6%	30.0%	0	0	100.0%	0%
Austria	48.7	17.5	1.8	32	0	7.6	14.8	77.6
Belgium	45.8	14.6	38.3	1.3	35.1	7.5	57.3	0.1
Canada	47	38	4.7	10.3	0	1.7	97.3	1
Germany	53.1	40.1	6.8	0	79	8	12.8	0.2
Mexico	0	15.8	18.7	65.5	0	2.8	78.5	18.7
Switzerland	76.4	6.2	16.7	0.7	81.7	0.6	15.7	2
United States	42.1	54.3	3.4	0.2	5.5	21.3	73.1	0.1

Source: OECD, *Revenue Statistics*, 2020

Note:
Australian and Mexican states and localities in Austria collect payroll taxes rather than broad-based income taxes.

Summary

Currently, 41 state governments collect broad-based individual income taxes, and 1 state, New Hampshire, collects income tax on a narrow base of capital income only. About 5,000 local governments spread over 11 states and the District of Columbia use individual income taxes. In 2018, income taxes provided 18.6 percent of state government general revenue on average, double the share provided by that tax in 1962.

The two principal issues in selecting an appropriate state income tax base are the degree of coordination between the federal and state income tax definitions and the treatment of income that crosses jurisdiction boundaries. State and federal income taxes are also related by deductions for income taxes paid to the other types of government.

State income taxes differ widely in the definition of the tax base and in rate structures. Only 9 of the 41 states with broad-based taxes (Colorado, Illinois, Indiana, Kentucky, Massachusetts, Michigan, North Carolina, Pennsylvania, and Utah) used flat rates in 2021. In the other states, the rate structure is progressive, although again to widely differing degrees.

The marginal tax rate – that is, the tax rate that applies to the last dollar earned – determines the magnitude of the incentive effects of income taxes. Federal deductibility of the state tax reduces marginal tax rates and also narrows the difference in marginal rates between low-rate and high-rate states. Reciprocal deductibility – that is, simultaneous federal deductibility of the state tax and state deductibility of the federal tax – has much the same effect, although to a greater magnitude.

Intergovernmental income tax deductibility reduces the progressivity of the tax structure. As a result, states may choose more progressive income tax-rate structures than they would without those deductions, states may be able to collect more revenue and thus spend more than without deductibility, and interstate differences in taxes are less than are suggested by differences in income tax rates.

Empirical studies of state tax policy decisions suggest that the idea of exporting as much state tax burden as possible – directly through nonresident purchases and indirectly through tax deductions or credits – is an important factor in explaining many (but clearly not all) differences in state tax structures.

One potential effect of federal tax reform is change in state income tax revenue because of common income tax definitions. Estimates show that after adoption of the 1987 federal tax changes, states tended to follow the federal government in reducing marginal income

tax rates and broadening the tax base. Despite changes to the federal deduction for state taxes, there was no major move away from use of income, sales, or property taxes by states. In response to the TCJA in 2017, states again largely adopted the federal tax base changes.

Discussion questions

1

(a) Does your state have an individual income tax? If so, how closely does it conform to the federal tax? Can one deduct the federal tax in computing the state income tax? List some specific ways that the federal and state tax bases differ. What problems, if any, do these differences create in computing your taxes?

(b) What is the rate structure of your state income tax? Are the rates progressive, and if so, how does that progressivity compare to the federal income tax rate structure?

(c) Use the information from parts a and b to estimate state income tax in your state for the families shown in the following table (assuming that all income is taxable and each takes the standard deduction if available):

Taxable income	*Marital status*	*Number of family members*	*Estimated 2019 federal tax*	*Estimated state tax*
$40,000	Single	1	$3,142	
40,000	Married	2	1,560	
80,000	Married	2	6,284	
80,000	Married	3	4,284	
160,000	Married	3	21,549	

2 Suppose that a taxpayer is in the 15 percent tax rate bracket for the federal individual income tax and faces a 5 percent state income tax rate.

(a) If the taxpayer cannot deduct either tax against the other, what is the taxpayer's combined marginal tax rate? What is the marginal rate if the taxpayer itemizes federal deductions and deducts the state tax? What if there was reciprocal deductibility?

(b) Now recalculate all three combined marginal tax rates assuming that the state tax rate is 10 percent. How do they change?

(c) Compute your combined marginal income tax rate (federal, state, and local, if appropriate) using your income last year or that expected this year.

3 Suppose a taxpayer faces a federal marginal income tax rate of 24 percent and pays local property taxes of $3,500 per year.

(a) The taxpayer itemizes federal deductions and thus deducts the local property tax (and no other state taxes) in calculating federal income tax. No state income tax deduction for local taxes exists. What is the net after-tax cost of property taxes to this taxpayer?

(b) Suppose the state introduces an income tax *credit* for 25 percent of property taxes up to a maximum of $900. What is the taxpayer's net property tax cost now? (Remember that the state income tax is also deducted against the federal tax.) How much does the net cost fall because of the credit? How much more would this taxpayer pay (net) if property taxes were increased to $4,500?

4 The two most important state taxes are income and general sales taxes, although states also make substantial use of excise taxes, direct business taxes (usually a corporate income

tax), and others. List and discuss briefly four factors that might influence a state in choosing between an income and general sales tax. What is the relative reliance in your state on these two taxes? If the relative reliance in your state is different than average, speculate about why that might be so.

Notes

1 www.azcentral.com/story/news/politics/arizona-education/2020/11/03/proposition-208-invest-education-act-election-results-raise-taxes-high-earners/6041668002/.
2 https://ballotpedia.org/Illinois_Allow_for_Graduated_Income_Tax_Amendment_(2020).
3 www.governing.com/finance/massachusetts-will-vote-on-millionaire-tax-in-2022?utm_term=Massachusetts%20Will%20Vote%20on%20Millionaire%20Tax%20in%202022&utm_campaign=The%20Digital%20Infrastructure%20We%20Need%20%5Cu2014%20and%20How%20to%20Pay%20for%20It&utm_content=email&utm_source=Act-On+Software&utm_medium=email.
4 George F. Break, *Intergovernmental Fiscal Relations in the United States* (Washington, DC: Brookings Institution, 1967), 28.
5 Local income taxes are also authorized but not currently used in two other states, Arkansas and Georgia.
6 Ronald Fisher, "Declining State and Local Income Taxes," *Tax Notes State*, November 15, 2021.
7 Other allowed itemized deductions include home mortgage interest and some charitable contributions, work-related costs, and medical expenses.
8 Prior to 1981, the top federal marginal income tax rate was 70 percent. This, combined with a 10 to 15 percent state rate and any additional local income tax, could have approached this situation. With the top nominal federal tax rate at 37 percent in 2021, this concern seems less important.
9 Given personal exemptions and the standard deduction in Alabama, the highest rate would apply at an income of about $21,500 for a family of four persons.
10 In addition, California levies an additional 1 percent tax on income over $1,000,000.
11 For background and detail, see the following articles: David Hoffman, "State Income Taxation of Nonresident Professional Athletes," *State Tax Notes*, *115* (October 21, 2002); Richard Hawkins, Terri Slay, and Sally Wallace, "Play Here, Pay Here: An Analysis of the State Income Tax on Athletes," *State Tax Notes* (November 25, 2002); Harley Duncan, "'Jock Tax' Analysis Way Off," *State Tax Notes* (July 28, 2003).
12 Some states, such as the District of Columbia, Maryland, and Virginia, have reciprocity agreements that specify all income is taxed only in the state of residence. This works well if there is substantial overlap in labor markets: that is, some MD residents work in DC, and some DC residents work in MD.
13 www.taxnotes.com/tax-notes-state/individual-income-taxation/scotus-invites-solicitor-generals-input-remote-worker-tax-suit/2021/02/01/2l7g3?highlight=New%20Hampshire%20tax.
14 www.jdsupra.com/legalnews/u-s-solicitor-general-recommends-the-3072786/.
15 In fact, with the end of the state of emergency in MA, the emergency regulation ended.
16 www.taxpolicycenter.org/taxvox/supreme-court-punts-state-tax-question-about-remote-work.
17 https://taxfoundation.org/remote-work-from-home-teleworking/.
18 Even though state income taxes are less progressive than in the past, Berliant and Strauss (1993) still report that state income taxes increase the overall progressivity of the unified personal income tax system.
19 https://taxfoundation.org/2020-tax-trends/.
20 Zhuoli Axelton, Jeffrey Gramlich, and Brandon Holbrook, "Washington State's New Capital Gains Tax," *Tax Notes State*, July 12, 2021, https://www.taxnotes.com/tax-notes-state/capital-gains-and-losses/washington-states-new-capital-gains-tax/2021/07/12/76qql.
21 "When New Yorkers Move Out of New York City Where Do They Go?" New York City by the Numbers / Independent Budget Office, accessed September 19, 2014, http://ibo.nyc.ny.us/cgi-park2/?p=778.
22 Sam Roberts, "Wealthier New Yorkers Aren't Fleeing the City for Tax Havens, a Study Says," *New York Times,* July 20, 2014.

Selected readings

Anderson, John E., and Shafiun N. Shimul. "State and Local Property, Income, and Sales Tax Elasticity: Estimates from Dynamic Heterogeneous Panels." *National Tax Journal*, *71*, No. 3 (2018): 521–546.

Break, George F. *Financing Government in a Federal System*. Washington, DC: Brookings Institution, 1980. See Chapter 2, "Tax Coordination."

Chernick, Howard. "On the Determinants of Subnational Tax Progressivity in the US." *National Tax Journal*, *57*, No. 1 (March 2005): 93–112.

Cordes, Joseph J., and Jason N. Juffras. "State Personal Income Taxes." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen, 300–332. Oxford, UK: Oxford University Press, 2012.

Rueben, Kim. "State Pass-Through Entity Taxes Let Some Residents Avoid the SALT Cap at No Cost to The States." *Tax Policy Center*, June 24, 2021.

Sjoquist, David L., and Rayna Stoycheva. "Local Revenue Diversification: User Charges, Sales Taxes, and Income Taxes." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen, 429–462. Oxford, UK: Oxford University Press, 2012.

Young, Cristobal, and Charles Varner. "Millionaire Migration and State Taxation of Top Incomes: Evidence from a Natural Experiment." *National Tax Journal*, *64*, No. 2 (2011): 255–284.

15 Business taxes

Headlines

"Maryland's legislature on February 12, 2021, voted to override the governor's veto of legislation imposing a new tax on digital advertising. Accordingly, the digital advertising services tax measures are enacted and effective for tax years beginning after December 31, 2020."[1]

HOUSE BILL 732[2]
TITLE 7.5. DIGITAL ADVERTISING GROSS REVENUES TAX.
(C) "ASSESSABLE BASE" MEANS THE ANNUAL GROSS REVENUES DERIVED FROM DIGITAL ADVERTISING SERVICES IN THE STATE.
(D) "DIGITAL ADVERTISING SERVICES" INCLUDES ADVERTISEMENT SERVICES ON A DIGITAL INTERFACE, INCLUDING ADVERTISEMENTS IN THE FORM OF BANNER ADVERTISING, SEARCH ENGINE ADVERTISING, INTERSTITIAL ADVERTISING, AND OTHER COMPARABLEADVERTISING SERVICES.
7.5–102.9
(A) A TAX IS IMPOSED ON ANNUAL GROSS REVENUES OF A PERSON DERIVED FROM DIGITAL ADVERTISING SERVICES IN THE STATE.
(B) (1) FOR PURPOSES OF THIS TITLE, THE PART OF THE ANNUAL GROSS REVENUES OF A PERSON DERIVED FROM DIGITAL ADVERTISING SERVICES IN THE STATE SHALL BE DETERMINED USING AN APPORTIONMENT FRACTION:
(I) THE NUMERATOR OF WHICH IS THE ANNUAL GROSS REVENUES OF A PERSON DERIVED FROM DIGITAL ADVERTISING SERVICES IN THE STATE; AND
(II) THE DENOMINATOR OF WHICH IS THE ANNUAL GROSS REVENUES OF A PERSON DERIVED FROM DIGITAL ADVERTISING SERVICES IN THE UNITED STATES.
7.5–103.24
THE DIGITAL ADVERTISING GROSS REVENUES TAX RATE IS:
(1) 2.5% OF THE ASSESSABLE BASE FOR A PERSON WITH GLOBAL ANNUAL GROSS REVENUES OF $100,000,000 THROUGH $1,000,000,000;
(2) 5% OF THE ASSESSABLE BASE FOR A PERSON WITH GLOBAL ANNUAL GROSS REVENUES OF $1,000,000,00 THROUGH $5,000,000,000;

DOI: 10.4324/9781003030645-19

(3) 7.5% OF THE ASSESSABLE BASE FOR A PERSON WITH GLOBAL ANNUAL GROSS REVENUES OF $5,000,000,001 THROUGH $15,000,000,000; AND
(4) 10% OF THE ASSESSABLE BASE FOR A PERSON WITH GLOBAL ANNUAL GROSS REVENUES EXCEEDING $15,000,000,000.

Data availability

As is generally the case, the Governments Division of the US Census Bureau is the major source of data about the revenue from state business taxes. These data are reported annually in the Survey of State Government Finances (www.census.gov/data/tables/2019/econ/state/historical-tables.html). The Federation of Tax Administrators ((www.taxadmin.org/current-tax-rates), the Tax Policy Center (www.taxpolicycenter.org/statistics/state-corporate-income-tax-rates), and the Tax Foundation (https://taxfoundation.org/publications/state-corporate-income-tax-rates-and-brackets/) all provide detailed information about the structure of state corporate income taxes.

Two principal issues facing state and local governments in designing taxes to be collected directly from businesses are the choice of the tax base – that is, the type of tax – and the method for apportioning that base among the various governmental jurisdictions in which a firm does business. Both choices have substantial implications for the incidence and economic efficiency of the state-local tax structure. Options states have for both choices and the implications of those options are considered in this chapter.

Reliance on business taxes

All states have at least one major tax directly levied on and collected from businesses; most states use more than one. Of course, in addition to these taxes focused specifically on businesses, general taxes also may apply including the property tax and sales tax collected on business-to-business purchases.

Corporate income taxes easily represent the most important state-local business tax in aggregate, being used by 44 state governments and the District of Columbia and generating about $60 billion of revenue in 2019, as shown in Table 15.1. However, the state corporate income tax is controversial, with unclear incidence and other economic effects. This has led Charles McLure to advocate for alternatives, noting "The state corporation income tax does not do what many seem to intend it to do, and it works only very clumsily and possibly at considerable cost . . .. Any single state would seem to be well advised at least to replace the corporation income tax with a tax levied directly on corporate sales, payrolls, and property."[3]

The tax accounts for 5.6 percent of total state tax collections and about 2.7 percent of state government general revenue. The importance of the corporate income tax varies greatly. For the states using the tax generally, it provides less than 3 percent of state tax revenue in Hawaii, South Dakota, New Mexico, Missouri, Oklahoma, Arizona, North Carolina, and North Dakota, but more than 10 percent of state tax revenue in New Hampshire, Alaska, Connecticut, Tennessee, and New Jersey. New Hampshire, a state without an individual income or sales tax, relies on the corporate income tax for more than one-quarter of state tax revenue. Of the 44 states plus the District of Columbia with corporate income taxes, 33

Table 15.1 State direct business taxes, 2019

Tax	*Number of states with tax*	*Revenue (millions)*	*Percentage of total tax revenue*	*Percentage of general revenue*
Corporate income	44 & DC	$60,379	5.6%	2.7%
Gross receipts	5	NA	NA	NA
Insurance premiums	50 & DC	23,575	2.2	0.9
Severance	34	14,911	1.4	0.7
Corporation license	48 & DC	6,642	0.6	0.3
Public utility license	36	1,328	0.1	0.1
Occupation/business license	50	15,219	1.4	0.7
Business taxes		122,055	11.3	5.5
Total taxes		1,081,563	100.0	49.1
General revenue		2,201,726		100.0

Source: US Census Bureau

have a single flat tax rate while the other 11 use graduated rates. Most state corporate income taxes share a number of common tax definitions with the federal corporate income tax.[4]

The relative importance of state corporate income tax revenue has declined substantially since the early 1980s. Gary Cornia et al. (2005) report that state corporate income taxes declined from about 10 percent of state taxes in 1981 to only about 5 percent in 2002, although corporate profits rose as a share of national income over a similar period. Cornia and colleagues also note that state corporate income tax revenue grew more slowly than state economies after 1981.

What factors account for this slow growth or relative decline in revenue from state corporate income taxes? A number of studies of this issue identify five main possible factors: (1) changes in federal tax laws that affect state tax definitions, (2) adoption of new tax incentives by states, (3) changes in the legal form of business by firms, (4) aggressive tax avoidance measures by firms (often called "tax shelters"), and (5) movement of firms to states with lower corporate tax rates. Although changes in federal tax laws that narrow the tax base could reduce state tax in states that adopt the federal tax definitions, Cornia et al. (2005) show that changes in federal tax laws since 1980 would have increased state corporate income tax bases and revenue. Similarly, Peter Fisher (2005) shows that the states where the manufacturing share of investment increased (suggesting a movement of manufacturing activity to those states) tend to have higher effective tax rates. Thus, these do not seem to explain the long-run change in state corporate income tax revenue. Rather, work by William Fox and LeAnn Luna (2002) and by Cornia et al. (2005) suggests that the middle three factors have most likely had the greatest impact.

Many states adopt a variety of special tax incentives to encourage economic development generally or to assist specific sets of firms, and such incentives obviously reduce state taxes. Cornia et al. (2005) conclude that explicit state tax changes account for only about a quarter of the change in corporate tax importance. In addition, limited liability companies (LLCs) are an increasingly popular form of business organization. LLCs have limited liability (like corporations) but are not subject to corporate taxation. For tax purposes, LLCs are treated as partnerships, with the owners paying individual income tax on the LLC profits. Cornia et al. (2005) report that the growth of LLCs may have reduced state corporate income tax revenue by as much as one-third. Finally, some firms set up holding companies in states or nations with no corporate income tax or low tax rates and arrange to have substantial amounts of business income transferred to the holding company. If successful, such passive investment mechanisms are thought to be able to shelter substantial amounts of corporate income.

Juan Carlos Serrato and Owen Zidar (2018) examine recent trends in state corporate income taxation and find that "tax base and credit changes have substantial impacts on state corporate tax collections." In their analysis, it is factors that have narrowed the corporate tax base – accelerated depreciation, investment and research credits, expanded loss carry forward, and increased use of allocation by sales – that explain state differences in the amount of corporate tax revenue and have reduced overall corporate tax liability. In contrast, nominal tax rates have changed relatively little, so high rates are not the primary cause of the decline in corporate income tax liability. Indeed, Serrato and Zidar estimate that that the revenue maximizing state corporate tax rate is about 10 percent, higher than exists in most states.

General gross receipts taxes are used by five states (Hawaii, Indiana, Ohio, Washington, and West Virginia), either instead of a corporate income tax or in addition. State (and sometimes local) governments also commonly levy a set of different taxes on specific businesses, defined either by type or industry. These include excise taxes on insurance premiums (all states), corporation license fees (used by 48 states and DC), occupation or business license taxes (all states), and public utility license or excise taxes (36 states). Severance taxes – that is, excise taxes on the value of minerals extracted in the state – are used in 34 states but are exceptionally important in several.

Severance taxes generated $14.9 billion in revenue in 2019. The tax is especially important in nine states (Alaska, Louisiana, Montana, New Mexico, North Dakota, Oklahoma, Texas, West Virginia, and Wyoming), which account for more than 92 percent of total severance tax collections, with Texas and North Dakota accounting for more than 55 percent themselves. Severance taxes (mostly from oil and gas) provide about half the state tax revenue in North Dakota and Alaska and almost one-third in Wyoming. Where severance taxes provide such a substantial amount of revenue, more general business tax types have not been required. In addition to severance taxes, Nevada (which has no corporate income tax) relies on a specialized source of revenue collected from business – excise taxes and license fees related to gambling.

Business tax structure issues

Alternative business tax bases[5]

The three primary potential business tax bases are gross income or gross receipts, value added – the increase in the value of goods caused by one stage in the production process – and net income or profits. A description of these bases (and several variations) is shown in Table 15.2 and discussed next.

Gross receipts tax

A gross income tax or gross receipts tax is a tax on the total receipts or total revenue of a firm, with no deductions allowed for any type of expenses. Because revenue is, by definition, equal to costs plus profits, a gross receipts tax is the same as a tax on both profits and all types of costs (materials and supplies, labor, interest, rent, depreciation). If this type of gross receipts tax is applied to all firms, the total tax base for an economy would be a multiple of the total value of production (GDP) because the tax applies to all business sales, including interbusiness sales, and those taxes are then added to the base for sales at later stages of production and distribution.

It is common, however, that when gross receipts taxes are used, sales of some commodities or sales by some types of firms will be exempt from tax. For example, government and

Table 15.2 Alternative business tax bases

Type	*Subtraction base*	*Additive base*	*Tax base*
Gross receipts	Revenue	Purchases + wages + depreciation + interest + rent + profits	a*GDP, a > 1
Value added, gross income	Revenue – purchases of materials	Wages + depreciation + interest + rent + profits	GDP
Value added, net income	Revenue – purchases of materials – depreciation	Wages + interest + rent + profits	National income
Value added, consumption	Revenue – purchases of materials – capital purchases	Wages + interest + rent + profits – net investment	Consumption
Net income or "profits"	Revenue – purchases of materials – wages – interest – rent – depreciation	Profits	Profits or return on investment

nonprofit entities almost always are tax-exempt. In that case, the aggregate base of a gross receipts tax would be smaller and even could be less than GDP.

Value-added tax (VAT)

Value added by a business is the difference between the sales of a firm and the cost of goods or services purchased from other firms that are used in production. For instance, the value added by a bakery is the difference between the sales value of the bakery's products and the value of the materials purchased in producing those products. There are two alternative but equivalent ways of calculating value added, as illustrated next. One method is simply to subtract materials costs from sales. The alternative is to add labor costs plus depreciation plus interest paid plus rent plus profit.

Business: Bakery

Costs:	Labor – Baker, sales clerk Materials – Flour, sugar, spices, utilities Capital – Mixer, utensils, oven Space – Building rent Credit – Interest paid on loans
Revenue =	Wages + Purchases of Materials + Depreciation + Interest + Rent + Profit
Value Added =	Revenue − Purchases of Materials = Wages + Depreciation + Interest + Rent + Profit

Three variants of the VAT concept arise from different methods of treating purchases of capital goods, as shown in Table 15.2. If no subtraction or deduction is allowed for capital expenditures or capital depreciation, the tax is a **gross income-type VAT**, which is equivalent to a tax on the sum of wages plus interest plus rent plus depreciation plus profit, as shown in the table. If all business entities were taxed, the aggregate base of the tax would be the total value of final production (or GDP).

If depreciation deductions are allowed, then the tax is a **net income-type VAT**, with the base for the firm equal to wages plus interest plus rent plus profit and the aggregate base equal to consumption plus net investment. In this case, deductions are allowed not only for the materials used in production but also for the capital goods "used-up" in production – that is, for the depreciation of capital goods during the production period. Because the aggregate base of this type of tax is total income if applied to all firms in a jurisdiction, the base is equivalent to that of a personal income tax.

The final VAT variant is a **consumption-type VAT**. In this case, all capital expenditures are subtracted from revenue in addition to materials purchases. The base of this tax is wages plus interest plus rent plus profit less net investment, which is equal to total consumption in an economic accounting sense. In essence, capital income to individuals is not taxed unless consumed. This is now the predominant form of business taxation in Europe. The aggregate base of this tax is total consumption if levied on all firms in a jurisdiction and is thus equivalent to a retail sales tax or a personal consumption tax.

Net income tax

For the traditional net income, or profits, tax, a business may deduct most all business expenses – including costs for materials, labor, interest, and rent, as well as depreciation of capital equipment – from gross income. The resulting tax base equals the return on investment to the business – that is, profits. No deductions are allowed for dividend payments out of profits to shareholders, so the business net income tax is independent of whether profits are distributed.

Illustration of alternative business tax bases

A numerical example of the bakery case, outlined in Table 15.3, illustrates how these alternative tax bases compare. A bakery purchases flour from a miller, who has purchased grain from a farmer. The bakery also purchases an oven, the only capital good in the example, from the oven manufacturer, who purchased steel from a separate steel producer. Other capital goods or material inputs that might realistically be required have been left out to avoid cluttering the example.

The baker's revenue or retail sales are $2,000, which equals total consumption in this simple economy. The oven producer's sales are $500, which represents production of one oven, the only capital good (or investment) in this economy. GDP in this economy (consumption plus investment) therefore equals $2,500. In addition, the farmer makes $100 of sales to the

Table 15.3 Tax bases and production stages

	Farmer	*Miller*	*Baker*	*Oven producer*	*Steel producer*	*Total*
Sales	$100	$500	$2,000	$500	$200	$3,300
Purchases of materials	0	100	500	200	0	800
Purchases of capital goods	0	0	500	0	0	500
Gross receipts tax @ 10%	10	50	200	50	20	330
Value added, gross income	100	400	1,500	300	200	2,500
Gross income VAT @ 10%	10	40	150	30	20	250
Depreciation	0	0	100	0	0	100
Value added, net income	100	400	1400	300	200	2,400
Net income VAT @ 10%	10	40	140	30	20	240
Value added, consumption	100	400	1000	300	200	2,000
Consumption VAT @ 10%	10	40	100	30	20	200
Profit	8	40	160	40	16	264
Profit tax @ 10%	.8	4	16	4	1.6	26.4

Value Added, Gross Income = Sales – Material Purchases
Value Added, Net Income = Sales – Material Purchases – Depreciation
Value Added, Consumption = Sales – Material Purchases – Capital Purchases
Profit = Sales – Material Purchases – Depreciation – Labor + Other Costs

miller, who makes $500 of sales to the baker, and a steel producer makes $200 of sales to the oven manufacturer. The possible taxes are as follows:

1 The base of a **gross receipts tax** is the total sales of all firms, which equals $3,300 in the example, so a 10 percent gross receipts tax generates $330 of revenue. In this case, the base of the gross receipts tax is 132 percent of GNP ($3,300/$2,500).
2 The base of a **gross-income VAT** is total sales minus purchases of materials from other firms, which equals GDP, or $2,500 in this example. A 10 percent gross income VAT generates $250 of revenue, and a rate of 13.2 percent would be required to equal the gross receipts tax revenue.
3 The **net-income VAT** is based on sales minus purchases of materials and depreciation and generates $240 of revenue at a 10 percent rate. (The example uses straight-line depreciation over a five-year life for the oven, so the depreciation deduction is one-fifth of the price.)
4 The **consumption-type VAT** is based on sales minus purchases of materials and capital goods and provides $200 of revenue at 10 percent. Note that the consumption-type VAT generates revenue equal to a retail sales tax levied at the same 10 percent rate. The only retail sales in the example are by the bakery, equal to $2,000.
5 The base of a **net income or profits tax** would be sales minus purchases of materials and depreciation minus other costs such as those for labor, interest, and rent. The profits tax base would equal the net income value-added base minus those other costs. Without specifying those other costs, sample profit figures, which are consistent with the ratio of corporate profits to net national income (GDP less depreciation) for the United States, are presented in the bottom row of the Table 17.3. Total profits from these operations amount to $264. Therefore, a 10 percent profit tax rate would generate only $26.40. A much higher rate is required to match the revenue from a 10 percent rate applied to the other tax bases.

Note that these tax equivalences (e.g., a consumption-type VAT is equivalent to a direct tax on consumption) only strictly apply for a closed economy. At the state-local level, however, many business and consumption transactions cross jurisdiction boundaries. For instance, suppose the farmer in the illustration of Table 17.3 is in a different state than the miller, oven producer, steel producer, baker, and consumer. Gross state product in the latter state is then only $2,400. A gross-income VAT would be levied on a base of $2,400 if the miller could deduct the $100 payment to the farmer in the other state, but the base would be $2,500 if such a deduction is not allowed. Similarly, if some of the bread consumers are in other states, then a consumption-type VAT in the manufacturing state would not necessarily be equivalent to a retail sales tax in that state. In practice, these issues usually are resolved by using some rules to allocate tax bases among states, as discussed next.

Allocating tax bases among jurisdictions

If firms do business in more than one taxing jurisdiction, an additional issue is how to allocate that firm's tax base – whichever type of tax is used – among those jurisdictions. Using the bakery example, what if the bakery sells its products in more than one state, or, for an even more complicated case, what if the bakery produces its products at two plants located in different states and sells those products in all states? And what if the bakery does business in another nation? Two issues need to be resolved: (1) under what conditions should a business be taxed by a specific jurisdiction? and (2) if the business is taxable, what share of the firm's business can reasonably be allocated to that jurisdiction?

Under the current procedures that are generally followed, a business is taxable in a state only if it has a "substantial business nexus or presence" in the state such that the business

benefits from state activities. After a 1959 Supreme Court decision, Congress "prohibited a state's taxing of income derived from sales within its borders when the only business activity in the state was the solicitation for orders to be sent outside the state for approval and shipment" (Break, 1980, 61). In practice, therefore, interstate businesses may be taxable in a state only if they maintain employees or property in the state.

If a business is to be taxed by a jurisdiction, three general methods may be used to apportion that firm's tax base among all taxing jurisdictions. One method requires **separate accounting** for some specific component of the business. Under this method, the firm's operations in different states or jurisdictions are treated as if they were separate firms, with calculation of the tax base separately for each one. It is often economically inappropriate and practically very difficult to do separate accounting in any convincing way for entire business entities. If an automobile manufacturer produces engines in one state, produces transmissions in another, and assembles the cars in still a third state, how can the profit made from selling a car be separately allocated to the engine production, transmission production, and assembly? The car as a final consumer product would have very little value without any one of the three. The value of the final product also includes the influence of nonmanufacturing operations of the firm, such as advertising and distribution. Implementing separate accounting requires that implicit or "transfer" prices be established for all the operations of the business. Essentially, one does accounting as if the division that produces engines actually sells them to the division that does assembly, and so forth.

Specific allocation is a second apportionment method that is sometimes effective for various kinds of subsidiary income of a firm. For instance, interest or dividend income for a manufacturer can be separated from the income for the whole entity, and that income may be specifically allocated to the state where the business is headquartered.

The third and most commonly used allocation method is to apportion tax base by **formula**. Historically, the most commonly used formula – called the "three-factor" formula – included three equally weighted factors: the firm's share of its (1) payroll, (2) property, and (3) sales in the state. In recent years, many states have switched to formulas that give added weight to sales in the formula.

The Federation of Tax Administrators provides a description of the how each state apportions corporate income for the tax.[6] Of the states with a corporate income tax, only 5 continue to use the three-factor formula involving sales, payroll, and property, with 2 other states using a combination of the traditional three-factor allocation and sales. In contrast, 27 now apportion income solely based on sales: that is, the share of the firm's total sales that occur in the state. Another 10 states apportion using the traditional three-factor formula but with double- or triple-weighting sales.

If all three factors in the traditional formula are equally weighted (as is done only by 5 states), the firms' allocation factor is the average of the payroll, property, and sales shares. Mathematically, the formula is

$$A_i = \frac{1}{3}\left[\frac{W_i}{W} + \frac{P_i}{P} + \frac{S_i}{S}\right]$$

where
A_i = apportionment factor to state i for a firm
W_i = wages paid by the firm to employees in state i
W = total wages paid by the firm
P_i = value of property owned by the firm in state i
P = value of all property owned by the firm
S_i = dollar amount of sales by the firm in state i
S = total sales by the firm.

The operation of this formula is illustrated by two examples shown in Table 15.4. Firm I does all its production in state A, and thus all its employees and property are located there. Only 10 percent of firm I's sales take place in state A, however, with the rest of its production sold to residents of other states (perhaps over the internet, by mail order, or through independent manufacturers' representatives in those states). Because this firm has no property or employees in other states, those states may not levy tax on this firm. In that case, only $87,000 of the firm's total profit of $125,000, or 70 percent, would be taxed by state A using the equally weighted three-factor formula. Because some part of this firm's net income goes untaxed by any state, some states have adopted rules that require that such untaxed sales be added back into calculation of the apportionment formula for the state (or states) where production occurs. If state A had such a **throwback provision**, then the entire $125,000 of the firm's profit would be taxable by state A.

Firm II is an example of a firm that both produces and sells in more than one state. In this example, 40 percent of both the firm's payroll and property are located in state A, although only 2 percent of the firm's sales volume arises in that state. Assuming that the other 98 percent of sales are included in the allocation formulas for other states (no throwback), then 27 percent of the firm's total profits would be subject to tax in state A.

One of the most controversial aspects of the three-factor apportionment formula is the inclusion of sales shares. Under current general practice, sales location is defined on a destination basis: the sale location is the location of the consumer. As a result, a business such as firm I in Table 15.4 may avoid state taxation on some part of its total net income or sales, even though all its production and facilities are located in one state. If the allocation formula is to apportion a firm's tax base proportionate to the benefits received from state services, then the theoretical issue is whether those benefits better correspond to the location of production or the location of the consumers of the product. Some economists believe that the benefits from "the privilege of doing business in a state" arise from the location of production and thus suggest that a two-factor formula based on payroll and property is more appropriate for apportioning profits among states, if separate accounting or allocation is not feasible.

The sales factor in the formula creates an opportunity for states to engage in strategic behavior in an attempt to stimulate economic development. All states could decrease effective tax rates on in-state production, and thus encourage more investment, by increasing the importance of sales in the formula. States with a substantial share of consumption but less

Table 15.4 Tax base apportionment example

Tax component	*Firm I*		*Firm II*	
	State A	*All states*	*State A*	*All states*
Compensation	$500,000	$500,000	$2,000,000	$5,000,000
Property	$1,200,000	$1,200,000	$5,000,000	$12,500,000
Sales	$250,000	$2,500,000	$500,000	$25,000,000
Profit	–	$125,000	–	$1,250,000
Compensation factor	1.00	–	0.40	–
Property factor	1.00	–	0.40	–
Sales factor	0.10	–	0.02	–
Three-factor	0.70	–	0.27	–
Apportionment	[(1 + 1 + .1)/3]		[(.4 + .4 + .02)/3]	
Taxable profit	$ 87,500 if other states tax remainder			$341,250
	$ 125,000 if sales in other states are "thrown back" to state A			

of production (payroll and property) can increase tax bases (and revenue) by increasing the weight for destination-based sales in the formula. As a result of these incentives, a number of states have moved away from the traditional equally weighted three-factor formula and moved to formulas that weight sales more heavily. In 2021, ten states used a formula that gives double or triple weight to sales. Twenty-seven states allocate tax bases based on the sales share only, using a single-factor formula that gives a 100 percent weight to sales. In addition, if tax rates differ among states as well, then the firms also may have a preference for one formula over another as a way of minimizing total state tax burdens.[7]

The effects of weighting sales more heavily are shown by the illustration in Table 15.5. In state A, the sample firm has substantial production (40 percent of its payroll and property is in state A) but only a very small amount of sales (2 percent of its total sales). In contrast, this firm does little production in state B (only 10 percent of its payroll and property is there), but 20 percent of its sales are in state B. If state A switches from the traditional three-factor formula to one that gives double weight to sales, the share of the firm's profits taxed by state A falls from 27 percent to 21 percent. The firm's corporate tax liability in state A falls from $341,250 to $262,500. State A may hope that the reduction in state tax will induce the firm to expand production in the state (or at least not to move production from the state). State A does lose corporate income tax revenue in the short run but may gain revenue (from personal income, property, and corporate income taxes) in the long run if investment and production increase. Essentially, weighting sales more in the allocation formula is a way for state A to assist a firm that has a major industrial presence and is important to the economy in that state.

If state B switches to a double-weighted sales formula, the share of the firm's profits taxed by state B rises from 13 percent to 15 percent, and the firm's corporate tax liability in state B increases from $166,625 to $187,500. State B has a relatively small amount of the firm's production (payroll and property). Weighting sales more in the allocation formula essentially allows state B to tax some of the production that occurs in state A. State B generates more revenue, even though most of the production is elsewhere. If state A has a throwback provision, state A actually loses revenue from state B's decision to weight sales more. That is, state B effectively takes revenue from state A.

Importantly, after state B increases the weight on sales in the formula, the firm can reduce its overall tax liability by moving production (payroll and property) to that state. Moving

Table 15.5 Illustration of double-weighted sales factor apportionment

Tax component	*Firm II*		
	State A	*State B*	*All states*
Compensation	$2,000,000	$50,000	$5,000,000
Property	5,000,000	125,000	12,500,000
Sales	500,000	5,000,000	25,000,000
Profit	–		1,250,000
Compensation factor	0.40	0.10	
Property factor	0.40	0.10	
Sales factor	0.02	0.20	
Three-factor formula	0.27	0.13	
	[(.4 + .4 + .02)/3]	[(.1 + .1 + .2)/3]	
Taxable profit	341,250	166,625	
Double-weighted sales formula	0.21	0.15	
	[(.4 + .4 + .02 + .02)/4]	[(.1 + .1 + .2 + .2 +)/4]	
Taxable profit	262,500	187,500	

payroll or property to the state increases tax liability in state B but reduces tax liability in state A more, so overall taxes are reduced (Edmiston, 2002).

What happens if state B moves to a single-factor allocation formula that gives 100 percent weight to sales? Because the sample firm makes 20 percent of its sales in state B, that state would be able to tax 20 percent of the firm's total profits, again generating an increase in revenue. If state A moved to a single-factor sales formula, the firm's taxes in the state would fall dramatically, providing an even stronger incentive for more investment in state A. The illustration shows why many states may have moved to greater weighting of sales in the allocation formula.

Another important aspect of formula apportionment is the degree of uniformity among states. If all states use precisely the same formula, such as the equally weighted three-factor formula, then the sum of a firm's tax bases in all states exactly equals the total tax base for the firm. That is, the sum of all states' apportionment factors for the firm equals one, as shown here:

$$\begin{aligned}\frac{\Sigma_i\left[W_i/W + P_i/P + S_i/S\right]}{3} &= 1/3\left\{\Sigma_i\left[W_i/W\right] + \Sigma_i\left[P_i/P\right] + \Sigma_i\left[S_i/S\right]\right\}\\ &= 1/3\left\{\frac{\Sigma_i W_i}{W} + \frac{\Sigma_i P_i}{P} + \frac{\Sigma_i S_i}{S}\right\}\\ &= 1/3\left\{1+1+1\right\} = 1.\end{aligned}$$

However, if states use different formulas involving different factors or different weights, or if some states do not use formula apportionment in favor of some type of separate accounting, then the sum of a firm's tax bases in all states may be either greater or less than the total base for the whole firm. In other words, either some of the firm's profit may be taxed by more than one state, or some part is taxed by no state. The use of sales shares in the apportionment formula and the choice of the destination principle for defining sales are major factors contributing to this possible inconsistency in apportionment.

Application 15.1: Maryland digital advertising tax

As shown in the *Headlines* starting this chapter, in 2021 Maryland became the first state to adopt a specific tax on digital advertising – targeting banner advertising, search engine advertising, interactive full-screen ads, and other advertising on a "digital interface" (software, website, game, app). The tax is levied on gross revenue derived from these digital advertising services in Maryland but applies only to entities with gross revenue of at least $100 million and digital advertising revenue from Maryland of at least $1 million. Therefore, the tax is intended to affect very large technology companies (such as Google, Facebook, and similar entities).

Although Maryland is the first state in the US to enact such a tax, a number of countries in Europe, Asia, and Latin America have adopted taxes of this exact type.[8] The history of the tax arises partly from Nobel Prize–winning economist Paul Romer, who has argued that a tax on the sale of targeted digital ads – the primary revenue source for large digital platforms – would be an effective way to induce the companies to alter their business model and affect misinformation that sometimes is spread through such sites.[9] However, the issue here is different as this tax raises several administrative and legal issues regarding taxation in a federal system of government and the tax authority of states relative to the federal government.

The Maryland tax is being challenged in both state and federal courts. First, we have learned that the way a tax base is apportioned between various states where a firm does business is not only important for determining tax liability, but also affects business decisions. The Maryland statute does not specify precisely how revenue derived from digital advertising service will be allocated to Maryland, instead stating that the state tax department will devise rules. This is not a simple matter. Suppose an individual runs a person search using Google and in the response is an advertisement for a book authored by that person. Google receives revenue from that book advertisement, but how much of that revenue should be allocated to a specific state? Perhaps it depends on the location of the individual who did the search, but what if that individual does not click on the book advertisement? Ambiguity in tax administration typically leads to litigation.

Another challenge is based on a violation of the federal Internet Tax Freedom Act. The ITFA prohibits states from levying discriminatory taxes on electronic commerce, where the discriminatory assumption arises if a similar activity is not normally taxed by the state. Maryland does not tax revenue from traditional advertising (print, television, and so on), so a tax exclusively on digital advertising could be judged to be discriminatory.

Finally, separate from electronic commerce, states may not discriminate in taxing interstate commerce against out-of-state firms or in favor of domestic firms. This is the issue discussed in Application 15.2. And there is often disagreement about the role or reach of the Commerce Clause in the US Constitution, which gives Congress the authority to "regulate commerce . . . among the several states." The Maryland law has different tax rates based on the *global* magnitude of digital advertising revenue, so some might argue that it discriminates against large, multistate firms and could be a violation of the Commerce Clause.

How the legal issues concerning the Maryland tax are resolved by the courts very likely may have important broader implications for state tax policy. The case also illustrates how changes in the nature or operation of the economy create difficult policy issues for state (and local) taxation. How should states be able to tax electronic commerce or digital businesses that now are common? Similar cases in which changes to the overall economy affect state revenues and may bring about or require adjustment of state taxes include taxation of services and internet sales (discussed in Chapter 13) and using motor fuel excise taxes to finance roads (discussed in Chapter 18).

Economic analysis: Efficiency and equity

Incidence and efficiency effects of state corporate profit taxes

The incidence and long-run economic effects of corporate income taxes is one of the most unresolved and controversial topics of public finance. The special aspects of state government use of corporate income taxes, especially formula allocation of the tax base, complicate matters still further. All the issues obviously cannot be resolved or even discussed carefully here. The approach, therefore, is to describe the potential effects of a national corporate income tax and then to consider how the special features of state use of the tax alter the story. The specific focus on state corporate income taxes also separately considers the aggregate effect of all state taxes as opposed to the effect of a single state's tax from the viewpoint of that state.

A national corporate income tax

The economic analysis of a national corporate income tax is similar to the analysis of a national property tax discussed in Chapter 12. In the short run, a uniform national tax on the net income or profits of corporations that attempt to maximize profits is expected to

reduce the return to corporate capital owners. This is based on the notion that firms are unlikely to be able to shift the tax to consumers or workers in the short run, either because of competitive pressures or because it would not be profit maximizing for them to do so (given that capital costs are fixed costs in the short run). Even this result is not guaranteed. Firms that have some objective other than maximizing profits, especially those operating in oligopolistic markets, may shift the corporate tax through higher prices or lower wages even in the short run.

If the tax is not shifted in the short run, there are (at least) two means for corporate capital owners to avoid or shift the burden of the tax in the long run. First, shifting capital from the corporate to noncorporate sector of the economy may reduce tax burdens because only corporations are subject to the corporate tax. The increase in supply of noncorporate capital reduces the return to owners of noncorporate capital, as well. The owners of all types of capital therefore share the tax on corporate capital. Second, if the tax reduces the return to capital ownership generally, then capital suppliers may respond by reducing the amount of capital accumulation in society. Over time, this means there will be a smaller stock of capital in the society than there would be without the tax, which causes labor productivity and thus real wages to be lower than they otherwise would be. In that case, part of the tax on corporate capital is shifted to labor in the long run.

State corporate taxation: Aggregate view

Two important features of state government corporate income taxation alter this conventional national analysis. First, not all states use a corporate income tax, and among those that do, there is substantial variation in tax rates. This creates an additional opportunity for shifting the corporate income tax by moving capital investment from high- to low- (or no-) tax states. Second, corporate net income of multistate firms is generally apportioned among the taxing states by an apportionment formula, as described previously. Charles McLure (1980, 1981) has carefully explained how this type of formula allocation effectively converts a state corporate income tax into a set of taxes on the formula's factors: wages, sales, and property.

Following the discussion by McLure (1981), suppose that a state levies a tax at rate t on the national profits, denoted Y, of corporations. For multistate firms, the tax base is allocated among states according to the average of the share of the firm's wages W, sales S, and property P, in that state. With the equally weighted three-factor formula, the corporate income tax can be represented mathematically as

$$T = 1/3\left[S_i / S + W_i / W + P_i / P\right]tY$$

or

$$T = \frac{tY}{3S}S_i + \frac{tY}{3W}W_i + \frac{tY}{3P}P_i$$

where i represents sales, wages, or property in state i.

From this view, the tax is seen as a set of three taxes on sales, wages, and property in state i, with the tax rate for each equal to one-third the nominal rate multiplied by the firm's profit rate on sales, wages, and property, respectively. Therefore, not only might tax rates differ among states, but the effective rate imposed by a single state on activity in that state also may differ by firm, depending on that firm's national profit rate.

Just as with the analysis of property taxes, state corporate income taxes involve two effects: the effect of the average rate of tax in the nation and the effect of the differentials from that

average. As with a national corporate tax, the average burden of state corporate income taxes represents a decrease in the return to owners of corporate capital, as demonstrated by Mieszkowski and Zodrow (1985). In the long run, that burden may be shifted to owners of all capital if activity is shifted from the corporate to the noncorporate sector, and the burden may also be partly shifted to labor in the long run if savings and capital investment are affected.

The effect from state tax rate differentials around the national average is best seen in the context of the three separate taxes that arise from formula apportionment of the corporate income tax base. Transfer of sales, employment, or property from one state to another state with a lower tax rate will reduce a firm's overall tax liability. In effect, it is as if states are imposing taxes on sales, payrolls, and property values in the state at differential rates. There is, therefore, an incentive from each component of the formula for firms to move their economic activity to lower-tax-rate states.

For instance, the effect of the property component of the allocation formula is expected to be the same as the excise effects that result from a statewide property tax. If property owners move investment from higher- to lower-tax-rate states, decreases in the prices of immobile capital, labor, and land are expected in the higher-tax states. Corresponding increases in the prices for those immobile factors are expected in the lower-tax rate states. Similarly, the sales component of the tax is expected to increase prices for consumers in the higher-tax states and lower prices in the lower-tax states, and the payroll tax component is expected to lower wages in the higher-tax states and raise wages in the lower-tax states if workers are largely immobile among states. In short, the excise effects from differentials in state corporate income tax rates are expected to impose relative burdens on immobile workers, consumers, and owners of land and immobile capital in the higher-tax states.

Mieskowski and Zodrow (1985) note that the increased consumer prices and decreased wages and prices of immobile capital and land in the higher-tax states will be matched by decreased consumer prices and increased wages and prices of immobile capital and land in the lower-tax states. It is not at all clear that these excise effects cancel out in any meaningful economic sense, however. If individuals' incomes are different in the higher- and lower-tax-rate states, then these excise effects can have substantial effects on the distribution of tax burdens across income classes and macroeconomic effects if marginal propensities to consume differ by income.

State corporate taxation: Single-state view

From the viewpoint of a single state, the effect of an increase in that state's corporate income tax is best represented by the effects from the implicit taxes on sales, payrolls, and property in the state. The national burden on all capital from the change in the average rate of tax is diffused among all states, and the gains to workers, consumers, and capital owners in the other states are of no concern to the state in question. Therefore, from the viewpoint of a single state, an increase in the state corporate income tax rate is expected to impose burdens on workers, consumers, and owners of immobile capital and land in that state. In other words, this tax increase generally is not exported to nonresidents because changes in real income of residents do occur.

The perspective of thinking about implicit taxes on sales, payroll, and property also helps explain the incentive for a state to increase the weight on sales in the allocation formula. By doing so, a state effectively reduces taxes on payroll (labor) and property in the state and increases taxes on sales or consumption in the state. If labor and/or capital are mobile, then the reduced taxes on those inputs are expected to increase employment and income in the state (in the case of labor) or capital investment in the state (in the case of property). Of

course, this change in the allocation formula also raises prices for consumption in the state. By weighting sales more in the allocation formula, a state is effectively increasing taxes on spending and reducing taxes on production.

A number of analysts have examined the economic effects of weighting sales more in the allocation formula. Kelly Edmiston (2002, 249) concludes, "The long-run economic development impact of independently moving from an equally weighted three-factor formula to a single factor sales formula can be significant." Edmiston also shows, however, that if all states move to a single-factor sales formula, some states will gain and some will lose, as illustrated in Table 15.5. It turns out, however, that the losing states would lose even more investment and revenue if they did not use the single-factor sales formula. In other words, if many or most states move to weighting sales more in the allocation formula, other states have an incentive to follow, as has happened.

Incidence and efficiency implications of gross receipts taxes

The use of gross receipts or gross income as the base of a general state tax collected from business creates a fundamental structural difficulty. Sales of all intermediate goods are taxed under a gross receipts tax, and sales of intermediate capital goods are taxed under a gross income VAT. Tax is levied on each of those transactions, and that tax "cascades" down into the price charged at the next production stage, on which tax is also levied. In that way, the tax is said to "pyramid" through the various stages of production, ending up larger than the single nominal rate might suggest.[10]

This factor underlies the three most fundamental criticisms of general gross income and gross receipts taxes:

1 The effective tax rate will be greater than the nominal tax rate, the difference depending on the number of stages of production.
2 The effective rate will vary arbitrarily between economic sectors, depending on the number of stages of production.
3 The tax creates an incentive for vertical integration to reduce taxes.

Returning to the numerical illustration in Table 15.2, total consumption is $2,000, although the gross receipts tax base is $3,300, and the gross income VAT base is $2,500. Therefore, a 10 percent nominal gross receipts tax has an effective tax rate of 16.5 percent of consumption; it generates the same amount of revenue as would a 16.5 percent retail sales tax. Similarly, the gross income VAT nominally levied at a 10 percent rate has an effective rate of 12.5 percent on consumption. As noted, effective rates exceed the nominal rates.

The baker can reduce gross receipts tax by integrating with any of the other firms in the production chain, and the baker can reduce gross income VAT by combining with the capital good supplier, the oven producer. If the baker integrates with the miller or the oven producer, gross receipts for the combined firm are $2,000 rather than $2,500 from the sum of the independent firms. If the baker integrates with the oven producer, aggregate gross income value added for the two is $1,300 rather than the $1,800 with separate firms. If this type of integration occurs in some sectors of the economy but not others, then the tax burden would vary among those sectors even if the sectors are the same size economically.

Because gross receipts taxes are effectively taxes on consumption, they tend to be regressive with respect to current income, as described in Chapter 13. To alleviate both the potential regressivity and any differences in effective rates among industries that arise, exemptions from tax or differential rates for specific types of goods or industries are common.

Current state gross receipts tax use

Three states – Hawaii, Ohio, and Washington – use a gross receipts tax as the main general tax collected from businesses. Delaware, Nevada, and Oregon also levy a gross receipts tax on business, although it is not the main general business tax.[11] The experience with those taxes in those states generally illustrates the difficulties noted earlier. As an illustration, those taxes are described next. In addition, many states apply gross receipts taxes to specific industries.[12]

The Hawaii General Excise Tax

Hawaii's General Excise Tax (GET) is a combination of gross receipts tax on all businesses and retail sales tax. A rate of 4 percent is levied on all "final" sales, including retail sales of goods and services (including medical and professional services) and intermediate sales of goods and services purchased by a business but not used directly in production. A rate of 0.5 percent is collected on nonretail sales of goods. Economically, this is equivalent to a 0.5 percent gross receipts tax on all businesses (including retail) and a very broad-based 3.5 percent general sales tax. For 2019, the GET generated about $3.8 billion of revenue, an amount equal to about 45 percent of state taxes in Hawaii. The nonretail component of the GET has provided slightly more than a quarter of state taxes in Hawaii.

In a report to the Hawaii Tax Review Commission, Bruce Billings (1984) estimated that pyramiding and taxation of intermediate sales increased the effective rate from the nominal 4 percent to an effective rate between 4.79 percent and 5.42 percent, an increase of about 25 percent. The Commission Report stated that "the 4% retail rate is actually about a 5% rate, on average, when the pre-retail General Excise Tax imbedded in the price is considered" (*Report of the First Tax Review Commission*, 1984, 8). It also appears that the gross excise tax may have contributed to vertical integration in the state. By comparing the ratio of value added to sales for specific industries across states (with the greater the ratio of value added to sales, the greater the degree of integration), Billings found statistically significant higher levels of integration in manufacturing industries in Hawaii compared to all other states for 1972 and 1977 and compared to 15 selected states relatively similar to Hawaii for 1967, 1972, and 1977. On average, integration among Hawaiian manufacturing firms was 114.8 percent of that in all other states and 123.2 of the level in the 15 selected states. With respect to manufacturing, Billings (1984, 37) concludes, "It appears that Hawaiian industry is somewhat more vertically integrated than the US norm."

Even so, one of the periodic Hawaii Tax Review Commissions recommended retention of the GET for three reasons: (1) a single replacement tax on a narrower base would require a substantially higher rate, (2) changeover to a different tax would alter the distribution of taxes among businesses, and (3) the potential substitute taxes appeared to be administratively more complex. This illustrates an important feature of tax reform as opposed to tax design. Once a tax has been in place for several years, the economic and business structure will have reacted to that structure so that any change to generate benefits in the long run must accommodate the short-run disruptions that result.

The Washington Business and Occupation Tax

Washington state also levies a multistage gross receipts tax called the Business and Occupation Tax (B&O tax). The tax applies to nearly all businesses located or doing business in Washington, including corporations, LLCs, partnerships, sole proprietors, and nonprofit corporations. The base of the tax is gross income from business conducted in the state, with no deductions for costs or expenses. A limited set of activities is exempt, and

various credits are utilized for specific cases or activities, including for small businesses. In general, the tax rate is 0.484 percent for manufacturing and wholesaling businesses, 0.471 percent for retailing businesses, and 1.5 percent for service and other businesses. In 2019, the B&O tax generated $4.4 billion, about 17 percent of state tax revenue in Washington.

Washington also levies a state sales and use tax at a rate of 6.5 percent (but Washington has no individual income tax). In concept, the combination of Washington's B&O and 6.5 percent retail sales taxes is very similar to Hawaii's GET. As with most states, the general sales tax in Washington does not apply to retail sale of many services (such as legal or medical services), but the B&O tax does apply to service businesses, including those not established as corporations. Consequently, Washington effectively includes services in the tax base to a much greater degree than most states. However, because the B&O tax is a multistage gross receipts tax, it also likely has the same problems as Hawaii's GET.

The Ohio Commercial Activity Tax

Hawaii and Washington have used a gross receipts tax for many years while Ohio changed from a prior business tax model including a corporate income tax to the gross receipts tax beginning in 2005. The tax is based on gross receipts from business activity in Ohio without any deductions for costs or expenses incurred. The tax applies to all types of businesses independent of industry (although some financial institutions are taxed differently) or legal form (corporations, as well as partnerships, proprietorships, and others). Rather than an apportionment formula, the Ohio law specifies that a business is subject to the tax if (1) it has property or payroll in the state of at least $50,000; (2) it has gross receipts of at least $500,000 in Ohio, or (3) at least 25 percent of property, payroll, or gross receipts are in the state.

The tax rate structure is a bit complicated as it combines a minimum tax with an additional percentage tax on gross receipts. The annual tax amount is (1) $150 if $150,000 < gross receipts <$1,000,000; (2) $800 plus .26 percent of gross receipts > $1,000,000 if gross receipts are between $1 and $2 million; (3) $2,100 plus .26 percent of gross receipts > $1,000,000 if gross receipts are between $2 and $4 million, and (4) $2,600 plus .26 percent of gross receipts > $1,000,000 if gross receipts are greater than $4 million.

In 2019, the Ohio CAT generated $1.9 billion, which is 6.5 percent of the total state tax revenue. Ohio also levies a state sales tax at a rate of 5.75 percent, which generated revenue of $10.8 billion in 2019. The sales tax in Ohio does not apply to purchases of groceries or prescription drugs but does apply to a relatively wide set of consumer services. Of course, the CAT does apply to the sales of food, medications, and services. As with Washington, the combination of the CAT and the state sales tax means that all consumption in the state is taxed substantially but at very different effective rates for different goods and services.

Because the CAT is a multistage gross receipts tax, it likely has the problems identified previously for this type of tax. Jared Walczak (2017) provides a discussion of gross receipts taxes generally, a thorough review of the operation of the CAT, and the available evidence of its effects. Walczak demonstrates how tax pyramiding leads to wide variation in effective tax rates for different industries. He also notes that assisting the manufacturing industry in Ohio was an explicit objective of the adoption of the CAT. However, Walczak writes,

> The manufacturing industry . . . tends to be disadvantaged under a gross receipts tax due to tax pyramiding across the production and distribution chain. This is evidenced by the fact that the manufacturing sector remits 26.1 percent of the CAT's total tax burden, far outstripping the industry's share of net income in the state economy.

Even so, the tax liability for manufacturing is less than it was in the previous tax regime. Still, it does not seem that the Ohio's economy was greatly affected, as Walczak notes, "Despite representing a substantial tax cut, it is difficult to identify any economic gains associated with the adoption of [the tax]."

The Michigan business tax experience[13]

Michigan has exhibited schizophrenic behavior in terms of its business taxation, alternating between value-added and profits taxation. From 1953 to 1967, the state used an income-type value-added tax with deductions (subtractions from gross income) for cost of goods sold and depreciation, called the Business Activity Tax (BAT). In 1967, at the time the state government introduced the first individual income tax, it also adopted a corporate income tax to replace the BAT. In 1975, the state replaced the corporate income tax with the Single Business Tax (SBT), which was a consumption-type value-added tax calculated by the addition approach. In 2007, the SBT was repealed and replaced by a combination of a modified value-added tax and a gross receipts tax, called the Michigan business tax. In 2012, the state returned to using a state corporate income tax.

Michigan's 30-year experience with the SBT is informative because it was the only state value-added tax. The base of a consumption-type VAT is revenue minus purchases of all intermediate goods and services, including capital goods, which was computed by the equivalent approach of adding up wages plus interest plus rent plus profit and subtracting net investment. The tax applied to a relatively broad spectrum of economic activities, with only government, nonprofit organizations, and agricultural firms exempt, and included exemptions, deductions, and credits that reduced tax liability for smaller firms, labor-intensive firms, and firms with negative profits. Because the tax applied to a broader set of firms than the corporations subject to most corporate income taxes, the Michigan Department of Treasury estimated that a corporate income tax rate of about 14.8 percent would have been necessary to generate the same revenue as the 1.9 percent SBT rate.

In effect, then, Michigan's SBT had the advantages usually attributed to gross income taxes – broad base, low rate, and relatively stable revenue stream – without the efficiency and equity problems of gross income taxes. Because VATs are not common in the United States (although that is the standard business tax form in Europe), there was substantial confusion and many misconceptions about the SBT among the state's taxpayers. Common criticisms included the idea that taxes are positive even when profits are negative and that value-added taxes discriminate against labor. Because the tax base is value added (wages + interest + rent + profit), the tax can be positive even if one component of the base is negative. Of course, business firms still use state services even when profits are negative. A consumption-type VAT, such as the SBT, taxes payments for both labor (wages) and capital (interest, rent, and profit) and thus is neutral with regard to input mix; in contrast, a corporate income tax is levied on the return to capital only and reduces rates of return to capital.

One potential economic advantage of a pure consumption-type VAT compared to a profits tax is a lower effective tax on capital income because capital expenditures are deducted immediately in the year the capital investment is made. In most corporate income taxes, depreciation deductions for capital are spread over the life of the capital asset. If capital is mobile among states, then the substitution of a consumption-type VAT for a state profits tax is expected to increase the rate of return to capital in that state, thus stimulating an increase in investment in that state. When the tax was adopted, multistate firms allocated the tax base, including the deduction for real property investment, based on the standard three-factor formula – one-third based on sales location, one-third based on payroll, and one-third on property. For deducting expenditures on personal property (equipment), however, multistate

firms used a formula of half based on payroll and on the location of the property. As Hines (2003, 611) notes, the effect of this provision was that

> Michigan's SBT offered a more generous treatment of investment expenditures than did the tax system of any other state. . . . The effect of this rule for apportioning deductions for personal property expenditures was to encourage investments by firms with significant production in Michigan.

These SBT allocation provisions were challenged by firms who argued that they were unconstitutional because they discriminated against interstate commerce by giving more favorable tax treatment to capital investments in Michigan than those outside. As a result of the court challenges and continuing concern on the part of the state about subsidizing investment outside Michigan, a number of changes were made in how the tax base and capital expenditures are apportioned for multistate firms. In 1999, the state substituted an investment tax credit for the apportioned investment deductions, moving the SBT further from the original concept of a consumption-type VAT. In addition, the magnitude of the credit was less than needed to make it equivalent to the capital expenditure deductions.

Despite the economic advantages of a consumption-type VAT, the Single Business Tax eventually fell victim to (1) business opposition based on the misperception that tax liability should be zero if profits are negative; (2) misperception that the tax discriminated against labor; (3) the fact that the tax was collected from business of all forms, not just corporations; and (4) the difficulty of developing a legal method for apportioning capital deductions. At this time, in 2014, Michigan uses a corporate income tax as its main business tax, but history suggests that future changes are likely.

Application 15.2: Discriminatory business taxes: The insurance case[14]

The fundamental legal issue regarding taxation of business in a federal system is the degree to and manner in which subnational governments may tax economic activities that cross jurisdiction boundaries: what is usually called interstate commerce in the United States. The Commerce Clause of the United States Constitution prohibits states from enacting laws designed to restrict interstate commerce, and the Fourteenth Amendment's Equal Protection Clause prohibits states from enacting laws that do not give all individuals equal protection (treatment). In general, states have been prohibited from applying taxes that discriminate against out-of-state firms. We have already seen these issues arise in the application of state sales and use taxes and in the apportionment of business income among states.

Still another example of the complex interaction of the relevant economic and legal principles arises concerning state taxation of insurance companies. All states levy specific sales taxes on insurance companies equal to some percentage tax rate multiplied by the amount of insurance premiums on contracts sold in the state. In 1981, 34 of these state insurance premiums taxes provided lower taxes (usually through lower rates) for insurance companies headquartered in the state (so-called domestic companies) than for insurance companies from other states (foreign companies). Typically, rates for domestic companies were 2 percent or less and rates for foreign companies 1 or 2 percentage points higher. This discriminatory taxation was defended by the states on grounds of encouraging expansion of the domestic insurance industry to ensure insurance for residents at the lowest cost and as a means of increasing investment in the state (because insurance companies use their cash flow to invest in many industrial and commercial projects).

The McCarran-Ferguson Act (1945) specifically gives states the authority to regulate and tax insurance activities, effectively limiting the Commerce Clause's application to the

insurance industry. The insurance industry challenged these state domestic preference taxes on grounds that they violate the Equal Protection Clause, however, and in a 1985 decision (*Metropolitan Life Insurance Co. v. Ward*), the US Supreme Court supported that view. The court rejected Alabama's domestic preference tax for insurance companies, arguing that the two reasons offered in support of the tax – to encourage the formation of insurance companies in the state and to encourage foreign insurance companies to increase investment in the state – were not legitimate constitutional reasons for state discriminatory taxation.

Subsequent to this Supreme Court decision, many states that previously had domestic preference taxes substituted premiums taxes with equal rates for domestic and foreign companies. A few states revised their insurance premiums taxes to levy equal tax rates on domestic and foreign insurers but provide tax credits based on some other measure of the firm's activity in the state (such as investment, property value, or location of corporate headquarters).

Economically, there is some question as to whether these domestic preference taxes could, in practice, accomplish the basic objective of expanding the insurance industry within a state. The largest insurance companies that market nationally sell insurance in many or nearly all states. The lower premiums tax rate in such a company's home state applies only to insurance purchased by residents of that state, which typically would be a small fraction of the total insurance sold by a national firm. Thus, the differential rate for domestic and foreign insurers cannot advantage an insurance company that desires to be national in scope (to lower taxes, it would have to do most of its sales in its home state or move its headquarters to the state where it does most of its business).

The domestic preference is, therefore, likely to be an advantage only for smaller regional or state firms that sell a substantial part of their insurance in their home state. For the domestic industry in a state to expand at the expense of the national companies, the domestic companies would have to offer insurance at lower prices than the national firms; that is, the lower state taxes would have to be at least partially passed on to consumers in the home state. If the entry of new insurance companies into a state can be limited by other means such as regulation or advertising, it seems more likely that the domestic preference tax would simply lead to higher profits for the domestic firms rather than lower prices.

Summary

The two principal issues facing state-local governments in designing taxes to be collected directly from businesses are the choice of the tax base, which is the type of tax, and the method for apportioning that base among the various subnational governments in which a firm does business.

A gross income tax collected from business is a tax on the total receipts or total revenue of a firm, with no deductions for any type of expenses allowed. A VAT is a tax on the difference between the sales of a firm and the cost of goods or services purchased from other firms that are used in production. The base for the traditional net income or profits tax is revenue minus most all business expenses, including costs for materials, labor, interest, rent, and depreciation of capital equipment.

The relative importance of state corporate income tax revenue has declined substantially since the early 1980s, owing to three factors that seem to account for the bulk of the decline: (1) adoption of new tax incentives by states, (2) changes in the legal form of business by firms, and (3) use of passive investment holding companies (often called "tax shelters").

The method used most often to apportion a multistate firm's tax base among all taxing jurisdictions is formula allocation, historically involving the firm's share of its payroll, property, and sales in the state. If all are equally weighted, the firm's allocation factor is

the average of the payroll, property, and sales shares. Recently, many states have moved away from the traditional equally weighted three-factor formula and moved to formulas that weight sales more heavily.

The three most fundamental criticisms of general gross receipts taxes are that the effective tax rate will be greater than the nominal tax rate, depending on the number of stages of production; the effective rate will arbitrarily vary between economic sectors; and the tax creates an incentive for vertical integration to reduce taxes.

The average burden of state corporate income taxes represents a decrease in the return to owners of capital just as with a national corporate tax. The excise effects from differentials in state corporate income tax rates among states are expected to impose relative burdens on immobile workers, consumers, and owners of land and immobile capital in the higher-tax states. From the viewpoint of a single state, an increase in the state corporate income tax rate is therefore expected to impose burdens on workers, consumers, and owners of immobile capital and land in that state.

One state – Michigan – previously used a VAT as the business tax, the common form of business tax in other parts of the world. VATs have many of the advantages of gross income taxes – broad base, low rate, and relatively stable revenue stream – without the efficiency and equity problems of gross income taxes. One additional potential economic advantage of a consumption-type VAT compared to a profits tax is a lower effective tax on capital income because capital expenditures are deducted.

Discussion questions

1 According to the "benefit principle" of taxation, a business's tax in a state should be related to the benefits to the business from services provided by the state and local governments. Practically, a firm's business activity or tax base is usually divided among states based on the state's share of the firm's capital, employment, and/or sales. Discuss how well each of those components of the allocation formula might correspond to service benefits. Does a firm with sales (through the internet or mail order, perhaps) but no employees or capital in a state benefit from any state or local government services?
2 Gross receipts, value added, and net income are three different potential business tax bases. For each of three firms – an automobile manufacturer (assembly plant), a food retailer, and a private-practice physician – list the components of each potential tax base and describe how the bases differ from each other for one tax and among the three taxes.
3 A national consumption-type VAT has the same base as a national retail sales tax (assuming no exemptions or the same exceptions for each). If one state has a consumption-type VAT, is that tax on the same base as a state sales tax? Suppose that every state adopted a consumption-type VAT. Would the cumulative effect of those taxes be the same as a national sales tax? How does the answer depend on how the tax base is allocated among states?
4 "If our state has to raise taxes, it should increase the corporate income tax. That way a good part of the tax will be paid by consumers in other states, not just taxpayers in this state." Evaluate this position.

Notes

1 https://home.kpmg/us/en/home/insights/2021/02/tnf-maryland-tax-digital-advertising-services-enacted.html.
2 https://legiscan.com/MD/text/HB732/id/2174077.
3 Charles E. McLure Jr., "The State Corporate Income Tax: Lambs in Wolves' Clothing," In *The Economics of Taxation*, edited by H. Aaron and M. Boskin (Washington, DC: Brookings Institution, 1980), 342.

4 It is difficult to characterize state corporate taxes easily because they differ substantially, with some applying one form of tax to some corporations and a different form to others. For a summary, see the Federation of Tax Administrators, www.taxadmin.org/assets/docs/Research/Rates/corp_inc.pdf.
5 This section draws on material prepared for the US Department of the Treasury and reported in *Economic Analysis of Gross Income Taxes*, 1986.
6 www.taxadmin.org/assets/docs/Research/Rates/apport.pdf.
7 The use of formula apportionment creates a number of other incentives for firms to alter behavior. For a discussion, see Gordon and Wilson (1986).
8 Frieden and Do, 2021, www.taxnotes.com/tax-notes-state/nexus/state-adoption-european-dsts-misguided-and-unnecessary/2021/05/10/59p2l.
9 www.nytimes.com/2019/05/06/opinion/tax-facebook-google.html.
10 Such taxes are sometimes called "turnover" taxes because tax is collected at each stage of production.
11 Texas levies a margin or franchise tax that is a gross receipts tax for many firms but has some characteristics of a profit tax for other firms. Gross receipts taxes are also levied locally in Virginia and West Virginia.
12 Gross income taxes also have been used by several other states on a more limited basis. A gross receipts tax was repealed by Alaska for all businesses but banks in 1979, with the tax on banks repealed in 1983.
13 This section is based on Michigan Department of Treasury (1985), Hines (2003), Citizens Research Council (2014).
14 For additional information on this topic, see Baldwin (1986).

Selected readings

Brunori, David. "State Corporate Income Taxes." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen, 333–351. Oxford, UK: Oxford University Press, 2012.

Cornia, Gary, Kelly D. Edmiston, David L. Sjoquist, and Sally Wallace. "The Disappearing State Corporate Income Tax." *National Tax Journal*, *58* (March 2005): 115–138.

Hines, James. "Michigan's Flirtation with the Single Business Tax." In *Michigan at the Millennium*, edited by C. Ballard. East Lansing: Michigan State University Press, 2003.

Luna, LeAnn, Matthew N. Murray, and Zhou Yang. "Entity Taxation of Business Enterprises." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen, 352–379. Oxford, UK: Oxford University Press, 2012.

McLure, Charles E., Jr. "The Elusive Incidence of the Corporate Income Tax: The State Case." *Public Finance Quarterly*, *9* (October 1981): 395–413.

Mieszkowski, Peter, and George R. Zodrow. "The Incidence of a Partial State Corporate Income Tax." *National Tax Journal*, *38* (December 1985): 489–496.

Serrato, Juan Carlos, and Owen Zidar. "The Structure of State Corporate Taxation and its Impact on State Tax Revenues and Economic Activity." *Journal of Public Economics*, *167* (November 2018): 158–176.

16 Revenue from government monopoly and regulation

Headlines[1]

All three states that had sports betting on ballots voted yes; sports betting now legal in 25 states[2]

"Voters generally want the freedom to place a legal bet on sports.

Tuesday's elections provided further confirmation. Three states had measures on the ballot to legalize sports betting: Maryland, Louisiana and South Dakota. All voted yes.

Unlike other races on Election Day, the voting for sports betting wasn't close. Maryland passed the measure with more than 66 percent of people voting yes. More than 58 percent voted yes to sports betting in South Dakota. Most parishes in Louisiana voted yes to allow sports betting, many by a wide margin.

That brings the number of states that allow legal sports betting to 25. . . . There are more to come, as the sports betting landscape continues to expand."

The Clear Winner of Election 2020: Marijuana[3]

"Voters approved a series of statewide ballot proposals on Election Day legalizing the use and distribution of marijuana for either medical or adult-use purposes.

Specifically, voters approved the legalization of medical cannabis access in two states, Mississippi and South Dakota.

Voters legalized the possession of marijuana by adults in Arizona, Montana, New Jersey, and in South Dakota.

In total, 15 states have now either enacted or have voted to enact adult-use legalization laws, while 36 states have either enacted or have voted to enact medical marijuana access laws."

Data availability

As is generally the case, the Governments Division of the US Census Bureau is the major source of data about the topics in this chapter. Census provides annual data about revenue and expenditures of public utilities, state alcoholic beverage monopolies, and state lotteries as well as revenue from state and local taxation of alcoholic beverages. Links or internet addresses to the relevant sources and tables are listed throughout the

DOI: 10.4324/9781003030645-20

chapter. As noted throughout the book, you may access these data directly from the Census (www.census.gov/topics/public-sector.html) or by using the tabulation utility maintained by the Urban Institute (https://state-local-finance-data.taxpolicycenter.org//pages.cfm).

Information about regulation and financial aspects of gambling in each state, especially concerning casinos and sports betting, is available from the American Gaming Association (www.americangaming.org/). Current data about the legal and financial status of sports betting in each state is also available through ESPN (www.espn.com/chalk/story/_/id/19740480/the-united-states-sports-betting-where-all-50-states-stand-legalization). Tax rates for alcoholic beverages and marijuana are reported by the Federation of Tax Administrators (www.taxadmin.org/tax-rates).

State-local governments may generate revenue by becoming the monopoly producer of a good or service and then charging prices for that good or service that are greater than costs. Three common examples of this behavior are considered in this chapter: operation of government-owned utilities, state government alcoholic beverage monopolies, and state lotteries and other forms of gambling. In all these cases, production by private firms is clearly an alternative and indeed is used in some jurisdictions. Therefore, one issue is whether government should be the producer. If government production is selected to generate revenue, then the monopoly structure directly follows.

An alternative option is for government to control a good or service through legalization and regulation, allow limited private production and sale, and generate revenue from these activities by taxing the production or sale of the commodities by those private firms. This approach has been used for alcoholic beverages in many states and for parimutuel racing for a number of years. Most recently, many states have applied this approach to newly legalized sports gambling and the use of marijuana.

Economics of government monopoly

Reasons for government monopoly

The issues considered in this chapter are different from the more general question of whether the characteristics of some goods and services lead the private market to an inefficient result, requiring government intervention (as discussed in Chapter 2). First, government can intervene in the market and even become a producer without becoming a monopoly – private schools typically coexist with public schools, for instance. Second, private production is not only feasible for the cases considered in this chapter but is used in some states and localities. The issue, therefore, is really how government can best regulate and generate revenue from these specific economic activities.

The existence of increasing returns to scale – that is, average cost decreasing as output rises – is the classic instance in which monopoly production is most efficient. With those cost conditions, goods or services can be produced at lower unit cost by a single firm than by a set of smaller, competing firms. Because of the relatively large fixed costs involved in the production and distribution of such utility services as electricity, natural gas, water, and mass transit, increasing returns to scale may be expected. Thus, monopoly production may be desired; indeed, these industries are sometimes referred to as "natural monopolies." The existence of increasing returns does not require government monopoly, however. Instead,

government may grant monopoly rights to a private producer subject to government regulation or taxation. Among utility services, government monopoly is most common for water-sewer and local mass transit, whereas private regulated monopoly is more common for electricity, natural gas, and intermetropolitan transit. Still, some electricity generation and distribution monopolies are owned and operated by state governments, by county governments in a few states, and by city governments in 46 states, as well as being provided by special districts in some other states.[4]

There is some evidence of economies of scale in the administration of lotteries as well. Larry DeBoer (1985) reports that the administrative costs of state lotteries per dollar of sales decline as sales increase. Indeed, DeBoer finds that this result apparently continues to be true even for those states with the largest lotteries, suggesting that production of lottery services is similar to that of the utilities. This tendency is even reflected in the aggregate data (shown in Table 18.4 later in this chapter), which show that administrative costs as a fraction of sales tend to be lower in states with a larger dollar volume of sales. Even with economies of scale, why should the monopoly be operated by government? Presumably, a state could grant the lottery monopoly to a private firm similar to a private utility and then regulate and tax that entity.

Using a monopoly for the distribution or sale of alcoholic beverages seems more problematic. Economies of scale are not expected to be important in this industry; indeed, (government) monopoly sale is used in only 18 states. Rather, the argument usually made for government monopoly in providing lotteries and the sale of alcoholic beverages concerns control of externalities associated with these types of consumption. The idea is that because sales are made only through the government, various regulations, such as those regarding underage consumption, can be enforced more easily.

Economic objectives

Whatever theoretical arguments might be offered to support government monopoly provision of these services, the political fact is that these monopolies often are effective ways for states and localities to generate revenue. This is not to imply that government monopoly exists only, or primarily, to produce revenue. Monopoly may serve to provide a service that would otherwise not exist, as in the case of increasing returns, or monopoly provision may serve other objectives of government. Generating revenue is only one reason but the main focus of this chapter.

The economic options to a government monopoly in terms of pricing and sales, which determine revenue for the government, are no different than for private-sector monopolists. The standard economic analysis is shown in Figure 16.1. The monopolist faces a downward sloping demand for its product, which implies that additional sales can be achieved by reducing the price. Consequently, the **marginal revenue** – the additional revenue from selling one more unit of the good or service – is always less than the price charged for that last unit. Selling more output entails reducing prices for all units of output sold. Graphically, this is reflected by the fact that the marginal revenue curve lies below the demand curve. (For any given quantity, marginal revenue is less than the price determined from demand.) In general, the equation for marginal revenue for any given output is

$$MR = P[1 - 1/E^d_p]$$

where
P = price so that the output is demanded
E^d_p = the (absolute value) of the price elasticity of demand at that output.

If the price elasticity of demand equals one, then marginal revenue equals zero – increases or decreases in price do not generate any additional revenue to the monopolist. An increase in price causes fewer units to be sold, with both effects exactly offsetting. If demand is price elastic (the price elasticity of demand is greater than one), then marginal revenue is positive but less than price. In that case, a decrease in price will cause an increase in sales revenue to the monopolist – the price decrease is more than offset by an increase in the number of units sold. Finally, if the price elasticity of demand is less than one (demand is price inelastic), then marginal revenue is negative. An increase in the number of units sold from lowering the price will not be sufficient to offset the lower price, so sales revenue would decline.[5]

To illustrate the monopolist's pricing options, the cost per unit of production is assumed constant in this case, so marginal cost and average cost are equal. The price the monopolist should charge to get the highest possible profit is that which corresponds to the output where marginal cost and marginal revenue are equal, quantity Q_0 in Figure 16.1. Recall from microeconomics that as long as the extra revenue from selling one more unit (marginal revenue) is greater than the extra cost (marginal cost), more production will generate more profit. The maximum profit is attained when all those opportunities are taken: that is, when marginal revenue and marginal cost are equal. So a price of P_0 and the resulting quantity of Q_0 provide the highest possible profit to a monopolist with these demand and cost functions. That profit is the difference between sales revenue and cost, which is shown as the shaded area of Figure 16.1.

Maximizing profits by a monopolist is generally not the same as attempting to maximize the dollar volume of sales. Maximum sales revenue results when marginal revenue is zero: that is, at price P_1 and quantity Q_1 in Figure 16.1. The difference between the two is that sales revenue alone takes no account of production cost. Lowering price to increase quantity sold beyond Q_0 simply does not pay off in increased profits because the marginal revenue from those transactions is less than marginal cost. Finally, if this product was produced by a competitive industry or if the government provider was trying to maximize consumer surplus, the price would equal P_2, and the quantity sold would be Q_2. Competition serves to drive prices down to just cover costs (including the opportunity costs of the investors). At quantity Q_2, price equals marginal and average costs.

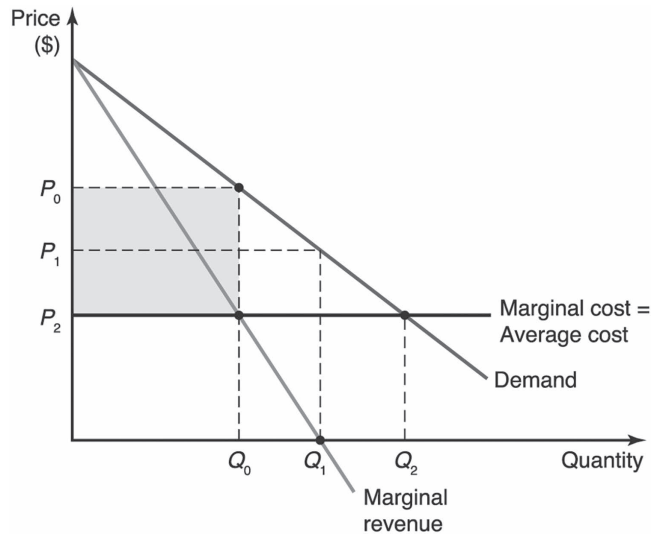


Figure 16.1 Monopoly pricing

The economic opportunity for a monopolist should now be clear. By increasing price above the level that would be charged by a competitive industry, the monopolist sells fewer units of product but may earn returns above those available in other industries if price is greater than average costs. There is a limit, however, to how high the price should be. If the monopolist sets the price too high, the amount sold may decline so drastically so as to miss some potential profit. The trick is to balance marginal revenue and marginal cost, which depends on how sensitive consumers are to price. For any given production cost, the price the monopolist should charge to maximize profits is higher the less price elastic demand is.

The analysis is only slightly different if production exhibits increasing returns to scale, as shown in Figure 16.2. Because average cost decreases as quantity rises, marginal cost is always less than average cost. It follows that if price is set equal to marginal cost at any output, financial losses result because the price (revenue per unit) would be less than average cost (cost per unit). This is why these situations are called natural monopoly; competitive market prices always generate losses. If the price is set equal to average cost at price P_1 and quantity Q_1, profits are zero. Because all costs are covered, the monopolist could continue to operate at this position, but no revenue above costs would be generated either for the private or public (government) monopoly owners. As before, profit-maximizing output occurs when marginal revenue and marginal cost are equal, which occurs at price P_0 and quantity Q_0. The shaded area of Figure 16.2 graphically represents the profit earned by the monopolist.

If the government charges a price above average cost, economic profits result. In other words, the government monopoly would earn profits beyond the normal rate of return on its investment in the business. Those profits could be used as revenue for general purposes or some specific earmarked purpose.

Even if government uses a monopoly position to generate revenue, it does not necessarily follow that the government will – or should – set prices so as to maximize profits, thus maximizing revenue to the government. The monopoly profits are only one of many sources of revenue to state or local government and should be evaluated by the same economic criteria applied to all revenue sources – equity, efficiency, and administration cost. Just as state-local governments may choose to set less-than-revenue-maximizing tax rates on some activities because of equity or efficiency factors, so too might the government choose to set less than

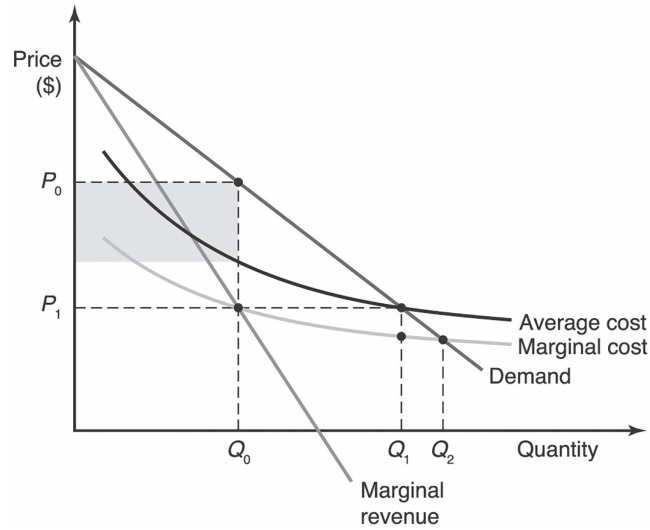


Figure 16.2 Monopoly pricing with increasing returns to scale

revenue-maximizing prices for goods produced by government monopoly. For instance, many states exempt food sales from the sales tax in order to reduce regressivity of the state's tax structure, but a zero state tax rate on food is surely less than the revenue-maximizing rate. The appropriate price for goods produced by government monopoly must be evaluated in a similar manner, depending on whether the objective for having government monopoly is to generate revenue and the equity and efficiency implications of raising revenue in that way.[6]

Monopoly versus taxation

Any general government revenue generated through a government monopoly could also be obtained through taxation of private producers, regardless of whether the market is served by a monopoly or competitive firms. This point is illustrated by Figure 16.3, which compares a profit-maximizing government monopoly to a profit-maximizing private competitive industry that is taxed by the government. With the government monopoly, the profit-maximizing price of P_0 and quantity Q_0 generates economic profits or revenue to the government, represented by the shaded area. If this good or service were instead produced by a set of competitive private firms, the price would be P_2, equal to marginal cost. An excise tax levied on sales by those private firms would increase marginal cost; if the tax rate is $t^\star$, the new marginal cost is $MC\ (1 + t^\star)$. If $t^\star$ is chosen so the new competitive market price is P_0, the quantity sold will equal Q_0, and the tax revenue generated will again equal the shaded area. Obviously, the monopoly profits and the excise tax revenue can be equal. If economic conditions call for monopoly production, whether by government or a private firm, taxes and government production can again be equivalent. If production is to be by a private monopoly, the government can just tax away all or part of the private firm's profits.[7]

From this viewpoint, it is clear that government monopoly prices above average cost are implicitly a tax that generates revenue. If the government monopoly sets prices above average cost, the government could provide the same good or service at lower prices. This is essentially equivalent to taxing the production or distribution of the service by a private firm. Although these two sources may be called and classified differently – one as revenue from government production and the other revenue from a tax – economically, this is a distinction without a difference. In both cases, government has intervened in the economy

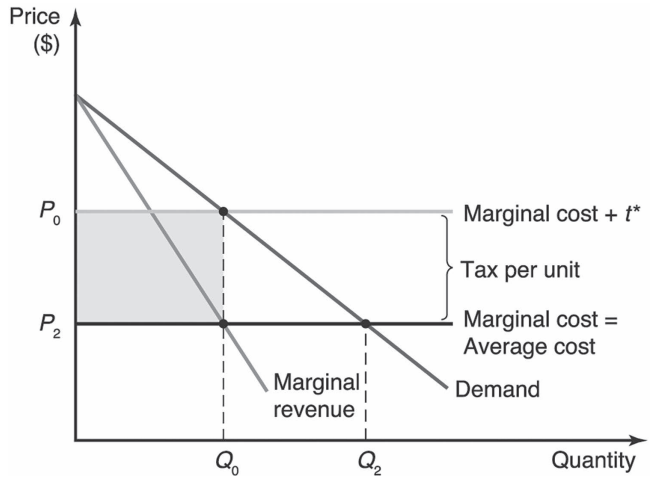


Figure 16.3 Monopoly pricing and taxation of competitive prices are equivalent

to increase the price of a good or service in order to generate government revenue. There may be important political distinctions between a "tax" and "monopoly revenue," however. A monopoly may permit the government to gain revenue without anyone having to vote for higher taxes, the monopoly revenues may not be subject to constitutional or statutory revenue limitations, and monopoly revenue may be perceived as a type of user charge paid only by consumers of particular services.[8]

Application 16.1: The official _____ of your city

In New York City, you can take the subway to the Barclay's Center Station in Brooklyn, which is the station that is closest to Barclay's Center, the home of the Brooklyn Nets NBA team. Barclays, an international banking firm, bought the naming rights not only for the arena but also for the subway station from the New York Metropolitan Transit Authority. Barclays is reportedly paying $200 million over 20 years for the naming rights to the arena and $4 million for the rights to the subway station name over the same period.[9]

A similar example is AT&T Station in the Southeastern Pennsylvania Transportation Authority (SEPTA), for which AT&T entered into a five-year deal in 2010 for about $5 million. (AT&T also provides the wireless service on this SEPTA line.) In Cleveland, the Regional Transportation Authority renamed its bus rapid transit system to HealthLine under contract with the Cleveland Clinic. In San Francisco, Salesforce is paying $110 million over 25 years to put its name on a transit center connected to the firm's building. In Detroit, Quicken Loans is paying $5 million over 10 years to name the new streetcar system Q Line.

Beyond transit facilities, Geico sponsors rest areas with "safe phone zones" along Virginia highways. Virginia also has started a process for individuals and firms to purchase the naming of roads.[10] Following the practice of professional and college naming rights for sports stadiums and arenas, a number of public schools have sold naming rights for or advertising at school sports or activity facilities.[11]

Localities and some states have increasingly sought revenue by using their monopoly provision of services or facilities as opportunities for private marketing and advertising. Some examples are common and well established – advertising billboards on or inside buses and subway trains have been in use for years. However, firms acquiring the naming rights to state or local facilities are more recent and unusual, for instance. How substantial are the revenue opportunities for states and localities from assisting private sector marketing? What problems do these public-private sector relationships create? And how will citizens view expansion of marketing through the public sector?

Public-private marketing arrangements fall into three general categories: (1) private advertising on public facilities, (2) exclusive contracts between governments and private firms, and (3) the selling of naming rights for public facilities. An article by Christopher Swope (2004) provides the following examples of all three. General Motors contracted with the Port Authority of New York/New Jersey to put images on the walls of a subway tunnel that runs under the Hudson River, which give riders the impression that they are watching a video as they ride by. In 1999, San Diego entered into an exclusive contract with the Pepsi Bottling Group, Inc., through which Pepsi vending machines were located on city property; Pepsi was granted the designation "Proud Sponsor of the City of San Diego"; and the city received a marketing fee, commissions, and merchandise for city programs. Finally, Las Vegas sold the name of a key station in its new monorail system to Nextel (reportedly for $50 million).

In most instances, the revenue from such public-private marketing arrangements appears to be relatively minor so far. But the potential is unclear. One can only speculate about the potential for private naming of Central Park in New York City, for instance (Central Park by

Disney?). How citizens will view expansion of private marketing through the public sector is also unclear. Citizens may see marketing revenue as a desirable alternative to taxes or user charges, partly because citizens do not directly pay for that revenue, which comes indirectly from the consumers, workers, and investors of the private firms. Citizens may also see marketing revenue as a way of exporting public sector costs to nonresidents. On the other hand, citizens may worry whether the contract or advertising is affecting quality of service. For instance, locating soft-drink machines in public schools has become quite controversial, with concerns about the potential effects on students and learning. Some worry that governments may accept inferior products because of marketing arrangements. Issues of image, taste, and morality are even more problematical. According to Swope (2004), Dallas rejected a naming offer from the parent company of Jose Cuervo tequila for a performance hall at a new Latino Cultural Center.

Other main concerns about public-private marketing arrangements relate to the contract or negotiation process. States and localities need to correctly identify the market value of these opportunities, which is often difficult because there may be few comparable markets. If a company wanted to purchase naming rights for New York City's Central Park, for instance, how would the city go about determining the value of naming such a unique asset? Competitiveness in the bidding or negotiation process is also considered important, as it usually provides maximum revenue and helps people perceive the process as fair. As a result, some cities have hired marketing professionals to coordinate this process. The city of San Diego has an official Corporate Partnership Program, with a separate page on the city's website. In 2021, San Diego had existing partnerships with eight private entities – Toyota ("Official Vehicle of the San Diego Lifeguards"); Canteen; California Coast Credit Union; Deloitte; AER Brands (for defibrillators); Turf Star; National University; and Service Line Warranties (see www.sandiego.gov/corporatepartnership). For instance, Turf Star is the "Official Golf Equipment Partner of the City of San Diego."

Public-private marketing arrangements represent another way that states and localities may generate revenue through monopoly power from the provision of public services or ownership of unique public facilities. How far this trend might go is just speculation at present. It is not at all clear that the forecast of one marketing industry – "I'm sure one day that Yellowstone will be named Tostitos Park" (Blackmon, 1996) – will ever materialize.

Operation of government monopoly

Utilities

Although government production of utility services is most common for water-sewer and urban mass transit, government monopolies also provide for the production and distribution of electricity and natural gas in a number of states. Municipalities are the most common form of government to own and operate these utilities, although special districts also are used in some states. In those states where local governments own electric and gas utilities, they are typically small and serve only a limited geographic area. Although public electricity utilities represent about 60 percent of the total number of electricity providers, they serve only 14 percent of all customers.[12] In most cases, government utilities can buy power from or sell power to the private electric firms as production and market conditions warrant. If a municipal utility does not own generating or production facilities, it would enter into a long-term contract with a private provider or another municipal utility. In that case, the city monopoly is more in distribution than production.

Economic information about the operation of these government-owned utilities, at least in aggregate, is given in Table 16.1. Both net income (sales minus operating and debt

Table 16.1 Operation of utilities owned by subnational governments, 2018

Utility	*State governments*		*Local governments*	
	Net income (millions)	*Net income as a percentage of revenue*	*Net income (millions)*	*Net income as a percentage of revenue*
Water supply	−$18.2	−5.6%	$15,016.9	21.8%
Electric power	1,698.6	17.8	11,842.0	16.6
Gas supply	−33.1	−308.0	−65.3	−1.0
Transit	−8,753.8	−211.4	−$30,257.6	−229.8

Source: US Census Bureau

expenses) and net income as a fraction of sales are shown for each of the four main types of utilities owned by state and local governments. Net income of transit utilities is negative, showing that the consumers of this service do not pay enough to cover the costs of the service. Not only are transit monopolies not sources of other revenue for the operating governments, they also require subsidy from other sources, as discussed in more detail in Chapter 18. Electric and water utilities owned by local governments provide positive net income – that is, revenue beyond operating costs and debt service. The positive net income does not guarantee that the utility is generating economic profits because all the opportunity costs to the government of owning the utility are not measured. Specifically, the operating costs do not include any measure of depreciation. Because the government has a large investment in capital goods in the utility, part of the net income is simply the normal or average return on that investment, equivalent to what the city could have earned by investing those funds elsewhere.

The question of whether these utilities earn economic profits is better shown by the ratio of net income to sales, the "profit" rate on sales or profit margin. For local government utilities, the highest ratio of net income to sales is for water service, about 21.8 percent. This means that for every $1 of water sales, $.21 to $.22 remains after operating costs and interest charges are paid, a slightly larger amount than for local electric utilities. Equivalent profit margins for all private firms in the United States typically have been between 5 and 8 percent. The slightly higher rates for local utilities suggest they may be generating small economic profits or revenue for other government purposes by charging prices higher than necessary to cover all costs.

The conventional belief is that water utilities are the local utility most likely to be generating revenue for other purposes. There are usually few private firms providing this service for comparison. Thus, consumers may not be aware that a government water monopoly is earning economic profits through its pricing policies. On the other hand, if the city electric company attempted to generate large profits, it would be relatively easy to compare that firm's prices and rate of return to those of private utilities serving neighboring areas.

Alcoholic beverages

States follow one of two general methods for regulating the sale of alcoholic beverages. Under the **control method** used by 17 states,[13] the state government has a monopoly on at least the wholesale distribution of distilled liquor. In some cases, the state wholesale monopoly also extends to beer and/or wine. Control states operate the wholesale system directly, and some control states also impose one or more restrictions on retail sale, varying from retail sale of alcoholic beverages in state liquor stores (exclusively or in competition with private retailers) to establishment of minimum retail prices to limitations on the number and

business hours of retail outlets to restrictions on advertising the retail sale of alcoholic beverages. In the control states, the state government wholesale monopoly allows the state to set wholesale prices in order to generate revenue for the state government, although state taxes on the sale of alcoholic beverages may be levied in addition.

The alternative **open method** used by the other states involves wholesale and retail sale of alcoholic beverages by private firms, usually quite a number, so the market is relatively competitive. In these states, the sellers are licensed by the state government (thus, the method is sometimes referred to as a **license system**), with the licensed private sellers also sometimes constrained by sales rules setting minimum prices or restricting business hours or advertising. In some license states, a limited number of wholesalers are licensed, and all alcoholic beverages must be distributed through those wholesalers. These states levy excise taxes on the sale of alcoholic beverages, typically collected at the wholesale level, with these taxes being the main source of revenue from alcohol in contrast to the control states. Reporting on these state alcoholic beverages structures shows a great variety of regulatory systems used by states of both general types.[14]

These two systems of state involvement in the sale of alcoholic beverages clearly show that state taxation and regulation of private firms is an alternative to state monopoly production. The history of the two systems is that states adopted one or the other at the time of the Twenty-First Amendment to the US Constitution, which repealed prohibition in 1933 and gave states the authority to regulate the sale and distribution of alcoholic beverages. In 2012, Washington became the first state to switch from one general method to the other (although states have altered the rules and restrictions used within their systems to bring about more or less economic competition).[15]

The control system states are Alabama, Idaho, Iowa, Maine, Michigan, Mississippi, Montana, New Hampshire, North Carolina, Ohio, Oregon, Pennsylvania, Utah, Vermont, Virginia, West Virginia, and Wyoming. Some financial information about the operation of the state alcoholic beverage monopolies is reported by the US Census Bureau. The state monopolies in these 17 states generated about $1.4 billion of income above operating and debt expenses in 2018 on total sales of about $8.6 billion, which represents a return of about 16 percent of sales. Net income provides about one-fifth of one percent of state-local government revenue in all these states. Of course, depreciation, capital opportunity costs, and capital construction costs are not included.

There is some variation among the monopoly states in the magnitude of net income generated, although all are small. Net income provides 1 percent of state government revenue only in New Hampshire, which has made sales to nonresidents a state business. Differences in net income from alcoholic beverages could arise from differences in the level of alcoholic beverage consumption by residents of these states, the costs of operating state liquor monopolies, pricing policies, or interstate transactions (residents of one state buying liquor from stores in a different, probably neighboring, state). Evidence and experience seem to suggest that the last of the three is the dominant explanation. The policy of the New Hampshire liquor monopoly to seek purchases from residents in the surrounding states is well known.

Overall state-local revenue from alcoholic sales is reported in Table 16.2. Revenue consists of the net income from state and local monopolies (wholesale and/or retail sale) plus sales taxes collected on alcoholic beverage sales plus license taxes paid by firms licensed by state or local governments to sell alcoholic beverages. In total, revenue is about $10.1 billion, which is .25 percent of total state-local revenue. State governments collect about $8.9 billion (.3 percent of state revenue), and local governments collect a bit less than $910 million (about one-half of 1 percent of total local government revenue). Revenue from alcoholic beverages sales can be fiscally important in some jurisdictions but is relatively small in aggregate.

Table 16.2 Revenue from alcoholic beverages, 2018

Type of tax	*State government*		*Local government*	
	Revenue (millions)	*Percentage of state revenue*	*Revenue (millions)*	*Percentage of local revenue*
Sales, monopoly states	$8,499.0	NA	NA	
Net income, monopoly states	1,443.3	0.05%	$197.6	0.01%
Alcoholic beverages sales tax	6,788.5	0.26	697.0	0.03
Alcoholic beverages license tax	710.2	0.03	215.5	0.01
Total	8,942.0	0.34	912.5	0.05

Source: US Census Bureau

Research comparing the open and control states suggests some economic differences. First, state wholesale liquor monopolies control not only the sale of liquor in a state but also the purchase of liquor from the manufacturers. As the single buyer from the distillers for all retail establishments in the state, the state monopoly may also have monopsony power. A **monopsony** is defined as a single buyer of a commodity, the parallel of monopoly but from the demanders' side of the market. Just as monopolies can use their market power on the supply side to charge higher prices than would prevail in competition, monopsony firms can use their market power on the demand side to pay lower prices for the product they are purchasing than they would in a competitive market. Weinstein (1982) reported, for instance, that at that time, the Michigan Liquor Control Commission was "the world's largest single purchaser of distilled spirits" (p. 726). Although state laws generally prohibit distillers from using explicit price discrimination among the states, some large state-government buyers may still be able to pay lower prices in effect by altering their timing of purchases from and payments to the manufacturers. To the extent that the state monopoly distributors can exercise monopsony power over the distillers, the wholesale cost of liquor would be lower in the control states.

Second, retail prices of liquor and other alcoholic beverages differ between states, sometimes substantially. Research reported by Hines in 2018 showed that the typical price of a 750ml bottle of Grey Goose vodka varied from $19.49 in Colorado to $40.99 in New York. The *Los Angeles Times* (Hirsch, 2005) reported that a bottle of Charles Shaw wine that sells for $1.99 in California (an open state) goes for $3.39 in Columbus, Ohio (a control state). A recent study by Michael Siegel and colleagues (2013) found that prices tend to be higher, on average, in the control (monopoly) states compared to the open (license) states. Even if true on average, it is not uniformly true. Control states such as New Hampshire and Delaware purposely set prices low to attract purchasers from neighboring states. When Washington changed from being a control state to an open or license state with many sellers, liquor prices apparently increased because of new state fees and taxes that were established. Variations in prices are the combined result of liquor costs, state monopoly pricing strategy, taxes, restrictions on advertising, and the number of retail outlets.

Third, it seems that per capita consumption of liquor tends to be greater in the open compared to the control states. Jon Nelson (2003) provides a careful analysis of this issue. Nelson reports "monopoly control of retail sales of spirits reduces consumption of spirits and increases consumption of wine. . . . The net effect of monopoly on total alcohol demand is significantly negative" (p. 21). Thus, the higher prices for distilled liquor in the control states reduce consumption of liquor. Although these higher liquor prices also induce some consumers to substitute wine for liquor, total consumption of alcoholic beverages is reduced.[16]

Similar results showing lower consumption for both liquor and wine in control states are also reported by Roland Zullo and colleagues (2013).[17]

The full cost of liquor to a consumer includes not only the retail price charged by the store or bar but also the time and out-of-pocket costs of going to the sales outlet. If there are few retail outlets or if they have limited hours, this second component of the cost of consuming liquor could be substantial. Even if retail prices are the same in two states, the full consumers' price will be higher in states that limit retail competition. If control states limit retail competition more than the open-system states, then the lower alcohol consumption levels in the control states are consistent with economic expectations about demand (that is, higher costs). Data tabulated by the Distilled Spirits Council of the United States (DISCUS) have shown more retail outlets selling liquor (including both on-premise and off-premise consumption) per capita in the open states, on average, than in the control states. A review by Carla Campbell et al. (2009) of numerous studies of various types concerning the relationship between alcohol outlet density and consumption confirmed a positive relationship between the number of alcohol outlets and consumption.

A technical analytical issue confronting all studies comparing alcohol consumption in the control (monopoly) states to that in the open (license) states is that it is possible that a state's residents' attitude about alcohol simultaneously determines the level of consumption and the type of distribution system. Is consumption lower in control states because of higher effective prices, or do residents who have less of a preference for alcohol consumption select control states?

Finally, generating revenue is only one reason for alcohol taxes or high monopoly prices; states may also be increasing prices to affect consumption because of negative externalities associated with alcohol consumption. Negative external effects could include drunk driving, other crime, negative effects on personal behavior, and higher medical costs for society, as well as personal health effects that are not perceived by users. As you learned from Chapters 2 and 11, if individual consumption creates costs for others that are not taken into account by the consumer, the social cost of the activity is greater than the private cost. Taxes can improve efficiency in that case by making or forcing consumers to take account of the full costs of their activity. The efficient tax should be equal to the marginal external costs created by the consumption. Substantial existing research shows that higher alcohol prices (through state monopoly action or taxes) affect consumption and, through that, reduce drinking and driving, accidents, domestic violence, and other crime as well as improving health. Some research that measures the external costs of alcohol consumption, reported by Lawrence Martin (2003), suggests that alcohol prices and taxes should be higher than currently to offset the externalities.

In addition to efficiency, taxes or the implicit taxes involved with high state monopoly prices should be evaluated on equity implications. There is some evidence based on consumer expenditure patterns that alcohol taxes are mildly regressive, especially for individuals in the bottom 40 percent of the income distribution. Two factors can mitigate this regressivity, however. First, taxes on beer and wine seem to be more regressive than taxes on liquor. Second, unit taxes (a tax amount per glass or gallon or barrel) tend to be more regressive than percentage taxes based on price. The reason, explained by Martin (2003), is that the volume of alcohol consumption falls as income rises even if spending does not because higher-income individuals tend to consume higher-quality (more expensive) beverages. Limiting the regressive impact of alcohol taxation or pricing can be achieved by basing taxes on price and targeting liquor (spirits) more than beer or wine.

Marijuana

Voters have acted to legalize use of marijuana in a number of states, as shown by the ballot proposals in the *Headlines* section at the start of this chapter. Legalization also involves

regulation (age limitations, for example) and taxation, so in many ways, state government treatment of marijuana may parallel that of alcohol. Alcohol use was illegal during prohibition (1920–1933) and then legalized again by the Twenty-First Amendment. State governments decided at that time whether to regulate and tax alcohol use (the license states) or to become the seller (the control states). Similar decisions are now being made with regard to regulation and taxation of marijuana.

As of May 2021, 17 states had legalized adult use of marijuana (Alaska, Arizona, California, Colorado, Illinois, Indiana, Maine, Massachusetts, Michigan, Montana, Nevada, New Jersey, New Mexico, New York, Vermont, Virginia, and Washington). South Dakota is a special case as voters approved an initiative proposal in the November 2020 election to legalize both medical and recreational use, but at this writing, the status of the vote is in litigation. Another 18 states permit the use of some form of marijuana or THC for medical purposes only. Of course, possession and use of marijuana (or THC) remains illegal by federal law.[18]

In April 2021, 11 states levied taxes on the sale of marijuana. In other states that had legalized use of marijuana, either sale was not allowed or a sale and tax structure had not yet been put in place.[19] The states collecting taxes on marijuana sales were Alaska, Arizona, California, Colorado, Illinois, Maine, Massachusetts, Michigan, Nevada, Oregon, and Washington. Others are scheduled to begin taxation in the future. Four main types of taxes are levied, although in different combinations by these states. Most commonly, a percentage excise tax is levied on the price, as in Colorado, which levies a 15 percent retail sales tax on marijuana sales and a 15 percent tax at the wholesale level. Three states (Alaska, California, and Maine) levy a tax based on weight, which is similar to the per-pack cigarette excise tax. Illinois and New York will collect an excise tax based on THC potency (just as states levy different rate excise taxes on liquor as opposed to beer or wine). In addition, marijuana sales are subject to state or local general sales taxes in many cases as well.[20]

Taxation of the legalized use of marijuana for medical purposes is often slightly different than for recreational or personal use. About half the states do not collect taxes on the sale of marijuana for medical use, essentially treating marijuana in this case similarly to prescription medication (see Chapter 13). The states that do levy a tax on the sale of medical marijuana often do so differently than for recreational marijuana.

Drawing the comparison to state treatment of alcoholic beverages, states have effectively adopted a license system for marijuana, licensing official sellers and taxing sales. So far, states have not used the control model for marijuana – that is, the state government becoming the monopoly seller – as we learned some do for alcoholic beverages. It is interesting that states that use the control (monopoly) system to regulate alcoholic beverages have not also then become the monopoly providers of marijuana. Therefore, in the case of marijuana, the states' monopoly power arises through legalizing a previously illegal activity, licensing sellers, and taxing production and sale.

Gambling and lotteries

"Gambling is not a fiscal panacea, and we would be foolish, indeed, to expect it to provide much in the way of budgetary relief."[21] Although states have generated revenue from gambling activities for many years, mostly from taxes on betting at horse and dog races, states have increased their reliance on gambling revenue and changed the nature of state involvement substantially over the past 50 years in an attempt to generate revenue, despite the admonition from Daniel Suits. Current forms of legal gambling and the number of state are shown in Table 16.4. Only two states – Hawaii and Utah – do not have some form of legal gambling (excluding bingo).

Table 16.3 Number of states with legal gambling

Lottery	*Commercial casinos*	*Native American casinos*	*Sports gambling*	*Parimutuel racing*	*Charitable gaming*
44 + DC	29	29	26 + DC 5 not yet operating	43	48 + DC
	465 locations	524 locations			

Source: American Gaming Association

Table 16.4 Financial structure of state lotteries, 2019 (in millions of dollars)

	Ticket sales, excluding commissions	*Prizes*	*Administration cost*	*Net revenue for states*	*Net revenue as a percentage of total state revenue*
Amount	$81,608.3	$52,747.1	$3,432.0	$24,621.6	0.9 %
Percentage of Sales		64.6%	4.2%	30.2%	
Implicit Tax Rate[a]	43.8%				

Source: US Census Bureau

a Net revenue as a percentage of prizes plus administration cost

First came the growth of state lotteries. In 2021, 44 states and the District of Columbia operated lotteries. The first state lottery was adopted by New Hampshire in 1963; by 1975, 13 states had begun lotteries; and there were 22 state lotteries in 1986, 32 in 1992, and 38 by 2002. In 2019, the lotteries in those states generated an average of just less than 1 percent of state governments' total revenue. These state lotteries are operated as state government monopolies (with potential competing private lotteries made illegal by the states). In contrast, states generate revenue from other forms of gambling by taxing gambling provided by private firms on such activities as casino games, racing, and sports events. Even though state governments have always closely regulated these private gambling activities, it was generally not until lotteries that the states directly operated, and encouraged, gambling activity.[22]

The second increase in gambling activity was the explosion of casinos owned and operated by Native American tribes, commercial casinos that are separate or located at racetracks or on riverboats, and gaming activities from which part of the funds goes to support a charitable organization. A federal government law adopted in 1988, the Indian Gaming Regulatory Act, made it clear that Native American tribes have a right to operate casinos on their lands offering games legal in those states, subject to agreements with the state governments. In 2021, more than 465 gambling casinos on tribal lands were operating in some 29 states, and nearly 525 commercial casinos of various types and locations were operating in a total of 29 states. A total of 48 states and the District of Columbia permitted "charitable gaming": that is, lotteries, card games, slot machines, roulette, or bingo overseen or operated by a nonprofit charitable organization as a fundraiser.

The third and most recent development in gambling activity regulated by states is sports betting. With the 2018 Supreme Court decision in *Murphy v. National Collegiate Athletic Association* that found the federal Professional and Amateur Sports Protection Act unconstitutional, 21 states plus the District of Columbia have legalized, regulated, and taxed sports gambling in operation, and another 6 states have authorized sports betting but not yet begun.

Lotteries

State lotteries are not homogeneous goods, with lottery bureaus or commissions typically operating several different types of games simultaneously. The most common types of games

include instant lotteries, for which the player buys a ticket and scratches off a covering surface to reveal the prize, if any; numbers games or the daily lottery, for which the player chooses a three- or four-digit number, and a fixed payoff is made daily on a randomly selected winning number; and lotto or draw games, involving parimutuel betting in which the player selects a number (usually of six or seven digits) from a choice of possibilities (usually 40 to 60 different numbers). The winning number is selected randomly weekly or semiweekly, and if there is no winner in one period, the money pool rolls over into the next game period. Some states offer video lottery games, where individuals can play various lottery-type games on electronic machines. As a result of a change in federal policy, states can now sell lottery games over the internet, but only to people located in the state.

According to John Mikesell and Kurt Zorn (1986), the numbers games historically provided the largest percentage of sales on average and in most states, with the lotto games second in significance but growing in importance. States typically use a particular game only for a limited period and then switch to a "different" game, even though it may be of the same generic type. The state lottery bureaus or commissions usually contract with one of only a few private firms that design the different state games. There are two major multistate draw lottery games – Powerball and Mega Millions – which have the largest payouts. The state lottery industry even has its own trade magazine, *Public Gaming International*, published by the Public Gaming Research Institute.

Although the lottery games differ somewhat financially, an overall picture of the economics of state lottery operations is shown by the data in Table 16.5. For the 44 states operating lotteries in 2019, the lottery pays out $.65 in prizes for each $1 of sales, on average, with another $.04 going to administration costs. (This understates the size of operation costs because the census reports lottery sales net of sales commissions.) Private retailers who are allowed to retain a percentage, often 5 to 8 percent, as compensation, typically sell lottery tickets. If commissions are included, then operation costs are closer to $.10 per $1 of sales, with the shares for prizes and state revenue correspondingly lower. Understanding this complication, the census data show that about $.30 of every lottery sale dollar ends up as revenue for the state government, on average.[23]

State monopoly pricing of lottery games is economically equivalent to state taxation of the service. The implicit tax rate embodied in lottery prices is the ratio of the revenue share per $1 of sales to the sum of the prize and cost shares. For these 44 states, the average lottery tax rate is about 44 percent. In other words, only $.70 of each sale dollar is used to operate the lottery and pay out prizes, but the ticket price is $1, about 44 percent greater.[24]

There is substantial variation in financial structure and revenue importance among the states with lotteries. The US Census Bureau reports financial data for state lotteries, available here for 2019: www.census.gov/data/tables/2019/econ/state/historical-tables.html.

The ten state lotteries with the largest sales – New York, California, Florida, Texas, Massachusetts, Georgia, Pennsylvania, Michigan, New Jersey, and Ohio – account for 65 percent of total lottery sales. Obviously, the economic characteristics of these lotteries dominate the national average. As noted, the administrative cost share is substantially greater than average in several states with small or recently enacted lotteries. Prize shares are especially high in Vermont, Massachusetts, Idaho, South Carolina, Arizona, and Pennsylvania at more than 70 percent of sales. In contrast, prize shares are especially low in Oregon, South Dakota, and West Virginia at only about 20 percent of sales.

The implicit tax rates on lotteries also vary substantially among the states. The highest tax rates are in the states that pay out the lowest share of prizes – 315 percent in Oregon, 311 percent in West Virginia, 282 percent in South Dakota. In contrast, the lowest tax rates are in the states that pay out the largest share of sales in prizes – 26 percent in Vermont, 29 percent in Maine, and 30 percent in Idaho.

Finally, the state lottery provides about 3 percent or more of state government revenue only in two states – Rhode Island (3.8 percent), and West Virginia (3.0 percent). On the other end of the spectrum, the state lottery provides less than 0.5 percent of state revenue in fifteen states.

Although this analysis shows that, on average, about $.30 per dollar bet in lotteries becomes state revenue, this revenue gain is overestimated because lottery spending may substitute for other types of gambling or other taxable purchases (such as going to the movies). Research by Mary Borg et al. (1993) suggests that 15 to 20 percent of net lottery revenue is offset by loss of other state taxes as a result of decreases in consumer purchases. In addition, O. David Gulley and Frank Scott (1993) report evidence showing that each additional dollar spent on lotteries reduces the amount spent betting on horse races, an activity that also is taxed by states. Gulley and Scott estimate that each dollar spent on lotteries reduces attendance at racing tracks and reduces the amount bet at the track by $.18 per person. Thus, the revenue the state gains from the lottery sale is partly reduced by the decreased tax revenue from betting on horse races.[25]

What are the economic gains from lotteries, and what are the economic reasons for government provision of lotteries? Although these two questions are often considered together, they are logically separate. The economic gain from the existence of lotteries is the same as the gain from the provision of any service; consumers get happiness or economic welfare from consuming the service – in this case, either, because of the potential for winning, the entertainment value, or both. After all, why do consumers get pleasure from watching hockey games or going to the theater or anything else? Some do. If individuals voluntarily choose to spend resources to consume those services, they must receive some pleasure. Thus, the provision of lottery services increases consumer welfare because consumers are willing to pay to have that service. This is not a reason, however, that the government must or should provide lotteries. Private firms could just as easily provide lotteries, as with horse racing and casino gambling, with government taxation if revenue collection is desired. Indeed, numbers games (one of the most common and largest types of state lottery games) have in the past and continue, by all reports, to be provided by private firms as well as states. Of course, the states argue that criminals run private numbers games, but that is partly circular logic given that it is the state that declared private numbers games illegal (although these firms may also be involved in other illegal activities).

Economic arguments for government as opposed to private lottery provision could be that the state revenue can be collected at lower administration cost with government provision than with taxation or that provision of lotteries either creates or generates opportunities for other effects that require regulation and that they can be more efficiently regulated by state provision. The case for the first argument seems weak; Mikesell and Zorn (1986) have noted that the administrative cost of broad-based state taxes is usually estimated to be less than 5 percent of tax revenue collected, which is less than the corresponding cost ratio for lotteries. The common version of the second argument regarding lotteries is that gambling can be complementary with other types of criminal activity, as a source of cash, as a way of transferring funds gained illicitly to legal uses, or as a means of fraud or extortion. By having gambling provided by the government, these potential secondary activities can presumably be limited. This argument is problematic at best because it presumes that legal state-provided gambling reduces demand for illegal private gambling, but if state gambling and the attendant advertising increase the overall demand for gambling, the opposite is possible.

One economic fact about state government revenue generated by lotteries, whether from government production of lotteries or taxation of private lotteries, is that the revenue comes disproportionately from lower-income households. A number of studies based on data from different sources and states shows uniformly that low-income households spend a larger

fraction of their income on lotteries than do high-income households, so state lotteries are a regressive source of revenue. These results are summarized in Rubenstein and Scafidi (2002) and Oster (2004). One analysis based on a nationwide survey of gambling behavior (Suits, 1977) showed that in 1974, about 25 percent of state lottery revenue came from families with incomes below $10,000, although those families represented only about 11 percent of total income in 1974. By some measures, lottery revenues appear to be twice as regressive as state sales taxes.

Such results are supported by the subsequent studies. Charles Clotfelter and Phillip Cook (1989) collected data on lottery expenditures by players in California, Maryland, and Massachusetts for a variety of current games including instant games, numbers games, and lotto. The authors conclude, "The evidence presented here demonstrates that the incidence of the implicit tax on lottery products in the 1980s is decidedly regressive, as it was in the 1970s" (p. 544). Indeed, the regressivity of lottery revenue is so dominant that a regressive pattern emerges even when the benefits of education financed by the lottery are considered. Mary Borg and Paul Mason (1988) estimated the **budget incidence** of the lottery in Illinois, which is earmarked to education, and conclude that "deducting the benefits of education . . . received by the average lottery playing household in Illinois from their lottery ticket expenditures reduces the regressivity [of the tax] but falls far short of eliminating it" (p. 75). Similarly, a budget incidence analysis of the Georgia lottery and HOPE scholarships, which it funds, by Rubenstein and Scafidi (2002) found

> a highly regressive pattern of net benefits. Lower income households (those reporting under $25,000 annual income) spend more on the lottery than they receive in benefits, while higher income households (those reporting over $50,000 in annual income) receive a positive net benefit.
>
> (p. 236)

The regressivity of lotteries differs by lottery game. Linda Ghent and Alan Grant (2010) study the income distribution characteristics of instant game, online numbers game, and lotto game purchases in South Carolina. They report that online numbers games are most regressive and lotto games are least regressive, with instant games somewhere between. They also report, however, that there are some differences in regressivity at various places in the income distribution, although the overall regressivity of state lottery games remains.

Clotfelter and Cook also report that purchase of lottery products tends to be concentrated in a relatively small sector of the population, even within income classes, and that lottery products tend to be consumed relatively more by blacks, males, and individuals with less education. Clotfelter and Cook (1990b) report that while 60 percent of adults in a lottery state may play at least once a year, the top 20 percent of lottery players (about 12 percent of the population) account for about two-thirds of the money spent on lotteries. Lottery play, therefore, and the state revenue that results from that play depend mostly on the behavior of this group of heavy players. State lotto games with exceptionally large jackpots may represent one exception to this idea of concentrated lottery purchasing. Oster (2004) presents evidence that the regressivity of the multistate Powerball lotto game decreases as the jackpot size increases, essentially because the large jackpots attract higher-income individuals who are not usually lotto players. Indeed, Oster suggests that at Powerball jackpots around $800 million, the incidence of that lotto game might switch to become progressive.

Increased state reliance on lotteries for revenue is equivalent, in an equity sense, to increased state taxation of any good that is consumed relatively more heavily by lower-income households. The curious difference about lotteries, of course, is that states promote and encourage consumption of this service so that additional revenue can be generated.

Through advertising, expanding distribution networks, and packaging of lottery products, state lottery agencies try both to attract new players and to increase sales to regular players. Would the public be equally tolerant of state government advertising to encourage cigarette smoking or liquor consumption so that state excise taxes would generate more revenue? As Daniel Suits argued in 1977 regarding state-run gambling, "[T]he government has become a pusher. And they're not pushing fire or police protection – only dreams" (*Business Week*, p. 68). Clotfelter and Cook (1990a) have suggested that lotteries might be run instead either to favor lottery players (the "Consumer Lottery" with much higher payout rates than currently) or to recognize the social costs of gambling (the "Sumptuary Lottery" without the current promotional advertising). Favoring the Sumptuary Lottery, the authors argue that some people's interest in betting could be accommodated without encouraging or expanding that interest as government policy.

Casinos

Casino gambling, including nonbanking (poker) and banking (blackjack) card games, slot machines, roulette, and electronic games such as video poker, originally followed the state monopoly model. Illegal in most places (or allowed only in a very limited way for special charity "Las Vegas Nights"), casino gambling was monopolized first in Nevada, followed by Atlantic City. Although the casinos were not owned by government (unlike the lottery), and there were several licensed private firms at each location, the governments that regulated the activity and received a share of the take essentially had monopoly power.

This situation changed dramatically starting in the late 1980s. In a 1987 decision involving California and the Cabazon Band of Indians, the US Supreme Court recognized the right of Native Americans to offer on their land any form of gambling legal in that state. The Indian Gaming and Regulatory Act, passed by Congress in 1988, set rules and procedures to govern such gambling. Under that law, tribes could operate traditional Indian games and such games as bingo and poker (so-called Class II games) if legal in the state. In addition, Indian casinos would offer such games as video poker, slot machines, blackjack, roulette, baccarat, etc. (so-called Class III games) if such games were used at all in a state (including by charities) and the state and tribe entered into a compact negotiated in good faith. Following a series of court cases involving disputes between states and tribes, a large number of Native American casinos now operate (or are approved) in 29 states. Most of these casinos offer the full range of Class III games.

While the Indian Gaming Act was being implemented, a number of cities (including Detroit and New Orleans) joined Las Vegas and Atlantic City in licensing major private, commercial casinos as a tourism and economic development action.

A demand for gambling activities has driven this expansion. It is estimated that total expenditures on legal gambling were approximately $79 billion in 2003 (Kearney, 2005). It is further estimated that expenditures on illegal sports betting fall between $80 billion and $380 billion annually. Both have been increasing at a fast pace. Kearney (2005) reports gambling expenditure or revenue for 2003 as nearly $29 billion in private, commercial casinos (including riverboats) and $17 billion at Indian casinos. It is estimated that casino gambling generates almost $3 billion in public revenue annually. However, one should distinguish the economic effects of casino expansion from the fiscal effects.

The case of casino gambling is different from state lotteries in two important ways. First and most obviously, states generally have not directly operated the casinos as they have lotteries, and in some cases, the states do not even derive tax revenue from casino gambling. States tax riverboat and private casino gambling at rates that vary from about 6 to 35 percent. However, states do not necessarily receive revenue from some Indian casinos. States

cannot tax tribal businesses, according to the federal law. As a result of agreements between the tribes operating casinos and state governments in five states (California, Connecticut, Michigan, New Mexico, and Wisconsin), the tribes make annual payments to the states for the rights to operate their casinos with limited competition. Those payments amounted to about $760 million in 2003, which translates to an effective tax rate of less than 5 percent. Thus, effective state tax rates on casino gambling are lower than the implicit tax rates on state-owned and operated lotteries (about 49 percent).

Second, besides ownership, casinos generally do not enjoy the same degree of monopoly power as state lotteries. Although numerous states, including neighboring ones, operate lotteries, purchase of lottery tickets through the mail is not allowed, so state governments essentially operate monopoly lotteries (except for tourists or those who live near state boundaries). But as casinos have increased in number, the monopoly once enjoyed by Las Vegas (and then Atlantic City) has eroded. Individuals commonly cross state boundaries to visit casinos, and consumers have multiple choices in some states and regions of the country. If the number of casinos continues to grow, the monopoly power (and revenue potential) of each will decline. Indeed, if the original idea of state-sponsored casinos was to attract business and state tax revenue from nonresidents, the proliferation of casinos in most states will make that unlikely. Rather, each casino will mostly register business from residents.

Also, the expansion of all forms of gambling has increased competition and reduced the monopoly power of each gambling form. Tosun and Skidmore (2004) report that competition among state lotteries across state borders is important. They report, "Lottery and lottery game adoptions in West Virginia's contiguous states have had statistically and economically significant negative effects on West Virginia border county lottery sales" (Tosun and Skidmore, 2004, 176). Elliott and Navin (2002) report evidence that both casino and parimutuel betting are substitutes for state lotteries, with increases in either leading to reductions in state lottery sales. In addition to offering alternative forms of gambling, many casinos offer lotteries or lottery-type games such as video poker or keno. In some cases, these are the exact games that state lotteries adopt. This may be one reason a number of states resisted the creation of Indian casinos, including through changes in state law and challenges in court.

From 2002 to 2019, real state lottery sales increased from $52 billion to about $80 billion but declined from providing 1.20 percent of state revenue to only 0.9 percent, as shown in Figure 16.4. Lotteries have increased prizes due to gambling competition, so the share of total lottery sales that the state receives in the form of net revenue has fallen from more than 40 percent in the 1980s to only about 30 percent today.

Sports betting

In 1992, the federal government, with the support of the NCAA and the major professional sports leagues (MLB, NBA, NFL, and NHL) adopted the Professional and Amateur Sports Protection Act (PASPA), which made gambling on sporting events illegal, except for the sports gambling that preexisted (sports books in Las Vegas; a sports-based lottery in Oregon; and small, specialized games in Delaware and Montana). Other federal laws also applied. The Federal Wire Act, 1961, prohibited gambling over the "wires," directed at the time at the telephone, particularly bets or wagers on any sporting event or contest. Over time, as technology changed, this law was interpreted by the US Department of Justice as prohibiting all forms of internet gambling. As a consequence, internet gambling sites available for access in the United States generally have been located outside the country. In 2006, the federal government adopted the Unlawful Internet Gambling Enforcement Act (which took effect in 2010), which required financial institutions to monitor transactions looking for gambling

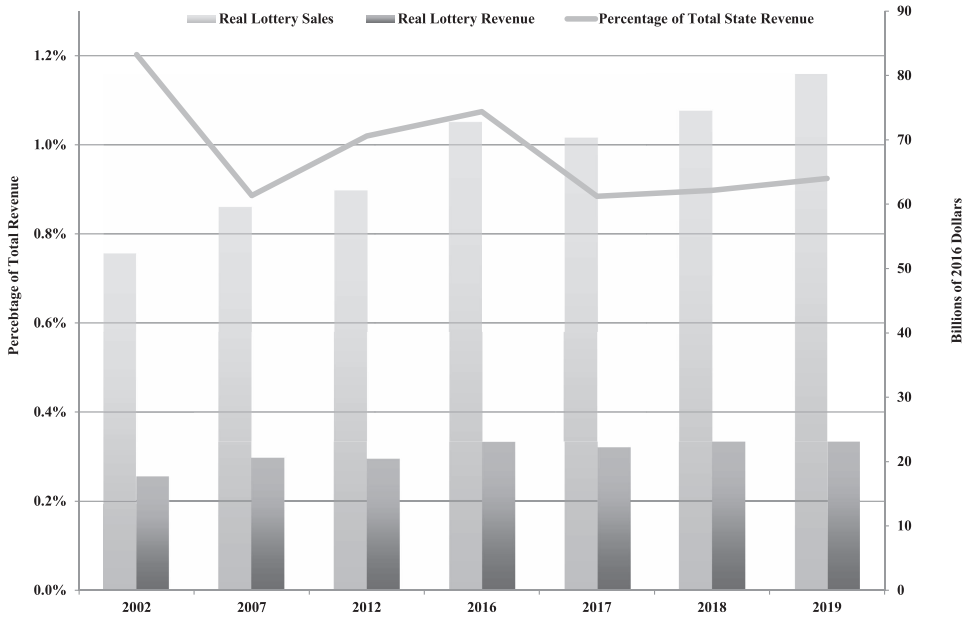


Figure 16.4 History of state lottery revenue

activity and block all such activity. The intent of the law was to limit the ability of offshore gambling sites to use US credit card companies for transactions. The essential effect of these several federal laws was to make all forms of gambling over the internet or telephone illegal and to make betting on sporting events illegal (except in Nevada) whether over the internet or not.

Many people are surprised to learn that betting on sporting events in most cases was illegal (indeed a federal crime) in the United States, despite the fact that some people regularly place sports bets online and others participate in informal betting through fantasy leagues or "March Madness" pools. Federal government policy changed slightly in 2011, when the Department of Justice issued opinions applying to Illinois and New York, giving these states authority to sell state lottery tickets over the internet to people in that state. Essentially, the federal government decided that if a gambling company and customer are in the same state, then state law applies. By these decisions, it appears that states could sell lottery tickets or authorize online poker within the state only. However, the federal opinions reiterated that sports gambling, even within a state, was not allowed.

Seeking new revenue from instituting sports betting, New Jersey voters approved a referendum in 2011 initiated by Governor Chris Christie to permit sports betting in the state. The four major professional sports leagues and the NCAA sued the state of New Jersey, seeking to block implementation of the sports betting plan envisioned in the referendum proposal. The federal district and appeals courts agreed that the state action violated the PASPA and was not permitted under federal law. The state of New Jersey appealed the federal court decisions to the US Supreme Court, arguing that a federal prohibition was unconstitutional as a violation of states' rights. In 2014, the Supreme Court declined to hear the appeal, essentially affirming the lower court's decision and ending (temporarily) New Jersey's attempt to initiate sports gambling.

New Jersey persisted, adopting the Sports Wagering Law in 2014 that repealed the state's laws against sports betting, restricted betting to racetracks and casinos, imposed an age limit of 21 and older, and prohibited betting on NJ college sports events. Monmouth Park, a horse racetrack, developed a sports betting area, but before it could open, the US District Court granted a temporary restraining order sought by the NCAA and professional leagues to block the opening. New Jersey again appealed to the US Supreme Court.

In May 2018, the Supreme Court issued a decision in *Murphy v NCAA*, finding that PASPA was unconstitutional based on the "anticommandeering principle" that follows from the Tenth Amendment: that is, "The basic principle – that Congress cannot issue direct orders to state legislatures." Congress could make sports gambling illegal, but it could not constitutionally restrict what state legislatures do in this matter. By October 2021, 25 states plus the District of Columbia had joined Nevada in legalizing, regulating, and taxing sports betting.[26] Five other states are in the process of implementing legal gambling on sports events.

Three reasons usually are cited against sports gambling. First, gambling might affect the integrity of sporting events, contributing to attempts to alter point spreads or fix the results of contests. Second, the leagues are concerned that if fans perceive that sports events are not fully legitimate, then consumer interest might decline, reducing revenue. Finally, it is argued that sports betting could support or encourage criminal activity. Indeed, the safety of athletes and referees might be at risk if they are threatened for not participating in gambling-related "fixes." All of these arguments have been cited by major professional sports organizations in the United States and the NCAA in opposing any expansion of legal sports betting. Some states are also concerned that legalized sports betting might reduce sales of other forms of gambling, including state lotteries. On the other hand, proponents argue that it is better for the activity to be legal, regulated, and taxed than illegal and off the books. Sports betting is legal in many other nations, including Canada.

Both government and private firms have been interested in the possibility of legalized sports betting because of perceived substantial revenue. However, the amount of sports betting is inherently difficult to estimate accurately because of its illegal status. Estimates of the overall magnitude of illegal sports betting vary substantially, with the $150 billion estimate by the American Gaming Association often cited. Such a magnitude seems unlikely, as state lottery sales were $82 billion, and the total spending by states and localities on police and fire protection was $170 billion in 2018. One economist used the amount of legal sports betting in the UK and made an adjustment for population difference and exchange rates to estimate that sports betting in the US (if people behaved similarly) would be about $67 billion.[27] The net profit from legal sports betting is less than 5 percent of the amount bet, so the profit potential is substantially smaller than the total revenue estimates.

State tax rates on legalized sports betting differ dramatically. A source that tracks sports betting reports that from June 2018 to May 2021, the total amount bet legally on sports reported by states was $51.5 billion, which generated $507 million in revenue for state governments.[28] This amount is miniscule compared to total state revenue or even the state revenue from lotteries ($24.6 billion). In Pennsylvania, the state with the largest amount of sports betting, the resulting state tax collection has been about $125 million, whereas the state lottery in PA generated $1.1 billion in state tax revenue.

Revenue potential

The income elasticity for lottery games is less than 1, implying that lottery purchases grow more slowly than income. Comparing lotteries to state income and sales taxes, Thomas Garrett and Cletus Coughlin (2009) report "the growth potential of state lotteries with respect

to income growth is much less than for traditional sources of revenue" (p. 97). Indeed, state lotteries provide a smaller fraction of state government revenue currently than in the past. In 1992, state lotteries provided about 1.5 percent of state government revenue in states with lotteries, with approximately 21 states receiving more than 1 percent of revenue from the lottery. By 2019, state lotteries provided only about 0.9 percent of state government revenue, and only 15 states relied on it for at least 1 percent of revenue.

Mark Nichols and Mehmet Tosun (2008) examined the income elasticity of casino gambling revenue and reported, "Gross casino revenue generally grows faster than taxable sales, but slower than taxable income. Gross casino revenue growth also slows as the industry matures" (p. 635). The policy implication is that income tax revenue is expected to increase over time more than lottery revenue (and income taxes can be proportional or progressive rather than regressive, as in the case of lotteries). Nichols and Tosun also note that eventually, casino gambling revenue growth slows and becomes more like a sales tax in revenue growth potential, as shown by their results for Las Vegas and Atlantic City.

Some states and localities have been concerned about substitution between expenditures on gambling activity and purchases of other consumer goods. If increased expenditure on gambling is offset by reduced expenditure on other commodities whose sales are taxable, then the actual, net increase in government revenue from gambling is less than it appears. Research by Anders et al. (1998) and Popp and Stehwien (2002) suggests that such substitution may occur, causing decreases in state-local income or sales tax revenue as a result of new casinos. Finally, the growing number of casinos and other types of gambling means that there is more competition for gambling expenditures. Russell (2013) reports that casino revenue had declined in 2012 in both Delaware and New Jersey and was related to the increasing availability of gambling opportunities. All these are reasons to be cautious about the state-local revenue potential of gambling.

The most recent previously illegal activities that states have now legalized, both to provide consumption benefits to residents and to generate revenue, are the recreational use of marijuana and gambling on sports events. All the caveats about consumer substitution among types of gambling and different types of personal drugs apply. It seems likely that potential revenue from taxes on legalized marijuana and gambling on sports events is not just pennies – it is a fraction of a penny.

Application 16.2: METOO-1: Personalized and specialty license plates

Although state-local governments are the exclusive providers of a number of services, they have generally used their monopoly power to set high prices to generate surplus revenue only in cases in which the government can justify a strong regulatory role, such as those already described in this chapter. One other similar case is the sale of both personalized ("vanity") and specialty ("affinity") license plates. Personalized license plates, which have characters selected by the buyer to indicate a specific message, are sold by all states for an additional fee beyond that for regular automobile registration. Most commonly, the additional fee is a fixed amount charged annually, although in some states there is both an initial fee and a lower renewal fee for subsequent years (which may even be zero). Specialty or affinity license plates provide buyers the opportunity to purchase plates with special backgrounds recognizing an institution (such as colleges or universities), cause (Save the Bay, etc.), or experience (military service, etc.). States charge an additional fee for the specialty plates, with the revenue shared in a variety of ways between the state government and the recognized organization or cause. According to a 2007 survey conducted for the Association of Motor Vehicle Administrators, there were more than nine million vehicles with vanity

plates (about 4 percent) in the US alone.[29] In addition, individuals also can choose specialty plates or affinity plates, some of which also can be personalized, effectively increasing the plate combinations available in any state.

One study by Erik Craft (2002) shows that the fees charged for personalized plates vary from $7.50 to $50 annualized over a four-year period, with renewal initial charges averaging about $30 and renewal fees about $20 (above that charged by the state for automobile registration generally). According to Craft, only about 3.5 percent of all automobile plates were personalized in 1997, substantially greater than the 2 percent reported by Alper et al. (1987) for 1983. Among the states in the 2007 study, the share of personalized plates was substantially greater than average in four states – Virginia (16 percent), New Hampshire (14 percent), Illinois (13 percent), and Nevada (13 percent). Craft had estimated that about 5 percent of all license plates in 1997 were specialty or affinity plates. Casual observation suggests that the use of specialty or affinity plates has proliferated in recent years and is now much greater than 5 percent.

My home state of Michigan offers the option of both personalized plates and affinity plates for each of the state's 15 public universities and for 18 sports team, organizations, and causes (such as Breast Cancer Awareness and Lighthouse Preservation). The additional fee for a personalized plate is $30 initially and $15 each year it is renewed. The additional fee for an affinity (or what the state calls a fundraising) plate is $35 initially and $10 each year it is renewed, with the university or organization receiving $25 initially as well as the full $10 renewal fee. As of 2013, the Michigan State University plate was the greatest seller, with more than a half-million sold since 2000.[30]

Source: Office of the Secretary of State, Michigan, https://www.michigan.gov/sos/vehicle/license-plates/university-plate-options

Economic analysis can help explain just what factors influence people to buy personalized or specialty plates and thus why personalized-plate usage differs among different states' residents. Economic studies by Alper and his colleagues, by Jeff Biddle (1991), and by Craft show that use of personalized plates is negatively related to price and positively to income, as economists would tend to expect. Aggressive marketing also seems to increase demand. This research also shows that the demand for personalized plates is price elastic, at least in quite a number of states. When combined with information about the marginal cost of the plates (expected to be between $2 and $10, depending on whether it is an initial or renewal sale), the estimated demand curves suggest that some states are charging less than profit-maximizing prices for personalized plates, while a few states charge too much. Craft (2002) reports that 10 of the 37 states in his sample "charge such a high price for personalized license plates that net revenues would rise by lowering the fees" (p. 143). Similarly, the demand results reported by Craft suggest that prices may be substantially less than revenue maximizing in 15 states. Craft's results show revenue-maximizing (four-year annualized) prices that vary among states from about $20 to $65. Biddle suggests that the profit-maximizing price may average about $40 if fixed annual charges are used, although the figure will vary by state. Harrington and Krynski (1989) estimate that profit-maximizing prices vary from about $44 to $63.

Biddle also reports that the demand for personalized plates differs in at least one important way from the standard economic concept of demand. He notes that typically, there are substantial increases in the sale of personalized plates in the years immediately following the start of a program, which are not explained by changes in prices or income. Apparently, the purchase of personalized plates by some individuals causes an increase in demand by others. Biddle offers two possible explanations for this behavior. The use of the plates by some is a type of advertising, conveying information about the existence of the program to individuals who are not aware of it, or the use of personalized plates by some people makes them more attractive to others who also want to be part of the fad, what has come to be called the "bandwagon effect." Indeed, Biddle's research shows that sales of personalized plates in one year are positively related to sales in the prior year, after accounting for other demand factors. One important implication of Biddle's observation, regardless of which of the two possible explanations causes it, is that it may be attractive for states to maintain relatively low prices for personalized plates in the early years of the program if they wish to generate as much state revenue as possible. The initial lower prices are expected to attract consumers whose use of the plates would then attract even more consumers in subsequent years.

Craft also reports that the use of specialty or affinity plates seems to increase the use of personalized plates. This suggests either that personalized and specialty license plates are complementary consumer goods for individuals or that the purchase of a specialty or affinity plate lowers the cost to an individual of also purchasing a personalized plate. This in turn implies that the optimal prices for either special service need to be lower than one would otherwise expect. States might be able to generate even more revenue from selling personalized license plates if they also can sell more specialty plates.

Summary

State-local governments may generate revenue by becoming the monopoly producer of a good or service and then charging prices that are greater than costs for that good or service. Three common examples of this behavior are operation of government-owned utilities, state government alcoholic beverage monopolies, and state lotteries or other forms of gambling.

The existence of increasing returns to scale – that is, average cost decreasing as output rises – is the classic instance where monopoly production is most efficient because goods or services obviously can be produced at lower unit cost by a single firm than by a set of smaller, competing firms. The existence of increasing returns does not require government monopoly, however. Instead, government may grant monopoly rights to a private producer subject to government regulation or taxation.

The political fact is that these monopolies are often effective ways for states and localities to generate revenue, although raising revenue is not the only reason for government monopoly. As long as the government charges a price above average cost, the economic profits beyond the normal rate of return on investment represent potential government revenue.

Revenue generated from government monopoly prices above average cost is implicitly a tax because government could provide the same good or service at lower prices. Although these two sources may be classified differently – one as revenue from government production and the other as revenue from a tax – and have different political implications, economically, this is a distinction without a difference. The monopoly profits should be evaluated by the same economic criteria applied to all revenue sources – equity, efficiency, and administration cost.

States follow one of two general methods for regulating the sale of alcoholic beverages. Under the control method used by 17 states, the state government has a monopoly on at least the wholesale distribution of distilled liquor. In some cases, the state monopoly also

extends to beer and/or wine or to retail sales. The open method used by the other states involves wholesale and retail sale of alcoholic beverages by private firms, which are licensed by the state government and sometimes constrained by sales rules. These states levy excise taxes on the sale of alcoholic beverages, typically collected at the wholesale level.

In 2014, 43 states and the District of Columbia operated lotteries as state government monopolies (with potential competing private lotteries made illegal by the states). These lotteries generated an average of .9 percent of the state governments' general revenue. These lotteries pay out, on average, $.62 in prizes for each $1 of sales, with another $.05 going for administration costs, so about $.33 of every lottery-sale dollar ends up as revenue for the state government.

One economic fact about state government revenue generated by lotteries, whether from government production of lotteries or taxation of private lotteries, is that the revenue comes disproportionately from lower-income households. By some measures, lottery revenues appear to be twice as regressive as state sales taxes. Lottery sales are also quite concentrated, with the top 20 percent of players accounting for almost two-thirds of the total revenue.

Casino gambling initially followed the monopoly model also, with the activity limited to just a few states, although those states licensed private firms to run the casinos and received tax revenue in return. But as casinos have proliferated, on tribal land and commercially in many states, state monopoly power for casino gambling as well as other forms of gambling is being reduced. Gambling of at least some type is now available in all but two states. Increasingly, states receive smaller (and sometimes zero) net revenue benefits from expansion of gambling activities.

Discussion questions

1 State lotteries operate in 43 states. In most of those states, the lottery was approved by a majority vote of the residents in a statewide election. States operate lotteries as a revenue source to finance state services. It is also true that a number of studies show that the state revenue generated by lotteries comes disproportionally from lower-income people – it is a regressive revenue source. Do you think that concern about the incidence of lottery revenue is irrelevant because the lottery was approved by the voters? If you were someone who never (or seldom) intended to buy lottery tickets (not because you are morally opposed to gambling but because you simply do not choose to gamble in this way), how would you have voted on the lottery? What would you consider in making that decision?

2 It is sometimes argued that state revenue generated by lotteries is different from tax revenue because people choose to buy lottery tickets. Compare three state revenue sources – cigarette excise taxes, personal income taxes, and state lotteries – in terms of the usual economic criteria of economic efficiency, equity, and administrative cost. Do all three arise from voluntary acts of taxpayers, and does that matter for the economic analysis?

3 States can generate revenue either by becoming the sole producer of a good or service and retaining the monopoly profits as revenue or by taxing goods or services provided by private competitive firms. One such case is the choice between a state monopoly for liquor sales and state taxation of private sellers. Another is the different treatment of lotteries and horse racing. Can you think of any reasons why states decided not to make lotteries legal and to tax the private firms or why states generally decided against state-owned and operated racetracks?

4 Suppose that the demand for personalized license plates and the marginal cost of production in a state is as shown in Figure 16.1. If all the profits go to the government and

the state wants to maximize revenue, what price should the state charge for the plates, and how many will be sold? Suppose that the state actually sets a price 10 percent lower than is profit maximizing. Show graphically by how much profits are reduced. Does the incorrect pricing cost the state very much? What might the state gain by setting the price a bit lower than the immediate profit-maximizing level?

Notes

1 "Marijuana on the Ballot," accessed March 30, 2015, http://ballotpedia.org/Marijuana_on_the_ballot#tab=By_year.
2 https://sports.yahoo.com/all-three-states-that-had-sports-betting-on-ballots-voted-yes-sports-betting-now-legal-in-25-states-184109132.html.
3 https://norml.org/blog/2020/11/04/the-clear-winner-of-election-2020-marijuana/.
4 These are monopolies only in their service areas. It is entirely possible to have private producers with exclusive rights to serve some areas of a state and government producers as the exclusive suppliers to other areas.
5 If you are uncertain about these uses of price elasticity, refer to the review in Chapter 3.
6 Jeff Biddle has noted that states can gain monopoly power through their sovereignty. For instance, states require all drivers to have licenses that are provided only by the state. Theoretically, states could charge relatively high fees for those licenses but do not.
7 It is a standard microeconomic result that a proportional tax on true economic profits (excluding the normal return to capital) will have no effect on the monopolist's choice of price and output.
8 However, it is not correct to state that the government monopoly is generating consumer surplus by producing a good or service that is valued by consumers. Such an argument presumes that private firms would not provide this good or service in the absence of the government production. If the government monopoly was created by first prohibiting private production or sale, government has created the possibility of providing a demanded service to consumers. That demand can be satisfied either by allowing private firms to operate or by government production.
9 Cooper, Michael, "Your Ad Here, on a Fire Truck? Broke Cities Sell Naming Rights," *The New York Times* (June 24, 2012).
10 www.washingtonexaminer.com/virginia-drafting-rules-for-highway-naming.
11 https://files.eric.ed.gov/fulltext/ED607561.pdf.
12 American Public Power Association, accessed March 30, 2015, www.publicpower.org/files/PDFs/USElectricUtilityIndustryStatistics.pdf.
13 Washington state ended the state monopoly and moved from a control to a license system on June 1, 2012. Maryland is usually not considered a control state, although several counties operate alcohol monopolies.
14 National Alcohol Beverage Control Association, accessed May 5, 2021, www.nabca.org/control-state-directory-and-info.
15 For instance, Iowa, Maine, Michigan, Montana, and West Virginia ceased state retail sales operations since 1987, but all these states maintained wholesale liquor monopolies.
16 Interestingly, Nelson (2003) also reports that bans on billboard advertising for alcoholic beverages do not seem to reduce overall consumption, although the effects vary by type of beverage.
17 The analysis did not control for the endogeneity of control laws.
18 www.rollingstone.com/feature/cannabis-legalization-states-map-831885/.
19 www.urban.org/policy-centers/cross-center-initiatives/state-and-local-finance-initiative/state-and-local-backgrounders/marijuana-taxes.
20 This is similar to motor fuel in many states, for which there is both a per gallon excise tax and the general sales tax based on the retail price.
21 Daniel B. Suits. "Gambling Taxes, Regressivity, and Revenue Potential." *National Tax Journal*, *30* (March 1977): 34.
22 One other example of a state-operated gambling monopoly is offtrack betting.
23 In contrast to the lottery, bettors at a thoroughbred racetrack get back $.80 to $.85 in winnings per $1 bet. The remainder goes to the track (usually private) and to state taxes. At a Las Vegas or Atlantic City casino, the "house cut" is perhaps only 5 to 10 percent.
24 If a lottery ticket sold for $.70 and was taxed at a rate of 44 percent, the tax would be $.30, giving a total ticket cost of $1.00.
25 Virve Marionneau and Janne Nikkinen, 2018, provide a compilation of research results about substitution among different forms of gambling.

26 www.espn.com/chalk/story/_/id/19740480/the-united-states-sports-betting-where-all-50-states-stand-legalization.
27 http://theconversation.com/market-for-illegal-sports-betting-in-us-is-not-really-a-150-billion-business-96618.
28 www.legalsportsreport.com/sports-betting/revenue/.
29 www.lcns2rom.com/11_12_07.htm.
30 https://detroit.cbslocal.com/2013/07/05/msus-is-top-specialty-license-plate-in-michigan/.

Selected readings

Auxier, Richard. "States Learn to Bet on Sports: The Prospects and Limitations of Taxing Legal Sports Gambling." *Tax Policy Center*, 2021. www.taxpolicycenter.org/publications/states-learn-bet-sports-prospects-and-limitations-taxing-legal-sports-gambling/full.

Clotfelter, Charles T., and Phillip J. Cook. *Selling Hope, State Lotteries in America*. Cambridge, MA: Harvard University Press, 1989.

Clotfelter, Charles T., and Phillip J. Cook. "On the Economics of State Lotteries." *Journal of Economic Perspectives*, *4* (Fall 1990): 105–119.

Dadayan, Lucy. "States' Addiction to Sins: Sin Tax Fallacy." *National Tax Journal*, *72*, No. 4 (2019): 723–754.

Kearney, Melissa Schettini. "The Economic Losers and Winners of Legalized Gambling." *National Tax Journal*, *57* (June 2005): 281–302.

Martin, Lawrence. "Miscellaneous Taxes in Michigan: Sin, Death, and Recreation." In *Michigan at the Millennium*, edited by C. Ballard, P. Courant, D. Drake, R. Fisher, and E. Gerber 667–680. East Lansing: Michigan State University Press, 2003.

Suits, Daniel B. "Gambling Taxes: Regressivity and Revenue Potential." *National Tax Journal*, *30* (March 1977): 19–35.

Part V

Applications and policy analysis

Chapters 17 through 20 focus on the dominant and specific government responsibilities of substantial policy interest, including provision of education, transportation, and health and welfare services, and the relationship between state and local government fiscal policies and economic activity. Although this is clearly not an exhaustive list of important fiscal policy issues among subnational governments, these four represent the largest amounts of state-local expenditure and have continued, over a long period, to be among the most controversial and topical fiscal policy issues. All also involve substantial economic aspects that can be analyzed with the information and tools presented in the book. The discussion in these final four chapters draws on the theory and evidence discussed in previous chapters and tends to be less conclusive, reporting what is known about these complex policy questions as well as factual matters that are as yet unresolved.

Spending on education, transportation, and health and welfare services together accounts for about three-quarters of state-local expenditure. Moreover, these are perhaps the most apparent state-local services: the ones that directly affect the greatest number of people on a day-to-day basis and can be the most controversial. For all three, the discussion in these chapters is intended to report both how those services currently are financed and produced and what the expected effects of proposed changes in production and finance may be.

The last chapter does not involve specific services or expenditures but rather focuses on the overall economic and fiscal effects of individual state and local government fiscal behavior. Although economic conditions in a jurisdiction are different and separate from fiscal conditions of the government for that jurisdiction, it is important to consider the relationship between economic and fiscal conditions. That states compete for economic activity is obvious; whether that competition is effective in increasing welfare is not.

DOI: 10.4324/9781003030645-21

17 Education

Headlines

Gov. Whitmer signs "historic" school budget, says it sets "solid foundation"

"*Lansing* – Michigan Gov. Gretchen Whitmer signed a $17.1 billion budget for K–12 education into law Tuesday with her office calling it the largest investment in schools in state history.

The bipartisan bill brings an overall funding boost of about 10% over the current year, equalizes the base foundation allowance of schools across the state and puts more money into prekindergarten education.

Under the budget, the state's base foundation allowance will be $8,700 per student. In the current year, the minimum foundation allowance was set at $8,111, and the maximum guaranteed foundation allowance was $8,529.

For decades, there have been differences in funding levels among Michigan school districts. Lawmakers have been gradually working to close the divide between those that receive the most money per student and those that receive the least."[1]

Unprecedented California budget to usher in sweeping education changes[2]

"Gov. Gavin Newsom and the California Legislature have seized a once-in-a-generation deluge of state and federal funding to set in motion a sweeping and ambitious set of education programs that seemed implausible six months ago.

The 2021–22 state budget, which Newsom signed late Monday, expands the state government's commitment to meet the needs of all students and redefines what constitutes an equitable education for low-income kids in a state with rising inequality.

The budget will provide billions of dollars to speed up movement on long-discussed goals: creating transitional kindergarten (TK) for all 4-year-olds and extending the school year and school day for all low-income elementary students. It includes enough funding to make a dent in – if not potentially eliminate – a teacher shortage through teacher residencies and other credentialing incentives."

DOI: 10.4324/9781003030645-22

Data availability

The most complete source of information about all levels of education in the United States is the annual *Digest of Education Statistics* prepared by the National Center for Education Statistics, a division of the US Department of Education. The *Digest* is available at https://nces.ed.gov/programs/digest/. The *Digest* includes detailed information about the revenues and expenditures of public elementary and secondary school districts and schools, as well as for institutions of postsecondary education. However, the *Digest* includes much more, including data about enrollment, private school education, home schooling, characteristics of teachers and school staffing, classroom operations, and educational results. The *Digest* also includes data and information for international comparisons of education.

The Governments Division of the US Census Bureau is the major source of comprehensive data about expenditure by state and local governments, including spending on education. Census provides a special Annual Survey of School System Finances that covers revenues, expenditures, debt, and assets of elementary and secondary public school systems in all states and the District of Columbia. This report is available sooner than broader census data about all state and local government finances and can be found at www.census.gov/programs-surveys/school-finances.html.

Broader data about state-local finances are reported annually in several different reports. State and aggregate local government spending in various categories is reported annually with a year or two lag (www.census.gov/data/datasets/2018/econ/local/public-use-datasets.html). Education spending is reported in aggregate for elementary and secondary education and higher education. Data about the magnitude of education spending by specific types of local governments – counties, municipalities and townships, school and other special districts – are reported in the Census of Governments, which is completed every five years, in years ending in 2 or 7. The Census of Governments is available at www.census.gov/programs-surveys/cog.html.

As noted throughout the book, you may access these data directly from the census or by using the valuable and easy-to-use data tabulation utility maintained by the Urban Institute (https://state-local-finance-data.taxpolicycenter.org//pages.cfm).

The State Higher Education Executive Officers Association (SHEEO) publishes the annual report "State Higher Education Finance" (https://sheeo.org/). This report provides the most complete and detailed information about revenue, expenditure, enrollment, and pricing for public higher education in the US. In addition to this report, SHEEO provides analysis and information about a variety of public higher education fiscal issues.

The Organization for Economic Cooperation and Development (OECD) generates the annual report *Education at a Glance* (www.oecd.org/education/education-at-a-glance/), which provides data for the structure, finances, and performance of education systems among OECD member countries as well as some others.

Education is, by almost any measure, the primary service provided by state-local governments in the United States. Expenditures on elementary and secondary education represent the single largest category of state-local government spending, equal to more than one-fifth of aggregate subnational government general expenditure in 2018. Elementary and secondary education is an even larger fraction of local government spending, about 40 percent in 2018. This is more than four times greater than local spending for police and fire protection

and about nine times as great as local spending on roads. Public elementary and secondary education teachers alone represent about 15 percent of total state-local employees and about one-quarter of local government employees.

Data about education spending do not fully capture the importance placed on public education and state-local government educational institutions. Education has been identified as an important means of altering the income distribution, generating social mobility, improving economic growth, increasing the "international competitiveness" of firms in the United States, and even improving the operation of the political public-choice system in a democratic society. A substantial economic literature shows that the perception of local schools is an important factor influencing location choices of both individuals and firms and, through that, influencing property values in specific jurisdictions. Perhaps no local government fiscal or political issue generates as much or as intense public interest and comment as consideration of closing or consolidating local public schools or the results of educational assessment tests.

The major challenge for state and local governments regarding education is identified by Helen Ladd and Janet Hansen as follows: "How can education finance systems be designed to ensure that all students achieve high levels of learning and that education funds are raised and used in the most efficient and effective manner possible?"[3] Therefore, one can think of three broad and important public policy issues: (1) How should public education be financed, including the relative role of state as opposed to local governments, the appropriate structure for state aid to local schools, and the relative roles of various taxes and charges? (2) How can education be produced most effectively and efficiently, including questions about school and class size, teacher compensation and training, and the role of technology? (3) How should educational results be measured and improved for all students, including issues about the appropriate structure and uses for student testing and mechanisms to reduce educational differences among groups of students?

Education environment

In 2019 expenditures for public elementary and secondary schools were about $752 billion, equal to about 3.7 percent of GDP and $16,000 per student in average daily attendance at those schools, as shown in Table 17.1. Public school expenditures have increased substantially over this period but generally remained between 3.5 and 4.0 percent of GDP. Expenditures per pupil also have increased substantially over the past 50 years, even in real

Table 17.1 Overview of public elementary and secondary education, various years

Year	*Spending (billion)*	*Spending as % of GDP*	*Spending per pupil (2019–20$)*[a]	*Number of school districts*	*Number of public elementary schools*	*Number of public secondary schools*
2019	$752.3	3.7	$15,946	13,551	73,686	30,160
2010	607.0	4.1	15,471	13,625	67,140	24,651
2000	381.8	4.1	13,050	15,178	64,601	21,994
1990	212.8	3.9	11,237	15,367	59,015	21,135
1980	96.0	3.7	8,253	15,912	59,326	22,619
1970	40.7	4.1	6,503	17,995	65,800	25,352
1960	15.6	3.1	4,124	40,520	91,853	25,784

Source: US Department of Education, *Digest of Education Statistics*

Notes:
a Current expenditures per pupil in average daily attendance for 2018.

terms (after adjustment for inflation). Real expenditures per pupil by public elementary and secondary schools were about four times greater in 2019 than in 1960 (see Figure 17.1).

Public schools in the United States are operated by both independent school districts and dependent school systems that are part of general-purpose local governments such as cities, townships, or counties. The number of school districts has decreased substantially over the

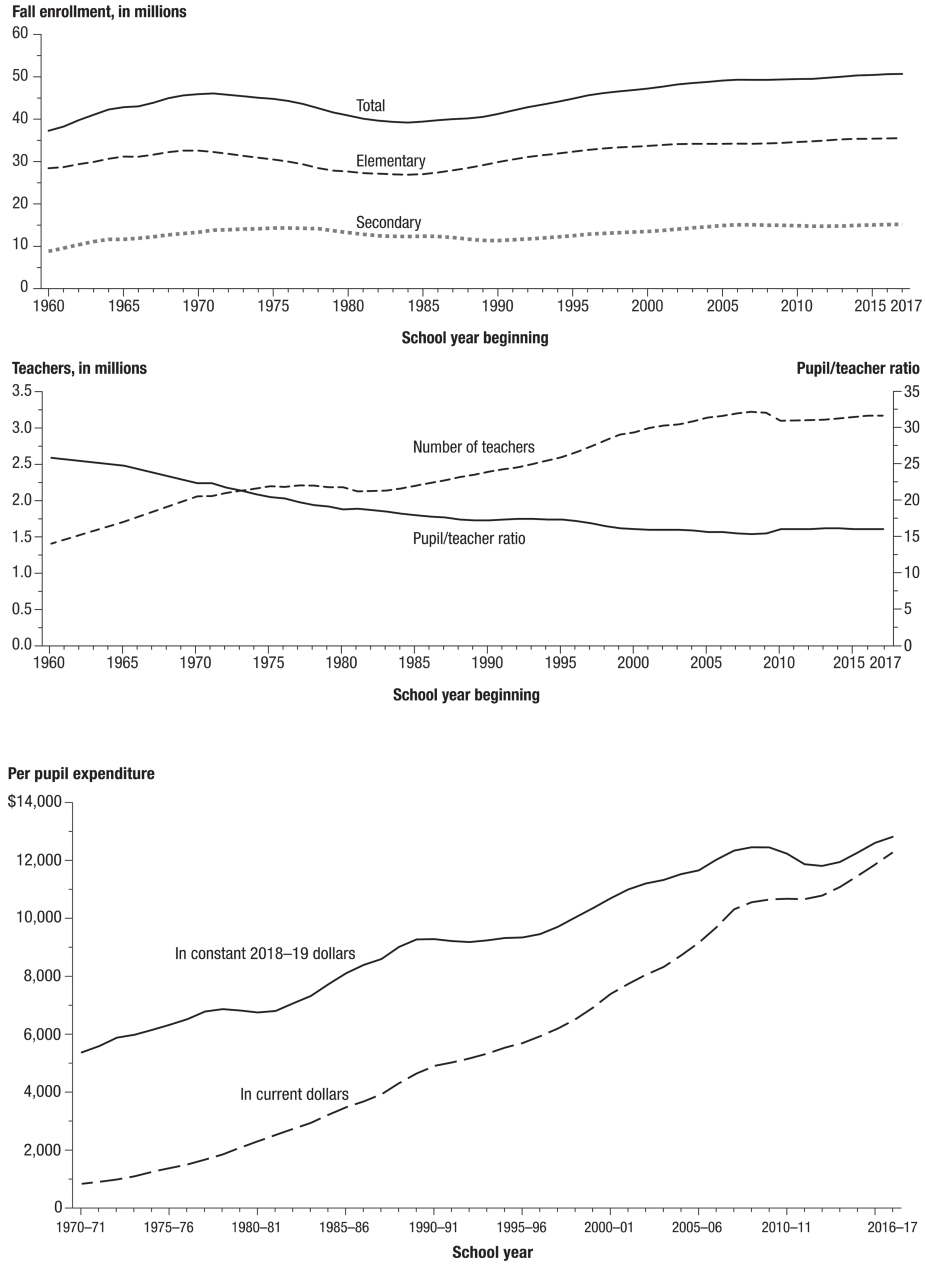


Figure 17.1 Enrollment, number of teachers, pupil/teacher ratio, and per pupil expenditures in public elementary and secondary schools: 1960–61 through 2017–18

Source: Department of Education, National Center for Education Statistics, "Digest of Education Statistics 2019"

past 60 years, particularly between 1960 and 1970, as shown in Table 17.1.[4] In 2019, there were more than 15,500 independent school districts operating more than 91,000 traditional public schools. There were substantial decreases in the number of public elementary schools until 1985. At the same time, the number of public secondary schools decreased slightly. Since 1995, the number of elementary and secondary schools has been increasing again, reflecting growth in the number of students.

An important and relatively recent development is the growth of **charter schools**, which are public schools providing free elementary and/or secondary education under a specific charter granted by the state legislature or other appropriate authority. Charter schools, which may be operated by public school districts, universities, or private organizations, receive state and federal financial support similar to other public schools (i.e., those operated by traditional school districts). Part of the idea of charter schools is to provide options to students and families besides the traditional neighborhood schools and, in the process, provide competition to those traditional districts and schools. In 2018, there were 7,193 charter schools operating in about 44 states with more than 3.1 million students enrolled, about 6 percent of total enrollment.[5]

There were an estimated 50.8 million students enrolled in these public schools in the fall of 2019. In addition, there were another 5.7 million students enrolled in private elementary and secondary schools. Public school enrollment generally increased in the 1950s and 1960s – peaking in elementary schools in the late 1960s and in secondary schools in the mid-1970s, as shown in Figure 17.1. After that time, public (and private) school enrollment decreased, largely because of demographic factors, until the mid-1980s. Elementary school enrollment began to increase again in 1985 and secondary school enrollment in 1991. Total expenditures by schools, per pupil expenditures, and even real per pupil expenditures continued to increase in the 1970-to-1985 period when school enrollment was declining. In recent years, enrollment has begun to level off.

In 2019, state governments provided about 47 percent of the revenue for public school spending in aggregate, and local governments – especially the school districts – provided about 46 percent, as shown in Figure 17.2. The federal government provided about 8 percent of public school spending through a combination of direct grants to school districts

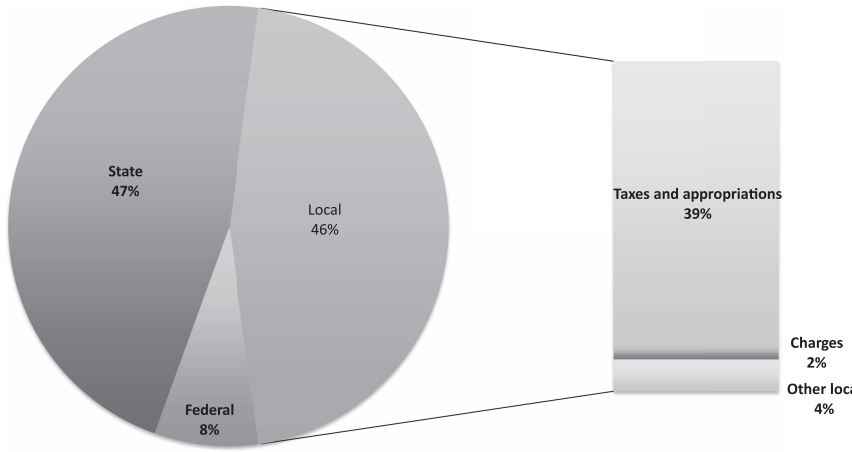


Figure 17.2 Distribution of public elementary and secondary education revenue, 2019

Source: US Census Bureau, Annual Survey of School System Finances, 2019

and funds provided through state governments. The federal government's role has always been relatively small, increasing a bit from 1960 to 1980 but relatively constant since (except for recession years). Private sources of spending (for private schools) represented only about 8 percent of total school spending in that year. Local taxes (mostly property taxes) constitute the bulk of local revenue for schools and amount to 37 percent of total revenue. Also, fees and charges represent a very small fraction of revenue for public education.

The relative roles of state compared to local governments in financing education changed dramatically in the 1970s, with the two levels of government effectively switching positions. Prior to the 1970s, state governments provided about 40 percent of school revenue on average and local governments more than half. Responding to a number of forces, state governments attempted to equalize educational opportunity across districts in the 1970s, which resulted in increased state financial commitments and corresponding decreases in the financial responsibility of the localities. The increased state share was accomplished by changing both the magnitude and type of state grants to school districts. Because the primary local revenue source for schools (and only source in many states) is the property tax, the increased state role in financing education reduced the demand for property tax increases in these years and, in some cases, resulted in property tax reductions. After being about equal in the first half of the 1990s, the state share has since exceeded the local share.

There is great diversity among states in the relative role of the state government in financing education. The distribution of states by the state government's share of public school expenditures in 2019 is shown in Figure 17.3. The state government provides essentially all funds for schools (excepting federal aid) in Vermont and Hawaii. Indeed, elementary and secondary education is a state government function in Hawaii, where local school districts do not exist. (The federal share is relatively large in Hawaii because of the substantial US military presence in the state.) The state government similarly provides a relatively large share of revenue in Arkansas, Washington, and New Mexico. In contrast, local government in New Hampshire, Nebraska, Texas, and South Dakota substantially finances public schools. There are a number of interesting differences between states that might be thought of as similar in other ways. Perhaps most dramatically, Vermont has the largest state share (90.8 percent), whereas New Hampshire has the lowest state share (30.7). In Michigan the state share is 57.7 percent, but it's only 39.3 percent in neighboring Ohio. There have also been major changes over time in the role of state governments in many of these states as new financing systems were put in place. The obvious conclusion is that there is no one or even typical way that states finance elementary and secondary education. As we will discover in this chapter, the economic, political, and social factors that underlie these financial differences extend as well to the states' role in regulating education.

Just as there are differences among states in how elementary and secondary education is financed, there are also substantial differences among the states in the level of educational spending. Per pupil spending on current services (excluding capital spending) by all public schools in aggregate was $13,187 in 2019, but varied from $25,139 in New York to $7,985 in Idaho. The **coefficient of variation**, a comparative measure of variation in distributions equal to the **standard deviation divided by the mean**, was .29 for 2019, meaning that among the states, there was an average of about 29 percent variation in per pupil spending around the mean. There has been an increase in the degree of difference among states in the level of education spending over the past 60 years, as the interstate coefficient of variation for per pupil spending was .25 in 1992 and 1980, .21 in 1970, and .22 in 1960.

The differences in per pupil spending among different school districts within states appear to be about as large as the differences among states. Wayne Riddle and Liane White (1994) report, for example, that the ratio of per pupil expenditures for districts at the 95th percentile

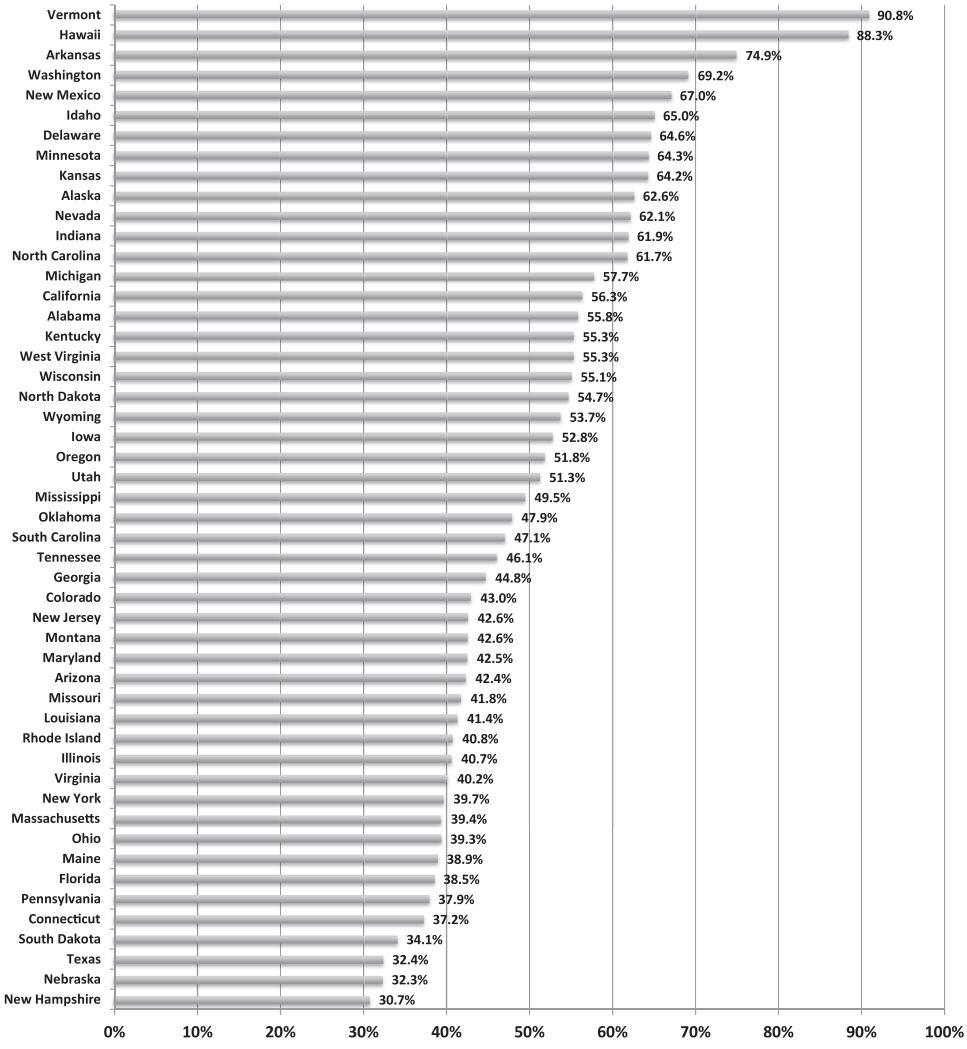


Figure 17.3 State government share of public K–12 school revenue, 2019

Source: US Census Bureau, Annual Survey of School System Finances, 2019

to those at the 5th percentile had a median value of about 1.5 in 1990 for those states with local school districts and varied from 3.1 to 1.3. (The ratio is 1 in Hawaii, which has a state school system.) Similarly, Linda Hertert et al. (1994) report the coefficient of variation for per pupil revenues among districts within states varied from .07 (West Virginia) to .35 (Montana) in 1990, with a median of about .175. Seventeen states had coefficients exceeding .20. Mike Maciag, writing in *Governing* (July 27, 2018), reported population-weighted coefficients of variation for per pupil school spending in 2016 varied from .36 (Alaska) to .05 (Florida). Recall from Chapter 7 that differences in expenditures can result from differences in input prices and environmental conditions as well as from differences in demand, so these differences in per pupil spending may not correspond to equivalent differences in educational results.

Salaries for teachers and other workers (administrators, librarians, counselors, maintenance persons, bus drivers) comprise the bulk of the expenditures by public schools. Employee compensation (salaries plus benefits) represented about 69 percent of the expenditure of public school systems in 2019. The number of public elementary and secondary school teachers also has increased over the past 50 years, including the period between 1970 and 1985 when the number of students was decreasing. As a consequence, the pupil-teacher ratio also decreased over the past 50 years, from nearly 26 students per teacher in 1960 to about 16 in 2017, a decrease of about 40 percent (see Figure 17.1). Thus, the picture that emerges of the provision of public education since 1960 is one of increasing spending per pupil, largely because of decreases in class sizes, and consolidation of both school districts and elementary schools within districts.

Eighty-seven percent of spending by public elementary and secondary schools in 2019 was for current services to students, the bulk of which was current spending for direct instructional expenses, which represented 53 percent of total spending, whereas support services accounted for another 30 percent. In contrast, capital expenditure on such things as buildings, technology, and transportation equipment represented about 10 percent of total spending by public elementary and secondary schools.

Intergovernmental grants for financing education

Unless state governments want to operate the public school system directly (as in Hawaii), states rely on intergovernmental grants to assist local governments in financing public education, and those grants must be one of the two general forms – lump sum or matching – described in Chapter 9.

Foundation aid

Lump-sum school grants are usually referred to as **foundation aid** because the per pupil grant represents a minimum expenditure level; the state aid is thought of as providing a basic foundation on top of which local revenue supplements may be added. Prior to the 1970s and then starting again in the 1990s, states generally used lump-sum per pupil grants to support local education. Those grants were sometimes equal per pupil amounts provided to all school districts, but more commonly, the amount of the per pupil grant for each district was directly related to educational costs in the district or inversely related to some measure of district wealth. The grant is lump sum because the size of the grant (per pupil) is independent of the district's choice about the level of spending (and thus taxes).

A foundation aid program requires a basic grant per pupil and perhaps a way of reducing the grant for richer districts. A generic formula for a foundation aid grant is

$$G_i = F[1 + C_i] - [R^{\star}][V_i]$$

where
G_i = per pupil grant to district i
F = basic per-pupil grant or foundation level
C_i = cost index for district i
$R^{\star}$ = basic property tax rate set in the formula
V_i = per-pupil property tax base in district i.

In the most basic application of the formula, suppose a state policy effectively sets all $C_i = 0$ (no adjustment for cost differences) and $R^{\star} = 0$ (no required local property taxes). In

that case, each district receives an equal grant of $F per pupil. The state policy might prohibit local tax revenue to supplement this amount, might allow local taxes for some specific purposes (capital investment, for example), or might allow any amount of local tax supplement.

Suppose, instead, that a state establishes such a program with F = $8,000 and $R^{\star}$ = $10 per $1,000 of taxable property value (assuming all C_i = 0 for a moment). The largest (per pupil) grant any district could receive is $8,000, but only if V_i is zero. Compare two school districts, one with per pupil property value of $50,000 and the other $100,000. The first would receive a per pupil grant of $7,500 [$8,000 – ($10 x 50)] and the second $7,000 [$8,000 – ($10 x 100)]. Because the only district-specific factor in the formula is the property tax base per pupil, which is outside of the direct control of the district, these are lump-sum grants. If both districts had identical property tax rates equal to the basic rate in the formula ($10), both would end up with $8,000 per student to spend. The first would collect $500 in property taxes per pupil and receive $7,500 in grant funds; the second would generate $1,000 from property taxes and $7,000 from the grant program. Thus, all districts are guaranteed $8,000 per pupil, the foundation amount. If districts wish to spend more than the guaranteed $8,000 per pupil and that is allowed, they must collect local taxes to finance all the additional spending.

In states where there are substantial differences in costs among districts, the nominal foundation level must be greater in districts with relatively higher costs to insure equal real foundation spending. For instance, if costs are 10 percent greater than average in one district (so C_i = .10) and that district has per pupil property value of $100,000, the district's per pupil grant would be $7,800 [(1.1 x $8,000) – ($10 x 100)]. This grant, combined with $1,000 of local property tax, would provide $8,800 per student to spend. A similar wealth district with average costs would receive only $7,000 in grants. When combined with $1,000 of local property tax, this district has $8,000 per student to spend. Per student spending is 10 percent greater in the first case because costs are 10 percent greater. In implementing such a formula, one might adjust for two types of cost differences – differences in input prices (especially for labor) and differences in environment (such as the nature of the students who are to be educated).[6]

Under what conditions would a district's grant be zero? A district would get no grant if its per pupil property tax base was equal to or greater than $(F/R^{\star})/(1 + C_i)$. If a district's per pupil property value is $800,000 and C_i = 1 for the example, then the per pupil grant is zero [$8,000 – ($10 x 800)]. With a per pupil tax base of at least $800,000 and standard costs, the basic tax rate of $10 would generate the full foundation amount in taxes; no grant is required to bring such a district up to the foundation level.[7]

Under some foundation aid programs, districts may choose tax rates greater (but often not less) than the basic rate in the formula. Compare two districts with $50,000 and $100,000 property tax bases per pupil. If they both select property tax rates of $40 per $1,000 of taxable value, the first collects $2,000 of property taxes per pupil and receives a grant of $7,500, allowing spending equal to $9,500 per pupil. The second collects $4,000 per pupil in property taxes and receives a grant of $7,000, allowing spending of $11,000 per pupil. Equal property tax rates do not generate equal amounts of per pupil spending if the tax rates are greater than the basic rate in the aid formula.

Guaranteed tax base aid

A **guaranteed tax base (GTB)** or **district power equalizing** plan is intended to provide an equal, basic per pupil property tax base to each district, rather than the basic minimum expenditure level of foundation programs. Per pupil spending may still differ among school districts if they choose different property tax rates, but the aid program will effectively

provide the same tax base to which the selected tax rate is applied. A GTB plan involves matching grants that reduce the price of education to the school districts, which is the important economic difference from foundation grants.

The general formula for GTB grants is

$$G_i = B + (V^{\star} - V_i)R_i$$

where
B = basic or foundation grant
$V^{\star}$ = guaranteed per-pupil tax base
V_i = per-pupil tax base in district i
R_i = property tax rate in district i or maximum rate allowed for the guarantee.

In a pure GTB program, $B = 0$, and R_i is the local tax rate without any maximum. In that case, districts receive positive grants if the per pupil tax base (V_i) is less than the guaranteed tax base ($V^{\star}$), with the grants being positively related to the tax rate selected by the district. Although there is no theoretical reason why these grants could not be negative, requiring that districts with $V_i > V^{\star}$ transfer funds to the state for redistribution, only in a few cases has such **recapture** of funds been tried. In one variation on this program, some states mix the foundation and GTB styles by providing a basic per pupil grant in addition to the guaranteed base: that is, $B > 0$. In that case, a district receives a per pupil grant exactly equal to the foundation amount if $V_i = V^{\star}$, with that grant being reduced if $V_i > V^{\star}$ until G is zero (negative grants again are not used). In one other variation, the guaranteed base $V^{\star}$ applies only to a maximum, state-specified tax rate; districts may set a higher rate, but it will only generate more local tax revenue and not additional grant funds.

To illustrate the operation of the GTB formula, suppose that a state program guarantees a tax base of $200,000 per pupil ($V^{\star}$ = $200,000) and sets no maximum on the tax rate that is eligible for that guarantee. Districts with a per pupil property tax base of $200,000 or more would receive no education grants from the state government. For districts with V_i < $200,000, the grant is inversely related to per pupil wealth. For instance, a district with a per pupil property tax base of $50,000 and a tax rate of $40 per $1,000 of taxable value would collect $2,000 per pupil [$50,000 x ($40/$1,000)] from property taxes and receive $6,000 per pupil [$150,000 x ($40/$1000)] from the state grant program. A district with a per pupil tax base of $80,000 and the same tax rate would collect $3,200 per pupil [$80,000 x ($40/$1,000)] from property taxes and $4,800 per pupil [$120,000 x ($40/$1,000)] in state aid. Both receive $8,000 per pupil in total, which is the revenue generated from a base of $200,000 and a tax rate of $40. In essence, all districts are guaranteed $200 per pupil for each $1 of property tax rate selected. Any portion of that amount that is not provided by the local property tax base is made up by a state grant.

It follows that an increase in a district's tax rate also will lead to a larger grant per pupil for districts with $V_i < V^{\star}$. Suppose that the district with a per pupil tax base of $50,000 increases its property tax rate to $41 per $1,000 of taxable value. That additional $1 in the tax rate generates an additional $50 per pupil from local property taxes and $150 per pupil from state aid; the net effect is an increase of $200 per pupil for each $1 of tax rate, the guarantee amount. The local district's share of the additional per pupil revenue is $V_i/V^{\star}$, 0.25 in this example. The district with a per pupil value of $50,000 pays only 25 percent of the cost of increased school expenditures per pupil, the remainder financed by the aid program. In contrast, the district with per pupil value of $80,000 would pay 40 percent of the cost of

increasing per pupil spending ($80,000/$200,000). One effect of a GTB aid program is to reduce the local price of providing education. The marginal cost or price to the local district of increasing per pupil spending by $1 is V_i/V^* if $V_i < V^*$ and $1 otherwise.

Economic effects of state aid

One important economic and policy issue about different state aid programs is their expected effects in influencing recipient school districts to alter educational expenditures. In short, do state education grants induce school districts to spend more on education and, if so, by how much? One way to understand the potential economic effects of different grant types is to work through the responses of specific districts given some assumptions about economic and fiscal conditions. The following educational grant simulation does just that. Information about the demand for educational service and the initial expenditure choices of several representative schools is first presented, and then a new proposed state education grant program is described. The effect of that grant program on each school district's behavior is then analyzed, given the demand restrictions.

Suppose that a state consists of four school districts, denoted A through D, each financing education solely with local property taxes. The initial fiscal situation in each of those districts is shown here, with V equaling the per pupil taxable property value in each district, R equaling the property tax rate in each district specified in dollars of tax per $1000 of taxable value, and E equaling the per pupil school expenditure in each district:

A	*B*	*C*	*D*
V = $150,000	V = $200,000	V = $250,000	V = $300,000
R = $56	R = $53	R = $54	R = $60
E = $8,400	E = $10,600	E = $13,500	E = $18,000

Thus, district A is the low-wealth, low-spending district while D is the opposite – high wealth, high spending. The product of the per pupil value and tax rate equals the per pupil expenditure in each district, which is required if local property taxes fully finance the schools.

Suppose it is known that the (absolute value of the) price elasticity of demand for educational spending is the same in each district and equal to .5, so demand for education is price inelastic. This value is consistent with the evidence reported in Chapter 3; if anything, it may be relatively high. Similarly, suppose that the income elasticity of demand for education in each district is 1.0, and the average family income in each district is half as large as the per pupil property value. (Such would be the case if all the property is residential and consumers buy houses valued at twice their income, so a consumer with a $50,000 income has a $100,000 house.)

The state government introduces a program of state education grants to these school districts, to be determined by the following formula:

$$\text{Grant per pupil} = \$500 + (\$250{,}000 - V)R$$

where V and R correspond to the per pupil value and tax rate in each district, and the per pupil grant may not be smaller than zero (no recapture). The policy question is to analyze what the expected effect of such a grant program would be on educational spending and property taxes in each district and, given that, what the potential advantages might be from the state's point of view.

The expected effects of the grant program on these school districts are as follows:

	A	*B*	*C*	*D*	*Average*
Initial spending	$8,400	$10,600	$13,500	$18,000	$12,625
New spending	$10,247	$11,718	$13,554	$18,000	$13,379.75
Per pupil grant	$6,100	$3,150	$500	$ 0.0	$2,437.5
Initial tax	$8,400	$10,600	$13,500	$18,000	$12,625
New tax	$4,147	$8,568	$13,054	$18,000	$10,942.25
Initial tax rate	$56.00	$53.00	$54.00	$60.00	$55.75
New tax rate	$27.65	$42.82	$52.22	$60.00	$45.67

District D receives no grant because its per pupil value is greater than the $200,000 base guaranteed in the grant formula. (D's grant from the formula is negative, but the smallest a grant can be is zero.) Therefore, it is expected that the grant program will have no effect on education spending or property taxes in district D.[8]

District C receives a lump-sum grant of $500 per pupil because its per pupil value exactly equals the guarantee amount [$G = \$500 + (0)R$]. Thus, district C receives the foundation amount but no matching aid from the GTB component of the formula. The lump-sum aid means that this district now has $500 more per pupil in income, which can be spent to buy more education service or other things. The per pupil income in district C is $125,000, so the $500 grant represents an income increase of .4 percent [($500/$125,000) x 100%]. With an income elasticity of demand for education equal to 1, an increase in income of .4 percent will cause an increase in educational spending of .4 percent. Thus, per pupil spending is expected to increase by $54, from $13,500 to $13, 554. Although the district receives a grant of $500 per pupil, only $54 of that amount is additional educational spending. The rest of the grant goes for lower local property taxes and more private spending by taxpayers. The grant allows district C to lower its property tax rate to $52.22 from $54.00. The district collects $13,054 per pupil in property taxes and receives $500 per pupil in state aid for per pupil education expenditures of $13,554. Spending rises slightly, but local property taxes decline by a greater amount.

District A receives both the full foundation amount of $500 per pupil and matching aid from the GTB part of the formula because its per pupil value is less than the guarantee amount. The grant to A, given the initial conditions, would be $6,100 [$500 + ($100,000) ($56/$1000)], but that grant amount will change as district A changes its property tax rate in response to the grant itself. First, district A receives the $500 of foundation aid, which it would continue to receive even if its property tax rate (and spending) was zero. That $500 grant represents a .67 percent increase in per pupil income [($500/$75,000) x 100%], which is expected to increase per pupil spending by .67 percent or $56 because the income elasticity of demand for education spending is assumed to be 1.[9]

In addition, the matching grant from the GTB formula reduces the "price" of educational spending to the residents of district A. The new price is V_A/$250,000, or .60. To increase per pupil spending by $1, district A must collect an additional $.60 in local property taxes per pupil and would receive an additional $.60 per pupil in state aid. Without the grant program, the local price was $1, so the effect of the grant is to lower the education price in A by 40 percent. If the price elasticity of demand for education spending is .5, then per pupil spending is expected to increase by 20 percent as a result of the matching grant. Through this effect, per-pupil spending in A would increase by $1,691. Thus, the new level of per-pupil education spending in district A is expected to be about $10,247, an increase of about $1,747 due to the grant. District A lowers its property tax rate to $27.65 from $56.00

as a result of the grant. The district collects $4,147 per pupil in property taxes and receives $6,100 per pupil in state aid, allowing spending of $10,247 per pupil. Of the total education grant of about $6,100, about $1,847 goes for greater education spending and the rest into lower taxes. The grant causes a larger expenditure increase in district A than in C because A receives a matching grant in addition to the foundation amount.

District B also receives both the full foundation amount of $500 per pupil and matching aid from the GTB part of the formula. First, district B receives $500 of lump-sum foundation aid, which it would continue to receive even if its property tax rate (and spending) was zero. This component of the grant increases income by .5 percent [($500/$100,000) × 100%] and desired spending by an additional .5 percent or $53.

In addition, district B faces a price effect from the matching component. In this case, the price effect is smaller because the district's per pupil tax base is larger. Because district B has a per pupil tax base of $200,000, its price for additional school spending is $0.80 [$200,000/$250,000]; B can increase spending by $1 by collecting an additional $.80 in property taxes and receiving as a result an additional $.20 in state aid per pupil. The grant has lowered the tax price by 20 percent (from $1 to $.80), which is expected to increase desired spending by 10 percent given the price elasticity. This represents an increase of $1,065 [.2 × $10,653]. Thus, the new level of per pupil education spending in district B is expected to be about $11,718, an increase of about $1,118 due to the grant. District B collects $8,568 per pupil in property taxes and receives $3,150 per pupil in state aid to fund spending of $11,718.

On the basis of this analysis, the proposed education grant program is expected to have the following effects in the state:

1 Per-pupil education spending increases slightly by about 6.0 percent, on average, although spending rises in only three of the districts. A little less than 40 percent of the state grant funds go for higher spending on education.
2 The variance in per pupil spending among the districts in the state is reduced only slightly. The ratio of the highest to lowest spending level is reduced to 1.76 from 2.14, about a 21 percent change. But the dollar difference between those districts is still $7,753.
3 Property taxes are reduced in all districts that receive state grants, resulting in about a 18 percent decrease in property tax rates, on average. Approximately 60 percent of the state education grant funds go to reduce local property taxes.
4 Property tax rates are reduced more in districts with lower per pupil property values, so effective tax rates now increase with property value. The ratio of tax rate to per pupil expenditure – which represents the tax rate required to provide per pupil spending of $1 – is made much more equal across the districts. Without the grants, those ratios were .0067 for A, .005 for B, .004 for C, and .0033 for D. Thus, a tax rate of $.067 per $1,000 of taxable value was required in order to spend $1 per pupil in A, but a rate of only about $.004 was required in C. With the grants, the required rates are $.0027 in A, $.0036 in B, and $.004 in C.

If recapture – that is, negative grants – were allowed, the price to local residents in district D per dollar of per pupil spending would have been $1.20 ($300,000/ $250,000). Residents of district D would have had to increase local property taxes by $1.20 per pupil in order to increase spending by $1 per pupil because the district would also have to pay additional funds to the state. Thus, the price of education to residents of D rises by 20 percent, which is expected to cause a 10 percent decrease in per pupil spending if the price elasticity is. 5. Thus, per pupil spending in D would have fallen to $16,200. That would generate more spending

equality than without recapture, although the differences would still be large, and the increased equality would be achieved by worsening educational opportunity in one district.

Policy implications

It is difficult to summarize the actual aid programs used by the states because each typically has a number of different components, the structure of the aid programs often includes fiscal features specific to each state, and the definitions of programs differ. Yao Huang (2004) summarized state aid systems for education for all states in 2001. Focusing only on general aid for schools (ignoring specific categories such as transportation or capital investment), Huang reports that thirty states were using foundation aid programs, all but two of which included some type of adjustment for cost differences. Eleven states used a guaranteed tax base system in addition to a foundation level to create an incentive for equalization, and only three states used a guaranteed tax base aid system exclusively. The remaining states used other systems, including flat per student grants in North Carolina, Pennsylvania, and Rhode Island and full state funding in Hawaii.

The Education Commission of the States reports current and detailed information about school funding systems in all states.[10] For 2019, they report that 38 states used a foundation aid formula for state support of schools, which they defined as follows: "[D]istricts receive a base amount of funding per student with additional money or weights added to meet the needs of high-need student populations." Another 8 states apply what the commission refers to as a "resource-allocation model," under which "states distribute resources rather than assigning weights or dollar values based on certain criteria," with the remaining states using some mixture. For example, North Carolina is a resource-allocation model state and provides funds to schools to pay for teacher and administrator salaries and textbooks based on the number of students.

The simplest foundation plan, of course, is one that sets equal spending in all districts. Such a plan could set targeted per pupil spending in each district at F and pay state grants to each district equal to the difference between F and the local property tax collected at some mandated level. Other options include foundation amounts (F) that vary with district costs, again with some maximum allowed expenditure or limit on local supplements to the foundation. Most states that switched from GTB aid programs to foundation aid coupled the foundation level with caps on spending or revenue. Spending caps are necessary to prevent growing spending differences among districts (or to bring about additional equalization) if the foundation is to be below the highest district spending levels.

Kenyon (2012) reported that 40 states used foundation aid systems. Whatever system is used, limits on spending or revenue are common. Three states effectively permit no local supplementation of revenue beyond that in the state formula, with another 25 states limiting local supplementation by setting maximum tax rates, setting limits on the per student amount of supplemental funds that can be collected, limiting the growth of revenue or spending, or requiring that part of any local supplemental revenue be recaptured by reducing state aid.

Regarding adjustments for cost differences, C_i in the general foundation aid formula, Tammy Kolbe et al. (2021) report that almost all states include adjustment for students differences (disabilities, economically disadvantaged, English-language learners, and so on), fewer states (perhaps roughly half) apply fund adjustments for district characteristics (density, area, transportation cost, or grade range), and only 11 states provide adjustments for teacher cost differences (based on regional wage differences). Baker (2008) has noted that such adjustments for teacher cost differences may exacerbate the equity effects of state school aid programs if labor costs are relatively higher in higher-wealth regions or districts.

Clearly, foundation aid programs are most common in 2021, although the historical process that led to this is complicated. One of the traditional criticisms of foundation grants is

that they do not equalize tax resources across districts and thus may not equalize spending unless the basic tax rate in the foundation aid formula is set high relative to the actual rates employed by school districts (which requires that the foundation level of spending also be set high) or district choice of R is limited.

This effect of the traditional foundation aid programs in the late 1960s and early 1970s led to a series of court challenges to the educational systems in place in various states. In these cases, it was argued that per pupil spending for local education was dependent on and generally varied by the per pupil taxable wealth of the school district and not exclusively on the wealth or income of the family. Because state aid programs did not offset this dependence, it was argued that students were being denied equal protection under the law. These cases were successful in a number of states, the courts finding that the state aid systems violated the equal protection clause of the Fourteenth Amendment to the US Constitution or similar equal protection provisions in state constitutions. The *Serrano* decision in California in 1971 was the most influential and often cited. The courts ordered the states to devise state aid programs that would eliminate (or at least reduce) the relationship between property wealth and per pupil spending in school districts.[11]

As a result, some states increased the basic grant amount in their foundation programs while many others switched to forms of guaranteed tax base aid because those programs provided the wealth neutrality that the courts had demanded. With GTB aid, each district is guaranteed a minimum tax base, usually property value per student, so spending need not depend on district property wealth.

However, substantial equalization of per pupil spending among school districts often did not happen in states that adopted GTB aid. Because the demand for education spending is price inelastic, the price reductions caused by the matching grants do not influence consumption very much. Similarly, given the magnitude of income effects, lump-sum grants also do not influence education spending levels substantially. As a result, most of the state education grant funds went to reduce local property taxes rather than to increase education spending. Therefore, the wide differences in educational spending between districts within states were not reduced substantially. As Richard Murnane (1985) has noted,

> It seems clear that the main lesson from the first ten years of school finance [reform] is that GTB finance plans which lower the price of education to property-poor communities, but leave the communities free to choose between more spending on education or lower tax rates, will not produce an equalization of per-pupil spending levels across school districts and will not result in districts spending enough to provide their students with a strong basic academic program.
>
> (p. 133)

This difficulty cannot be changed by increasing the size of state aid programs if the structure of those programs remains the same. If demand is price inelastic, a substantial portion of the grants will go to reduce taxes regardless of how much the price of education spending is reduced. Therefore, even though many states adopted GTB aid programs, which are theoretically wealth neutral, court challenges to state education finance systems continued. Huang et al. (2004) report that as of 2003, only 5 states (Delaware, Hawaii, Mississippi, Nevada, and Utah) had not faced any litigation regarding education finance. State education finance systems had, at the time, been rejected or overturned by the courts in 18 states, and systems have been upheld in 16 states. Thus, Huang et al. (2004) report,

> Of these thirty-four states, at least eleven have ongoing litigation in which plaintiffs are seeking further reform or . . . presenting new evidence or legal theories. In an additional

> four states, state supreme courts have issued interim decisions favorable to plaintiffs and litigation continues. Finally, suits are pending in three states.
>
> (p. 329)

Anna Lukemeyer (2004) reports that the basis for continuing court challenges to state education finance systems has changed over time. Some challenges still focus on the wide differences in educational spending per student that exist within states, although often no longer using an "equal protection" argument but rather based on clauses in state constitutions about the required state role in providing or guaranteeing adequate or appropriate education for all students. This more recent set of court challenges focuses on results: whether the education system in a state serves to provide an "adequate" or "efficient" education to students in aggregate. In such cases, plaintiffs are less concerned about spending differences per se and more about the level of education spending, services, and outcomes in the state overall. For instance, Lukemeyer (2004) notes the 1989 Kentucky Supreme Court decision in which the court found that the constitution's requirement of "an efficient system of common schools throughout the state" was not being met and ordered changes to provide each student "an equal opportunity to have an adequate education" and then defined an "adequate education" at a quite high level.[12]

Martin West and Paul Peterson summarize the legal and policy issues involved in the new direction of court challenges to school finance in their introductory chapter "The Adequacy Lawsuit: A Critical Appraisal" in the book *School Money Trials: the Legal Pursuit of Educational Adequacy* (2007). They note that following the Kentucky case mentioned earlier, "courts throughout the country have based their decisions at least partially on adequacy grounds in the vast majority of cases won by the plaintiffs." However, as authors of other chapters in the book note, the adequacy challenge in courts has inherent limitations as well. West and Peterson conclude "[courts] lack the information and institutional capacity to accomplish something as complicated as assessing the best way to achieve an adequate state education system." Thus, in the end, school finance is a policy issue for the political state and local government system.

What are the options for state policymakers who wish to equalize education opportunities or spending among school systems in their state or increase the level of spending throughout the state?[13] In general, there are three approaches. First, a state government can assume the responsibility for directly providing elementary and secondary education, effectively having a single-state school district as in Hawaii. This would certainly involve the most dramatic and traumatic change to the fiscal system among the alternatives. There are at least two economic reasons why this alternative may not be desirable. If there are cost differences among different school districts, then equal per pupil expenditures may not generate equal educational service. Politically, it would likely be very difficult not to have equal per pupil spending in all areas with a state system. The advantage of local districts is that such cost differences as well as differences in individual desires about emphasis in education can be recognized and acted on.

The second option is for states to mandate a minimum amount of per pupil spending through their aid programs and to set that minimum relatively high compared to actual spending levels in that state. The second prescription is crucial because, unless the minimum applies to a number of school districts, there will be little equalization. States can do this using either a foundation or GTB program. With foundation aid, the state can require that districts levy at least the specified tax rate in the formula, with both that rate and the foundation amount set relatively high. For instance, if the foundation amount is set at $5,000 per pupil and the required tax rate is $50 per $1,000 of taxable value, districts with values less than $100,000 per pupil ($5,000/[$50/$1,000]) would receive foundation grants. But the minimum any district could spend is $5,000 per pupil. With GTB aid, this result can

similarly be accomplished by setting a relatively high minimum required tax rate. Returning to the simulation, if the minimum were set equal to the average rate of about $47 that prevailed after the grants were received, districts A, B, and C would have to increase their tax rates and per pupil spending. By requiring a number of local districts to increase spending up to the minimum amount, the state government is restricting local choice but to a lesser extent than results from direct state provision of education.[14]

This second option – to narrow school spending differences raising the minimum allowed spending or tax rate – is often accompanied by limits on maximum allowed spending (or maximum allowed growth of spending) for high-spending districts. Such spending limits are intended to prevent or reduce spending increases that would occur in these districts (due to income growth or other factors) to assist in narrowing the differences. Such spending limits have at least three difficulties. By preventing some districts from raising local taxes to support additional desired education service, states may reduce support for the education finance system overall. In addition, such spending caps may reduce the overall level of spending on education. Finally, these limits might induce residents of the limited districts simply to purchase more education service in a different way – from the private market or through school-parent associations or foundations, for instance. Of course, this last difficulty is the ultimate reason it is impossible to cap spending by higher-income families; the state may limit school spending but not spending on education.

Evidence reported by William Evans et al. (1999) and by Caroline Hoxby (2001) suggests that states have in fact pursued this second option, so court-ordered changes in state systems to finance education led to equalization of education resources among districts. Evans, Murray, and Schwab examined education provision in 46 states during the period 1972 to 1992; 11 of those states experienced court-ordered school finance reform in those years. They report that those education finance reforms, all of which involved increases in the state government role in financing schools, reduced spending differences between districts in those states substantially – on average about 20 to 30 percent. Evans and colleagues also report that for these cases, the reduced differences between districts occurred as a result of the lowest-spending districts increasing spending substantially – what is called "leveling up." Hoxby modeled the state education finance systems in every state in 1990 and then related the characteristics of each state's financing system to actual education spending in the state. She reports that spending is increased by high foundation levels and by GTB programs that reduce tax prices substantially for low-wealth, low-spending districts. But Hoxby also finds that a substantial amount of the equalization of spending among districts arises from limiting or restricting spending by the highest-spending districts – what is called "leveling down."

A final alternative is for states to mandate minimum educational conditions but not minimum spending levels in local school systems. For instance, a state might set minimum standards all teachers must satisfy, or a state might establish minimum course requirements that students must satisfy in order to graduate. If those minimum standards are set relatively high compared to the actual performance of many districts in the state, then those local districts will be required to adjust the educational service provided, which might require increased per pupil expenditures in some districts. The difficulty with this alternative, as we will examine next, is discovering just what conditions matter for educational results and thus how to set the minimum standards.

Application 17.1: State attempts to reform education finance – the Michigan case

Many states have continued to wrestle with the fundamental policy problem of providing an equitable and efficient level of education to all children in the state while recognizing the

role of local school districts and the differences between districts in educational costs and demands. In most states, this has been a continual process involving interaction between state government, the courts, and the local districts. Occasionally, states make radical or dramatic changes in the educational system, but smaller marginal changes occur almost continuously. The experience in Michigan is particularly illuminating.

Beginning in 1974, Michigan had changed its state aid program for schools from a foundation program to a power-equalizing/guaranteed tax base plan, which then was continued with only minor modification until 1993. Under the state's GTB aid plan, the aid formula parameters were altered each year so that between 50 and 65 percent of the local school districts received aid and had a marginal reduction in tax prices. Districts generated local revenue from property taxes, which were limited only slightly, and there were no limits on school spending.

The results of the new (1974) financing system in Michigan were disappointing on at least two fronts. Differences in spending among districts were not reduced (although differences in local taxes per pupil were reduced); in fact, spending differences increased over time. Prior to 1974, the coefficient of variation for operating expenditures per pupil among Michigan districts was approximately .16; by 1980 it was about .17, and by 1994 it had increased to .23. Spending differences increased rather than decreasing due to continued use of state categorical aid (which was not equalizing), state property tax credits that applied to wealthy as well as poor localities, local tax increases adopted by voters who wished to increase spending (because of income increases or other personal influences), and the fact that residents of low-spending districts did not respond to the price incentives of the GTB plan. (Demand was very price inelastic.) In addition, state equalizing aid did not increase sufficiently to fund desired local spending on education, so property taxes provided an increasing share of school revenue. In 1978, local property taxes provided about half of school revenue; by 1994, this share had increased to about 66 percent. Property tax burden in Michigan relative to income was the seventh highest in the nation.

As a consequence of high property taxes and growing spending disparities among districts, Michigan changed its system entirely again in 1994. Voters in Michigan approved "Proposal A," which reduced local property taxes for schools, increased several state taxes, and substituted an entirely new system of state government support for public K–12 education. A state government property tax, called the state education tax, was instituted and levied on all property at six mills, the revenue earmarked for state government support of K–12 education. Local school district property taxes for operating expenses were limited to a maximum of 18 mills on all "non-homestead" property.[15] A few selected high-spending districts were permitted to collect so-called "hold-harmless" millages, which are levied only on homestead property in a school district and intended to allow those districts to continue to have per student spending above the state foundation. Finally, the annual increase in the taxable value of all properties (adjusted for structural changes) was limited to the lesser of the percentage change in the CPI or 5 percent. At the state government level, the general sales tax rate was increased from 4 to 6 percent, with all additional sales tax revenue due to the rate change earmarked for state government support of schools.[16]

The state government adopted a "foundation guarantee" school financing system, with the foundation amount varying by district with the goal of establishing minimum per student funding level for all districts. The option for local school districts to supplement the state support with local taxes was greatly restricted. The foundation guarantee for each district, which is the allowed pre-student spending, was determined by spending in 1993–1994 and allowed annual increases. Districts above the state's basic foundation (initially $5,000 per student in 1994–1995) received annual lump-sum per student increases equal to the percentage growth of state school aid revenue multiplied by the basic foundation. Districts spending

less than the basic foundation receive up to double those annual per student amounts. To finance the districts' foundation guarantee, each district received a lump-sum per student grant from the state equal to the difference between that district's guarantee and an 18 mill local tax on non-homestead taxable property. Districts spending more than $6,500 per student in 1994–1995 (the highest 6 or 7 percent) also levied an additional local property tax on homesteads only to fund the differences between $6,500 and the district's guarantee. Over time, the foundation amount grew, so the minimum level of per student spending also rose. For 2013, the basic foundation was $8,049.

Michigan's new financing system had five primary initial effects, as noted by Julie Cullen and Susanna Loeb (2004). First, the state government share of revenue increased to more than 75 percent of funding for schools, more than double its share before the change. Second, as the state funding comes mostly from state sales taxes, a state property tax, and the state income tax, the importance of property taxes (especially local property taxes) was substantially reduced initially. Third, the level of educational spending increased substantially, by more than 9 percent in real terms between 1990 and 1998. Average real revenue per student grew from about $5,700 in 1991 to more than $7,200 in 2000. Fourth, relative spending differences between districts were reduced as low-spending districts were raised to the basic foundation level, which is indexed annually, and the growth of spending in high-spending districts was limited. The coefficient of variation for per student revenue fell from .22 in 1991 to .13 in 2000. Finally, state aid, paid as a per student grant, became proportional to enrollment, with individual districts having essentially no option to increase local taxes to support school operating expenses.

A lesser-known component of the structural change in 1994 was that annual payments to the school retirement fund were transferred from the state government to local school districts. All K–12 public education personnel (not including charter schools) are required to participate in the Michigan Public Schools Employees Retirement System, a defined-benefit plan run by the state government. Although this transfer was revenue neutral initially, in recent years, the annual retirement fund payments have increased much faster than the per student foundation amount that each school district receives from the state government. The Citizens Research Council of Michigan (2012) reports that the real value of the per student grant from the state government to school districts declined after 2002.[17] When the effect of rising real retirement costs per student is included, the decline in the real value of the state grant for operating purposes is further reduced.

Both property tax rates and property tax amounts initially decreased substantially (especially for primary residences). Another obvious immediate effect was less geographic variation in property tax rates because the new system imposed uniform property tax rates for K–12 education, with two exceptions. A few districts were permitted to continue collecting higher property tax rates on homesteads to maintain pre-reform spending, and property tax rates to repay borrowed funds (to cover debt) remained under the control of the local districts (and voters). Property tax levels in Michigan declined initially as a result of the "tax swap," so they are now about at the national average. For 2018, property taxes in Michigan were 3 percent of personal income, compared to 3.1 percent nationally. However, property taxes were 4.7 percent of personal income at the time of the reform in 2003. Similarly, property taxes now generate 16 percent of state-local revenue in Michigan, compared to 16.6 percent nationally.

After the Great Recession, the basic foundation amount was increased most years, and real spending per pupil also increased (Kenyon and Munteanu, 2021). However the basic foundation amount was not exactly the same for all districts. Conlin and Thompson (2014) note "Michigan distributes state revenue relatively evenly across school districts, but districts in the wealthiest quintile receive nearly $600 more in revenue per pupil than districts in other

quintiles." As noted in *Headlines*, in 2021, a major change was made so that all districts will receive an equal per pupil foundation amount (with other specific categorical aid as well). Some districts may continue to spend more through local property taxes for capital projects and some operations, but the differences in resources among school districts were further reduced.

Research suggests that the reforms have had an impact on the academic performance of students. Reflecting on the period 1990 to 1998, Cullen and Loeb (2004) note, "Relative academic achievement for Michigan students also appears to have improved (though unsteadily) in recent years" (p. 216). Papke (2005) provides evidence, using data from 1992 to 1998, that pass rates in Michigan on fourth-grade math tests improved with increased spending, with the largest effects for schools with initially poor performance. She concludes "that 10 percent more real spending increases the pass rate by between one and two percentage points, and more for initially underperforming schools." However, some statistical formulations of the tests by both Cullen and Loeb and Papke found no effects. This was a period when per student spending was increasing substantially in Michigan, particularly in low-spending districts after 1994. Roy (2011) finds that increased spending improved performance on state assessment tests in reading and mathematics in the period 1995 to 2001 but had no effect on ACT college entrance tests. Hyman (2017) finds that students in the 1995–2000 period whose districts had increased spending through the reform were more likely to earn a postsecondary degree. However, Kenyon and Munteanu (2021) note that even with the improvement, in 2019, Michigan students ranked below the average state in most national reading and mathematics assessment tests.

In the 1994 reform, Michigan voters traded local control of K–12 schools for lower property taxes, especially on "homesteads." Property tax rates remain lower than before the reform. Property taxes remain an important revenue source for schools, partly because of the state government property tax for education. The state government level of financial support for school spending has varied substantially, especially with the business cycle. Because the grants are in per student terms, decreases in enrollment cause proportionate decreases in state funding, but costs may not fall proportionately. Finally, with the state government providing a large share of revenue for schools, K–12 education must compete with other state services for the available state revenues.

Producing education

The paradox of declining performance

Per pupil spending by public schools in real terms has increased nearly continuously over the past 60 years, in part because average class sizes have declined. The paradox, however, is that student performance, at least as measured by a variety of average test scores, has not increased proportionately. Changes in the scores on the Scholastic Aptitude Test (SAT) – a test purporting to measure preparation for college given to high school seniors and with which many of the readers of this book are intimately familiar – have been given prominent attention. The now well-known story is that average scores for both verbal and mathematics skills declined from 1963 to 1980. Over that period, the average SAT verbal score declined by more than 11 percent and the average math score by more than 7 percent. (Subsequently, the nature of the test and the score scale have changed several times.) Since 1980, average SAT verbal scores have remained about the same, and average math scores increased until about 2005, after which both have been declining. American College Testing Program (ACT) average scores have a similar pattern.

It is now generally understood that the SAT score changes were also being reflected by changes in scores of other standardized tests given to students at various grade levels over that

period. For instance, Hanushek (1986) noted that scores on the Iowa Tests (standardized tests once used in many states and given to students in grades 5, 8, and 12) also declined beginning in the mid-1960s through the 1970s. Interestingly, Hanushek also noted that the timing of improvements in those test scores and others he discusses are consistent: fifth-grade scores started to rise in 1975, eighth-grade scores in 1977, and twelfth-grade scores in 1980. Murnane (1985) discussed a set of tests sponsored by the national government called the National Assessment of Educational Progress (NAEP) given to students aged 9, 13, and 17 in various years. Those results show that reading skills have remained essentially constant since 1971 for 13- and 17-year-olds and improved for 9-year-olds. Over the same period, students' mathematics skills remained stable for 17-year-olds but have improved quite substantially for 9- and 15-year-olds. More recently, attention has focused on a set of student assessments used internationally. By those measures, achievement by students in the United States remains below that of students in many other nations that have lower educational spending (see the International Comparison section later in this chapter).

What are the possible explanations for student achievement test scores not keeping pace with increases in public school spending? Part of the explanation for the change in test scores lies in changes in the number and mix of students who were taking the test and going on to college. Some of the explanations offered for the broader trend include shortages of qualified teachers, especially in mathematics and science; the nature of teacher training programs emphasizing education over academic classes; social factors that altered interest or participation in education; and changes in the characteristics of schools and public school programs themselves, such as the introduction of broader, less academic curricula or new teaching methods. The evidence is inconclusive or even negative on some of these factors. Resolving the paradox requires discovering what inputs into the education process affect educational outcomes and by what magnitude. With that information, it may be possible both to understand what happened in the 1960s and early 1970s and to improve the provision of education in all types of schools.

A production function approach to education

A production function characterizes the relationship between inputs and the range of possible outputs that can be produced with each input combination (as discussed in Chapter 7). If the technology of producing "education" can be identified and quantified – that is, if the effect of different educational inputs on educational results can be determined – then one would have a mechanism to evaluate how different schools go about educating and why educational results differ for different students or at different times. The concept of education production analysis by economists is to relate education outputs to education inputs statistically. Mathematically,

$$Q = q\,(I_1, I_2, I_3, \ldots)$$

where
Q = the educational outcome
I = educational inputs.

Measuring outcomes

The first step in analyzing and evaluating production decisions is identifying both the objective of the organization and some way of measuring output. Neither of these characteristics is straightforward in the case of many services provided by governments, including, and

perhaps especially, education. Moreover, the appropriate way to measure output depends on what the objective of the government is in providing the service. For instance, a discovery that schools do not do a good job of improving students' scores on standardized tests may not be surprising or very useful if, in fact, schools do not care about test scores and thus do not try to improve them.

Decisions seem clearer doing production analysis for private firms, particularly those in manufacturing. Economists typically assume that the objective of the firms is to produce the amount of product that generates the highest possible profit. Output can either be measured by the number of physical units produced or by the dollar volume of sales. If profit rises, then the firm is moving in the direction of achieving its goal. Production changes that increase profits are deemed desirable. Economists also sometimes consider objectives other than maximizing profit, such as increasing market share or maximizing sales subject to a minimum profit restriction, but even in those cases, the objective is clear and easily quantifiable.

With respect to government services, education particularly, the objective of the government is not so easily defined. Even if a clear objective can be identified, the measures of output and thus success in meeting the objective are imprecise. The output or result of education is usually measured in one of four ways: (1) by scores on standardized tests, (2) by numbers of students achieving a particular level of education (number graduating from high school and number entering college, for example), (3) by economic achievements such as rate of employment or level of income, or (4) by subjective measures (often through surveys) of individual satisfaction. Among the numerous studies attempting to relate education inputs and methods to educational results, test scores are easily the most commonly used measure of performance or output, partly because they are readily available for many students and because they make comparisons over time relatively easy.

Analyses relating economic achievements to education level certainly suggest, at least on the surface, that more education leads to economic gains. For instance, the basic data indicate that unemployment rates are lower and incomes higher among those who have completed more years of school. There are two qualifications to these correlations, however. First, some have argued that rather than producing education, the primary effect of the school system is to serve as a *screening device*, identifying more able individuals by the fact that they are allowed to pursue more education. From this viewpoint, the role of schools is to select the more able and provide that information to the market. If that is the case, those with more education do better economically because they are more able, not because additional years of school made them more skilled.

Second, these correlations do not distinguish the quantity of education from the quality of result. Measures of numbers of students graduating on time, the percentage entering college, the number of school years completed, or the number who are employed x years after graduating are predominantly quantity measures, which do not distinguish the quality of education very well. After all, there are a wide variety of colleges, and the fact that someone is employed does not indicate the type of job or level of satisfaction. This is, of course, another reason for the attractiveness of test scores that can be interpreted as reflecting an entire range of outcomes. Whether test scores do, in fact, reflect educational "quality" is controversial and problematic. The evidence shows, for instance, that test scores are not necessarily correlated with students' later economic success.

But even if a measure (or several measures) of educational output from this list can be agreed on, it is not clear what the objective of the school system is or should be. This difficulty arises because there is typically a wide range of students in any school system, so one might be interested in the distribution of results among those students as well as the average result. This point has been emphasized by Byron Brown and Daniel Saks (1975), who suggest that schools might be interested in both the mean and variance of test scores,

for instance. Suppose that the two alternative sets of test scores shown in Table 17.2 are both possible outcomes that arise from different allocations of the teacher's time and other resources for a school or class. The average test score (or equivalently, the sum of scores) is maximized in case A by applying more of the educational resources to the better students. Although the resulting average score is high, the variation among the students is also very large; the coefficient of variation is 30.2, meaning an average of 30.2 percent variation in scores around the mean score. Case B represents the results of an alternative application of the same educational resources, perhaps applying those resources more evenly among the students. The result is a 2 percent lower average score but much less variation among the students (about 20 percent around the mean). In essence, what has happened is that the top scores have fallen by more than the bottom scores have risen, but the percentage gains by the students at the bottom of the distribution outweigh the percentage decreases by those at the top.

Which distribution is better? Which do you prefer? There may be no clear answer. Equal opportunity in education or society may be sought, and an explicit economic objective of government is to alter the distribution of income or resources in society. If that is the case, then individuals and government may be willing to accept lower average test scores or educational outcomes in exchange for a more even distribution of those outcomes. This issue reflects one of the difficulties in evaluating teachers or schools. If teachers are evaluated or paid or districts rewarded with state aid based on the average score of their students on some standardized test, then there is an incentive to maximize those average scores by allocating teaching time or resources to those students whose test scores improve the most. But the resulting distribution of student performance may not be what is most desired.

Measuring inputs

The second requirement for analyzing educational production is to identify and measure the inputs into the production process, those factors that are expected to influence educational results. In general, one can identify three types of inputs: (1) those provided by the schools, (2) those provided by society (broadly defined), and (3) those provided by the student. Thus,

$$Q = q \text{ (School Inputs, Social Inputs, Student Inputs)}$$

Table 17.2 Sample alternative test score distributions

Student	*Case A*	*Case B*	*A–B*	*Percent change*
1	700	600	–100	–14.3%
2	650	570	–80	–12.3
3	600	550	–50	–8.3
4	550	520	–30	–5.5
5	500	490	–10	–2.0
6	450	450	0	0.0
7	400	410	+10	+2.5
8	350	380	+30	+8.6
9	300	350	+50	+16.7
10	250	320	+70	+28.0
Average	475	464	–11	(Loss) –2.3
Standard deviation	143.6	92.1	–51.5	(Gain) –35.9
Standard deviation/average	30.2	19.8	–10.4	– 34.4

Examples of each type of input follow:

School inputs	*Social inputs*	*Student inputs*
Teachers	Family experiences	Innate ability
Books	Cultural factors	Effort
Computers	Nonschool learning	
Classroom hours	Books at home	
Curricula	Technology resources	
Other students		

At least three important issues must be resolved before this general model can be applied. First, one factor that differentiates the production of education from production of many other commodities is that the inputs are expected to have a cumulative effect. The educational achievement of a student at a particular grade or age is expected to depend on all the previous education inputs applied to that person, not just on the most recent or those from a particular grade. In other words, for a statistical analysis based on test scores, one should not relate the score at a particular grade to the inputs provided by that year's class, but rather to all past education received by that student. This is another difficulty in using test scores or achievement results to evaluate teachers or school systems because a student's achievement at one time may depend on the work of past teachers or other schools. This is another reason focusing on the change in achievement in a particular period may be more useful.

Second, the school inputs can be measured either by the actual numbers of inputs used (number of teachers per student, number or percentage of teachers with a master's degree, number or percentage of teachers with more than five years' experience, number of school days or hours per year, types of subjects taught) or by the amount of money spent by the school on those inputs (instructional expenditures per student). However, it may be that additional spending will improve educational outcomes only if those resources are applied in particular ways. Finally, it must be decided whether the unit of analysis is to be the classroom, thus focusing on specific teachers, or on the school or school system.

Evidence on educational production: What matters?

Hanushek (1986) identified about 150 different studies, prepared over the previous 20 years using the basic approach outlined previously, of the factors influencing educational production. Although these studies use different data sources and different theoretical and statistical models, some relationships among inputs and results were noted consistently while other hypotheses about relationships were constantly unsupported by the research. Accordingly, an initial consensus developed based on this early research about what factors appear to be important in improving educational results.

First is a surprising result about some factors that apparently have not been associated with improved educational outcomes. As stated by Hanushek (1986), "There appears to be no strong or systematic relationship between school expenditures and student performance" (p. 1162). As we have previously learned, the instructional expenditures of schools are largely composed of the costs of teachers. So higher per pupil expenditures would most likely be expected to arise from smaller class sizes, paying all teachers higher salaries, or hiring teachers with more education (which would require higher salaries). The absence of a relationship between per pupil expenditures and student performance is also found when expenditures are decomposed into these characteristics. So in this early work, there appears to be no strong or systematic relationship between smaller class sizes, teachers with more graduate education, or higher teacher salaries generally and student performance.

That per-pupil expenditures per se do not appear to matter for student performance is certainly surprising, at least to economists, because it implies that additional inputs do not lead to additional output. It is important to note, however, that although the result suggests that increased per pupil expenditures *did not* lead to improved performance, increased spending still *might* lead to improved performance if those additional resources were spent differently: that is, on different inputs that do affect performance. For instance, smaller classes might improve performance if the time in those classes was used differently than it is in larger ones, whereas the finding that graduate education of teachers does not improve performance may say more about the current nature of graduate education than it does about the value of more training generally.

Second, the "skill" of the teacher is one factor that apparently is related to student performance. As Murnane has noted (quoted in Brown and Saks, 1981),

> Virtually every study of school effectiveness finds that some attributes of teachers are significantly related to student achievement. . . . In particular, the intellectual skills of a teacher as measured by a verbal ability test or the quality of college the teacher attended tend to be significant.
>
> (p. 222)

A similar theme is cited by Hanushek (1986, 1164) who writes "The closest thing to a consistent finding among the studies is that 'smarter' teachers, ones who perform well on verbal ability tests, do better in the classroom." The practical difficulty with this finding is that it may not always be easy to identify ahead of time "more skilled" or "smarter" people and then to induce more of those people into teaching. In fact, it may be that there are several ways for individuals to be successful teachers, so identifying a single characteristic to indicate that someone will be a "good" teacher is not feasible.

The third general conclusion of these initial studies was that the school curriculum can be related to student performance, at least on standardized tests. As noted by Murnane (1985),

> The best-documented schooling change contributing to the [SAT] score decline is a reduction in the number of academic courses students take. . . . Subsequent research supports the link between the number of academic courses students take and their scores on standardized tests.
>
> (p. 120)

By "academic courses," this finding refers to the so-called basics – reading and writing, mathematics, science, social studies – as opposed to vocational and other courses students can select (the arts, sports, and so on). This finding should not be surprising because it is these academic skills that are primarily tested by standardized tests. Nonetheless, it is comforting that the statistical studies come to such a common sense conclusion: If one wants students to read and write well and do mathematics, then those are the courses students must take and the skills they must practice in school.

The approach and results of the early research into the factors affecting educational outcomes have been challenged by a new, more recent wave of economic research. Jackson (2020) provides a summary of this new research and findings. In the previous section about producing educational results, you learned that results depend on various inputs, written as

$$Q = q(\text{School Inputs, Social Inputs, Student Inputs}).$$

However, because of the organization of school districts and the funding of schools, many school inputs (spending on teachers, books, equipment, and facilities) may be affected by

the same things determining social and student inputs (books and resources at home, family experiences, and so on). Importantly, both are likely influenced by family income and wealth. This creates a problem for research as it may be difficult in research studies to separate the effect of school inputs from social or student inputs. Put simply, if some group of students shows better educational results, is that due to higher school spending or higher family income if higher school spending is caused by higher family income? As Jackson (2020) notes, "If one does not appropriately model the relationships between school spending, family background, and student outcomes, a regression model using observational variation is unlikely to correctly attribute 'blame' to the correct variable."

The research solution to resolving such confusion is to use changes in school spending that are not related to family characteristics or other factors affecting educational results to study the effect of spending on results. For example, suppose a national recession affects state government resources for schools differently in some states than others because certain industries are affected more than others. Thus, school spending falls more in some states. Suppose that student test scores also decline more in the states with larger recession effects. The change in school resources (spending) is unrelated to family income or characteristics, so the decline in test scores that happens as a result of such changes in school spending can be attributed to that reason.

Jackson (2020) surveys 13 studies using multistate data and 20 based on a single state's experience, all but one done since 2000. Of the multistate studies, all but one find a positive and significant relationship between school spending and educational results. Among the 20 studies examining the experience in a single state, 13 report positive and significant relationships between school spending and educational results. Results are most often measured by test scores but also by graduation rates, income, and college attendance. It does seem that the type of school spending matters, with capital (infrastructure) spending and federal support for low-income students seeming to have the least effect. Jackson (2020) concludes,

> The recent quasi-experimental literature that relates school spending to student outcomes over-whelmingly support a causal relationship between increased school spending and student outcomes. . . . Importantly, this is true across studies that use different data sets, examine different time periods, rely on different sources of variation, and employ different statistical techniques.
>
> (p. 13)

Several examples from this new research approach illustrate the different results. Lafortune et al. (2018) focus on the effects of state school finance reforms in what they call the "adequacy era." They find that such reforms increased school spending in general, but more so in low-income school districts. Moreover, they find that these changes in school spending – more teachers, more resources toward instruction – especially improved the educational results of students in these districts. Focusing on the estimated effect on student achievement ten years after reform, they conclude, "Reforms increased the absolute and relative achievement of students in low-income districts."

Candelaria and Shores (2019) focus specifically on court-ordered finance reforms between 1989 and 2010 (also the adequacy era), comparing those results on school spending and graduation rates to other states that reformed school finance without court mandate. They find that seven years after the court-ordered reform of school finance, the bottom 25 percent of districts had especially large increases in spending and graduation rates. They conclude, "High-poverty districts in states undergoing reform increased revenues and graduation rates relative to high-poverty districts in nontreated states; in addition, these effects were relatively more equalizing compared to trends taking place in other states across the United States."

Policy implications

These results have spurred changes in state education policies, some of which focus on teachers and courses. Regarding teachers, the issue concerns how teachers are trained, certified, evaluated, and paid. A number of colleges and universities have now agreed that students working to become teachers will take fewer education classes and more classes in the specific disciplines they plan to teach. Thus, for example, someone who plans to be a high school math teacher might major in mathematics in college and take some specialized education classes in addition (rather than majoring in education and taking a few math classes). All states have some procedure to certify teachers as eligible to teach in that state. A number of states have acted to toughen certification requirements by raising the basic education requirement, creating certification exams, and/or using a probation period coupled with on-the-job evaluation. In 2018, all states required teachers to hold at least a bachelor's degree and to pass some type of specific tests for initial certification. In 25 states, tests for specific core content or topics are required for initial certification at the elementary level, and at least 38 states require specific subject matter tests for certification at the secondary level.[18]

Regarding teacher pay, the two common proposals are for higher teacher salaries generally and for adoption of a merit-pay system for salary increases, with increases depending on some measure of a teacher's "success." The first is intended to attract more skilled people into teaching, whereas the second is intended both as an incentive for teachers to be more successful and as a reward for teachers who are. The average annual salary of public elementary and secondary school teachers was $63,645 in 2019–2020 (US Department of Education, 2020).[19] In contrast, the median annual earnings in 2020 of workers 25 years old and over with at least a bachelor's degree was about $73,900. Although the average nominal salary of teachers has increased essentially continually since 1960, real average salaries have risen and fallen over this period. For instance, real salaries in 2020 were about the same as in 1990 and 2000 and lower than 2010. Of course, teacher salaries differ greatly among the states, as do worker wages in general. In 2019–2020, average teacher salaries varied from $87,543 in New York to $45,192 in Mississippi.

Perhaps even more relevant is the initial or starting salary for teachers just completing college. In 2019, this was about $40,150, which is equivalent to about $25 per hour (assuming 40 weeks in a school year). Again, there are major differences among states, from more than $48,000 in California to about $32,000 in Montana.

There seem to be at least three important economic issues about proposals to alter teacher pay. First, increased salaries may not be successful in attracting more skilled people into teaching soon if there is no mechanism to create job vacancies for these individuals and if teacher certification requirements prevent some people from moving into teaching without additional specialized training. Second, increases in teacher pay generally may not succeed in attracting more of the scarcest teachers, those in mathematics and science. The opportunity costs for people trained in those disciplines may require paying different salaries to teachers of different subjects, even if they have the same education and experience. Third, although merit pay is likely to induce teachers to spend more time generating the results on which the merit evaluation is based, that will improve education only to the extent that the performance test is valuable or appropriate. If the merit pay is based on the average performance of students, then teachers have an incentive to maximize test scores and may be less concerned with the distribution of those scores, as previously discussed.

Application 17.2: School size and performance[20]

Although the number of school districts in the United States has decreased substantially as a result of consolidations, the structure of school districts has not changed substantially.

The Census Bureau reported that in 2017, 76 percent of independent school districts and 64 percent of dependent (city or county) districts provided both elementary and secondary grades. The other common structure is districts that provide only elementary grades, about 2,300 out of a total of about 12,700 districts. The great bulk of high schools – about 16,900 in number and representing about 70 percent of all secondary schools – cover three or four years involving grades 10 through 12 or 9 through 12. Another set of approximately 3,450 schools comprising 14 percent of all secondary schools covers five or six years of grades, essentially combining the junior and senior high school grades. The US Department of Education further reports that of all the regular junior and senior high schools (19,325 in number), about 9 percent had enrollment of fewer than 100 students, 29 percent had enrollment of fewer than 300 students, and 52 percent had enrollment of fewer than 600. In contrast, about 30 percent had enrollment of at least 1,000 students, and about 8 percent had enrollment of at least 2,000 students.

There have been a substantial number of studies of economies of scale or size in the US context examining size effects for both local school districts and individual schools. That research was initially reviewed and summarized by Fox (1981) and more recently by Andrews et al. (2002). In some cases, these studies examine the effects of size (enrollment) on costs, holding output constant, while other studies examine the effect of size on output (student performance), holding cost constant.

In their review of production function studies, Andrews et al. (2002, 258) conclude "decreasing returns to size may begin to emerge for high schools above 1,000 students and elementary schools above 600 students." Lee and Smith (1997) find that high schools of between 600 and 900 students maximize student performance, while Eberts et al. (1984) find that elementary schools of between 300 and 500 students seem optimal. Taking all the studies into account, Andrews et al. (2002, 246) conclude that there likely are "potentially sizeable cost savings up to district enrollment levels between 2000 and 4000 students" and that "moderately sized elementary schools (300–500 students) and high schools (600–900 students) may optimally balance economies of size with negative effects of large schools."

Monk and Haller (1993) carefully examine the effect of high school size on the variety of classes in the high school curriculum, disaggregating effects by both academic discipline and target audience (advanced versus remedial). They report that "there are stronger positive relationships between school size and course offerings in foreign languages and the performing and visual arts than in mathematics and social studies" and practically no relationship in English and science. Specifically, their results show that "the largest schools offer more than fifteen additional foreign language and more than sixteen additional . . . arts courses than do the smallest schools." Focusing on the fraction of classes in each disciplinary area that are "specialized" – that is, targeted either to advanced or remedial students – Monk and Haller find that "the percentage share of the courses earmarked for either remedial or advanced students increases with school size." A particularly striking pattern emerges for mathematics, which is the area with the least degree of class specialization in the smaller schools but the area of greatest specialization in the largest schools.[21]

A substantial number of studies have emerged recently in the education literature suggesting that large high schools can have substantial negative effects on student performance (and/or cost), especially for disadvantaged students. The issues usually include concern about an environment that effectively discourages student and staff motivation and effort in large schools, concern about the potential for less parental involvement, the potential for higher labor costs, and possibly greater opportunity costs for students due to greater transportation distances. Many of these studies seem to focus on large high schools with enrollments of approximately 1,500 students or more. From this perspective, the result of a variety of

statistical studies that an optimal-size high school is between 600 and 1,000 students seems reasonable and understandable.

The evidence also shows that the cost structure for providing elementary education is quite different than that for providing secondary education, as the optimal-size elementary school (300 to 500) is about half that of the optimal-size high school (600 to 1,000). Unless there is a highly skewed age distribution of children in a school district, there is a standard relationship between district and school size at each level. For districts that provide both elementary and secondary education, elementary students will represent about 54 percent of the total (7 out of 13 grades) and high school students about 31 percent (4 out of 13). Districts with 2,000 to 3,500 students would be expected to have approximately 1,100 to 1,900 elementary students and 600 to 1,000 high school students, permitting an "optimal" size high school and multiple "optimal" size elementary schools. Once districts exceed 4,000 students, single high schools may become too large, or it may be efficient to operate multiple high schools. Districts with fewer than 2,000 students, on the other hand, may be too small to operate an efficient-size high school.

The situation in Michigan illustrates the difficulties posed by district and school organization. Of the approximately 576 independent public school districts in Michigan, 91 percent provide both elementary and secondary education. The enrollment in these districts varies dramatically. More than one-third of all districts have fewer than 1,000 students total, which implies a high school enrollment of about 300 or less. There are about 270 high schools (including charter schools) with fewer than 300 students (compared to an expected minimum efficient size of 600). All told, about 60 percent of Michigan's high schools including charters are smaller than the optimal size range for high schools (less than 600 students). Similar circumstances exist in other states as well.

This suggests a whole range of school organization options – including separate elementary and secondary districts, small elementary districts contracting with larger integrated districts for high school service, high schools that are jointly operated by separate K–8 districts, and a possible increased state role for secondary as opposed to elementary education.

Assessing educational results

Education policy has increasingly focused on evaluation of students, schools, and educational results. The federal government has examined the overall performance of students since 1969. State governments initiated the emphasis on accountability during the 1990s, which in many ways was the natural result of legal decisions that forced states to take more fiscal responsibility for the distribution of educational resources and for ensuring adequacy of educational production. The state emphasis on accountability also arose from the now well-documented long-run trend of continuous increases in real per student spending by public schools and decreases in average class sizes, whereas student performance – as measured by a wide variety of tests comparing students in the United States as well as comparing US students internationally – either declined or did not improve nearly as fast as spending grew. This fact induced states to want to improve the results of public education systems and to find ways to ensure that the increasing state spending is being used in the most effective manner.

Ladd (2001, 385) reported "Forty-five states now [in 2001] have report cards on schools, and 27 of them rate schools or identify low performing schools." Hanushek and Raymond (2001, 369) note, "The basic skeleton of accountability systems involves goals, standards for performance, measurement, and consequences." They further report that while few states had set clear goals for their accountability systems, essentially all states had established standards for performance and tested students in some form. In addition, most of the states also

evaluated and reported on the performance of schools, but perhaps only about half had explicit consequences for poor performance by either students or schools.

For a number of years, the federal government has used the National Assessment of Educational Progress (NAEP) to measure the performance of the education system overall.[22] NAEP is given to a representative sample of students across the country, and the results are reported for groups of students with similar characteristics (e.g., gender, race and ethnicity, school location). Tests are administered for mathematics, reading, and (in some assessment years) science and writing in grades 4, 8, and 12. Results are reported nationally, by state, and for a few large urban school districts, but the goal is not to assess individual students or schools.

EducationWeek reported on assessment tests used by state governments in 2019.[23] All states now utilize some type or set of tests to measure education results. Thirty-two states use tests they designed or bought from private testing firms, 15 states and the District of Columbia administer tests created through the Partnership for Assessment of Readiness for College and Careers (PARCC) or what are called Smarter Balanced tests, and 3 states use some hybrid of these options. PARCC is a partnership of several states and federal agencies established to create a set of assessments based on the Common Core State Standards.[24] In addition, 25 states require high school students to take the SAT or ACT as states look for ways to encourage students to go to college. Finally, thirteen states require students to pass a test to get a high school diploma. With all this testing and test information, how should it be used?

Assessing and accountability issues

Four issues about educational accountability seem to be the most difficult and contentious: (1) Who should be evaluated – students, teachers, schools, or school districts? (2) How should the evaluation be structured – i.e., what are the relative advantages of various evaluation methods? (3) What level of government should be primarily responsible for setting standards, conducting the evaluation, and paying the costs – states or the federal government? and (4) What remedies or consequences should apply to schools or students who fail to meet assessment standards.

Unit of evaluation

The production function approach to education presented earlier in this chapter can be used to illustrate the difficulties of using districts, schools, teachers, or students as the unit of evaluation. Districts and teachers clearly seem the worst options. Education is produced in schools, not districts, and focusing on district average results would allow poorly performing schools to be hidden by other schools that perform well. A given teacher in a single grade is but one input among many that affect a student's learning, and thus it would seem nearly impossible to attribute a student's score on an assessment test to one single teacher.

Between students and schools, Ladd (2001, 398) argues, "schools are the most logical starting point for a top-down accountability system." First, schools are the production unit that controls educational resources and can act to reallocate those resources in an attempt to improve educational performance. Second, what school to attend is the educational unit that families most directly select and that families can change if performance is unacceptable. Third, poorly performing schools cannot escape notice and attention if schools are the focus of assessment. Finally, as Ladd puts it, "school-based incentive rewards provide an incentive for all school personnel to work cooperatively toward a well-specified goal" (p. 389).

The concerns about focusing on schools are also easy to note. Student learning and knowledge, either that which students actually possess or that which may be represented or

measured by test scores, are a cumulative result of learning done in all schools attended and learning done outside school through personal or family experiences and activities. Scores on tests administered in the middle of the 8th grade, for example, can hardly be attributed only to the 15 months that the student attended that particular middle school. Certainly the elementary schools that the students attended – which might be in a different district or different state or even a different country – would be expected to have had an impact. In addition, one cannot minimize the importance of the learning that students achieve through interactions with their fellow students as well the learning that arises from private activity – parental reading or teaching, books in the home, family travel or other experiences, athletics, music, etc. Finally, not all students are in a personal or community environment that places equal value on education or provides equal motivation. Surely, the score a student achieves on a test in the 3rd, 8th, or 11th grade reflects the combined effects of all these influences. Why, then, should those scores be attributed solely to the contribution of the last school?

In the end, one of the strongest arguments for assessing schools may be the difficulty with assessing and penalizing only students. Although students certainly influence their own education by their behavior, they have little direct control or influence over the allocation of educational resources; students do not control curricula, hire teachers, maintain facilities, and so on. Some of the potential problems of focusing assessment on schools may be mitigated by appropriately structuring the assessment instrument and information, as discussed next.

Methods of evaluation

Although there are a host of controversial and well-known issues about student testing, there are ways of using test results to shed light on the school contribution. One option is to compare schools only with the same populations – schools in rural, low-income communities to those in similar communities; predominantly minority, central-city schools to the same; etc. A second option is to correct for different student populations using statistical methods. Usually this involves comparing the results in a particular school or district to the results that might be expected or predicted for the population of students in that district. A third possibility is to look only at the improvement of students in a particular school or district. If a school's average score is at the 50th percentile of the statewide average for students in 3rd grade, say, but at the 75th percentile for that same group of students in the 11th grade, then the school would seem to have made relative improvement in the students' performance. Which is having a greater impact: a school that has students who perform at the 85th percentile in both grades or one that shows improvement between the grades?

The issue is whether to focus on the level of outcome or result by a student or school or on the change in that level by a student or school over some time. The distinction is important because factors specific to a student (innate ability, effort, family circumstances, social environment) are expected to influence the level of achievement by that student, and those factors may be difficult to measure and thus control for in studies of educational outcomes. By focusing on the change in achievement for a given student or set of students over time, those other student-specific factors are held constant so that the change in achievement may reflect the **value added** by the educational system.

Local, state, or national responsibility

States remain concerned about the federal government imposing a single evaluation mechanism on all schools regardless of differences in circumstances or expectations of state residents. Many state officials have argued that state assessment systems are better able to accommodate

differences among states and among districts within states. You have seen evidence earlier in this chapter about the substantial variation in educational levels and emphasis between states and even between districts within states.

With the approval of the Federal Education Act in 2002, advocated by the Bush administration and called the No Child Left Behind Act, the federal government took a direct role encouraging educational assessment and accountability. A number of states were extremely concerned about this relatively new activist approach by the federal government, including the costs of administering the assessments required by NCLB as well as the costs that schools would face to improve achievement toward proficiency goals. A report of a task force on NCLB comprising state officials and organized through the National Conference of State Legislatures questioned whether NCLB should be evaluated as an unfunded mandate imposed by the federal government on states, which would require additional action by federal law. States developed an alternative, the Common Core Standards.

Consequences and remedies

Assessment consequences can include providing information about the performance of schools, providing rewards (perhaps in the form of additional resources) to schools that meet specific performance objectives, and imposing penalties on schools that meet assessment standards. Some states have incorporated reward/penalty provisions in their education grant systems, essentially threatening to reduce resources in poorly performing schools. This might be seen as counterproductive by some, although the concept is that resource reductions would induce additional students to leave poorly performing schools and to move to other schools with better performance ratings, which would then receive additional resources.

Perhaps the most important long-run issue is how students, teachers, schools, school districts, states, and the federal government will respond to cases in which schools are found to be performing poorly. Students can switch schools, low-achieving students may receive additional tutoring, school staff can be changed, the school day lengthened, or curriculums revised. Unfortunately, the economic research about education production discussed earlier in this chapter does not provide much guidance. That research, as well as the body of research by educational specialists, has identified only a limited number of curriculum, teacher, and technology options that clearly seem to improve educational results.

The fact that research about education production has identified only some specific factors that can be used to boost teacher productivity and educational results has caused a number of states to experiment with entirely new approaches. Some states, such as Kentucky, have experimented with grouping students differently (eliminating traditional elementary "grades") and with less structured classroom activity. Other states are experimenting with changes to the length of both the school day and the school year; perhaps it would be preferable if students attended school for fewer hours (providing time for more personal study and work) but more days (eliminating long breaks away from school). The results of these and other experiments are likely to be important in improving education in the future.

States have also acted to change school curricula and the types of courses students take, largely by altering graduation requirements imposed by state governments. According to the US Department of Education (*Digest of Education Statistics*, 2013)[25], all but four states (Colorado, Massachusetts, Nebraska, and Pennsylvania) have substantial state-set academic requirements for high school graduation. Many of those state standards were established or strengthened since 1985. The other four states essentially leave those standards as an option for local districts. Among those states with course requirements imposed by the state government, common requirements are four units (years) of English and two to four units of mathematics, science, and social studies each. Dramatic changes occurred in Florida, which now

has among the most stringent requirements, and Michigan, which, until 2011, had only one state requirement for high school graduation – one half year of "health" – but now demands a set of English, mathematics, science, and social studies requirements.

Therefore, schools already have incentives to use any new methods or technologies known to improve educational performance, although they may not always have sufficient resources to apply all of them effectively. In addition, in the cases of some students, it just may not be possible through the application of additional school resources to offset a variety of environmental factors – the social inputs and peer effects in the educational production function – that work against those students' educational achievements. Therefore, simply identifying that a school and its students are performing poorly and not meeting assessment standards is not particularly helpful unless some clear mechanisms are known that will improve education results for that particular group of students and adequate resources are available to implement those mechanisms.

Assessing and accountability evidence

The newer focus on assessing and accountability is not necessarily inconsistent with the attention to equity and educational fairness that was once the primary focus but continues to be important, as noted by Rice and Schwartz (2008). As equity issues have turned attention from inputs (equal spending) to outputs (adequacy), assessing and accountability measures can be used to determine whether schools are achieving desired outcomes for all types of students as well as for different schools or school types.

Assessment and accountability are largely based on student test results, both the level of and improvement in scores. To use test results to evaluate schools, one has to account for students who move among schools, the composition of students within schools, and what time period of test results to use. It is not clear that one year's results are as meaningful as a multi-year moving average of scores. In addition, there is substantial evidence that schools tend to concentrate effort on subjects covered in the tests and on the grades when tests are administered, so the choice of test is crucial. Figlio and Ladd (2008) emphasize that testing and accountability systems are not insured to improve student performance because of lack of resources or strategic actions on the part of schools to manipulate test results without real educational improvement.

The evidence suggests that test-based accountability systems have had a greater effect on improving results in math than reading. Figlio and Ladd (2008) write,

> Other studies suggest that accountability systems are associated with at most small or nonexistent gains in reading achievement when achievement is measured by national tests, but positive gains when reading achievement is measured by local high-stakes tests. In math, the estimated gains are consistently somewhat larger, as measured by national tests or local high-stakes tests.
>
> (p. 177)

There is evidence that teachers and teacher quality can affect student performance and testing results, but Goldhaber (2008) emphasizes that identifiable characteristics of teachers – such as years of experience, degree level, and type of preparation for teaching – often do not have consistent results in the research. This makes it difficult for school administrators to identify the best teachers. One consistent result in the research seems to be that teachers who score better on achievement or licensure tests seem to do better in improving student achievement. Partly because of this uncertainty, Goldhaber (2008, 157) notes, "While policies designed to reward teachers for their contribution toward students' performance, such as merit pay, sound sensible and straightforward, they presume an ability to accurately measure student performance."

One different approach to accountability is to use competition between schools or school systems – including vouchers for private schools and the creation of charter schools – in an attempt to improve student performance in traditional public schools. Here the evidence is also not conclusive, as discussed in Application 17.3.

Application 17.3: The charter school debate

As noted earlier in this chapter, **charter schools** are public schools providing free elementary and/or secondary education under a specific charter granted by the state legislature or other appropriate authority and typically operated by private organizations, universities, or even some public school districts. Charters receive state and federal financial support similar to other public schools (i.e., those operated by traditional school districts) but are separate from local school districts or cities. Charter schools first appeared in Minnesota in 1991. By 2018, there were 7,193 charter schools operating in about 44 states with more than 3.1 million students enrolled, about 6 percent of total enrolment. Whether charter schools have been successful in improving education for their own students and strengthening the overall K–12 educational system is controversial. Philip Gleason and Helen Ladd discuss these questions in a point/counterpoint exchange in the *Journal of Policy Analysis and Management* (2019).[26]

Gleason offers two key points. Although the research does not suggest improved achievement for all charter school students, he notes it does show certain cases where there has been improvement, especially "urban charter schools serving mostly disadvantaged and minority students." He also argues that charter schools have influenced school districts to adopt some new policies used by charters, including extended school time, more autonomy from all regulations, intensive tutoring, comprehensive behavior policies, mentoring and training for teachers, and using data to make educational decisions. He states,

> Charter schools have searched for ways to more effectively serve students, using new and different approaches. Not all charter schools succeed and not all of their students thrive. But some charter schools have improved student outcomes, and lessons drawn from their success have been applied more broadly.

Ladd focuses on three factors. (1) She argues that charters impose fiscal costs on local school districts as they attract students away, which reduces the amount of state government funds school districts receive. As you have seen, many states allocate funds to schools districts on a per pupil basis, and districts may not be able to reduce costs proportional to the decline in students and state funds. Suppose, for example, an elementary school has seven grades with one 20-pupil class per grade for a total of 140 students. Now suppose 2 students per grade level leave for a charter school. The school still has 18 students per grade level, so it is exceedingly difficult to reduce the number of classes and teachers. But funds have been reduced.

(2) She also suggests that by attracting certain specific types of students, charters may increase racial segregation of students in a community. (3) Finally, she argues that focusing on how well charter school students do academically is the wrong question. Rather, she suggests the correct research and policy issue is "whether all children are doing better on average in communities where charter expansion is greater."

In conclusion, Ladd's recommendations are "to limit the number of charter schools" and "to impose stronger accountability and transparency requirements to assure that the existing charter schools are promoting the public interest." In response, Gleason argues "There is little evidence to suggest that charter schools have systematically harmed district students. Most

districts have adjusted to challenges posed by charter schools. Moreover, charter schools have had notable success in serving highly disadvantaged student populations."

At least one study suggests that the effects of competition among schools for students may have unexpected, untended results. Rothbart (2020) analyzes the effects on school spending from school choice competition in New York. He finds that schools facing new or increased competition increased spending on non-instructional functions. Thus, spending per pupil increases, but educational results from instruction do not.

International comparison

Not surprisingly, the structure and financing of primary and secondary education varies greatly among industrialized nations, just as it varies greatly among the states. Comparisons are difficult because of differences in the structure of government, problems in converting financial amounts to comparable units, and obvious cultural differences. Still, comparing primary and secondary education in the United States to other nations both illustrates many of the issues discussed in this chapter and suggests options that the United States might consider for altering its educational system.

Valuable comparative information about international differences in education is provided in both the US Department of Education report *Digest of Education Statistics* (https://nces.ed.gov/programs/digest/current_tables.asp) and the OECD report *Education at a Glance* (www.oecd.org/education/education-at-a-glance/). The information reported in Table 17.3 and Figures 17.4, 17.5 and 17.6 (and other background data from the same

Table 17.3 Secondary education comparisons, selected nations

Nation	*Percentage of 25–64 completed high school 2019*	*Percentage of 15 year-olds in secondary school, 2017*	*Elementary & secondary education expenditure per student, 2017*	*Pupils per teacher in upper secondary education, 2017*	*Average reading literacy score for 15 year-olds, 2018*	*Average mathematics literacy score for 15 year-olds, 2018*
Australia	83%	101%	$11,270	12	503	491
Austria	86	94	15,097	10	484	499
Belgium	79	99	13,054	10	493	508
Canada	92	101	11,380	13	520	512
Denmark	82	99	12,163	–	501	509
France	80	97	10,867	11	493	495
Germany	87	98	12,195	13	498	500
Ireland	84	103	9,218	13	518	500
Italy	62	98	10,036	10	476	487
Japan	–	99	9,963	12	504	527
Korea, Republic of	89	101	12,704	13	514	526
Netherlands	80	100	11,931	18	485	519
Norway	83	100	14,848	10	499	501
Spain	61	96	9,166	11	–	481
Sweden	84	103	12,339	14	506	502
Switzerland	89	97	12,138	12	484	515
United Kingdom	80	100	11,597	17	504	502
United States	91	101	13,511	15	505	478
OECD average	80	97	9,934	13	487	489

Source: US Department of Education, *Digest of Education Statistics*, 2019

Note: Literacy score scales were designed to have an average score of 500 points and standard deviation of 100

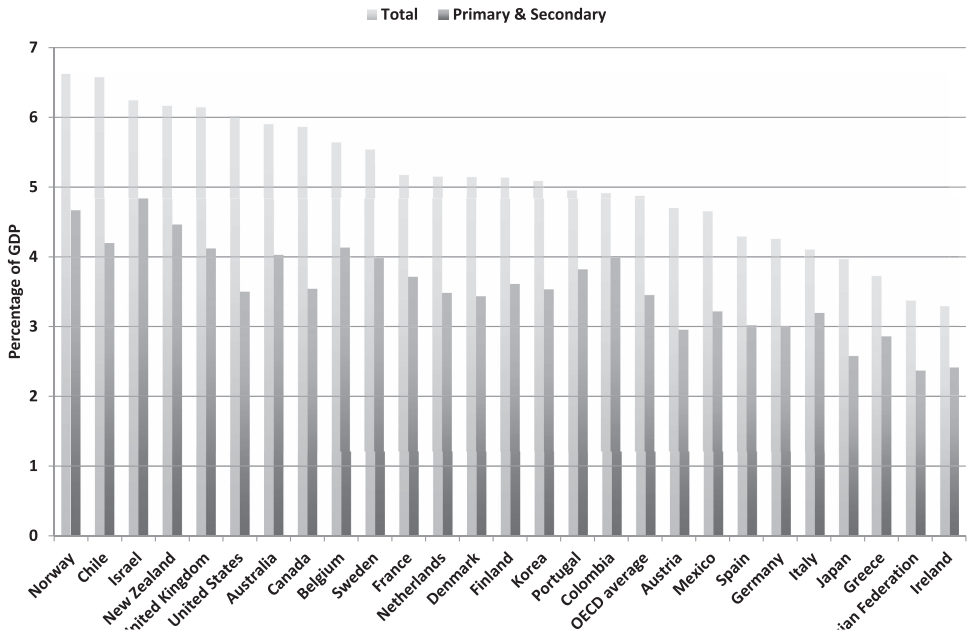


Figure 17.4 Education expenditure percentage of GDP, selected nations, 2018

Source: OECD, Education at a Glance 2021, www.oecd.org/education/education-at-a-glance/

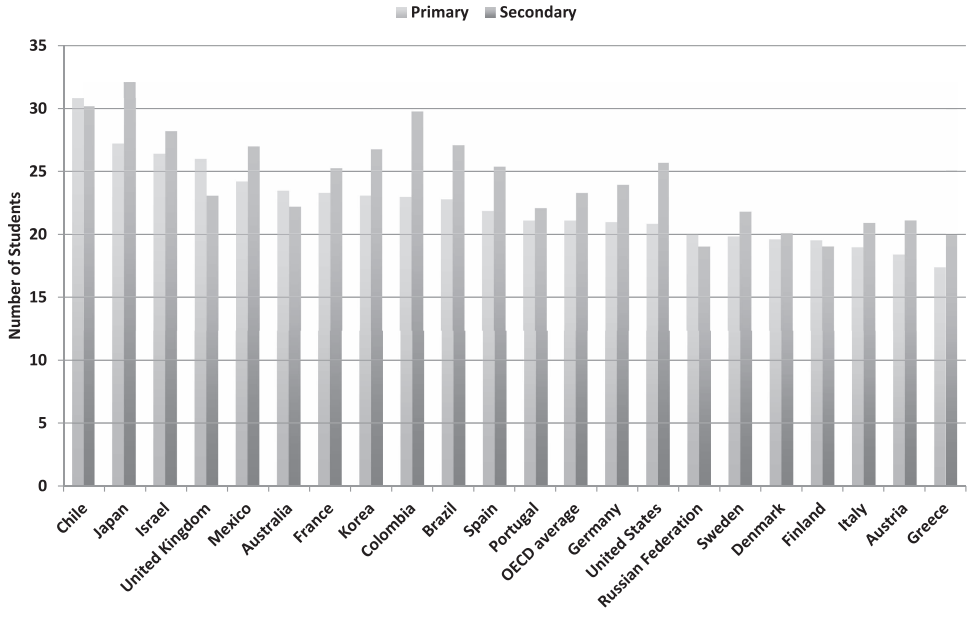


Figure 17.5 Average class size, selected nations, 2018

Source: OECD, Education at a Glance 2020, www.oecd-ilibrary.org/education/education-at-a-glance-2020_69096873-en

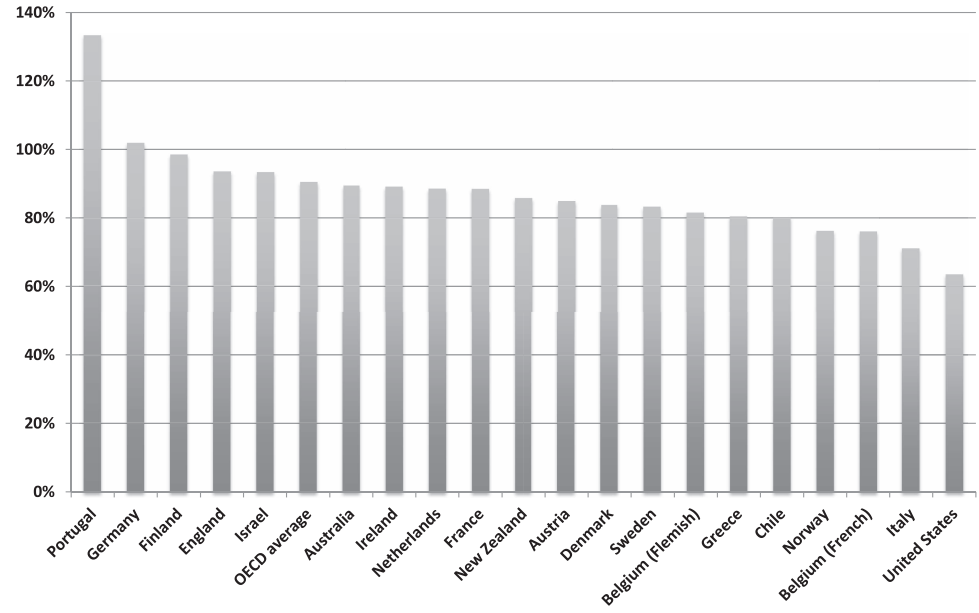


Figure 17.6 Secondary teacher salary as percentage of all college educated, 2020

Source: OECD, Education at a Glance 2020, www.oecd-ilibrary.org/education/education-at-a-glance-2020_69096873-en

sources) suggest the following comparative observations about primary and secondary education in the United States:

1 The United States spends about 4 percent of GDP on primary and secondary education, which is about average among the developed nations represented in the OECD.
2 Expenditure per student is relatively high in the United States. (Only Austria and Norway have higher spending among the nations shown in Table 17.3, although Luxembourg also is above the United States.)
3 The United States has a relatively high percentage of adults who have graduated from high school, reflecting a long-standing program of widespread compulsory education, and is about average in terms of the percentage of current students attending secondary schools. Thus, other nations are now requiring or providing for broad secondary education. In the US, more than 90 percent of adults have completed high school, compared to about 60 percent in Italy and Spain and about an 80 percent average among OECD nations. In contrast, the differences in the percentage of 15-year-old students who are enrolled in secondary school are quite small.
4 Typical class sizes in the United States are about average, substantially smaller than in such nations as Canada and Japan but larger than in nations such as Austria and Greece.
5 Students in the United States attend school for more hours per year than those in most other nations.
6 Teacher salaries in the United States relative to those for all full-time workers with college degrees are lower than average at about 60 to 65 percent of all workers' salaries, compared to an OECD average of 80 to 90 percent. In contrast, teachers in England and Germany are paid about the same as the average college-educated worker.

7 Scores of United States students on standardized tests administered specifically for international comparisons are about average but generally lower than for students from Australia, Canada, Japan, and the United Kingdom, for example.

The picture that emerges for the United States, then, is a nation that spends an average fraction of its income on education, but because income (GDP) is very high in the United States, spending per student is also very high. Indeed, data reported by the OECD show clearly that education spending per student is positively related to national income, as measured by GDP per capita. That relatively high spending in the United States funds a larger than average amount of time in school for students rather than substantially smaller than average class sizes or higher-than-average teacher salaries (which could be alternative uses of the funds). The longer time spent in school per year by US students arises not because US students go to school more days per year, generally, but rather because of more hours per day. The comparison with Japan is particularly dramatic. Japan spends roughly 25 percent less on education than does the United States (3 percent of GDP in Japan compared to 4 percent in the US) and has roughly 25 percent larger classes (at least in primary and lower secondary schools). Students in Japan attend school fewer hours per year than in the US, but teachers are paid more relative to national GDP.

There are two other important structural differences in the educational system in the United States compared to most other nations not illustrated by the data. First, the United States uses one of the most decentralized systems of all nations to provide education, even compared to the other nations with federal systems of government (having federal, state, and local governments, such as in Australia, Canada, and Germany). As we have seen, local school districts in the United States generate a share of revenue for primary and secondary education and are responsible for spending essentially 100 percent. In comparison, reliance on local finance is substantially lower in Germany, and state governments in Australia govern, finance, and operate the schools (as is done only in Hawaii in the United States). Second, primary and secondary education in the United States is a uniform or non-stratified system, with students at any given age and location all participating in the single school system and taking a similar curriculum. A number of other nations, notably most European nations, operate stratified systems, with students sorted into various educational tracks at relatively young ages (as young as ten in Austria and Germany).

Interestingly, there seems to be no clear overall relationship between these characteristics of educational production systems and educational results, at least as measured by standardized tests. As noted previously, the performance of students from the United States on these tests is about average, although there is some variation by subject area; US students score relatively better in reading than mathematics. The OECD reports that although there is a tendency for students in stratified educational systems to perform relatively less well, this tendency is small and not statistically significant. However, the OECD also concludes that

> in countries that separate students at an early age into schools of different types, students' social background tends to be relatively strongly related to their performance. Disadvantaged students are more likely to be placed in low status schools with less demanding curricula . . . and then to end up with relatively poor performance. Socially advantaged students are more likely to be placed in high status schools with demanding curricula and then to end up with relatively high quality performance. . . . In countries that keep students together in comprehensive schools, the relationship between social background and educational performance is weaker.
>
> (OECD, *Education at a Glance, 2005 Edition*, 399)

Summary

In 2019, public elementary and secondary schools served nearly 51 million students and spent about $752 billion, equal to about 3.7 percent of GDP, $16,000 per student in average daily attendance at those schools, and 40 percent of all local government spending. Expenditures per pupil, even after adjustment for inflation, increased substantially over the past 50 years.

In 2017, state governments provided about 47 percent of the revenue for public school spending in aggregate, and local governments – especially the school districts – provided about 45 percent. The federal government provided about 8 percent of public school spending through a combination of direct grants to school districts and funds provided through state governments.

Lump-sum per pupil grants to support local education are referred to as foundation aid because the per pupil grant represents a minimum expenditure level; the state aid is intended to provide a basic foundation on top of which local revenue supplements may be added.

Guaranteed tax base or district power equalizing aid plans are intended to provide an equal, basic per pupil property tax base to each district, rather than a basic per pupil minimum expenditure level. A GTB plan involves matching grants that reduce the price of education to the school districts. Because the demand for education spending is price inelastic, the price reductions that are caused by the matching grants generally have not influenced education spending very much.

Recent research contradicts the old view and shows a typical positive relationship between rising school expenditures and improved student performance. The intellectual skills of a teacher as measured by a verbal ability test or the quality of college the teacher attended tend to have a significant effect on student performance. A third general conclusion is that the school curriculum can matter because of the link between the number of academic courses students take and their scores on standardized tests.

In the 1970s, the primary educational policy issue concerned the differences in per pupil spending among districts. States altered their educational grant programs and spent more money on education, but spending differences among districts were not reduced, and educational performance generally did not improve. Recently, the primary issue moved its focus from educational spending to educational results. The current primary focus is on measuring or evaluating educational results, finding ways to use the resulting evidence to improve educational outcomes, and improving educational results for all students.

Discussion questions

1 Per pupil spending often varies among school districts in a given state. Suppose that one district spends $6,000 per pupil for instruction (excluding transportation, lunches, administration, and so on) while another district of about the same size spends $10,000 per pupil. What could account for this difference? Consider factors in the categories of the quantity of inputs, the type of inputs, the prices of inputs, and the type of output.

2 The role of state governments in providing public primary and secondary education varies greatly. In one case, the state government operates the school system; in a number of others, the state government provides a substantial amount of the revenue for local schools (half or more) and sets minimum graduation or teacher requirements; and in other cases, the state either provides a relatively small amount of revenue or sets few standards or both. What are the economic arguments for and against state involvement in financing and producing education? What social and economic characteristics of a

state might influence the choice of how to produce education? Do these help explain the cases of Hawaii and New Hampshire or Washington compared to Oregon?

3 The education grant simulation case showed that a program of matching grants was not effective in equalizing per pupil spending because demand was relatively inelastic. What other means might be used to narrow these spending differences? Outline the specifics of a state program that you believe would be successful in setting a minimum per pupil spending level of $10,000. Explain the effect of that program on each district, and discuss whether you would support such a change in your state.

4 Suppose that your local school district wants to implement a program to assess teacher quality and success and to use that assessment as part of the evaluation of teachers that may affect their salary or retention. What are the advantages and disadvantages of using student test scores to evaluate teachers? What factors might influence student test scores other than the "quality" of a specific teacher? If one is concerned that learning in prior classes might influence current test scores, how could one separate the effect of a single class or teacher? What might be included in teacher assessment other than test scores?

5 Suppose that your college or university decides to evaluate its undergraduate program to determine how successful it is at educating students. How should the output of a university be measured? In terms of education only, what characteristics do you think show how good a job a college does? How should the teaching output or quality of individual professors be measured? Does your university attempt to measure education output or teaching success? Does your university have a merit pay system for faculty, and if so, what role does education output or teaching quality play?

Notes

1 Craig Mauger, *The Detroit News* (July 13, 2021), www.detroitnews.com/story/news/education/2021/07/13/whitmer-signs-historic-school-plan-says-sets-solid-foundation/7948801002/.

2 John Fensterwald, *EdSource* (July 13, 2021), https://edsource.org/2021/unprecedented-california-budget-to-usher-in-sweeping-education-changes/657849.

3 Helen F. Ladd and Janet S. Hansen, Editors. *Making Money Matter: Financing America's Schools*. Final report of the National Academy of Sciences Committee on Education Finance. National Academy of Sciences Press, November 1999.

4 The decreases in the 1960s were a continuation of a trend operating at least since 1930. See US Department of Education (May 1987).

5 In 2016, about 3.3 percent of school-age children were home schooled.

6 But the "costs" must not be determined solely by the recipient government. With respect to labor, for instance, the index might be based upon average wages for all jobs in the region of the school district.

7 Note that districts with per pupil tax bases greater than $(F/R^{\star})/(1 + C_i)$ will generate more than $8,000 per pupil in real revenue and will be able to spend more than the foundation.

8 D would get a positive grant if it lowered its tax rate to less than $10 per $1,000 of value, but education spending per pupil would fall drastically.

9 Douglas Wills has pointed out to me that there is some ambiguity about this example because the analysis of the lump-sum component of the grant assumes a tax price of one, even though the matching component of the GTB grant reduces the tax price. The analysis presented here is equivalent to assuming that the lump-sum grant occurs first. This seems appropriate because if a district selects a tax rate (R) equal to zero, it still receives the lump-sum grant.

10 www.ecs.org/research-reports/key-issues/funding/.

11 For more detail about these court challenges and decisions, see Lukemeyer (2004) and Huang et al. (2004).

12 See Lukemeyer (2004) and Flanagan and Murray (2004).

13 For a discussion of the early evidence of the effects of state aid programs on school spending, see Fisher and Papke (2000).

14 Zhao (2020) offers a variant on this approach in which the cost of achieving a given education level is compared to the revenue-raising capacity of a district, with grants making up the difference. Setting a high educational level or high minimum grants achieves the spending result.

15 A "homestead" is intended to be the principal residence of a taxpayer. A second home, such as a vacation home, is considered "non-homestead" property, as are agricultural, commercial, and industrial property.
16 In addition, a state real estate transfer tax was levied at .75 percent, and the state excise tax on cigarettes was increased from $.25 to $.75 per pack.
17 https://crcmich.org/crc-recommendations-reflected-in-proposed-school-retirement-system-reforms
18 www.nctq.org/publications/State-of-the-States-2021:-Teacher-Preparation-Policy.
19 https://nces.ed.gov/programs/digest/d20/tables/dt20_211.50.asp
20 This section draws from Ronald C. Fisher, "Organization of Educational Production: Schools, School Districts, and Consolidation." Working paper presented at the annual conference of the International Institute of Public Finance, Milan, 2004.
21 Interestingly, Monk and Haller find that the increased specialization in mathematics classes in larger high schools arises primarily because of the offering of more remedial classes. Thus, the students needing the most help may be most disadvantaged in mathematics by small schools.
22 https://nces.ed.gov/nationsreportcard/about/.
23 www.edweek.org/teaching-learning/what-tests-does-each-state-require.
24 www.corestandards.org/.
25 https://nces.ed.gov/programs/digest/2013menu_tables.asp
26 Gleason, Phillip M. "Let the Search Continue: Charter Schools and the Public Interest," *Journal of Policy Analysis and Management, 38*, No. 4 (Fall 2019): 1054–1062; Helen F. Ladd, "How Charter Schools Threaten the Public Interest," *Journal of Policy Analysis and Management, 38*, No. 4 (Fall 2019): 1063–1071.

Selected readings

Fisher, Ronald C., and Leslie Papke. "Local Government Responses to Education Grants." *National Tax Journal*, *53* (March 2000): 153–168.

Hanushek, Eric A. *Making Schools Work*. Washington, DC: Brookings Institution, 1994.

Jackson, C. Kirabo. "Does School Spending Matter? The New Literature on an Old Question." In *Confronting Inequality: How Policies and Practices Shape Children's Opportunities*, edited by L. Tach, R. Dunifon, and D. L. Miller, 165–186. Washington, DC: American Psychological Association, 2020.

Kenyon, Daphne. "Providing and Financing K–12 Education." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen, 519–541. Oxford, UK: Oxford University Press, 2012.

Ladd, Helen F., and Edward B. Fiske. *Handbook of Research on Education Finance and Policy*. London: Routledge, 2008.

Ladd, Helen F., and Janet S. Hansen, eds. *Making Money Matter: Financing America's Schools*. Committee on Education Finance, Commission on Behavioral and Social Sciences and Education, National Research Council. Washington, DC: National Academy Press, 1999.

Yinger, John, ed. *Helping Children Left Behind: State Aid and the Pursuit of Educational Equity*. Cambridge, MA: The MIT Press, 2004.

18 Transportation

Headlines

US Driving Last Year Was Lowest in Two Decades, New Data Show[1]

"After six consecutive years of gradual increases in vehicle-miles traveled (VMT), the Federal Highway Administration (FHWA) today released new year-end estimates showing total US driving fell by 13.2% – from 3.3 trillion VMT in 2019 to 2.83 trillion in 2020.

The latest VMT data . . . show that, combined, all miles driven on public roads and highways in 2020 is the lowest since 2002. Nationwide closures of businesses, schools and other economic factors related to the nation's ongoing health crisis are thought to be key factors in the year's estimated 430.2 billion VMT decrease."

COVID-19 gave us an historic traffic hiatus, but the pause didn't last long[2]

"America's worst public health crisis in a century flattened roadway congestion to levels not seen in 40 years. . . .

In the pandemic shutdown of spring 2020, daily commuter traffic dropped by almost half compared to the year before. Any traffic snarls that did exist were spread over more hours of the day, as rush hour travelers took on roles as midday shoppers and child transporters. Also, more of each week's travel delay in 2020 was shifted to the weekend, another result of reduced weekday rush-hour commuting.

Truck traffic, on the other hand, hardly dropped at all during the year, a result of increased at-home delivery of items as everyday as cereal and toilet paper."

Early Estimate of Motor Vehicle Traffic Fatalities in 2020[3]

"A statistical projection of traffic fatalities for 2020 shows that an estimated 38,680 people died in motor vehicle traffic crashes. This represents an estimated increase of about 7.2 percent as compared to the 36,096 fatalities reported in 2019."

Passengers on All 2020 US-Based Flights Down 62% from 2019[4]

"US airlines and foreign airlines serving the US carried 398 million systemwide (domestic and international) scheduled service passengers in 2020, 62% fewer than in 2019 when the record high of 1.1 billion annual passengers was reached."

DOI: 10.4324/9781003030645-23

Data availability

The most complete source of information about all levels of transportation in the United States is the Bureau of Transportation Statistics in the US Department of Transportation. Two annual reports are particularly valuable. "National Transportation Statistics" (www.bts.gov/product/national-transportation-statistics) provides information about the entire transportation system, including highway, rail, air, and water components and performance. "Highway Statistics" (www.fhwa.dot.gov/policyinformation/statistics.cfm) provides information about vehicles, drivers, physical structure, travel, taxation, and finance.

The Governments Division of the US Census Bureau is the major source of comprehensive data about revenue and expenditure by state and local governments, including that related to transportation. State and aggregate local government spending for transportation components (and other areas) is reported annually with a year or two lag (www.census.gov/data/datasets/2018/econ/local/public-use-datasets.html). Data about the magnitude of transportation-related spending by specific types of local governments – counties, municipalities and townships, school and other special districts – are reported in the Census of Governments, which is completed every five years, in years ending in 2 or 7. The Census of Governments is available at www.census.gov/programs-surveys/cog.html. These same reports also include data about motor fuel excise tax revenue as well as charges and fees from highways, public transit systems, airports, and ports.

As noted throughout the book, you may access these census data directly from the census or by using the valuable and easy-to-use data tabulation utility maintained by the Urban Institute (https://state-local-finance-data.taxpolicycenter.org//pages.cfm).

The relevant professional associations also provide information about specific modes of travel. The American Public Transit Association provides detailed information and data about public transit in the annual Public Transportation Fact Book (www.apta.com/research-technical-resources/transit-statistics/). Similarly, the Association of American Railroads provides data about rail freight transportation (www.apta.com/research-technical-resources/transit-statistics/).

The International Transport Forum (www.itf-oecd.org/) provides data, research, and information about all types of transportation for a large number of different nations.

Although education is the dominant single service provided by subnational governments, transportation is surely the most apparent service, the one more individuals benefit from directly on a day-to-day basis. In fact, transportation facilities provided by state and local governments may be so apparent that they sometimes are taken for granted, without an understanding of what they cost or how they are financed. Once, while making a presentation about state government spending to a citizens group, I was confronted by an individual who asserted that he did not get any benefits from state taxes. I asked the fellow how he had gotten to the meeting that day. He responded that he had driven and then said, "Well, obviously I use the roads, but except for that." Except for the roads? It is estimated that interstate highways cost at least $10 million per mile in urban areas and $5 million in rural areas for construction alone, plus the cost of engineering and acquisition of land. Although primary, secondary, and most urban roads cost less, it is clear that even a short automobile trip requires the use of many millions of dollars' worth of capital infrastructure provided through governments. A ten-mile urban commute to work uses a $100 million asset – every day, in each direction.[5]

Transportation is also somewhat unique because inputs provided both publicly and privately are combined to produce transportation service. Individuals and businesses own private automobiles, which they drive on public roads and bridges. Private airline firms fly privately owned airplanes to publicly provided airports using a publicly provided air traffic control system. Privately owned and operated boats travel on publicly owned and maintained waterways and harbors. In essence, the private and public sectors jointly supply transportation service, with the public sector primarily responsible for providing and maintaining transportation routes. The demand for transportation service – both for routes and vehicles – arises almost entirely from private choice, however. As a result of the complementary nature of the public- and private-transportation inputs, government must consider private demand for transportation in providing facilities. However, those publicly provided facilities – and their prices – can influence private decisions about the amount and type of transportation individuals demand.

How transportation facilities are financed and priced is both important and controversial. Writing in 1963, William Vickrey wrote "In no other major area are pricing practices so irrational, so out of date, and so conducive to waste as in urban transportation."[6] As we shall learn, the situation may be no different now. Those publicly-provided facilities—and their prices—can influence private decisions about the amount and type of transportation individuals demand.

The emphasis in this chapter is on the role of government in providing and financing those public facilities. Roads and highways are the largest category of transportation facilities provided by government, measured by both dollars and use. In the provision of highways, state governments play the dominant role by receiving aid funds from the federal government, collecting substantial own-source revenues, spending directly on the construction and maintenance of roads, and transferring aid funds to local governments for their direct spending.

Financing transportation: Current practice

Types of transportation service

Governments provide transportation facilities or service for air, rail, road, and water transit. All levels of government together spent nearly $371 billion on these transportation services in 2018. In the years from 1991 to 2018, transportation spending increased by 242 percent in nominal terms, which equates to a real increase of about 129 percent. Not surprisingly, about 64 percent of spending in 2018 was for highways, whereas about 19 percent was for mass transit and 13 percent was for air travel, as shown in Table 18.1. The shares of total spending for the various categories have been remarkably stable over time.

The dominance of spending on highways is certainly not surprising because it reflects the dominance of the automobile and the scope of highway transportation in general. In 2019 there were about 4.2 million miles of roads in the United States on which the approximately 276 million registered motor vehicles were driven about 3.3 trillion vehicle miles by the 229 million licensed drivers. The data in Figure 18.1 show that the number of licensed drivers has effectively continually increased, although since the mid-1980s, the increase in drivers has simply followed the increase in population. About 70 percent of people in the United States are licensed to drive.

Since the early 1970s, the number of registered vehicles has been greater than the number of licensed drivers. The share of households with more than one vehicle has increased essentially continually since 1960. Although miles of travel per vehicle have declined slightly in recent years (even before the pandemic), it has not been enough to reduce the overall

Table 18.1 Federal, state, and local transportation expenditures by mode, selected years

	1991 percentage of total	*2000 percentage of total*	*2018 percentage of total*
Highway	61.5%	64.3%	63.5%
Transit	19.2	18.7	18.9
Air	12.9	12.1	12.5
Water	5.4	4.1	4.1
Rail	0.7	0.4	0.7
Pipeline	0.0	0.0	0.0
General support	0.2	0.4	0.2
Total (billions of current dollars)	$108.3	$186.3	$370.6

Source: US Department of Transportation, National Transportation Statistics

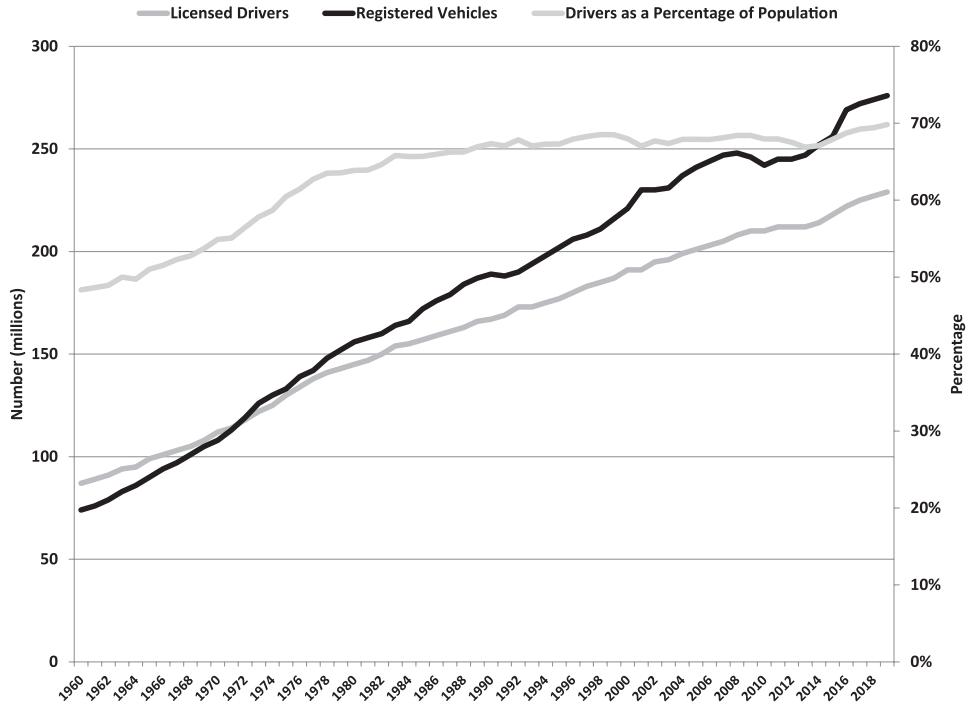


Figure 18.1 Automobile use in the US

amount of highway use. The main purposes of automobile travel by individuals are travel to work (33 percent of trips and 47 percent of vehicle miles), on family and personal business (18 percent of trips and 24 percent of vehicle miles), and for social and recreational trips (24 percent of trips and 21 percent of vehicle miles).

The role of the federal and subnational governments

The general pattern for financing transportation services involves both direct spending on purchases and payment of intergovernmental aid by each of the three primary levels of

government. The federal government's role concerning highways and public transit is primarily in providing grants to subnational governments, as shown in Table 18.2, whereas for air and water transportation, the federal government has a substantial role in directly purchasing and providing services and facilities. For instance, of the approximately $50 billion spent by the federal government for highways in 2018, about $46.7 billion, or 93 percent, was composed of highway grants paid to state-local governments. Ninety-nine percent of federal government spending for public transit is in the form of grants to state and local governments. Although the federal government plays an important role in financing highway transportation, that role primarily is generating funds to be spent by states and localities. The federal government spends very little directly purchasing highway facilities.

For air transportation, in contrast, about half the spending is done directly by the federal government and the other half by subnational governments. The federal government is responsible for the air traffic control system and security, whereas the subnational government sector (mostly local governments) is responsible for airports.

State governments, on the other hand, provide transportation services and facilities directly and transmit aid to local governments. In the case of highways, for instance, state transportation departments engage in highway construction and maintenance directly (or through contracts) on the roads for which each state government has responsibility. State governments also make substantial intergovernmental grants (that is, transfer state highway funds) to local governments for road construction and maintenance. Local governments mostly serve as direct purchasers and providers of facilities and services, using both their own revenues and the intergovernmental aid they receive from states and directly from the federal government. In 2019, for example, of the total $203 billion that state and local governments spent for highways, state governments spent about 62 percent of that amount and local governments about 38 percent. Conversely, local governments accounted for more than 75 percent of direct spending for public transit and state governments less than 25 percent. Local governments were even more dominant in direct spending for air transportation, accounting for 91 percent of state-local spending, as airports are largely local government entities in the United States.

An accurate picture of the roles of the different levels of government in financing transportation requires the distribution of both final spending and own-source revenue used for purchases and intergovernmental grants in each transportation category. The case of highway spending for 2019 is illustrated in Table 18.3. This characterization by the federal Department of Transportation includes all revenues used for highway purposes and spending for capital outlay, maintenance and traffic services, interest on debt, administration and research, and highway law enforcement and safety.

State (and territory) governments generated about $146 billion in own-source revenue for highway purposes, received around $44 billion in grants from the federal government and $5 billion in grants from local governments, paid approximately $23 billion in aid to local

Table 18.2 Composition of federal transportation expenditure, 2018 (millions of dollars)

Transportation mode	*Total spending*	*Grants to states and localities*	*Direct spending*
Highways	$50,006	$46,678	$3,328
Transit	14,472	14,440	32
Air	18,094	3,054	18,040
Water	8,820	108	8,712
Rail	2,284	0	2,684

Source: US Department of Transportation, National Transportation Statistics

Table 18.3 Fiscal federalism for highway finance, 2019

	Revenue	*Grants to states*	*Grants to local*	*Direct spending*[a]
Federal	$44.2 billion	($44.3 billion)	($4.3 billion)	$3.6 billion
State	$145.8 billion	$49.2 billion	($23.3 billion)	$158.8 billion
Local	$70.8 billion	($4.9 billion)	$27.6 billion	$95.6 billion
Total[b]	$260.8 billion	$49.0 billion	$28.0 billion	$258.0 billion

Source: US Department of Transportation, Highway Statistics, Table HF-10

Notes:

a Includes capital outlay, maintenance and traffic services, administration and research, interest on debt, and highway law enforcement and safety.

b The difference between spending and revenue reflects changes in reserve funds.

governments, and had total spending of about $159 billion. State governments spend more directly on highways than own revenue generated because federal aid to state governments is larger than state aid to local governments. The important role of state governments in both generating revenue and spending for highways is clear. Local governments also spend more (over $95 billion) than they generate in own-source revenue (about $71 billion) because of grants from state governments. The federal government's role is almost exclusively in generating revenue and transferring that revenue to state governments.

State governments have a central role in financing highways. States receive substantial amounts of federal aid, which accounts for 23 percent of state highway revenue, and pay considerable grants to local governments, which represent about 11 percent of state highway-related expenditures. On the revenue side, about 47 percent of state receipts arise from user revenue (mostly fuel taxes) and tolls, 23 percent is federal aid, 8 percent is borrowed by issuing bonds (to be repaid from state funds in the future), and the remainder comes from a variety of sources (including license and registration fees). On the spending side, 48 percent of state government disbursements go toward direct capital expenditure, 16 percent for highway maintenance, and 11 percent for grants to local government. Local governments have a role in maintaining roads (33 percent of local highway spending) and slightly less in constructing new facilities (35 percent of local government spending).

Transportation revenues

Although governments generate revenues for transportation spending from a variety of sources, taxes and tolls collected from users are the major component. The federal government levies excise taxes on the sale of motor fuels ($.184 per gallon of gasoline and $.244 per gallon for diesel fuel), tires, trucks and trailers, and airline tickets and also collects user charges for road use (from trucks weighing more than 55,000 pounds) as well as for airport and waterway use. State and some local governments also levy excise taxes on the sale of motor fuels (varying from $.08 to $.50 per gallon, as shown in Chapter 13), and some states apply their general sales tax to the sale of gasoline as well, sometimes with that revenue earmarked for transportation. State-local governments collect fees for licensing both vehicles and drivers, which serves as a regulation function as well as a transportation revenue source.

State-local governments also collect tolls and charges for highway, airport, and waterway use and for parking. In fact, charges from toll highways have been among the fastest-growing components of overall state-local revenue and certainly the fastest-growing component of highway finance – much greater than fuel excise taxes.[7] From 2010 to 2018, highway tolls increased by 68 percent in real terms to $18.5 billion and motor fuel taxes by 11 percent,

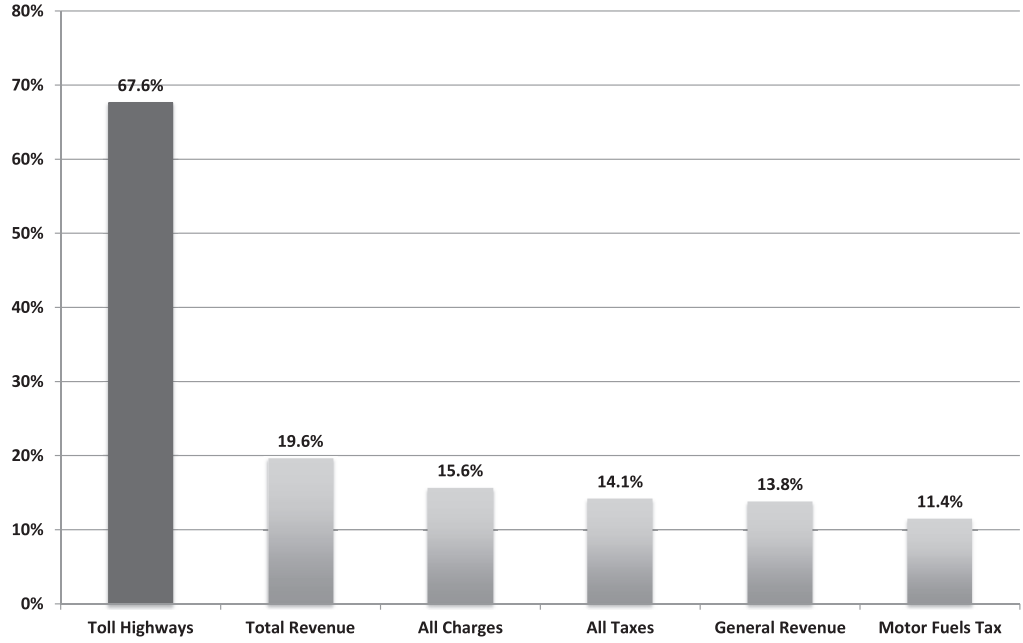


Figure 18.2 Percentage change, real state-local revenue components, 2010–2018

Source: US Census Bureau

even with state tax rate increases (see Figure 18.2). Revenue from toll roads grew much faster than all charges collected by state-local government and total state-local revenue. Of course, state motor fuel taxes still generate more revenue ($50 billion in 2018) than do highway tolls ($18 billion).

International comparison: Differences in transportation modes and facilities

Passenger transportation methods and finance vary substantially among industrialized nations. Personal automobiles and public highways dominate transportation in the United States. For ground passenger travel, the United States relies more on personal vehicles and roads and less on rail transportation than other major industrialized nations. Use of personal vehicles and roads accounts for more than 90 percent of ground transport passenger miles in the United States, but it represents only about 83 percent in France, 84 percent in Germany and 62 percent in Japan (see Table 18.4). In contrast, rail transportation, which provides less than 1 percent of ground transit in the United States, accounts for about 9 percent of ground travel in Germany, nearly 33 percent in Japan, and 60 percent in China. In essence, rail is substantially more important in Europe than in the US and much more important in Asia (China and Japan) than it is in Europe.

These differences in transportation approach reflect or result from several policy decisions by government. First, government in the United States has invested relatively more in roads and highways and less in rail facilities compared to these other nations. Second, excise taxes on gasoline are substantially less in the United States than in most other

industrialized nations, which largely explains why gasoline prices are lower in the United States than elsewhere. Thus, it seems that because the United States has maintained low taxes on gasoline, US residents choose to own more personal vehicles and drive more than residents of other nations, which requires government to invest more in road facilities. The data in Figure 18.3 illustrate that vehicle ownership is higher in nations (especially the United States) with lower fuel prices. Also, the United States and Canada have invested in more road capacity relative to population. In other nations such as Japan, where gasoline taxes and prices are relatively high, consumers choose fewer personal vehicles and relatively more rail travel, and government invests less in roads and more in rail facilities.

This story misses an important point: consumer preferences influence governments' fiscal choices, including the decision about the level of gasoline taxation. Due to preferences or other economic and social factors (area and income perhaps), US consumers have chosen road transportation, whereas Japanese consumers have selected rail transportation to a greater degree. It is not clear that consumers in the United States would respond to higher gasoline prices in the same way as the Japanese. For instance, gasoline prices in France are essentially the same as in Japan, but the reliance on road travel in France is more similar to the United States than to Japan. Noting the relatively high miles per gallon of vehicles in France, it seems that the preferred response of French consumers to high gasoline taxes and prices has been to change the nature of their vehicles rather than the mode or amount of travel. In short, the transportation systems selected by residents in various nations vary dramatically and reflect a combination of economic, geographic, and cultural factors.

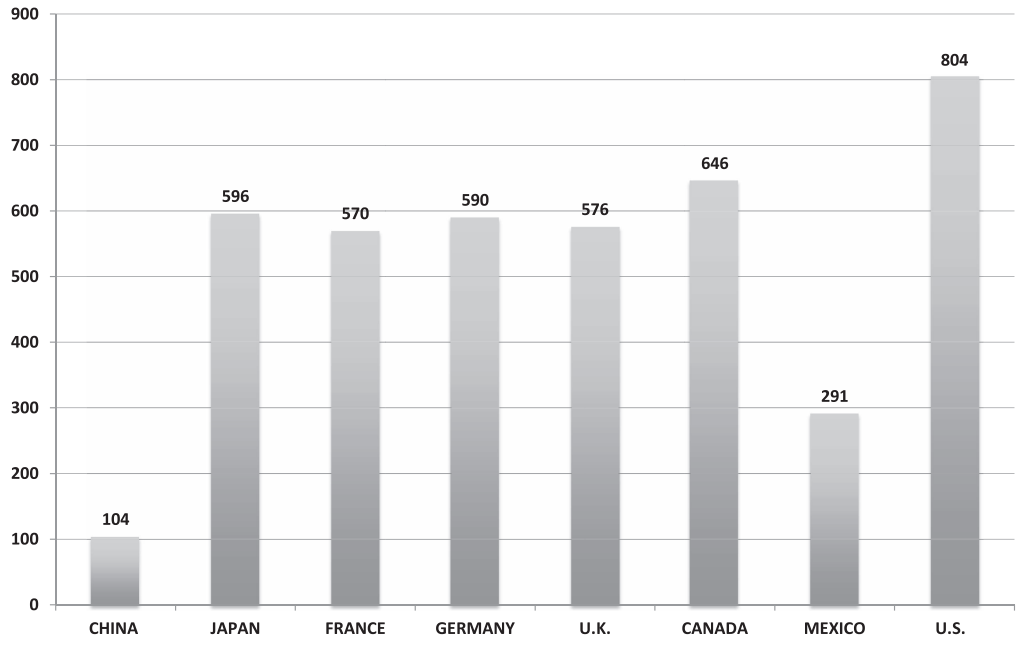


Figure 18.3 Registered vehicles per 1,000 population

Source: US Department of Transportation, Highway Statistics

Financing transportation: Theoretical issues and alternative practices

Role for user charges

Recall from Chapter 8 that user charge financing is attractive if the share of marginal benefits accruing to direct users is relatively large, the users can be identified easily, and the direct users can be excluded (at reasonable cost) from consuming the service unless the charge is paid. Are these conditions representative of transportation facilities and services provided by state-local governments? Typically the answer is yes, with one qualification. Although external benefits from transportation systems undoubtedly exist, they may be swamped by the substantial demand by and benefits to direct users. Direct users identify themselves by purchasing and registering vehicles, by purchasing fuel and other supplies, and by taking trips. The potential qualification is that while exclusion of users who do not pay is possible, it may be costly, particularly for some forms of transportation user charges. This suggests that transportation user charges will be attractive only when they can be collected and enforced in a relatively low-cost manner.

One issue in applying user charges to transportation is whether users – through direct charges – should pay part or all of the capital cost of facilities. The answer depends on the distribution of marginal benefits between those who are direct users and those who are not, rather than simply on the existence of benefits to nonusers. Surely individuals benefit from the transportation network provided by state-local governments for reasons other than their direct use of those networks. The transportation networks are used to bring individuals and goods to those who are not direct users (i.e., there are general social benefits from a transportation system). In general, a basic transportation network enables the economy to function smoothly and assists government in carrying out its defense and public safety responsibilities. The relevant question is whether expanding the transportation network enhances those social purposes. Are there social or external benefits at the margin?

The possibilities are illustrated in Figure 18.4a. Demand curve A_0 represents the private marginal benefits that go to individuals as a result of their direct use of the transportation network, and B_0 represents the general social marginal benefits that go to all of society. Marginal benefit means the additional gain from an additional unit of transportation facility, perhaps another mile of highway. The efficient amount of this transportation facility is T_0, where the marginal cost of another unit of the facility equals the sum of the marginal benefits that go to direct users and to society generally. At that size transportation system, there are no additional benefits to society generally, only additional benefits for direct users. Apparently, a smaller transportation network would be sufficient to allow the economy and government to function as well, at least in providing general benefits to all of society.

Table 18.4 Passenger ground transportation, share by mode

Country	*Car*	*Bus*	*Rail*
Australia	87.9%	6.8%	5.3%
China		60.4%	
France	82.6%	6.3%	11.1%
Germany	83.8%	7.3%	8.9%
Japan	62.4%	5.2%	32.5%
UK	85.3%	4.5%	10.2%
United States	90.6%	8.9%	0.5%

Source: International Transport Forum, inland passenger transport, https://stats.oecd.org/Index.aspx?DataSetCode=ITF_INV-MTN_DATA

Expansion of the transportation network beyond that size benefits specific individuals due to their use of that facility but does not provide any additional general benefits to all. In that case, those direct users who benefit from the expansion of the transportation facility should pay all the capital cost.

A second possibility, perhaps representing an earlier time or the case for a different transportation mode, is shown in Figure 18.4b. Although the general social marginal benefits from this transportation facility are the same as in Figure 18.4a, the private, direct benefits to users are lower; that is, the private demand for this transportation facility is less than in Figure 18.4a. In this case, there are marginal gains both to direct users and to society generally at the efficient amount of the facility, T_1. Appropriate financing in this case requires that direct user charges be u_1 per unit of the facility, with the remainder of the cost, $MC - u_1$, coming from general taxes paid by all of society. User charges are still appropriate but only to cover a portion of rather than all the capital costs.

In other words, if the transportation system is already large enough to provide all the general benefits that arise from having a transportation network, then any further expansion of that system will only generate private benefits and should be financed entirely by users of that expansion. It is often suggested that this is the current situation regarding highways, so it is appropriate to finance more road building entirely from user charges. However, if full user-charge financing is used when there are still additional social benefits at the margin, society will underinvest in transportation facilities. If users were charged the full marginal cost as shown in Figure 18.4b, they would demand less than the efficient amount of facility. In short, user charges should cover the same portion of costs as direct user benefits represent of the aggregate marginal benefits.

How far does the actual transportation financing system correspond to this theory? For highways, at least, it seems to match fairly well. According to DOT, about 70 percent of the revenue for highway expenditures for all purposes in 2012 came from highway-user taxes and tolls (48 percent), income from invested funds and reserves (12 percent), and proceeds of transportation bond sales (10 percent). The latter two primarily represent past and future

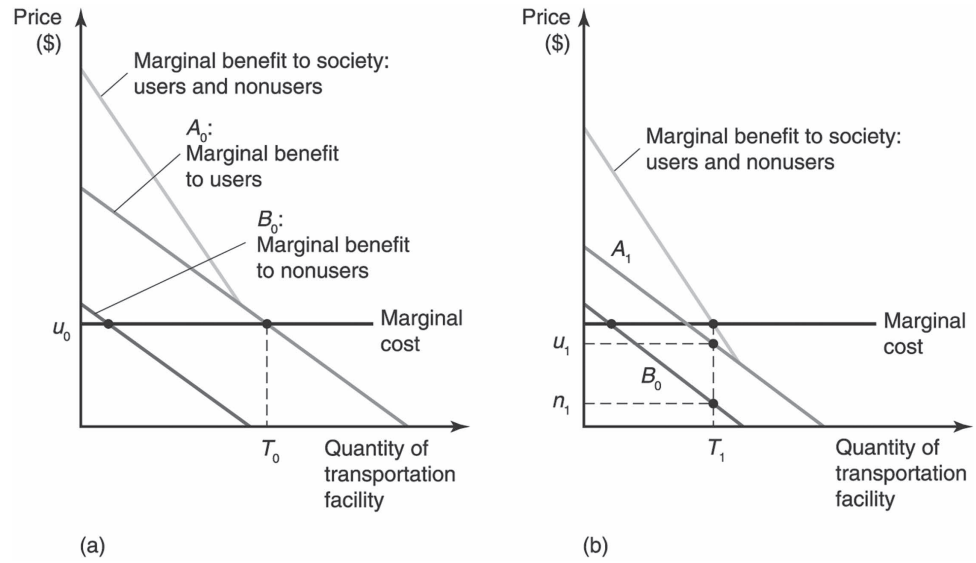


Figure 18.4 Allocation of transportation costs to users and nonusers

highway-user taxes and tolls. The other 30 percent of highway revenues came from other taxes, fees, and assessments, especially property taxes. In fact, most of the highway revenue not collected directly from users arose at the local government level. Some local government property taxes were special assessments for streets and roads. When coupled with the fact that not all total highway expenditures actually go toward the facilities (some of the money goes for law enforcement and safety programs, for instance), it seems likely that funds collected directly from highway users account for almost all expenditures on road and highway facilities.

Motor fuel taxes on gasoline and diesel fuel account for the great bulk of highway-user taxes and tolls, more than 85 percent of current charges to users in 2012. Thus, motor fuel taxes represent a bit more than half of total highway spending for all purposes. It is important to ask, therefore, how well motor fuel taxes work as user charges. Most importantly, motor fuel taxes vary by the amount and type of road use. The more miles an individual travels, the more gasoline required and thus the more gasoline excise tax implicitly paid. Similarly, larger or heavier vehicles generally require more gasoline than smaller or lighter ones to travel a given distance, which corresponds to road "use" if larger and heavier vehicles impose greater maintenance or safety costs on the highway system. Collection of motor fuel taxes also entails relatively low administration costs, partly because they are usually collected at the wholesale or distributor level, where there are fewer firms than at retail.

Motor fuel taxes are imperfect user charges for at least three reasons, however. First, fuel usage is not expected to correspond perfectly to road and highway "use" because vehicles (and drivers) differ in their fuel economy, increasingly vehicles utilize an energy source that is not taxed (such as electric vehicles), and different vehicles impose varying maintenance costs on the roads. Second, not all gasoline and diesel fuel is used on highways; some is used for boats, airplanes, agricultural machinery, off-road vehicles, and lawnmowers, for example. Because of this, some motor fuel taxes are often earmarked for waterway or natural resources use, and some states exempt fuel for agricultural purposes from the tax. Third, fuel taxes do not do a good job of differentiating highway use by location and time, so they do not adequately represent congestion costs created by highway users. Fuel taxes may have to be supplemented with some form of congestion charge, therefore, as discussed later in this chapter. Despite these difficulties, motor fuel taxes came to be accepted and used as the primary highway user charge. The future of motor fuel taxes as a means of financing roads is uncertain, however, as discussed in Application 18.1.

Many of the other fees and taxes collected from highway users do not correspond to road use. Driver's license and vehicle registration fees, for instance, are usually not based on any accurate measure of road "use." Driver's license fees are usually lump-sum charges, and vehicle registration fees are usually based on either vehicle value or weight, neither of which corresponds to actual road use. These fees are intended more as a regulatory device than a source of revenue for highway facilities. A similar argument applies to road-use fees for trucks and excise taxes on tires, which are also based on weight. On the other hand, road tolls or mileage fees can be tailored to road use, differentiating by distance traveled, vehicle type, and time and place of trips, although those types of charges sometimes entail high administrative and compliance costs, depending on the toll collection mechanism.

Spending on transportation facilities for air and water travel is also heavily financed through taxes and charges collected from direct users. On the other hand, spending on mass transit services – urban bus, rail, and subway systems – is not as heavily reliant on user taxes and charges. According to Jose Gomez-Ibanez (1985, 191),

> Passenger fares had been enough to cover operating costs and make a small contribution to capital expenses through the 1950s, despite the fact that the [mass transit] industry

was contracting. In 1964 passenger receipts fell below operating expenses for the industry as a whole and by the 1980s covered only about 40 percent of operating costs and made no contribution to capital expenses.

Data from the American Public Transit Association for 2019 show that passenger fares provided less than 30 percent of the operating costs of public transit systems.[8] Indeed, the share of transit revenue from passenger fares has decreased substantially since 2000 (from 36 percent to the 30 percent). Transit expenditures, which are almost all made by local governments, are financed by substantial amounts of federal and state aid and by local taxes. Among transit revenue for operating purposes, state and general local government grants for operations have increased faster than passenger revenue. In 2019, general local government aid for operations represented about 27 percent of operating revenue, state aid 23 percent, and federal aid 8 percent; fares accounted for 29.5 percent of operations. Capital expenditures for transit infrastructure (rail lines, cars, and buses) are financed separately. In 2019, federal grants provided about 32 percent of transit capital revenues and state and general local government aid about 44 percent, with about 24 percent being generated by the transit system from transit taxes and tolls.[9] For the federal government and many states, gasoline taxes are a major source for at least part of the transit grant funds. This may serve as an indirect form of benefit charge if highway users benefit from the existence of mass transit systems, an issue considered later in the chapter.

Role of federal aid

Even if it is agreed what share of transportation costs should be borne directly by users, the appropriate level of government to collect those user taxes and charges and to provide general funds also must be resolved. Federal grants play an important role in financing transportation, particularly for highways and investment in mass transit facilities. The federal government finances more than one-fifth of all expenditures on highways, almost all through grants to the states, and more than 40 percent of new capital expenditures on mass transit facilities. What economic rationale is there for the federal government's role in financing transportation facilities and services, and does the federal aid system as structured correspond to that theory?

One economic rationale for intergovernmental grants is to correct for inefficient service choices by subnational governments, which arise because consideration is given only to local or state benefits. If there are benefits external to the government providing a service and those benefits are not considered, then too little of the service is provided from the broader viewpoint of the entire society. One way to correct that problem is to provide a matching grant for the service, which reduces the cost of the service to the providing government and thus induces an increase in the amount provided. The matching rate should correspond to the ratio of nonresident to resident benefits at the margin. A matching grant also achieves a degree of fairness by effectively requiring nonresidents of a jurisdiction to help finance services provided by that jurisdiction from which they benefit.

In theory, this concept provides a reason for federal government involvement in transportation finance. There are presumably national reasons for wanting to have a relatively uniform transportation network covering the breadth of the nation and connecting various metropolitan areas and states. At the very least, it has been argued that such a transportation network is necessary for the federal government to carry out its national defense responsibilities. To the extent that the benefits of interstate transport are underestimated or neglected by the states or that intrastate transport is underappreciated by local governments, the federal government has the responsibility of resolving those externality problems.

Because nonresidents substantially use transportation facilities directly provided by states and localities, some nonresident contributions – through federal and state aid – are appropriate.

Initially at least, these reasons seem to correspond closely to the structure of federal aid for transportation, especially for highways, as suggested by the abbreviated history of federal transportation aid in Table 18.4. Federal aid was initially limited to principal roads connecting states or counties within states, and even until 1954, the roads eligible for federal highway grants were limited to rural primary and secondary roads and urban extensions of rural primary roads. For those types of roads, federal matching grants resulting in a 75 percent federal cost share and 25 percent state share were available. Urban extensions of rural secondary roads were added to the federal aid highway system in 1954, and financing of the Interstate and Defense Highway System began in 1956, with federal grants covering 90 percent of capital costs. Even then, the focus of federal transportation grants remained on transport among states or regions within states.

The role of federal aid was expanded somewhat in the 1960s and 1970s, however, by the creation or expansion of grant programs for road maintenance and mass transit services. A separate grant program for bridge repair and replacement was instituted in 1970, and specific grants for resurfacing, restoration, and rehabilitation of interstate highways were first offered in 1976. As more and more of the primary and interstate highway system was in place, a change in spending away from additional construction and toward maintaining the existing structure is certainly expected. The issue, however, is whether the federal government should play a similar role in maintenance as it did in construction. The federal government also began to support mass transit services in this period. Grants for up to two-thirds of capital expenses were started in 1964, with the federal share increased to 80 percent in 1973. Matching grants for mass transit operating costs at a 50 percent federal share were started in 1974. Thus, a federal aid system that had started out to assist states in financing construction of major roads connecting states and population centers was, by the late 1970s, also substantially assisting in the construction and operation of roads and transit systems mostly used for transport within metropolitan areas.

Although the Reagan administration proposed a major restructuring of federal transportation aid in 1981 toward financing transport only among states and regions, a less radical alteration was adopted. With the Surface Transportation Assistance Act of 1982, the federal gasoline tax was increased from $.04 to $.09 per gallon, with all of the $.05 per gallon increase in the tax earmarked for limited purposes. The additional revenue from $.04 of the increase was restricted for aid for interstate and rural primary roads only, whereas the revenue from the additional $.01 increase was earmarked for the Federal Mass Transportation Trust Fund to be used solely for mass transit capital expenses. As a result, the portion of federal aid going toward highways used for transport among states and areas was substantially increased, consistent with the original intent of federal transportation aid.

In 1991, the entire federal grant system for roads was changed with the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA), which eliminated the old federal aid highway definitions and replaced them with a national highway system. The NHS includes interstates, including grants for interstate maintenance at a 90 percent federal share, and most principal urban and rural arterial roads. A companion surface transportation program provides grants for other local roads, highways, and mass transit capital projects at an 80 percent federal share.

In 1990, federal gasoline excise taxes were increased to $.14 per gallon, with $.10 earmarked for highway aid, an increase from $.08 previously. In 1993, gasoline tax rates were increased further to $.184 per gallon, with $.10 for highway aid, $.015 reserved for mass transit capital grants, and $.068 for deficit reduction. In October 1995, the division changed to $.12 for highways, $.02 for mass transit, and $.043 for deficit reduction. With this change,

federal motor fuel taxes were being used for general federal services, not just those related to transportation.

The federal transportation funding bills in 1998 (TEA-21) and 2005 (SAFETEA-LU) increased the amount of federal funding for transportation purposes substantially. The transit share of the federal gasoline tax was increased to $.0286 in 1998. The major issue in these years was the allocation formulas for federal aid, which determine how federal support is divided among the states. The changes in allocation formulas in 1998 had the effect of directing more aid to the Sun Belt states, mostly at the expense of the older states in the North. With the adoption of SAFETEA-LU in 2005, a compromise was reached, guaranteeing states that at least 92 percent of gasoline taxes collected in a state would be returned through federal grants.

In recent years, agreement on a new long-term federal transportation funding plan has been difficult to achieve. Initially when the 2005 law expired, it was extended temporarily. In 2012, a federal funding bill, MAP-21, was approved but applied only through fiscal year 2014. Then in 2015, the Fixing America's Surface Transportation Act (FAST) was approved, which essentially extended federal transportation programs through fiscal year 2020. As part of FAST, states are now guaranteed a minimum 95 percent return (up from 92 percent) on contributions to the Highway Trust Fund.

Debate about the magnitude, structure, and focus of federal transportation funding continues. In early 2021, FAST was extended through September 2021. As of this writing, Congress is considering an infrastructure investment proposal from the Biden administration that includes a new federal transportation funding program to succeed FAST. Outcome and details are yet to come.

Effects of federal aid

The structure and effects of federal highway aid can be seen by examining both the road system in the United States and the distribution of aid dollars among various types of roads. In 2019, urban roads represented nearly 30 percent of all road miles but accounted for nearly 70 percent of travel (measured by vehicle miles), as shown in Table 18.5. In contrast, rural roads represented 70 percent of all road miles but handled only about 30 percent of travel or traffic. The concentration of travel on certain types of roads is illustrated by the interstate highways, which represent about 1 percent of road miles but handle more than one-quarter of all vehicle miles of travel. At the opposite end of the spectrum, the great majority of road miles are in the form of local roads (70 percent of road miles), but those local streets account for only about 13 percent of travel.

Despite the expansion in the scope of federal highway aid over the years, it remains primarily directed toward roads used for interstate and interregional travel, also shown in Table 18.5. For instance, in 2019, 34.3 percent of federal aid highway funds were used for interstate highways, although they accounted for only around 26 percent of the total vehicle miles traveled. The share of aid is greater than the share of vehicle miles for rural arterials (rural roads connecting cities), urban interstate highways (1.2 ratio), and rural interstate highways (1.6 ratio). In contrast, the share of federal aid relative to travel declines as one goes from interstate highways to arterial (primary) roads to collector roads and then to local roads. The ratio of aid share to travel share is only .17 for local urban roads, .36 for rural local roads, and .52 for urban collectors and minor arterials.

When interstate or regional transportation externalities justify federal grants for efficiency reasons, the second economic issue concerns the appropriate matching rate for those grants. The theoretical answer is that the grant should cover that fraction of marginal benefits that spills over to nonresidents. If, for instance, 30 percent of the benefits from a new highway

Table 18.5 History of federal transportation aid to states and localities

Year	*Federal aid structure and uses*
Early 1900s	Federal highway aid begins.
1921	Federal aid restricted to principal roads connecting states or counties within states.
1944	Rural secondary roads and principal urban highways added to federal aid system by Federal Highway Aid Act. Matching grants used with 75% federal and 25% state-local shares. Federal aid road system includes rural primary roads, rural secondary roads, and urban extensions of rural primary roads.
1954	Urban extensions of rural secondary roads added to federal aid system.
1956	Substantial grants for Interstate and Defense Highway System begun with 90% federal and 10% state shares. Highway Trust Fund created by the Highway Revenue Act to receive transportation-related taxes and charges.
1964	Grants for mass transit capital costs instituted to cover up to two-thirds of the cost.
1970	Separate grants for bridge rehabilitation and replacement instituted.
1973	Maximum federal grant share for mass transit capital costs increased to 80%, still the current rate.
1974	Grants for mass transit operating costs at a 50/50 share instituted.
1976	Specific grants for resurfacing, restoration, and rehabilitation of interstate highways provided.
1983	Surface Transportation Assistance Act increased federal gasoline tax from $.04 to $.09 per gallon with $.04 of the increase restricted to aid for interstate and rural primary roads only and $.01 earmarked for mass transit capital grants.
1991	Intermodal Surface Transportation Efficiency Act (ISTEA) revamped the federal aid system, creating a new national highway system to include interstate highways, most urban and rural principal arterials, and strategic connectors. The interstate system is to be completed by 1995, with continuing funds for interstate resurfacing and rehabilitation at a 90% federal share. The Surface Transportation Program provides grants for local or rural roads, bridges, and mass transit capital projects.
1993	Federal gasoline tax increased to $.184, with $.10 for highway aid, $.015 for mass transit capital grants, and $.068 for deficit reduction. In October 1995, the division changes to $.12 for highways, $.02 for mass transit, and $.043 for deficit reduction.
1998	Transportation Equity Act for the 21st Century (TEA-21) extended most transportation user taxes and allocations through September 30, 2005. Federal aid for highways was increased and allocation formulas changed to direct more revenue to growing states, essentially those in the Sun Belt. The transit share of the gasoline tax was increased to $.0286.
2005	Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) adopted just before the provisions of TEA-21 were to expire. It extends highway-user taxes at current rates through September 30, 2011. States will be guaranteed a minimum 92 percent return on contributions to the Highway Trust Fund. States receive increased flexibility to use tolls and other forms of road pricing to manage congestion and to finance infrastructure improvements.
2012	Moving Ahead for Progress in the 21st Century Act (MAP-21) funded surface transportation programs at over $105 billion for fiscal years 2013 and 2014. MAP-21 expanded the national highway system to incorporate principle arterials not previously included. MAP-21 authorized $82 billion for road, bridge, bicycling, and walking improvements as well as doubling funding for infrastructure safety.
2015	Fixing America's Surface Transportation Act (FAST) authorized spending $305 billion for fiscal years 2016 through 2020. This action provided longer-term funding after the short-term fix in 2012. More than 92 percent of federal highway funds are allocated by formula. States are guaranteed a minimum 95 percent return on contributions to the Highway Trust Fund. Many provisions in MAP-21 were continued. In 2021, FAST was extended through September 2021.

Sources: US Department of Transportation, various years; Gomez-Ibanez, 1985.

Table 18.6 Public road system in the United States

Type of road	*Percentage of total miles*	*Percentage of vehicle-miles*	*Percentage of federal highway funds*	*Ratio of aid share to travel share*
Rural mileage, total	70.3%	30.2%	37.6%	1.25
Interstate	0.7%	8.0%	13.1%	1.63
Other principal arterial	2.2%	6.1%	9.2%	1.51
Minor arterial	3.2%	4.5%	5.9%	1.30
Collectors	15.9%	6.3%	6.2%	0.98
Local	48.1%	4.0%	1.4%	0.36
Urban mileage, total	29.7%	69.8%	62.4%	0.89
Interstate	0.5%	17.7%	21.2%	1.20
Other freeways and expressways	0.3%	7.8%	6.1%	0.78
Other principal arterial	1.6%	14.8%	11.8%	0.79
Minor arterial	2.7%	12.8%	6.3%	0.49
Collectors	3.6%	7.4%	3.8%	0.52
Local	21.0%	9.4%	1.6%	0.17

Source: US Department of Transportation, Highway Statistics, 2019

project in one state will directly go to nonresidents of that state or to society generally, then a federal matching grant with a 30 percent federal share and 70 percent state share is appropriate. By focusing only on direct benefits to residents, the state underestimates aggregate benefits by 30 percent, which can then be offset by a grant that reduces the price to the state by 30 percent. If the matching rate is set above the share of marginal external benefits, then the price reduction to the state or local government causes overinvestment in that transportation facility.

The current federal government share for the major transportation grants is 90 percent for both construction and maintenance of interstate highways, 80 percent for other roads eligible for support, and 80 percent for the capital costs of new or expanded urban mass transit systems. It seems unlikely, however, that the share of general social and nonresident benefits is anywhere near that high. In fact, if the federal government will pay 90 percent of the cost of interstate highways and 80 percent of the cost of subways, you might wonder why states and cities are not building new highways and transit systems all over the place.

The answer, of course, is that these are not open-ended grants; the matching rates do not apply to all expenditures on these services by states and localities, only those approved by the federal granting agencies. Similarly, the Interstate and Defense Highway System begun in 1956 includes only a planned set of interconnected highways. There are other divided, four-lane or larger highways, some of which predate the interstate system and some of which are toll roads, which are not part of the interstate system and not eligible for the matching grants at the 90 percent rate.[10] For mass transit systems, cities must apply to the Federal Transit Administration and satisfy a number of federal regulations concerning the cost of potential alternatives to the proposed transit system, treatment of potential cost overruns, and timing of the development.

Because of the limitations on the magnitude of these transportation grants, the full effect of the large price reductions is not expected to be realized. If the grant to a state is capped at an expenditure level below that which the state actually selects, then the last dollar spent by the state is not matched, and the price of the marginal expenditure is not reduced. For those states, these are effectively lump-sum rather than matching grants. The irony is that the caps are required because of the very high matching rates, rates well beyond the expected magnitude of external benefits. However, the caps also negate the spending effect that the high matching rates are intended to bring about.

The common prescription of economists for this problem is to return to the original notion of matching grants to offset only benefit spillovers. As proposed by Edward Gramlich (1985b, 57),

> [I]f there is a valid spillover rationale for categorical grants, a better way to improve the grant than by simply converting it to block form . . . is simply to lower federal matching shares until the ratio of internal to total program costs at the margin equals the ratio of internal to total program benefits at the margin. . . . My own preference would be to assume an internal share of 80 percent unless it could be shown to be significantly lower.

If Gramlich's prescription were applied to transportation grants, the relative cost shares of the federal and state governments effectively would be reversed from the current status. Paradoxically, such a change could actually increase spending on these transportation services. In at least some cases, the caps on the current transportation grants mean that they have no effect on the marginal cost of transportation facilities; the price of the marginal dollar spent is $1. If a 20 percent federal grant without any spending limits were substituted, the marginal cost or price to states of these transportation facilities would be reduced by 20 percent. Because a small price reduction is expected to have more effect than no price reduction, state-local spending on these transportation facilities could be expected to rise in those cases. On the other hand, the amount of federal aid would fall, and states would pay a larger share of the average cost of these facilities than they do now. In other words, the appropriate role for the federal government in financing transportation is reflected not just by the amount of federal aid but also by the structure of the grant programs.

Federal transportation aid is also provided for urban mass transit. The federal government pays 80 percent of the capital costs of local mass transit systems and for a time paid up to 50 percent of operating costs. Because urban (rail and subway) mass transit systems largely transport individuals only within metropolitan areas, the nature of the national interest in these systems is problematic, at best. On the other hand, another benefit from mass transit is reduced air pollution from automobile transportation, which may benefit individuals across states. The political reason for federal grants may be distributional, rather than related to economic efficiency. Federal aid for mass transit is justified because aid is implicitly given to individuals who use other transport modes (cars) because the central cities where most mass transit systems are located may have fiscal or economic difficulties and because certain states or localities are perceived as being "shortchanged" in receipt of federal government spending. The federal government has legitimate distributional responsibilities, which may be one reason for federal mass transit aid rather than the national interest arguments that apply for highways.

Application 18.1: Alternatives to gasoline taxes

The bulk of state-local revenue spent on transportation comes from state and federal excise taxes on the sale of motor fuels, especially gasoline. These taxes most often are specific taxes at a rate of so many cents per gallon, and thus the revenue generated for any set of rates depends on the number of gallons consumed. Over time, however, purchases of motor fuels have not increased as much as highway travel. Indeed in some periods, consumption of gasoline has decreased. Those changes put a squeeze on highway and other transportation funds in a number of states because reductions or slow growth in the gallons of fuel consumed directly affect excise tax revenues.

The changes in gasoline use relative to travel have resulted from several forces. Increases in gasoline prices have induced drivers to alter behavior in a variety of ways, including use

of more fuel-efficient vehicles, a switch to vehicles powered totally or in part by electricity, changes in driving behavior, and changes in location to reduce commuting distances. Government has established increasing fuel efficiency requirements for vehicle manufacturers to reduce imports of oil and reduce air pollution. The long-run trend is clear as fuel consumption has increased more slowly than vehicle miles of travel, and gallons of fuel per vehicle have fallen substantially.

For example, gasoline prices increased in the 1970s after OPEC reduced oil output, and consumers eventually responded by altering behavior in a number of ways to hold down consumption of gasoline. The average price of gasoline in the United States more than tripled between 1970 and 1980, with the largest increases coming in 1973 and 1979. As a result, the price of gasoline was increasing much faster than the average level of prices; the price of gasoline in "real terms" (after adjustment for inflation) rose nearly 65 percent in that decade. Consumer use of gasoline proved to be more sensitive to the price than was often believed. After the large price increases in 1973 and 1979, both highway use of gasoline and consumption of all motor fuels (diesel fuel and gasohol as well as gasoline) actually declined in the next several years. Indeed, gasoline consumption for highway use in 1980, about 101 billion gallons, was not substantially different from the 100.6 billion gallons consumed in 1973, despite increases in population, income, and highway travel over those years.

State highway funds felt the effect of these changes. Unless motor fuel tax rates are increased, reductions in motor fuel consumption lead to reductions in state transportation revenue. In reaction, states already have adjusted their motor fuel taxes in an attempt to maintain revenue. States have acted to continuously increase the motor fuel tax rates, with 31 states having done so since 2013. And a number of states have switched from fixed tax rates per gallon to variable, indexed, or *ad valorem* tax rates.[11] A variable motor fuel tax rate automatically increases if fuel consumption decreases or prices rise. *Ad valorem*, or percentage, taxes mean that tax revenue would be related to expenditure on fuel rather than the number of gallons.

This trend is soon to become more serious due to a switch to vehicles powered totally or in part by electricity. Although electric vehicles currently account for a small share of new vehicle sales and an even smaller share of the total number of vehicles using the roads, dramatic change is expected in the next decade. Essentially all major automobile manufacturers have announced plans to greatly increase production and sale of electric vehicles, many by 2030.[12]

One alternative that is receiving increased attention is to substitute a direct highway user fee – typically called "metered usage" or a mileage fee or vehicles miles traveled toll – for fuel taxes and vehicle fees to fund highway construction and maintenance. One key advantage of such a funding method is that each individual's fee is based directly on use of the roads. The charge for traveling on a particular segment of a particular road could vary by vehicle type and time of day or year, although any differences in prices for different times would have to be known by the users so that travel decisions can be altered. Moreover, as Jennifer Weiner (2014) notes,

> As the name implies, a VMT tax charges a flat or variable tax per mile traveled. A key advantage of such a mechanism is that it is not adversely impacted by increases in fuel efficiency or the use of alternative-fuel vehicles. Indexing a VMT tax to general or construction inflation can help to ensure that the real value of revenue generated by the tax does not erode over time.
>
> (p. 2)

Vehicle mileage tolls do not have public support (yet), have been opposed by the trucking industry, and face a variety of implementation challenges (how to measure, how to collect,

privacy concerns, interstate transportation, and so on). Opposition seems to arise primarily from a misperception of cost, concerns about privacy and technological collection mechanisms, and worry about out-of-pocket startup or adoption costs. So far, there seems to be greater public support for traditional road tolls than for new vehicle mileage tolls. Denvil Duncan and colleagues (2017) report results of a survey about funding options for road maintenance, construction, and repair. Tolls were supported by 34 percent, compared to only 21 percent support for what they called a "mileage user fee."

Metered usage requires some method of measuring and recording use of roads and highways coupled with a billing or paying procedure. A number of variations of this alternative have been suggested, but one of the first and most interesting is that proposed by Vickrey years ago (1963):

> My own fairly elaborate scheme involves equipping all cars with an electronic identifier . . .[which] would be scanned by roadside equipment at a fairly dense network of cordon points, making a record of the identity of the car; these records would then be taken to a central processing plant once a month and the records assembled on electronic digital computers and bills sent out. Preliminary estimates indicate . . . the operating cost would be approximately that involved in sending out telephone bills. Bills could be itemized to whatever extent is desired to furnish the owner with a record that would guide him in the further use of his car. In addition, roadside signals could be installed to indicate the current level of charge.
>
> (pp. 457–458)

Writing in the early 1960s – before personal computers, digital electronics, microchips, microwave transmissions, and smart phones – Vickery envisioned receiving a monthly bill for road or transit use, just as we are billed for our metered use of electricity, natural gas, water, and telephone. When Vickrey advanced this idea 50 years ago, questions about technological feasibility and cost were legitimate concerns, but no longer. Today, a number of options ranging from simple to technologically advanced are available. A simple approach is to record miles driven when the vehicle registration is renewed annually or at an annual vehicle inspection.[13] "Smart highway" systems – such as E-ZPass, I-PASS, and FasTrak – allow drivers to pay tolls with a prepaid toll account or credit card and could also be used for mileage tolls. A sophisticated system could measure miles driven with a recorder or GPS transponder in each vehicle (similar to that used in cell phones). The technology exists and is in use, as some insurance companies offer policyholders the option of basing insurance payments on measured miles in this way. Concern about government acquiring and using travel records of individuals is one potential difficulty with this version of metered usage, although it is not clear that those records would be any more sensitive than the telephone and tax records maintained now and available to the government.

Research shows that people often overestimate how much they would pay with a vehicle mileage fee, which is another reason for opposition. In a Michigan survey, only about 30 percent correctly estimated the amount they would pay with a fee of 1 cent per mile, with about 50 percent thinking it would be more than double the actual amount.[14] If a person drives 100 miles in a gasoline-powered vehicle that gets 25 miles per gallon, this requires four gallons of gasoline, which costs $1.05 in state gasoline tax, on average, and another $.73 in federal gasoline tax. That is a total of $1.78 in tax for 100 miles of travel, which is equivalent to a vehicle mileage fee of 1.78 cents per mile.

A comparison of the monthly expense for several mileage tolls as opposed to the average state or state plus federal gas excise is shown in Figure 18.5 for three different annual mileages. For 13,500 annual miles, the monthly toll varies from approximately $6 at a rate

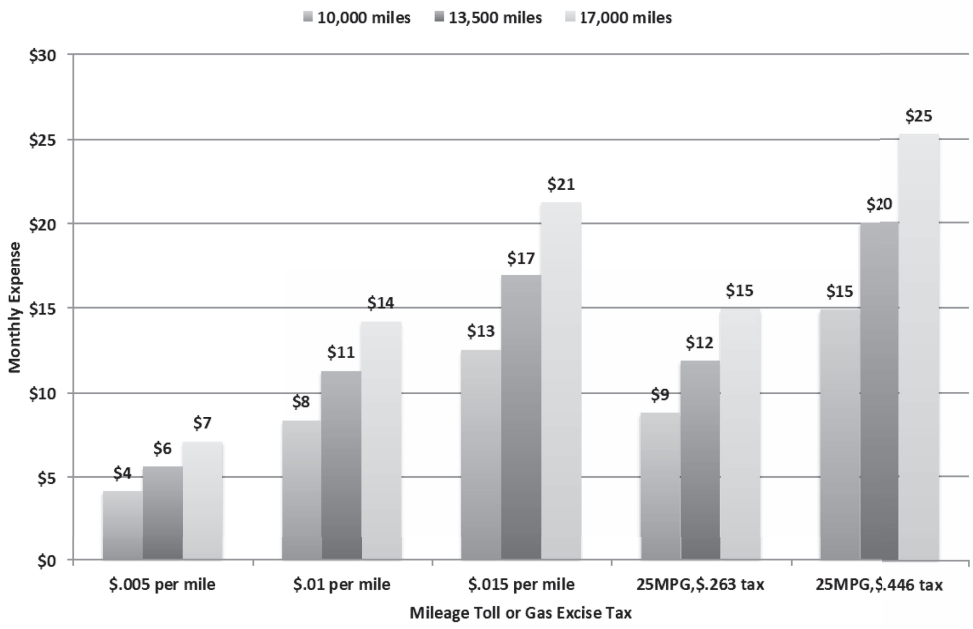


Figure 18.5 Monthly cost, mileage toll versus average gas excise taxes

Source: Author calculations

of .5 cents per mile to $17 at a rate of 1.5 cents per mile. The last two sets of bars show the monthly expense for the average state gasoline tax and for the combined average state plus federal gasoline tax. At 13,500 miles, these amounts are approximately $12 and $20 per month. It seems clear from this comparison that the current average state gas tax is about equivalent to a 1 cent per mile mileage toll, whereas the combined average state plus federal tax is similar to a mileage toll of slightly more than 1.5 cents per mile.

Vehicle mileage fees have been tried in a few pilot programs and used to any significant degree only in Oregon, interestingly the same state that started gasoline excise taxes more than 100 years ago. A pilot program in the state eventually led to the optional opt-in mileage fee alternative to the gasoline excise tax that is available currently (but selected by few drivers). A few other states have seriously studied vehicle mileage fees, but without adoption. At this writing, a bill is being considered for a requirement to have Oregon drivers of new, high-MPG vehicles pay a mileage fee starting in 2026.[15] Several states have implemented annual fees for electric vehicles as a substitute for the gasoline tax, and others are considering mileage-based fees only for alternative fuel vehicles.[16]

This situation illustrates two important features of government finance. Earmarking of revenues reduces budget flexibility for government and can create short-run disruptions. Because highway finance is tied to motor fuel taxes, other revenues are not often readily available. Fuel tax rates have to be increased or alternatives found, but in some cases not before a highway finance crisis results. Second, focusing on tax rates alone can be misleading because it is the change in the rates and base that determines what happens to the amount of tax revenue. In this case, holding tax rates constant has meant decreases in revenue and an even wider gap between the growth of revenue and costs.

Optimal transportation pricing

User charges may be appropriate and necessary to bring about efficient use of public facilities after they have been constructed, if those facilities experience congestion. If a facility is congested, an additional consumer imposes extra costs on all other users. The purpose of use fees or prices for those facilities is to make those costs apparent to potential users: that is, to allocate the scarce facility among competing demands. In fact, congestion on roads and in mass transit systems and airports is common.

The Department of Transportation has explained the circumstance as follows: "Because the next user of a congested system bears only a small fraction of the additional delays he or she causes, transport systems with essentially free access are unable to ration their use efficiently and are thus prone to congestion." The DOT concludes, "Traffic congestion problems have steadily worsened, thereby increasing traffic delays, fuel consumption, and air pollution while decreasing productivity. . . . These increases have prompted federal, state, and local highway agencies to rank urban traffic congestion as a top priority" *(National Transportation Statistics: Annual Report*, 1994, 89).[17] Economists have long suggested that a more efficient transportation system would result if users were charged prices for transportation services that reflected congestion costs. Indeed, one important aspect of SAFETEA-LU and subsequent federal bills is that states receive increased flexibility to use tolls and other forms of road pricing to manage congestion.

Congestion prices

A facility is said to be congested when an additional user reduces the benefits for all other users. In the case of transportation, this usually means that it takes more time to travel between two given points. As a road or highway becomes congested, for instance, the traffic speed is reduced, increasing the travel time required for a given trip. It is that increase in travel time, rather than an increase in vehicle operating costs, that accounts for most of the increase in travel cost to users due to congestion.

This notion of highway congestion is represented in Figure 18.6. Up to traffic quantity T_c, sometimes called the travel "capacity" of the road, there is no congestion. The operating and time costs for one vehicle to travel one mile are constant at C_0, assuming some value of time. If traffic exceeds T_c, congestion begins. The operating and time costs for one vehicle to travel one mile, the average cost that each individual driver faces, increases as the amount

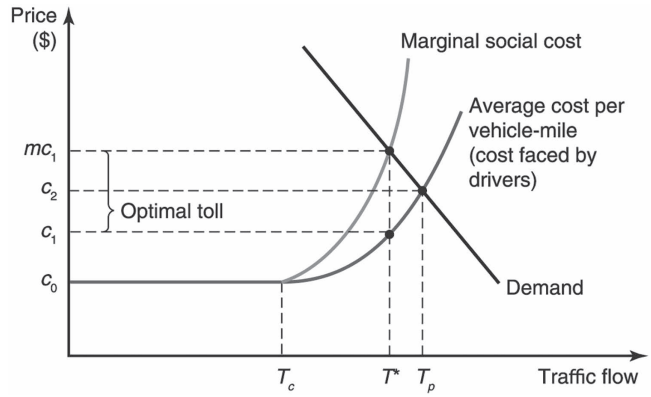


Figure 18.6 Pricing traffic congestion

of traffic increases – travel speed goes down, and travel time increases the more traffic there is. The marginal social cost, on the other hand, represents the extra cost to all travelers from one more vehicle using the road because the additional vehicle slows traffic. As with all marginal and average cost curves, for average cost per vehicle to increase requires that the extra cost created by each additional vehicle be greater than the old average. (The marginal cost is above the average cost in Figure 18.6.)

The existence of congestion creates inefficiency because each user is concerned only with his or her own travel costs and does not consider the costs imposed on other travelers by the additional congestion. Because users perceive the costs to be lower than they truly are, the road is overused or too crowded. If the demand for this road is as shown, then T_p vehicles would use this road at an average cost of c_2, although the cost imposed on all users by the last vehicle to enter this road, the marginal cost, is much greater. Thus, use of this road at peak demand is inefficiently too high – the marginal cost imposed by the last vehicle is greater than the marginal benefit to that user, as shown by the demand curve. The efficient amount of use of this road is $T^{\star}$, where marginal cost equals marginal benefit or demand. Reducing the number of vehicles on this road from T_p to $T^{\star}$ reduces travel time, and the gains to the remaining users are greater than the loss to those who no longer use the road at this time.

Efficient use of this road requires that all potential users perceive the full costs of their road use, including the congestion costs imposed on others. In short, users must face a price that reflects all costs. The economic solution to this congestion problem, therefore, is to levy a congestion fee or toll equal to the difference between average and marginal cost at the efficient quantity. For the case in Figure 18.6, a congestion fee equal to $mc_1 - c_1$ would mean that users would face a price per vehicle-mile of mc_1 at quantity $T^{\star}$. A price equal to true marginal cost would result in $T^{\star}$ vehicles using the road at this demand time. With the efficient price, congestion is not necessarily eliminated, but it is reduced until the benefits from use of this road are in line with the true costs. Second, because the optimal congestion fee equals the difference between average and marginal cost, the fee should be greater for facilities or times when the congestion is worse. Indeed, if demand is such that road use is below T_c, no congestion toll is required because there is no congestion.

Application of this pricing theory to real situations is obvious. Many roads, highways, and bridges are very congested during the work commuting periods in the morning and early evening but not crowded during other parts of the day. Roads in some parts of urban areas seem congested all day – midtown Manhattan, the Loop in Chicago, and the Central Artery in Boston come to mind – while roads in other parts of those metropolitan areas are congested only at some times or perhaps not at all. Public, mass transit systems may be congested during commuting periods and airports congested during certain times of day and during holiday periods. All these situations might be resolved through the use of congestion pricing, but actual use of that tool so beloved by economists remains relatively rare.

Four reasons seem to account for the general absence of congestion pricing in transportation. The first is public opposition to "paying twice" for facilities, a misperception because the costs of construction and the costs from congestion are separate and different. As noted by William Vickrey (1963, 455) over 50 years ago, "The delusion still persists that the primary role of pricing should always be that of financing the service rather than that of promoting economy in its use." The second reason is that consumers often see the congestion tolls as a new immediate cost, whereas the benefits of reduced congestion or expansion of the transportation facility are received only in the future. Third, it is sometimes difficult to measure just what the marginal congestion cost is and thus what the appropriate congestion charge should be. The last reason arises from difficulties in administering and enforcing congestion charges, the issue to which we now turn.

Methods of levying congestion charges

Tolls can reflect the costs of construction and maintenance as well as congestion and can vary by vehicle type, place, time of day, and time of year. The most obvious way congestion charges have been levied in the past is by a road or bridge toll paid either just before or just after traveling on the facility. The disadvantage of tollbooths is that they traditionally entail both high administration costs (wages of collectors) and high compliance costs (delay). Indeed, use of tollbooths to relieve congestion can be counterproductive because stopping to pay the toll may only create more congestion. It is becoming more common for tolls to be collected electronically through transponder devices in vehicles (E-ZPass) or billing using vehicle registrations. Those tolls also can serve a congestion prices by varying by place and time.

On the other hand, where tolls are already being collected, such as for buses, subways, and airports, changing the structure of those tolls to levy congestion charges may not increase collection costs much, if at all. If the usual or regular bus or subway price is $1.00 per trip, it would not cost more administratively to charge $2.00 per trip during congested periods.

Motor fuel taxes, while a relatively good way of collecting charges for construction and maintenance of roads, do not make very good congestion charges. If gasoline taxes were increased so that drivers faced the full costs of travel, including congestion costs at the most congested time of day, then the cost of travel would be too high for uncongested times. This simply substitutes a new efficiency problem for the other. In addition, it would be nearly impossible to enforce higher gasoline prices in congested areas than in uncongested ones, because individuals may simply adjust where they buy gasoline.

A simple congestion charge involves the sale of travel permits for driving in a specific area during congested hours. Under such a system, any vehicle entering the restricted zone during established hours would have to display a nonremovable sticker purchased by the operator. In effect, anyone wishing to drive anywhere in the zone for any period would have to pay the single extra charge for the permit. Such a system was adopted in 1975 in Singapore. Windshield stickers were required to enter a restricted zone between 7:30 a.m. and 9:30 a.m. from any of 22 entry points. The price of the dated stickers was about $1.30 (US) per day or $26 per month. Cars with at least four occupants and public transit vehicles were exempt, and 14 park-and-ride lots were established just outside the zone for transfer to relatively inexpensive minibuses. Enforcement was encouraged by guards located at the entry points to the zone, who recorded the license numbers of vehicles violating the rules for subsequent arrest.

According to a World Bank study reported by K.J. Button and A.D. Pearman (1985), congestion pricing in Singapore had immediate dramatic effects. After about one month, the number of vehicles entering the zone during the two-hour period decreased by about 45 percent, and average speeds increased by approximately 22 percent. The reduction in vehicles resulted from a large increase in the use of car pools, a shift to travel routes just outside the zone (which increased traffic congestion in those areas), and the expansion of commuting into the 7:00 a.m. to 7:30 a.m. period (eventually, the time a permit was required for was expanded to include this half-hour as well). In contrast, very few individuals switched from cars to the buses, so the park-and-ride lots were eventually largely abandoned. The travel permit system generated substantial revenue for the government, so much so that fees were substantially increased in early 1976 to levels that may not have been justified purely on congestion grounds. Although it is not clear that this particular method could be applied equally effectively in larger or more diverse urban areas, the responses to congestion prices in Singapore suggest that there is substantial elasticity to commuting travel demand.

An alternative to travel permits for congestion pricing in urban areas is to use toll collection before entering the congested area, as used in Bergen, Oslo, and Trondheim in Norway. For example, since 1986, a ring of tollgates around Bergen has been used to collect tolls during rush hours. After just one year, traffic was reduced by 7 percent, with the revenue used for road improvements and construction of bus-only lanes.[18] Apparently, consumers respond to prices by altering their travel behavior.

In the US, New York adopted a program that was planned to begin in 2021 to charge a toll for vehicles driving in a segment of the Manhattan borough of New York City. Electronic tolls based on license-plate readers would be assessed on vehicles that enter Manhattan below 60th Street. The plan was approved by the federal government in 2021, but travel issues related to the pandemic have delayed implementation.

Vehicle mileage tolls could also be used as congestion charges by setting higher fees per mile during congested times or in congested locations. Individual drivers could use congested roads at congested times if they were willing to pay the full price, or they would have the option of using a less congested (and thus lower-priced) alternative road, changing to a public transit system, changing the time of their trip, or forgoing the trip altogether.

Pricing of competing transportation facilities

An alternative to direct congestion pricing is available if consumers have the choice of a competing mass transit system or uncongested road as an alternative to a congested road. If it is technologically or politically infeasible to levy a congestion charge on the congested road, a reduction in the cost of the competing transit mode may have an equivalent effect. In both cases, the relative cost of the congested road rises. This possibility is illustrated in Figure 18.7, which shows T_0 use of the uncongested transit mode at an average cost of c_0 and T_p use of the congested road at the peak travel time. The efficient use of the congested road is $T^\star$, which could be accomplished by an efficient congestion charge, as previously argued. But if the congestion charge is not feasible, a similar effect can be accomplished if the modes are substitutes by lowering the cost of the uncongested travel mode. If travel on mode I is subsidized so that the cost falls to c_1, the demand for the now relatively more expensive mode

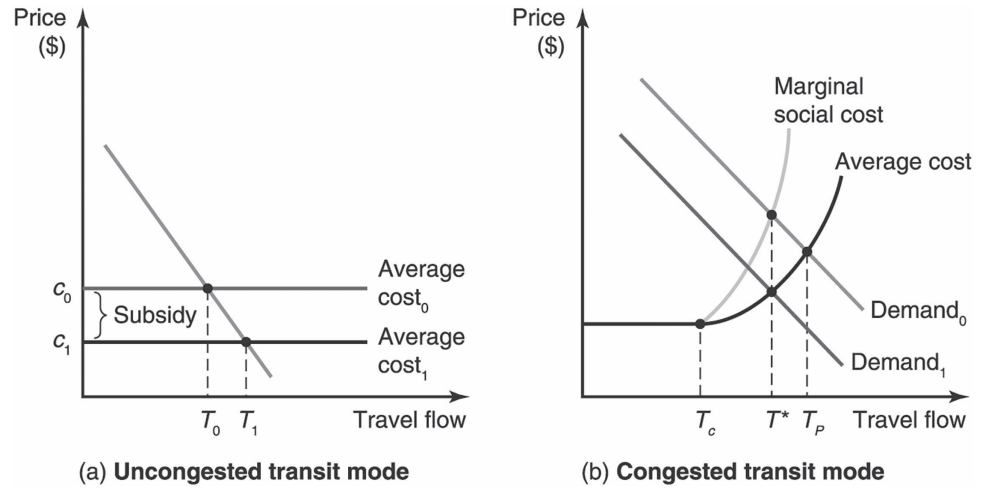


Figure 18.7 Pricing of substitute transit modes

II is reduced. Theoretically, there is some subsidy that would reduce demand for mode II just enough so that use falls to $T^{\star}$.

This argument has been applied to justify the use of gasoline excise tax revenue to subsidize mass transit costs. If lower transit fares induce travelers to switch from cars to transit, then the remaining drivers who pay the gasoline tax benefit from the reduced highway congestion. In essence, the share of the gasoline tax that goes for mass transit is a type of congestion charge. Of course, the validity of this argument depends on the willingness of some travelers to switch from cars to mass transit. The evidence is not encouraging as it suggests that very large subsidies – sometimes even larger than the transit fares – are often required to induce a substantial switch to transit.

If the competing mode I is an uncongested road, the switch may be easier. To induce travelers to switch to the uncongested road (even though it may require a longer trip), the cost might be reduced by raising the speed limit, removing some traffic lights, and resurfacing, for example. It is important to understand why transferring travelers from an existing congested to an uncongested transportation facility increases economic efficiency. Because the uncongested road already exists, more vehicles can be accommodated there at no additional cost, whereas less use of the congested road reduces social costs. Not using the uncongested road up to capacity means that society is effectively wasting resources invested in that facility.

Airport congestion and airline delays

The nature of airport congestion is remarkably similar to that of highways. The large airports in major metropolitan areas and others that airlines use as hubs are very congested, especially at certain hours of the day, while most other airports in smaller cities are never congested. Thus, crowded facilities in some places are balanced by an excess capacity at others. And where congestion does exist, typically there are peak and off-peak periods.

Since federal government deregulation of airline routes and fares in 1978, the amount of airline travel has increased substantially, with more passengers traveling more miles. Airlines carried more than 811 million passengers in the United States in 2019, compared to only 275 million in 1978, an increase of 195 percent. The number of passenger miles in 2019 was about four times greater than it was in 1978.[19] In contrast to the increase in air travel, the number and size of airports have not increased comparably since deregulation. Airports serving commercial airline flights are owned and operated by local governments and financed by a combination of federal government grants and locally generated revenues. The federal government levies a 7.5 percent tax on the price of domestic airline tickets plus additional fees per segment with the revenue earmarked for the aviation trust fund and used for airport construction grants as well as other air services. Local airports generate revenue from aircraft landing (or takeoff) fees, "passenger facility charges" of up to $4.50 per ticket, parking and concession charges, and sometimes property taxes. Revenue from PFCs is intended for capital projects for expansion, to improve safety or security, to increase competition, or to reduce noise.

Just as with highways, there are two major economic issues. The short-run issue concerns the efficient use of all existing facilities. All airlines tend to want to offer flights to the major metropolitan areas at the same times because those are the areas and times in greatest demand. The users at peak demand often are charged fees for the congestion they create because landing fees may not be higher at those congested times or even at the more congested airports. The solution proposed by economists should not be surprising: congestion tolls. Specifically, it is argued that landing fees should be higher at congested than uncongested airports and, at those crowded airports, higher at the more congested times. Such a pricing strategy would

create an incentive for the airlines to schedule and consumers to prefer more flights at the less congested times and airports, making better use of the existing airport capacity.

The long-run issue concerns the appropriate amount and location of new investment in airport facilities. The optimal amount of airport investment in an area depends on the cost of construction compared to the benefits of reduced delays. Because both the cost of airport construction (largely due to land price differences) and the benefits of reduced congestion will vary for different areas, some of the congested airports should be expanded more than others while some of the uncongested airports should be closed or allowed to depreciate.

Increased transportation investment

One alternative for dealing with a congested transportation facility is simply expanding that facility. If a two-lane road is crowded, build a four-lane road; if that becomes crowded, expand it to six lanes; if that becomes congested, build a new road parallel. Often, that has been the approach to transportation investment in the United States. But this concept raises the issues of just what determines the optimal amount of investment in transportation facilities and how that determination is related to the use (or absence) of efficient transportation prices.

The simplistic and standard economic answer to the question of the optimal amount of investment in transportation facilities is that more facilities should be built if the marginal benefit to society exceeds the marginal cost. The marginal cost includes the cost of the land for the facility and the actual cost of construction. The marginal benefit includes the amount of time, fuel, and pollution that would be saved in making current trips and the value of any new trips that would be made on the expanded facility. The difficulty in applying this rule is knowing what the marginal benefit of road or transit expansion is if individuals are not charged the true cost of using those facilities now. Thus, the first step in determining the optimal investment in transportation facilities is setting an efficient price for the current capacity.

The cost curves in Figure 18.8 represent a transportation facility – say, a road – with a "capacity" of T^t_0: that is, there is no congestion until use rises above that quantity. If demand is D_1 and there is no congestion pricing, the amount of traffic using the road is T_1, so the road is congested. How much would the road have to be expanded to eliminate congestion given $Demand_1$? The road would have to be expanded so that it has capacity T^t_1; that amount of traffic could use the road at the constant average cost of C_0. Note that the amount of

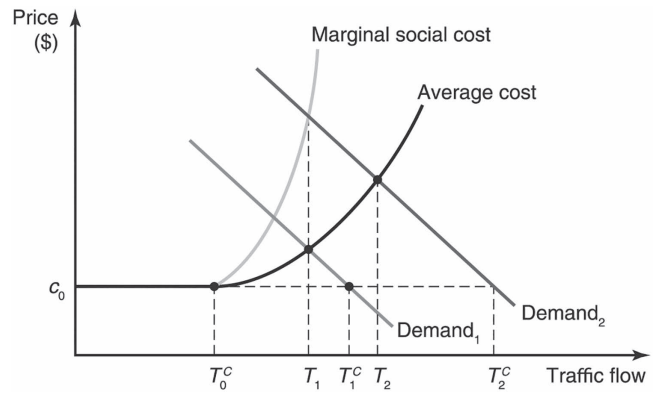


Figure 18.8 The relation between highway capacity and use

traffic using the road after expansion, T'_1, is greater than the amount using the road before expansion, T_1. The expansion of the road itself lowers travel costs and attracts more traffic.

A similar argument applies if an expansion is justified by a forecast increase in demand to $Demand_2$. To maintain the target average travel cost of C_0 with the higher demand, the road capacity would have to be increased to T_2^c. But if demand increased and the road was not expanded, average travel costs would rise due to the congestion, and use of the road would stop at T_2. The congestion serves to hold down use of the road, whereas expansion of the road attracts more traffic by reducing congestion and thus lowering travel costs. If an efficient congestion charge were levied (price equals marginal social cost), use of this road would stop at T_1, even if demand rises to the higher-level $Demand_2$. The key point is that use of a road or other facility is not an appropriate measure of the "need" for or benefits of expansion of that facility if users do not pay the full costs.

This emphasizes again why efficient use charges are important. If use and congestion of a transportation facility continue to increase even when the consumers are paying charges reflecting all the costs, then there is evidence of substantial benefits from additional investment in those facilities. Indeed, Herbert Mohring and Mitchell Harwitz (1962) showed that if the production of the transportation facility exhibits constant returns to scale (the cost of producing another unit of the facility is constant) and if users are charged the full costs including congestion costs, then the revenue generated by the congestion tolls will be exactly sufficient to pay the cost of an efficient-size facility. Under those conditions, if revenues greater than costs are being generated, then the facility should be expanded using those surplus funds. When the facility is at the efficient size, toll revenues will just cover costs. If production of the facility exhibits increasing or decreasing returns, the results of this analysis are different, although the concept is the same. If consumers are charged appropriate congestion fees and the cost conditions for expansion of the facility are known, then the revenue from the congestion charge can be a guide to the efficient amount of investment. Without efficient congestion fees, government officials are effectively flying blind in trying to evaluate the demand for expansion of transportation facilities.

Application 18.2: Transportation policy: A state or local function?

As you have learned in this chapter, state and local governments are primarily responsible for providing transportation services (although using some revenue generated by the federal government). State governments take direct responsibility for constructing and maintaining some roads and provide the bulk of resources that local governments use to build and maintain the other roads in the state. Local governments also own, operate, and finance airports as well as operating public transit systems (buses, subways, etc.). State and local governments share responsibility for public safety services related to transportation.

State and local governments share ownership and maintenance responsibility for highways and roads. Nationally in 2018, local governments (counties and municipalities principally) were responsible for 75 percent of public road mileage in the United States and state government highway departments about 19 percent. The small remainder is either the direct responsibility of the federal government (federal parks, federal forest land, and so on) or other state government agencies (including, importantly, state toll roads operated by agencies independent of the highway department).[20] State government responsibility for public roads is greater in rural areas (21 percent) than in urban areas (14 percent). Interstate highways and roads that carry substantial quantities of interstate traffic are typically the responsibility of state governments: either the state highway department or a state agency operating a toll road that is part of the interstate system. Local governments have relatively greater ownership of roads that primarily serve populations within states.

However, the division of road ownership (by mileage) between the state and local governments varies dramatically among the states. In 2018, local government ownership of public roads dominated (at least 90 percent of roads "owned" by local governments) in Kansas and Iowa (91.6), New Jersey (91.1), Michigan (90.7), and Massachusetts (89.9). In contrast, state governments are primarily responsible for (and own) public roads in West Virginia (88.5 percent), Delaware (84.9), Virginia (78.4), North Carolina (74.5), and South Carolina (52.1). The states where local government ownership of roads is very high include some that are quite rural (Kansas and Iowa) and some that are relatively urban (New Jersey and Massachusetts). Similarly, some of those states are expected to have substantially more interstate traffic (New Jersey) than others (Wisconsin). Some states have elected to decentralize the responsibility for road construction and maintenance, whereas others have chosen a centralized system for the same service.

Interstate comparisons of transportation expenditure and service, as well as individual state studies, should consider these substantial differences in the role of the state compared to local governments. Kenneth Boyer's (2003) analysis of road transportation provision in Michigan illustrates this point. Professor Boyer's analysis shows first, that Michigan is rather typical among the states in terms of the quantity of roads relative to land area and population. Among states, increases in both area and population lead to an increase in lane miles of roadway, but less than proportionally. The elasticity of lane miles of road with respect to area is 0.3 to 0.5, whereas the elasticity of lane miles of road with respect to population is 0.5 to 0.7.

However, the state government in Michigan "owns" (is responsible for) a much smaller fraction of major roads than is true in most other states. Focusing on highways that carry significant amounts of interstate traffic or traffic between regions in the state, he notes "The Michigan Department of Transportation owns only 29.2 percent of through roads, compared to Ohio's 64.6 percent and the national average of 57.6 percent" (Boyer, 2003, 326). Thus, local governments in Michigan are responsible for an unusually large fraction of roads and highways, including those that are major through routes. The road structure in Michigan is different from that of other similar states in two other important ways. As a consequence of local ownership, it appears that Michigan has invested in far fewer multilane roads other than limited-access freeways, particularly in rural areas, than other states. Also, Michigan seems to have a different pattern of road construction techniques than in comparable states.

The method state governments use to transfer state transportation revenue (mostly from state taxes on motor fuels) to local governments is especially crucial in states where local governments have substantial responsibility for roads. This issue is considered next.

Application 18.3: Allocating transportation funds

In the area of transportation funding, states have opted for centralized (state) collection of revenue, principally state motor fuel taxes and vehicle registration fees that are often referred to as "user-related" taxes. Most states earmark these revenues solely for transportation purposes, with a substantial component distributed to counties and municipalities that have substantial responsibility for providing transportation services. In some cases, local governments have primary responsibility for constructing and maintaining roads, even though the state government has primary responsibility for generating revenue for highway transportation. Thus, the allocation formula for state transportation grants to local governments is particularly important.

The US Department of Transportation collects and reports information about the methods used by states to distribute state motor fuel tax revenue and state motor vehicle fees to local governments. Ronald Fisher and Andrew Bristle (2012) summarize how motor fuel tax revenue and motor vehicle fees are distributed to county and municipal governments, all

of which are lump-sum formula grants. Six primary allocation factors are used: (1) origin (funds returned to the local jurisdiction from which they were collected), (2) equal share (total amount to be distributed divided by the number of recipient jurisdictions), (3) population (per capita), (4) area, (5) vehicle registrations, and (6) road miles.

The most prevalent factors used to allocate fuel tax revenue to both counties and municipalities are population and road mileage, whereas allocation by origin of fuel tax revenue – that is, the jurisdiction where the tax was collected – is the least-used allocation method. Only three states – Iowa, Kansas, and Nevada – allocate fuel tax revenue to localities on the explicit basis of road use.[21] In Iowa, "daily vehicle miles traveled" is one of five factors in the distribution formula for counties that was developed in 2006. Kansas uses "average daily road miles traveled, exclusive of the interstate system" for counties, and Nevada uses "vehicle miles of travel" for cities, with the travel variable one of four allocation factors.

For vehicle taxes and fees, origin (the jurisdiction where the vehicle tax originated) is used far more frequently as an allocation method, equal in relative frequency of use to population or per capita allocation. Population and road mileage are among the most frequently used allocation methods for both revenue sources because, in many states, motor vehicle fee revenues and motor fuel tax revenues are deposited into the same budgetary fund and are thus distributed in the same way. Fisher and Bristle report that no state includes an explicit cost index in any allocation formula to account for regional road production or maintenance cost differences (input prices, such as labor cost differences) and that distribution by equal shares, land area, and vehicle registrations are relatively more common in allocating funds to counties than municipalities.

Fisher and Bristle (2012) conclude that allocation of state funds to localities for transportation is rarely based on direct road use data, is based on vehicle registrations or tax origin in

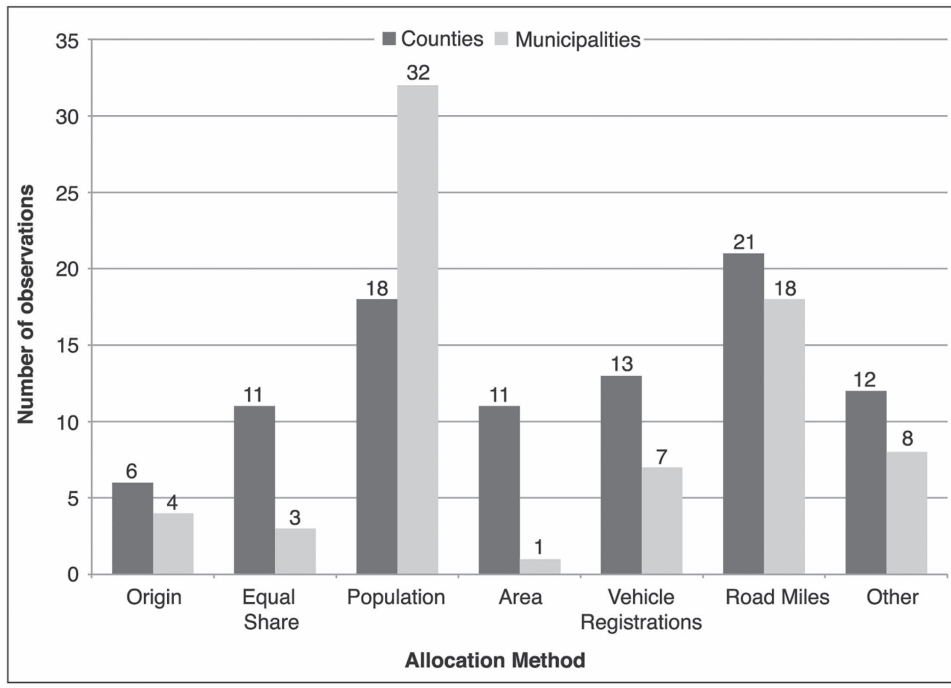


Figure 18.9 Frequency of allocation methods for motor fuel taxes

Source: US Department of Transportation

only a few instances, and never includes geographic cost factors. Population, or per capita distribution, is the most common characteristic used to allocate state transportation aid to localities but does not provide a good measure of either cost or demand. Areas with relatively low populations may have a relatively large number of miles of roads, whereas urban local governments with relatively large populations may have substantially more relative road use because of commuters (the case for many central cities and retail centers, for instance).

The distribution formula for transportation funds can have unusual policy implications, as illustrated by the case of Michigan. The allocation formulas used direct a disproportionate amount of revenue to rural as opposed to urban areas. Counties in Michigan with populations of more than 100,000 received $44.59 per capita in 1999, whereas counties with fewer than 20,000 people received $199.74. Because a large share of traffic in Michigan travels on urban roads, it is not surprising that major roads in urban areas of Michigan are of very poor quality compared to the roads in rural areas (Boyer, 2003).

Summary

Of the total expenditures by all levels of US government on transportation facilities or services for air, rail, road, and water transit in 2018, about 64 percent went toward highways.

Taxes and tolls collected from users, including motor fuel taxes, vehicle and driver license fees, taxes on airline ticket prices, aircraft landing fees, and a variety of user tolls are the major components of revenues for transportation spending.

The US federal government's role concerning highways and public transit is primarily in providing grants to subnational governments, whereas for air and water transportation, the federal government has a substantial role in directly purchasing and providing services and facilities. For instance, of the approximately $50 billion spent by the federal government for highways in 2018, about 93 percent was composed of highway grants paid to state-local governments.

State governments, on the other hand, both provide transportation services and facilities directly and transmit aid to local governments. Local governments mostly serve as direct purchasers and providers of facilities and services, using both their own revenues and the intergovernmental aid they receive from states and directly from the federal government.

The method state governments use to transfer state transportation revenue (mostly from state taxes on motor fuels) to local governments is especially crucial in states where local governments have substantial responsibility for roads. Allocation of state funds to localities for transportation is rarely based on direct road use data, is based on vehicle registrations or tax origin in only a few instances, and never includes geographic cost factors. Population, or per capita distribution, is the most common characteristic used to allocate state transportation aid to localities.

If the transportation system is already large enough to provide all the general benefits that arise from having a transportation network, then any further expansion of that system will only generate private benefits and should be entirely financed by users of that expansion. About 75 percent of the revenue for highway expenditures for all purposes comes from highway users, with motor fuel taxes representing a bit more than half of total highway spending.

Motor fuel taxes have been good proxies for highway user charges because motor fuel taxes vary by the amount and type of road use and because they can be collected at relatively low administration costs. Motor fuel taxes are imperfect user charges because vehicles (and drivers) differ in their fuel economy and use of alternative energy sources, all gasoline and diesel fuel is not used on highways, and fuel taxes do not differentiate highway use by location and time. As vehicles move away from motor fuel and toward electric systems, replacement of motor fuel taxes will be necessary, with a vehicle mileage toll most likely.

The argument for federal highway aid is that nonresidents substantially utilize transportation facilities directly provided by states and localities. Despite the expansion in scope of federal highway aid over the years, federal highway aid is still heavily skewed toward roads used for interstate and interregional travel.

The appropriate matching rate for federal grants should cover that fraction of marginal benefits that spills over to nonresidents. The current federal government share for major transportation grants is 90 percent for both construction and maintenance of interstate highways, 80 percent for other roads eligible for federal aid, and 80 percent for the capital costs of new or expanded urban mass transit systems.

The existence of congestion creates inefficiency because each user is concerned only with their own travel costs (the average cost) and does not consider the costs imposed on other travelers by the additional congestion (the marginal cost). The economic solution to any traffic congestion problem is to levy a congestion fee or toll equal to the difference between average and marginal cost at the efficient quantity. The congestion fee can be levied through tolls, fuel taxes, or metered usage.

The degree of congestion of a road or other facility is not an appropriate measure of the "need" for or benefits of expansion of that facility if users do not pay the full costs. Thus, the first step in determining the optimal investment in transportation facilities is setting an efficient price for the current capacity. The facility should then be expanded if that price generates sufficient revenue.

Discussion questions

1 Congestion is a common problem on roads and other transportation systems. Carefully explain what an economist means by "congestion" and why it is an economic problem. What type of user charge can "solve" a congestion problem?
2 "If a road is congested, then it is too small for the demand. The road should be expanded or replaced." True, false, or uncertain? Explain your answer.
3 Suppose that Your College Town has two parallel four-lane roads connecting the college to the rest of the city. One goes from the college directly into the heart of town and is usually congested, particularly at rush hours and other times when there are special activities on campus (such as a concert or athletic event). There are no special tolls or charges for this road. The other runs two miles south of the first with a number of connecting streets and is seldom crowded. The state highway department would like to use the revenue from a gasoline tax increase to expand the first road to six lanes. Would such an expansion be called for on economic efficiency grounds? Does society lose anything if the second road is not used to capacity? How else might the congestion on the first road be alleviated? What if congestion tolls were not feasible?
4 Explain why it may be necessary for state governments to begin to replace unit (per gallon) gasoline excise taxes with an alternative tax or different revenue source. Make the case for a user fee based on miles driven. What are some options for how such a fee could be collected?

Notes

1 Federal Highway Administration, https://highways.dot.gov/newsroom/us-driving-last-year-was-lowest-two-decades-new-data-show.
2 David Schrank, Luke Albert, Bill Eisele, and Tim Lomax, *2021 Urban Mobility Report,* Texas Transportation Institute, The Texas A&M University System, June 2021 https://mobility.tamu.edu/umr/media-information/press-release/.

3 National Highway Traffic Safety Administration, https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813115.
4 Bureau of Transportation Statistics, www.bts.dot.gov/newsroom/passengers-all-2020-us-based-flights-down-62-2019.
5 It is estimated that it cost more than $24 billion over some 10 years to replace and rebuild the 7.5 miles of Boston's Central Artery, converting it into an underground highway. See "True Cost of Big Dig Exceeds $24 Billion with Interest, Officials Determine," *Boston Globe* (July 10, 2012).
6 "Pricing in Urban and Suburban Transport," *American Economic Review* (May 1963): 452.
7 Ronald Fisher and Robert Wassmer, "Tolls Rule," *State Tax Notes* (July 23, 2018).
8 See APTA Public Transportation Fact Book, www.apta.com/research-technical-resources/transit-statistics/.
9 For those transit capital projects that receive federal support, the federal grant share is 80 percent.
10 These are likely to be eligible for matching grants at the 80 percent rate.
11 National Conference of State Legislatures, www.ncsl.org/research/transportation/variable-rate-gas-taxes.aspx.
12 If electric vehicles are eventually autonomous (self-driving) as well, then metered use based on miles driven (and even time or location) might be accomplished easily or automatically. For a discussion of the fiscal implications of AVs for state and local governments, see the Forum articles by William Fox, Ronald C. Fisher, and Benjamin Clark in the March 2020 issue of the *National Tax Journal*.
13 To avoid cheating, if mileage was reported incorrectly, this would be noted when the vehicle was sold and back fees collected at that time before the sale was permitted.
14 Ronald Fisher and Robert Wassmer. "Does Perception of Gas Tax Paid Influence Support for Funding Highway Improvements?" *Public Finance Review*, 2017.
15 Andrew Theen, "Oregon Considers Miles Traveled Tax to Replace Gas Tax," *Governing* (April 21, 2021).
16 Very low mileage fees have the potential to generate substantial revenue for transportation funding. A fee of 1 cent per mile would cost the typical driver in the United States about $10 per month but would generate substantial revenue for state governments to fund transportation projects. In Michigan, for example, such a fee would provide about $1 billion annually.
17 https://rosap.ntl.bts.gov/view/dot/5459
18 Ingersoll (1993).
19 The decline in 2020 noted in *Headlines* due to the pandemic is expected to be temporary.
20 Examples include the New York State Thruway Authority, the Massachusetts Turnpike Authority, and so on.
21 In New York, the shares of revenue to be distributed among counties, cities, and towns are determined by vehicle miles of travel in the past, but allocations to specific jurisdictions are then based on lane miles.

Selected readings

Boyer, Kenneth D. "Michigan's Transportation System and Transportation Policy." In *Michigan at the Millennium*, edited by C. Ballard, 323–349. East Lansing: Michigan State University Press, 2003.

Downs, Anthony. *Stuck in Traffic: Coping with Peak-Hour Traffic Congestion*. Washington, DC: Brookings Institution, 1992.

Fisher, Ronald C. "The Demise of the Gasoline Excise Tax?" *Tax Notes State*, May 24, 2021.

Gifford, Jonathan L. "Transportation Finance." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen, 594–623. Oxford, UK: Oxford University Press, 2012.

Kirk, Robert, and William Mallett. "Funding and Financing Highways and Public Transportation." Congressional Research Service, May 11, 2020.

"Report of Minnesota's Mileage-Based User Fee Policy Task Force." Accessed December 2011. https://angel.msu.edu/section/default.asp?id=SS14-PPL-891–001–97CS9X-EL-38–676.

Schrank, David, Luke Albert, Bill Eisele, and Tim Lomax. *Urban Mobility Report*. Texas: A&M Transportation Institute, June 2021.

Vickrey, William S. "Pricing in Urban and Suburban Transport." *American Economic Review* (May 1963): 452–465.

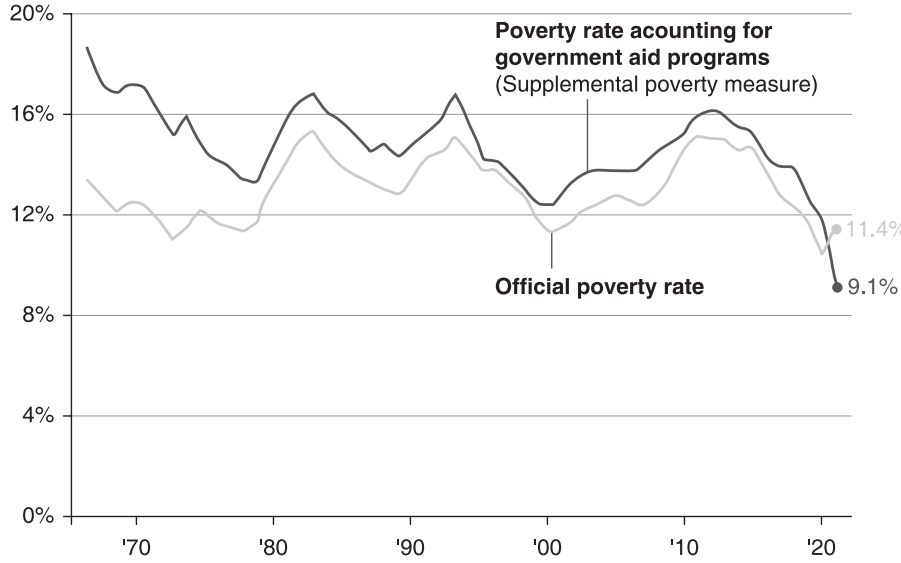
Weiner, Jennifer. "State Highway Funding in New England: The Road to Sustainability." In *New England Public Policy Center*. Boston: Boston Federal Reserve Bank, 2014.

19 Health and welfare

Headlines[1]

US Poverty Fell Last Year as Government Aid Made Up for Lost Jobs

"When government benefits are taken into account, a smaller share of the population was living in poverty in 2020, even as the pandemic eliminated millions of jobs.



The share of people living in poverty in the United States fell to a record low last year as an enormous government relief effort helped offset the worst economic contraction since the Great Depression.

In the latest and most conclusive evidence that poverty fell because of the aid, the Census Bureau reported on Tuesday that 9.1 percent of Americans were living below the poverty line last year, down from 11.8 percent in 2019. That figure – the lowest since records began in 1967, according to calculations from researchers at Columbia University – is based on a measure that accounts for the impact of government programs. The official measure of poverty, which leaves out some major aid programs, rose to 11.4 percent of the population."

DOI: 10.4324/9781003030645-24

Data availability

The US Census Bureau reports data about poverty rates, nationally and by state (www.census.gov/topics/income-poverty/poverty.html) and access to and type of health insurance (www.census.gov/topics/health/health-insurance.html).

The Governments Division of the US Census is the major source of comprehensive data about expenditure by state and local governments, including general spending on welfare programs, including cash assistance and vendor payments. As noted throughout the book, you may access these data directly from the census or by using the valuable and easy-to-use data tabulation utility maintained by the Urban Institute (https://state-local-finance-data.taxpolicycenter.org//pages.cfm).

A variety of organizations collect and report data about specific health and welfare assistance programs, the largest of which is Medicaid. Most all data related to Medicaid and the Children's Health Insurance Program (CHIP) come from information tabulated by the Centers for Medicare and Medicaid Services (www.cms.gov/Research-Statistics-Data-and-Systems/Computer-Data-and-Systems/MedicaidDataSourcesGenInfo). Because that basic information is complex and detailed, other organizations provide summaries or ways to access the information more easily. These organizations include the Medicaid and CHIP Payment and Access Commission (www.macpac.gov/macstats/) and the Kaiser Family Foundation (www.kff.org/state-category/medicaid-chip/).

The Office of Family Assistance in the US Department of Health and Human Services provides detailed information about the Temporary Assistance for Needy Families or TANF program (www.acf.hhs.gov/ofa/resource-library?f%5B0%5D=type%3Aeasychart). The Food and Nutrition Service in the US Department of Agriculture provides data and information about the Supplemental Nutrition Assistance Program or SNAP (www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap). The IRS reports data for the federal earned income tax credit or EITC (www.irs.gov/credits-deductions/individuals/earned-income-tax-credit/earned-income-tax-credit-statistics).

The National Association of State Budget Officers' annual "State Expenditure Report" (www.nasbo.org/reports-data/state-expenditure-report) includes specific chapters about Medicaid and public assistance programs (especially TANF).

Finally, detailed international comparative information and data and about health care and government health programs is available through the OECD Health Statistics Database (www.oecd.org/els/health-systems/health-data.htm) and the OECD report Health at a Glance (www.oecd.org/els/health-systems/health-at-a-glance-19991312.htm). Other organizations that are focused on health policy provide summary reports partly based on these data, including the Commonwealth Fund (www.commonwealthfund.org/sites/default/files/2021-02/Tikkanen_Fields_2020_multinational_comparisons_chartpack.pdf) and the Peter G. Peterson Foundation (www.pgpf.org/blog/2020/07/how-does-the-us-healthcare-system-compare-to-other-countries).

The provision of health and welfare services in the United States is the combined responsibility of the federal government, state-local governments, a variety of charitable nongovernmental organizations, religious groups and organizations, and private-sector service providers. The overriding objective of these efforts was identified, especially clearly by President Franklin Roosevelt as the nation recovered from the Great Depression when he

stated "The test of our progress is not whether we add more to the abundance of those who have much; it is whether we provide enough for those who have too little."[2]

Regarding the public-sector role, the federal government has had primary responsibility for financing programs and services and establishing minimum requirements. State governments have had a substantial responsibility for operating a variety of the programs designed to deliver health and welfare services, in addition to providing financing. This joint responsibility generates an inherent tension between the level of government that primarily finances services and the level that determines and delivers them on the one hand and between achieving national objectives for citizen welfare and the alleviation of poverty and allowing state choice about the level and structure of support programs on the other.

When President Bill Clinton signed the Personal Responsibility and Work Opportunity Reconciliation Act in 1996, dramatic changes were fostered in the welfare and support system. Welfare was to become a path to work, rather than an end in itself. States were to be rewarded for preparing and moving welfare recipients into jobs. States were to have both greater responsibility and more flexibility to accomplish these goals. When President Barack Obama signed the Patient Protection and Affordable Care Act in 2010, similarly dramatic changes were fostered for the health-care system. All individuals were to have health insurance. States were encouraged to establish competitive marketplaces for individuals to shop and purchase insurance. States were encouraged by substantial subsidies to expand free health care to a broader set of those in need of it, especially children and young adults. When President Joseph Biden signed the American Rescue Plan in 2021, new programs were initiated and existing programs expanded to support individuals and businesses and hasten the economic recovery from the COVID-19 pandemic recession. These changes, which might be extended, further reduced child poverty substantially.

Although dramatic changes were initiated, several tensions remained. One concerns establishing a fiscal structure to combine national standards and expectations about health and welfare with differences among states in needs, resources, and interests. A second is the conflict between the conventional policy wisdom, which suggests that states cannot effectively conduct redistributive policy because of interstate mobility, and actual practice in providing welfare and health services, where states have substantial options in determining eligibility and benefit levels. These are the issues covered in this chapter.[3]

Poverty and health care in the United States

About 37 million people in the United States, or about 11.4 percent of the population, were deemed to be living in poverty in 2020 (see Figure 19.1). Individuals and families are considered to be officially "poor" if the income of their household or family is below a threshold level based on the age of the householder and the number of people in the household. For instance, in 2020, the individual poverty threshold for someone under the age of 65 was an income of $13,465; a single individual with an income below that amount is considered to be "poor" in the official statistics. Similarly, the poverty threshold for a household with an adult under the age of 65 with one child was $17,839; for an adult (single parent) with two children the threshold increases to $20,852.[4] To put these poverty thresholds into context, a person working full time (40 hours per week) at the federal minimum wage would earn slightly more than $15,000 per year (40 hours per week x 52 weeks x $7.25 per hour = $15,080).

Both the number of persons and families living in poverty and the fraction of poor persons and families has risen and fallen over time, due to changes in both economic conditions and antipoverty programs, as shown in Figure 19.1. Since 1990, the fraction of the population considered "poor" has varied from a low of 10.5 percent (in 2019) to a high of 15.1 percent (in 1993 and 2010). The poverty rate rose in the early 1990s following the

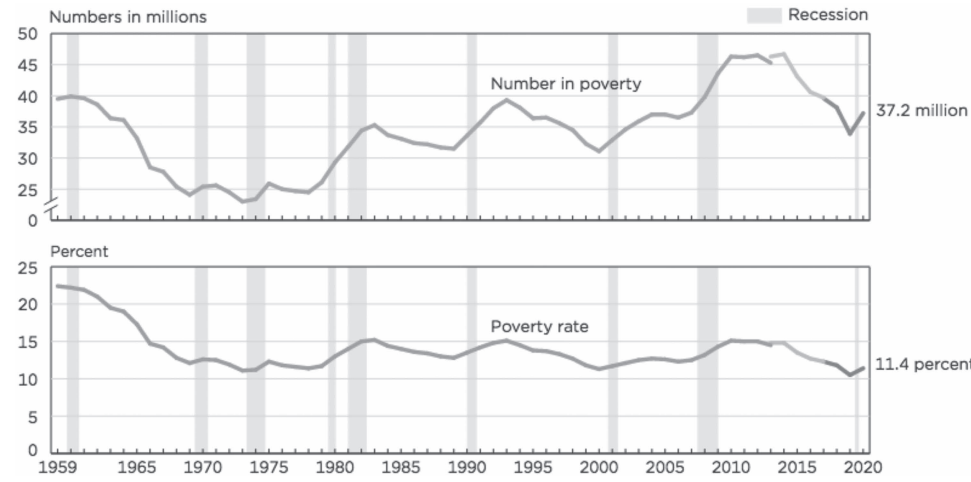


Figure 19.1 Number in poverty and poverty rate, 1959–2020 (population as of March of the following year)

Source: US Census Bureau, Current Population Survey, 1960–2014 Annual Social and Economic Supplements

Note: See www.census.gov/library/publications/2021/demo/p60-273.html.

recession in 1990 and 1991 and then declined throughout the remainder of the 1990s as the national economy grew substantially. Since 2000, the poverty rate has generally increased, especially during and following the Great Recession. The poverty rate increased from 12.3 percent in 2006 to the peak of 15.1 percent in 2010 and declined after that until the pandemic recession in 2020. The degree of poverty in the United States is substantially less than it was in 1960, before the expansion of federal welfare programs. In 1960, more than 22 percent of individuals were classified as poor. Since 1980, the poverty rate has varied in a narrow band between 12 and 15 percent, increasing during recession periods and falling during periods of growth.

Among poor individuals or families, poverty is most prevalent among children under the age of 18, as shown in Figure 19.2. In 2020, there were nearly 12 million children in poor households, about 16 percent of all children of that age and about one-third of all poor people in 2020. The poverty status of children is explicitly intertwined with the economic status of those children's families. More than 23 percent of female-headed families with no husband present (the traditional single-parent household) have income below the poverty threshold. In contrast to the poverty status of children, only about 9 percent of adults 65 years of age and older were poor in 2020 compared to more than 35 percent in 1960. The relative welfare of older, often retired adults has improved substantially since 1960, partly because of private pensions and improvements in Social Security and other programs for the aged.

The Census Bureau also provides a "supplemental" poverty measure that includes nutrition assistance, housing and energy programs, and tax credits like the earned income tax credit in additional to cash income and applies different poverty thresholds that take account of other household expenses. By this measure, the poverty rate for 2020 was 9.1 percent or about 30 million people. This is the lowest supplemental poverty rate since the alternative measure was introduced in 2009. The expanded unemployment insurance payments and other income support payments implemented to offset the effects of the pandemic recession

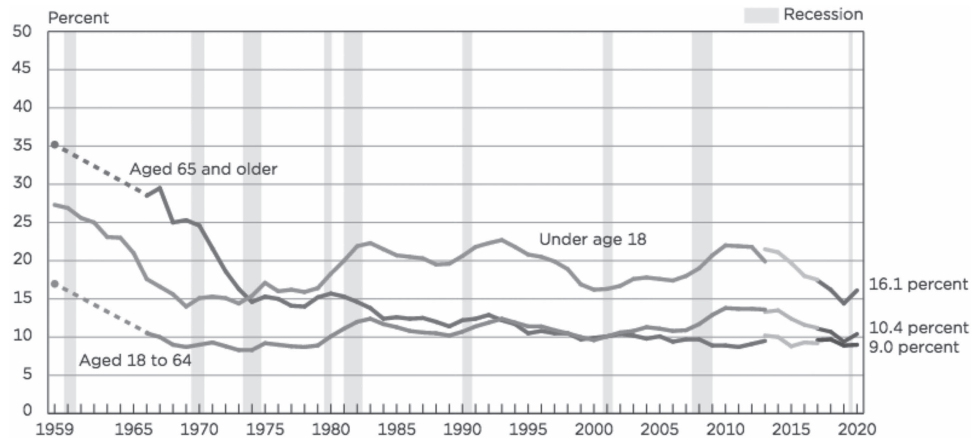


Figure 19.2 Poverty rates by age, 1959–2020 (population as of March of the following year)

Source: US Census Bureau, Current Population Survey, 1960–2014 Annual Social and Economic Supplements

Note: See www.census.gov/library/publications/2021/demo/p60-273.html.

in combination with the usual programs (Social Security, SSI, etc.) caused the supplemental poverty measure to be lower than the official measure for the first time.

Economic conditions and poverty rates differ substantially among the states and also geographically within states. (Additional information about state incomes and economic conditions is also presented in Table 20.1 in Chapter 20.) State poverty rates for individuals in 2019 varied from 7.3 percent of the population in New Hampshire and 8.9 percent in Utah to more than 15 percent of the population in Mississippi (19.6 percent), Louisiana (19.0 percent), New Mexico (18.2 percent), Kentucky (16.3 percent), Arkansas (16.2 percent), West Virginia (16.0 percent), Alabama (15.5 percent), and Oklahoma (15.2 percent). Obviously, state poverty rates are related to average state incomes, with the higher income states (such as Connecticut, Maryland, New Jersey, and Minnesota) having relatively low poverty rates, and the lower income states (such as Mississippi, Louisiana, New Mexico, and Arkansas) having among the highest poverty rates.

Actual differences in poverty among the states are overstated slightly because the same poverty income thresholds are used for all states and regions; no adjustments are made to the poverty thresholds for regional cost-of-living differences. If the prices of consumer goods are higher in higher-income states, then that fixed amount will buy more goods and services in some locations than others. In fact, competitive market analysis suggests that prices for some locally produced goods, especially housing, and some services such as medical care are likely to be higher in high-income states than low-income states. Differences in cost of living are not large enough to account for all the differences in poverty rates, however. For instance, the poverty rate in Mississippi is two and a half times that in New Hampshire, but cost of living differences between those states are not nearly large enough to account for the poverty difference.[5]

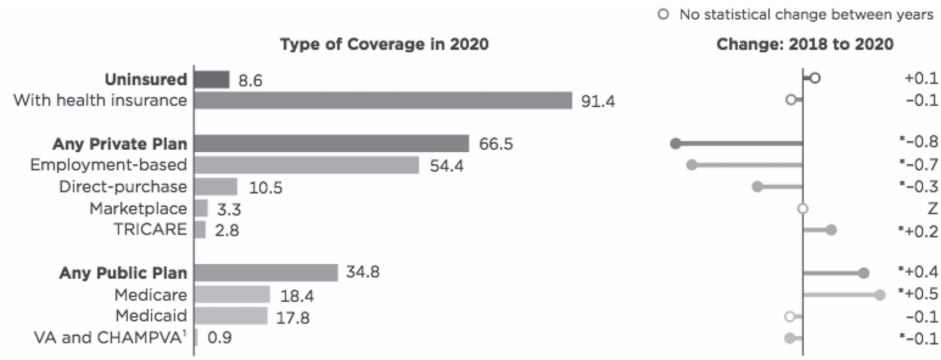
The seemingly obvious point that poverty rates tend to be higher in lower-income states is central to the issue of the degree to which welfare programs should be a state, as opposed to federal, government responsibility. If income redistribution or welfare programs were to be financed entirely by states, then redistribution occurs only from higher-income individuals to poorer persons in the state. Because income is not uniformly distributed among the states,

lower-income states could "afford" less redistribution – that is, less income support – than higher-income states. In the limit, if one state had only poor people and another only rich ones, then no redistribution occurs if welfare is entirely a state responsibility.

Welfare or anti-poverty issues in states cannot be separated from health-care issues, as Medicaid is by far the largest "welfare" or low-income support program in the United States, and the absence of health insurance is clearly related to poverty. In 2020, nearly 35 percent of people in the United States received health insurance coverage as a result of government programs, as shown in Figure 19.3. Medicare (health care for senior citizens) provided health insurance coverage to about 18 percent of the population, Medicaid (health care for low-income individuals) covered another 18 percent, and health insurance to military personnel covered another 1 percent. Importantly for state and local finances, about 28 million people, representing almost 9 percent of the population, had no health insurance coverage.

Not surprisingly, the share of people without health insurance coverage nationally declines as family income rises. Among families with an annual income of at least 400 percent of the poverty level, only about 3.4 percent do not have health insurance coverage, whereas more than 17 percent of people in families with income less than the poverty level are not covered. More than half the population receives health insurance coverage as part of their employment, so full-time workers with substantial incomes also tend to receive health insurance, whereas part-time workers or those in low-wage jobs are much less likely to have that benefit.

There is substantial variation among the states in the share of population without health insurance coverage. In 2019, the largest share of people without health insurance coverage was in Texas (18.4 percent), Oklahoma (14.3 percent), Georgia (13.4 percent), Florida (13.2 percent), and Mississippi (13.0 percent). At the opposite end of the spectrum, fewer than 5 percent of people are without health insurance in Minnesota (4.9 percent), Vermont (4.5 percent), Hawaii (4.2 percent), Rhode Island (4.1 percent), the District of Columbia (3.5 percent), and Massachusetts (3.0 percent). By the measure used in this census calculation, the average among all states is about 9.2 percent without health insurance. Massachusetts is an unusual case, having adopted a state plan requiring everyone to have health



* Denotes a statistically signficant change between 2018 and 2020 at the 90 percent confidence level.
Z Rounds to zero.
[1] Includes CHAMPVA (Civilian Health Medical Program of the Department of Veterans Affairs), as well as care provided by the Department of Veterans Affairs (VA) and the military.

Figure 19.3 Percentage of people by type of health insurance coverage and change from 2018 to 2020 (population as of March of the following year)

Source: US Census Bureau, Health Insurance Coverage in the United States: 2020, www.census.gov/library/publications/2021/demo/p60-274.html

insurance or face tax penalties – similar to the new federal requirement in the Affordable Care Act. Overall, there is quite a regional difference in insurance coverage.

Magnitude of health and welfare expenditures

The public sector in the United States engages in a variety of activities to improve social welfare, including programs providing direct cash payments, subsidies for purchases of specific goods and services, provision of in-kind benefits for specific services to specific groups, and services to improve the skills and income-earning ability of individuals, as well as a variety of insurance, research, and public information efforts. By one comprehensive measure, total government expenditures for education, health, and income security amounted to about $4.89 trillion in 2019, an amount equal to about 59 percent of total government spending and 23 percent of GDP. In addition to these amounts, a number of private-sector organizations, especially nonprofit ones, provide additional social welfare services.

The focus of this chapter is on a subset of health and social welfare services that provide cash payments or in-kind benefits to particular "needy" individuals or families, programs that are typically referred to as "public welfare programs." Each of the programs discussed in this chapter includes a specific means test, so they are targeted to individuals or families based on income and/or wealth.[6] As a consequence, a number of other important government programs that support subsets of the population who are in special circumstances but are not based directly on income or wealth are not considered in this chapter. These latter cases include Social Security, Medicare (health care for the aged), unemployment compensation, workers' compensation (for injured or disabled workers), and veterans' benefits.

Five major welfare or support programs represent the bulk of public aid spending and thus are the programs focused on in this chapter. **Temporary Assistance to Needy Families (TANF)** and **Supplemental Security Income (SSI)** provide monthly cash payments to individuals and families with low income, disability, or other special circumstances. **Medicaid** finances health care for low-income individuals and families without other health insurance or health benefits. The **Supplemental Nutrition Assistance Program (SNAP)** allows low-income individuals and families to purchase food using credit provided by government. Federal and some state governments provide **earned income tax credits (EITC)** to subsidize the earnings of low-income workers, so the total income of these workers is increased. In addition to these major programs, various other federal and/or state programs provide public or subsidized housing, health and nutritional services, and energy assistance.

Of these five major public welfare or support programs, Medicaid is by far the largest, both in terms of the magnitude of spending and the number of recipients, as shown in Table 19.1. Total Medicaid expenditures were estimated to be $626 billion in 2020. This amount is essentially three times the sum of the amounts spent through the other four programs in 2020 (about $31.6 billion for TANF, $55.9 billion for SSI, about $79.1 billion for SNAP, and $64.1 billion through the federal EITC). More than 76 million persons received direct medical care paid for by Medicaid in 2020, and on average during 2020, about 40 million people received SNAP support, around 2.8 million were in families receiving TANF payments, and approximately 9 million received SSI payments. Nearly 28 million federal tax returns for 2012 included earned income tax credits. Obviously, many individuals benefited from more than one of these programs. For instance, TANF and SSI recipients are automatically eligible for Medicaid, and many TANF and SSI recipients also may receive SNAP benefits.

Medicaid has also been the fastest-growing component overall of state and local government spending. Expenditure rose about 193 percent in the 2000 to 2020 period, an average

Table 19.1 Participation and expenditure for major health and welfare programs

	TANF/ AFDC[a]		*SSI*		*Medicaid*		*Food stamps/ SNAP*	
Year	*Number of Recipients*	*Amount*	*Number of Recipients*	*Amount*	*Number of Recipients*	*Amount*[b]	*Number of Recipients*	*Amount*
1970	8.5	$4.90	NA	NA	17.6[c]	$5.1	4.3	$0.60
1980	10.8	$12.50	4.2	$7.90	21.6	$25.2	21.1	$9.20
1990	11.7	$19.10	4.9	$16.60	25.3	$72.2	20.0	$15.50
2000	5.8	$24.8 (12.1)	6.7	$31.60	42.8	$206.2	17.2	$17.10
2010	4.6	$33.3 (12.3)	7.9	$48.20	65.5	$401.5	40.3	$68.30
2020	2.8	31.6 (7.1)	8.9[d]	$55.85[d]	76.5	$626.0	39.9	$79.10
Percentage change								
2000–2020	–51.7%	27.4%	32.8%	76.7%	78.7%	203.6%	132.0%	362.6%

Notes:
Amounts in billions of nominal dollars; number of recipients in millions
a AFDC through 1995; TANF after. Amount is total TANF expenditures. TANF payments for cash assistance only shown in parentheses.
b Total expenditures, including both benefit and administration expenditures.
c Projected.
d 2019.

rate of approximately 9 percent annually. A bit less than half the increase in Medicaid expenditures is attributable to increases in eligibility and participation as the number of recipients increased by about 79 percent, with the remainder due to higher health-care costs or coverage of new medical procedures for people who were already participants.

Financing welfare and health-care services: Major current programs

Medicaid: Health care for low-income persons

Medicaid, instituted in 1965, is a joint federal-state program partly financed with federal open-ended grants to the states to provide medical care to individuals and families with low incomes and resources. States have substantial latitude in setting eligibility and benefits subject to federal restrictions and requirements. For medical care received by recipients, states pay Medicaid funds directly to providers (vendors) so that individuals never receive the cash. In addition to direct provider payments for services, Medicaid also pays some health insurance premiums and makes payments to some hospitals, usually in inner-city areas, that provide care, especially emergency care, to unusually large numbers of Medicaid recipients.

Regarding eligibility, states are required to cover certain individuals: individuals eligible for AFDC payments based on rules in effect on July 16, 1996; recipients of SSI payments, generally all children in families with income below the official poverty thresholds (at least children under 19 and some up to 21), pregnant women and children under six in families with income less than 133 percent of the poverty level, and certain other specific groups. States have had the option to provide Medicaid coverage to broader groups and receive federal matching funds, such as infants and pregnant women in families with incomes under 185 percent of the poverty level; certain aged, blind, or disabled individuals with low incomes; some institutionalized individuals; and others.

Regarding benefits, states determine the types of medical services to be covered, the duration of coverage, and the rate of payment to providers for each type of covered service.

Certain services are mandated in order to receive federal funds, including inpatient and outpatient hospital services, physician services, prenatal care, vaccines for children, laboratory and X-ray testing, as well as others. Optional coverages for state choice include prescription drugs, eyeglasses and optometrist services, dental services, prosthetic devices, and others. For both required and optional services, states determine the duration of coverage, such as a limited number of days of hospital care or number of physician visits or tests. Finally, states set the payment rates to health-care providers, which they must accept for all covered services, and states also determine any deductibles or co-payments that recipients must pay.[7]

States receive open-ended matching grant funds from the federal government to help finance Medicaid payments. The federal grant share of state expenditure is determined by the formula

$$100 - \left\{ \frac{State\ Per\ Capita\ Income^2}{National\ Per\ Capita\ Income^2} \right\} \times 45$$

with per capita income measured as the average over a three-year period. The maximum allowed federal share is 83 percent, and the minimum is 50 percent. Thus, the federal government pays half of Medicaid expenditures in states with per capita income equal to or greater than that of the nation; it pays a larger percentage of expenditures in states with lower-than-average per capita incomes, up to a maximum of 83 percent.

The American Recovery and Reinvestment Act (ARRA) of 2009, part of the federal government's fiscal response to the Great Recession, included an increase in the federal share of Medicaid up to 14 percentage points for the first quarter of FY 2009 through the first quarter of FY 2011, with the magnitude depending on state unemployment rates. These increases in the federal share of Medicaid spending were subsequently extended for the second and third quarters of FY 2011, but at lower levels than had been the case under ARRA.

As part of the Families First Coronavirus Relief Act in 2020, the federal share of Medicaid expenditures was increased by 6.2 percentage points for each state, provided that those states met several conditions in the legislation. The increased federal share was to remain in effect as long as the federal government officially declared a public health emergency. The enhanced federal share started in January 2020 after the Trump administration declared an emergency, and the Biden administration has announced (at the time of this writing) that the official PHE would continue at least through 2021. The Affordable Care Act provided a temporary higher federal share for certain individuals added to Medicaid, discussed fully in the next section of the chapter

The largest federal government Medicaid shares for 2021 (before the FFCRA increase) are 78 percent in Mississippi, 75 percent for West Virginia and 73 percent in New Mexico and Alabama. Thus, of every dollar paid to health care providers by the Medicaid program in Mississippi, $.78 is paid by the federal government (through a grant to the state program) and $.22 is paid by revenue collected by the state government in Mississippi. The minimum federal share of 50 percent applies in 13 states (Alaska, California, Colorado, Connecticut, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Virginia, Washington, and Wyoming). Overall, in recent years (excluding the special enhancements), the federal government has funded around 64 percent of Medicaid spending.

The largest group of Medicaid recipients is children in low-income families, who represented 43 percent of all recipients in April 2021. Other recipient groups include adults (24 percent), blind or disabled individuals (17 percent) and seniors (9 percent). Although children are the largest group of recipients, they account for a relatively small fraction of health care expenditures financed by Medicaid. In fiscal year 2016, children represented

about 40 percent of the recipients but accounted for only 19 percent of payments. On the other hand, aged beneficiaries represented 8 of all recipients and 16 percent of payments, and the blind and disabled were 15 percent of recipients but accounted for 39 percent of total payments. Thus, about 55 percent of Medicaid expenditures for direct medical care went for aged and blind or disabled recipients, even though they represented less than one-quarter of beneficiaries.[8]

In 1997, the state Children's Health Insurance Program (CHIP) was established as a complement to Medicaid to assist states in expanding health insurance to children in families with income too high to qualify for Medicaid who do not have private or employment-based health insurance. State governments are given the option of using CHIP to expand Medicaid coverage for children, create a children's health insurance program separate from Medicaid, or utilize both approaches simultaneously. All states have established CHIP programs. Although state plans can differ substantially, generally coverage is provided to children under age 19 in families with incomes less than 200 percent of the poverty level or up to 50 percent greater than the Medicaid eligibility level. As with Medicaid, states receive grants with a federal matching rate that is slightly higher than that for Medicaid, although the total appropriation for CHIP in any year is fixed (so it is not an open-ended grant). The minimum federal share of state CHIP expenditures is 65 percent. According to the Medicaid and CHIP Payment and Access Commission, in fiscal year 2020, the federal government allocated $18.7 billion to CHIP and state governments an additional $2.7 billion, which provided total spending of $19.7 billion to provide health-care benefits to nearly 7 million children.

There are substantial differences among states in Medicaid and CHIP eligibility, coverage, and benefits, and therefore, it is difficult to report accurately about them. Some general information shows the magnitude of these differences. Medicaid recipients in 2019 varied from 8.5 percent of the population in Utah and 13.2 percent in Wyoming to 44.1 percent in New Mexico and 38.8 percent in the District of Columbia. According to estimates by the National Association of State Budget Officers, Medicaid expenditures in 2020 averaged 28.6 percent of total state government spending, but varied from 12 percent of state spending in Hawaii and 13.3 percent in Wyoming to 38.5 percent in Missouri and 38.1 percent in Ohio.

Fortunately, several organizations collect and report information about Medicaid differences among states. The Kaiser Family Foundation provides "Medicaid State Fact Sheets" for every state and the District of Columbia (https://www.kff.org/interactive/medicaid-state-fact-sheets/). For example, the "fact sheet" for my state of Michigan shows that Medicaid or CHIP covers 22 percent of the population, three out of every eight children (37 percent) are covered by Medicaid, and total state Medicaid spending is $16.4 billion. If you are in the US, look up your state's experience.

Similarly, Medicaid.gov, part of the federal government's Centers for Medicare and Medicaid Services, provides "State Profiles" for Medicaid and CHIP (www.medicaid.gov/state-overviews/state-profiles/index.html). For example, the profile for California shows that 12.8 million people were enrolled in Medicaid or CHIP in April 2021, which is about 15 percent of total national enrolment. Children are eligible to be covered by Medicaid or CHIP in California if they are in households with income no more than 261 percent of the federal poverty threshold. The profiles also provide information about quality of health care and specific aspects of the state's program.

The Medicaid and CHIP Payment and Access Commission (MACPAC) provides the report "MACStats: Medicaid and CHIP Data Book," which provides a wide variety of data about these programs, both nationally and by state (www.macpac.gov/macstats/). For example, Medicaid spending per enrollee in FY 2018 varied from $5,345 in Alabama and $5,379

in Georgia to $13,611 in North Dakota, $11,908 in New York, $11,392 in Nebraska, and $11,368 in Minnesota.

Finally, the report "2020 Medicaid and CHIP Beneficiary Profile: Characteristics, Health Status, Access, Utilization, Expenditures, and Experience" from the federal Centers for Medicare and Medicaid Services includes overall program data as well as selected program data by state (www.medicaid.gov/medicaid/quality-of-care/downloads/beneficiary-profile-2021.pdf).

Medicaid is not only the single largest welfare program, but, over the long run, it has also been the fastest-growing welfare program and the fastest-growing component of state budgets. Since 1990, personal health-care expenditures in the United States have increased at an average annual rate of 10.5 percent; Medicaid expenditures have grown at an average annual rate of 19.7 percent, almost twice as fast. Therefore, state government costs for Medicaid expenditures have also been growing substantially faster than aggregate state government spending, so Medicaid is becoming a larger and larger share of state budgets. According to the National Association of State Budget Officers, Medicaid expenditures represented about 28.6 percent of state government spending in fiscal year 2020, up from only about 7 percent in 1990 and 19.5 percent in 2000.[9]

The growth of Medicaid and other state-local health care expenditures is part of a national trend of increasing relative expenditure on health care generally. Health-care spending in the United States rose from 8.8 percent of GDP in 1980 to 12 percent in 1990 to nearly 15 percent in 2002 to more than 17 percent in 2020. A major factor is that growth in spending for prescription drugs continues to outpace growth of spending for health-care services in general. States continue to explore options to restrain Medicaid and other health-care expenditures. States have followed three approaches: (1) simply altering the parameters of their existing programs; (2) attempting to develop entirely new programs, often with programmatic waivers for Medicaid; and (3) seeking new revenues and to alter behavior that leads to health-care expenditures.

In seeking to contain costs and maintain services, some states have sought and received federal waivers to implement state programs to substitute for Medicaid. The details of these state experiments are less important than the fact that they are occurring. Essentially, states are operating as laboratories and conducting experiments on alternative ways of delivering health-care services generally, especially to low-income individuals and those with other health insurance coverage. In many of these cases, states are developing forms of managed care plans, in which care is overseen by a single organization such as a health maintenance organization (HMO); some states are using waivers to expand health-care financing through government to others not covered by insurance plans. For instance, Arizona, Florida, and Tennessee all operate forms of managed care programs as alternatives to traditional Medicaid, and Oregon received a federal waiver to implement a rationing plan, in which benefits are limited to specific prescribed lists of health services, with expanded preventive care. The common theme of these and other state experiments is finding some way to limit services to beneficiaries.

In a completely different direction, states have directed attention to activities or organizations that contribute to the states' health-care costs. The best known of these may be the lawsuits filed by states against tobacco products companies, seeking reimbursement from those firms for state health-care costs associated with smoking and other use of tobacco products. Initial lawsuits were filed in 1994 and 1995; in 1998 the attorneys general of 46 states settled most of those cases by approving the Master Settlement Agreement (MSA) with the four largest tobacco companies in the United States. Under that agreement, the tobacco industry is projected to pay the settling states in excess of $200 billion over the next 25 years. Four other states – Florida, Minnesota, Texas, and Mississippi – settled their tobacco cases

separately from the MSA and will also receive payments from the tobacco companies. Total payments to the 50 states are expected to be about $246 billion.

Similar to the tobacco experience, states filed lawsuits against the manufacturers and distributors of opioid drugs. Several of those cases now have tentative settlements that would bring substantial payments to states and localities to cover costs associated with opioid and related drug use. Other cases are ongoing as of this writing.

Medicaid and the Affordable Care Act

Effective January 1, 2014, as part of the Affordable Care Act, states were permitted to expand eligibility for Medicaid to all individuals under the age of 65 – including childless adults – in families with incomes of less than 138 percent of the poverty threshold (133 percent of the poverty threshold with a 5 percent margin of error). The Affordable Care Act made continued federal financial support for traditional Medicaid conditional on state expansion of eligibility. However, some business groups supported by a number of states challenged the Affordable Care Act in court. In a 2012 decision (*National Federation of Independent Business et al. v. Sebelius*), the US Supreme Court upheld the constitutionality of the ACA but ruled that states could not be required to expand eligibility as a condition for continuing to receive federal support for Medicaid. As a result, states had to decide whether to expand Medicaid eligibility beginning in 2014.

The federal government will continue to share in the financing of Medicaid but at a higher percentage for those recipients newly eligible for the scheme as a result of the ACA. The federal government covered 100 percent of the costs for the newly eligible recipients from 2014 through 2016. The federal share was then reduced over time to 90 percent for 2020. This new matching rate for federal Medicaid support creates an interesting public finance experiment – how will states respond to a higher matching rate of an open-ended matching grant? States did not have the option not to participate in Medicaid initially, although states had substantial flexibility to establish the parameters of each state's Medicaid program, resulting in higher participation and higher benefits in some states than in others. Now states have a complete option whether to participate in expanding eligibility, at even higher matching rates.

At the time of this writing, 38 state governments and the District of Columbia have elected to implement the Medicaid expansion permitted in the ACA, according to the Kaiser Foundation. In contrast, 12 states have decided not to proceed with the expansion. The states not accepting the additional federal support to provide health insurance for additional poor individuals are Alabama, Florida, Georgia, Kansas, Mississippi, North Carolina, South Carolina, South Dakota, Tennessee, Texas, Wisconsin, and Wyoming. This has not been a pure public finance experiment, however, as the decision has involved politics as much as economics. States in which elected officials opposed the Affordable Care Act have tended not to implement the expansion despite the enhanced federal support. Some officials express a concern that the enhanced federal support might be reduced in the future; others oppose the expansion on principle of what the role of government should be.

The American Rescue Plan adopted in 2021 as a response to the pandemic recession included a new financial incentive for states to expand Medicaid. States that had not adopted expansion at the time this law was enacted were offered a 5 percentage point increase in the general federal matching rate for Medicaid for two years. For example, in Mississippi, the federal matching rate with expansion would have been 78 percent (standard) plus 6 percent from the FFCRA plus 5 percent from the ARP or 89 percent! And the expanded population would still be covered at 90 percent. In fact, this incentive applied to Missouri and

Oklahoma, which had agreed to expansion before the law was adopted but not taken effect until July 2021.

The decision by states whether to expand Medicaid has substantial implications. In many states, the income eligibility level for Medicaid for parents is less than the federal poverty threshold, and adults who are not parents are ineligible in most states. If expansion is implemented, many people in these groups will gain health insurance coverage. Often in economic policy, there are unexpected consequences. For example, Wen et al. (2017) find that earlier Medicaid expansion in 2001 through 2008 contributed to a reduction in rates of robbery, assault, and larceny as a result of increasing substance use treatment and reducing substance use prevalence.

Another provision of the ACA requires all individuals to acquire health insurance or face tax penalties, and individuals with certain low income levels are eligible for subsidies to purchase insurance through state or federal exchanges. The catch is that some low-income parents and childless adults who are not covered by Medicaid currently and are not added through expansion in states not implementing it will not be eligible for the insurance subsidies. Medicaid is destined to grow in both expenditure and recipients as a result of the Affordable Care Act, but those changes will be highly uneven among the states.

SNAP: Supplemental Nutrition Assistance Program

The SNAP program provides credit to low-income individuals and households, which can be redeemed for food at retail stores. Like Medicaid, this program provides in-kind benefits (quantities of a specific good, food) rather than cash payments, but it is operated and financed by the national government with nationally uniform eligibility and benefit standards, similar to SSI.[10]

When the program was fully instituted in 1964, recipients purchased coupons at a discount – a family might purchase $100 worth of coupons for $50 – so that effectively, the program reduced the price of food purchases. To purchase a food item that cost $1.00 in the store, an individual needed to spend $.50 of private income to buy the coupons worth $1.00. The rate of price reduction was related to income, with bigger price decreases for those with lower incomes. Beginning in 1977, the program was changed so that individuals did not pay for the "free" value of coupons for which they were eligible. Rather than paying $50 for $100 worth of coupons, an individual in the same economic circumstances would just receive $50 worth of coupons as a grant. Economically, this change is expected to be significant, as now the coupons do not reduce the price (marginal cost) of food, but rather give recipients more resources that must be spent on food. Beginning in 1996, states began switching from paper coupons to electronic benefit transfer systems through which recipients essentially receive a debit card for the amount of their benefits. Recipients may purchase only prescribed "food items" with credit, and cards (credit) may not be sold.

To be eligible to receive SNAP credit in most cases, a household must have less than $2,250 of assets, total income less than 130 percent of the poverty threshold for a household of that size, and net income (income minus specific deductions) that is less than the poverty threshold.[11] Net income is 80 percent of gross income minus a standard deduction and a portion of costs for shelter, medical care, and child-care expenses. Households with all individuals receiving TANF or SSI payments are automatically eligible for food stamps independent of the tests outlined. The amount of credit a household receives is the difference between the cost of a nutritionally adequate diet for a household of that size (which is determined annually by the national government based on food prices) and 30 percent of net income. In October 2014, for instance, a two-person household with no income would receive $357 per month in SNAP benefits; if income is positive, benefits are reduced. The

implicit assumption is that households should spend no more than 30 percent of their net income (as defined previously) on food.

In fiscal year 2021, an average of nearly 42 million people received SNAP credit worth an average of $214 per month. Total program expenditure for 2020 was more than $79 billion. The number of food stamp recipients grew pretty much continually until the early 1980s, when program changes reduced eligibility to some extent. The number of recipients increased substantially in the first half of the 1990s, declined in the latter half of the 1990s, and has been increasing since. The number of SNAP recipients increased dramatically during and after the Great Recession (2007 to 2009). The number of recipients increased from about 26 million in 2007 to nearly 47 million in 2013. Average monthly benefits also increased substantially in real terms around the recession. Increases in unemployment and decreases in income for those working made many more individuals eligible.

State differences in food stamp payments and participation reflect differences in the number of eligible persons (state income or poverty relative to the national poverty threshold). For fiscal year 2019, California (3.5 million people in 1.8 million households) and Texas (3.2 million people in 1.4 million households) operated the largest programs in absolute size. Not surprisingly, the smallest program was in Wyoming (about 24,000 people in 11,000 households). Relative to population, New Mexico (21.5 percent) has the largest fraction of people receiving benefits, and Wyoming (5.5 percent) has the smallest fraction. Average benefit levels are highest in Hawaii ($258 per recipient per month) and Alaska ($181) and lowest in Arkansas, New Hampshire, and Minnesota (all about $110). Among mainland states, benefits are highest in Virginia ($176).

One contentious participation issue in recent years has concerned legal immigrants. In 1996, legal immigrants were made ineligible for food stamp benefits unless they became citizens, worked and paid taxes for a total of 40 quarters (10 years), served in the US armed forces, or had special refugee status. Food stamp benefits were restored to some legal immigrants (disabled, over 65, and under 18) in 1998. In 2003, eligibility for food stamps was returned to all legal immigrants under the age of 18 and other legal immigrants after residing in the United States for five years.

Partly in response to the substantial increase in SNAP participants, reauthorization of the program became a controversial component of crafting a new Farm Bill in the Congress. After some proposals to greatly reduce the size of the program, the final Farm Bill adopted in 2014 reauthorized the SNAP program for five years with some important reductions and clarifications of eligibility. The eligibility rules clarified that lottery winners and college students from affluent families are not eligible. Also, a practice used by some states to increase the amount of benefits for some families by overestimating heating costs was banned. These changes are estimated to reduce program spending by about $8 billion over ten years by reducing benefits to about 850,000 households. The Farm Bill adopted in 2019 continued the SNAP program with only minor changes and no reduction in benefits. There was debate in Congress about establishing work requirements for some categories of SNAP recipients, which would have reduced the number of beneficiaries, but that was not adopted.

The pandemic recession resulting from COVID-19 brought several changes to SNAP and food assistance. As part of the Families First Coronavirus Response Act of March 2020, states were authorized to provide additional emergency allotments to participants; the subsequent COVID assistance plan adopted in December 2020 increased the maximum SNAP benefit by 15 percent, a change that was later extended through 2021. The Families First law also created a program denoted P-EBT through which states could provide meal replacement benefits to children whose school was closed, an option extended as long as there is a federal health emergency. All states have utilized the P-EBT program to varying degrees.[12]

TANF: Temporary Assistance for Needy Families

With the passage and adoption of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996, Temporary Assistance for Needy Families (TANF) replaced Aid to Families with Dependent Children (AFDC) and two other smaller programs as the government's direct "welfare" or cash assistance programs.[13] TANF is designed for states to provide financial assistance for individuals mostly for limited time periods in exchange for those individuals either working or preparing for work. State governments have wide latitude to establish and operate TANF programs that meet the four goals identified in the act. State governments receive lump-sum block grants from the federal government to finance their TANF programs, although states are required to maintain a minimum level of state funding (80 percent of state AFDC expenditures in 1994) in order to receive the federal block grant funds. The federal block grants to states also impose certain programmatic constraints on the states' TANF choices. The amount of the federal block grant has been $16.5 billion annually since 1996. Each state's allocation is based on the amount that state received during the mid-1990s in federal support for AFDC.

There are a number of important differences between TANF and the AFDC program that it replaced. Several of the most significant differences are:

1 TANF includes federal requirements that recipients must work or engage in work-related activity as soon as they are ready for a job and no more than two years after beginning to receive assistance. Generally, states are required to show that 50 percent of all families and 90 percent of two-parent families receiving assistance through TANF are engaging in work-related activities. Single parents were expected to engage in those activities for at least 30 hours per week, and two-parent families at least 35 to 55 hours per week, depending on circumstances. Besides direct employment, work-related activities include on-the-job training, community service, secondary school attendance, vocational training (for up to 12 months), and job search (for up to six weeks).[14] States may use federal TANF funds to create community service jobs or provide hiring incentives for private employers.
2 Generally, there is a time limit on how long individuals or families may receive assistance through TANF. A family that includes any adult who has received federally funded assistance for five years, or a shorter time period set by state option, is not eligible for cash assistance through TANF. The idea is that there is a maximum lifetime five-year limit on TANF benefits for any individual. States have the option of extending TANF benefits beyond five years to no more than 20 percent of beneficiaries, and states may provide benefits beyond five years using state funds only.
3 Under TANF, states have substantial flexibility in how to allocate federal block-grant funds and the required state "maintenance of effort" funds and are not limited to making cash assistance payments. States are expected to use TANF funds in a manner "reasonably calculated to accomplish the purposes of TANF." For instance, substantial amounts of TANF funds are used to pay child-care expenses for working parents, to pay for transportation to work or school, to fund programs targeted at pregnancy prevention and family formation, and to cover the administrative costs of the programs. States can also allocate TANF funds to cover the costs of refundable earned income tax credits, which create cash assistance payments to low-income workers indirectly.

One characteristic of TANF has important economic implications, as you should realize from the discussion about the expenditure effects of intergovernmental grants in Chapter 9. The block grants that fund TANF are lump sum and thus do not have price effects

as matching grants do. States are required to allocate an amount of state government funds equal to a percentage of state AFDC spending in 1994. If states elect to spend more than those amounts, however, the amount of federal grant funds does not increase. Thus, the "tax price" or marginal cost to states of increasing state spending on cash-assistance benefits now is equal to $1.00, which is higher than under the old AFDC program.

In fiscal year 2020, about 2.8 million individuals in nearly 1.1 million families, less than 1 percent of the population, received direct assistance or benefits through state programs related to TANF. Total TANF-related expenditures by states were about $31.6 billion in 2020, although cash assistance payments were only about $7 billion of that total. Thus, cash assistance payments represented only about 22 percent of total spending. Federal funds represented $16.6 billion of the total and state government funds about $15 billion. In contrast, in 1995 (the last year of AFDC) about 13 million people, or 5.4 percent of the total population, were in families receiving AFDC cash benefits that totaled $21.6 billion and averaged about $140 per person per month.

Given that a major objective of TANF was to permit state governments substantial flexibility in designing programs, very large differences among the states in the TANF programs have evolved. The monthly earnings ongoing eligibility limit for a single parent family of three people varies from $268 in Alabama to $2,231 in Minnesota. Almost all the states also use an asset limit for eligibility, typically on the order of $2,000 or $3,000, excluding a motor vehicle. Most of the states have adopted the maximum federal time limit of 60 months; 12 have a lower limit and 3 (Massachusetts, New York, and Vermont) have no time limit (requiring the use of state funds only after 60 months). The maximum monthly benefit in July 2019 for a family of three people varied from $170 in Mississippi to $1,066 in New Hampshire.[15]

Perhaps the most interesting aspect of the TANF program is how small it has become. Among the five major welfare programs described in this chapter, it is the smallest by far. Even more importantly, the cash assistance provided through the two federal government programs discussed next – $56 billion through SSI and $64 billion through the EITC – greatly exceed that provided through TANF (about $7 billion). Today, state government support for low-income individuals is largely provided through Medicaid rather than cash assistance.

SSI: Supplemental Security Income

The second major means-tested program providing cash payments is Supplemental Security Income, administered by the federal Social Security Administration and instituted in 1974. SSI provides monthly payments to persons aged 65 and older, blind or disabled adults, and disabled children with low incomes and assets. SSI eligibility standards and benefit levels are set by the federal government and are uniform nationally, with benefits indexed for cost-of-living increases in the same way as Social Security payments. States may supplement the federal SSI benefit amounts. In 1994, 27 states plus the District of Columbia did so, adding about 18 percent to federal SSI expenditures.

For 2020, the basic monthly federal SSI benefit for an eligible person with no income is $783 ($9396 annually). This benefit is reduced if the individual has other income (including from Social Security). The benefit is reduced by one-half of monthly earnings above $65 and by all of Social Security or unearned income above $20. For instance, a disabled person who earns $180 per month would have benefits reduced by $57.50 [($180 – $65) ◊. 5] and would receive a monthly SSI payment of $725.50 ($783 – $57.50). Similarly, a retired person with a monthly Social Security benefit of $300 would receive an SSI payment of $463 ($783 – [$300 – $20]). To be eligible, individuals must have assets of less than $2,000, excluding a home, car, household goods, burial plots, and $1,500 of life insurance.

In 2019, about 8.9 million people received some form of SSI payments that totaled $55.9 billion for all of 2019 and averaged about $565 per month ($6,780 annually). Of this total amount, $53.3 billion (95 percent) represented basic federal SSI payments, and $2.6 billion represented state supplementation. Some 2.6 million individuals received state supplement amounts. The largest category of SSI recipients and payments by far is for disabled and blind persons, who accounted for 86 percent of the recipients and 89 percent of expenditures in 2019. Because eligibility and federal benefits are uniform nationally, differences in SSI payments by state arise either due to differences in the number of people who are eligible or differences in income for recipients.

EITC: Earned income tax credits

The federal government, 30 states, and the District of Columbia provide an income tax credit for low-income workers that either reduces income taxes owed or, in the case of the federal government and 22 states, can be refunded if the credit is more than tax liability. In this latter case, the EITC becomes a mechanism to make cash payments to low-income workers. The federal EITC was established in 1975, initially as a means of encouraging work by AFDC recipients. It has become a substantial income-support program that also includes a powerful incentive for recipients to work. The various EITCs together represent the largest cash assistance program for low-income families operated by government and the second-largest welfare or support program overall (after Medicaid).

The federal EITC is based on earnings, marital status, and family size, with separate credit parameters for taxpayers with no children, one child, or two or more children. To be eligible, taxpayers must have a Social Security number allowing them to work in the United States, have earned income under certain thresholds, have investment income (interest, dividends, and so on) of less than $3,650, and not be claimed as a dependent by another taxpayer. For each class of taxpayer, earnings are matched at a constant credit rate up to a threshold earnings level. After reaching that earnings amount, the credit remains a constant dollar amount for an additional range of earnings. At a second threshold level, the credit begins to be reduced until falling to zero. The operation of the credit for tax year 2021 for a single parent household with two children is illustrated next:

Federal earned income tax credit, head of household, two children, 2021

	First threshold	*Second threshold*	*Third threshold*
Earnings range	0 – $14,950	$14,951 – $19,520	$19,521 – $47,915
Credit rate	40 %	Varies	Varies; falls to zero
EITC	.40 * Earnings	$5,980	$5,979–0
Sample calculation			
Earnings	$7,000	$16,000	$25,000
EITC	$2,800	$5,980	$4,721
Total income	$9,800	$21,980	$29,721
Credit rate	40% (2,800/7,000)	37.3% (5,980/16,000)	18.8% (4,721/25,000)

Taxpayers receive a credit equal to 40 percent of earnings up to $14,950. Consequently, total income increases by $1.40 for every dollar the taxpayer earns. Put another way, if such a taxpayer is offered a job paying $7.25 per hour (the minimum wage), the taxpayer effectively earns about $10 per hour ($7.25 + .40 * $7.25). For earnings between $14,950 and $19,520, the EITC is a constant $5,980, so the credit rate continuously falls. Finally, after earnings

exceed $19,520 the credit amount is reduced as earnings rise until the EITC is zero at earnings of $47,915. As shown by the illustration, at earnings of $25,000, this taxpayer receives an EITC of $4,721, which is a credit of 18.8 percent of earnings. If the taxpayer with earnings of $25,000 is paid a wage of $13 per hour, the effective wage per hour including the EITC is about $15 ($13 + .152 * $13).

The EITC parameters in 2021 for married taxpayers with zero, one, or two children are shown next:

EITC parameters, married filing jointly, 2021

	No children	*One child*	*Two children*
Initial credit rate	15.3 %	34 %	40 %
First threshold	$15,760	$16,590	$20,900
Constant EITC	$1,502	$3,618	$5,980
Second threshold	$17,550	$25,470	$25,470
EITC = 0	$27,367	$48,108	$53,865

Several important features of the EITC are apparent. Unlike other welfare programs that provide support if income is zero, individuals must work and have earnings to receive any earned income tax credit. The initial credit rates are quite substantial for taxpayers with children, augmenting earnings substantially and creating a stronger incentive to work. The importance of having the credits be refundable is also clear. A married couple with one child and earnings of $15,000 would owe no federal income tax, so by making the credit refundable, the taxpayer receives the credit amount as a cash supplement to income. One aspect of EITCs is that taxpayers need to file a tax return to claim the credit and receive the refund, even if tax liability is zero. This has led to a concern that substantial numbers of eligible taxpayers may not receive EITC benefits.

For tax year 2018, 26.5 million federal individual income tax returns included an EITC, and the total amount of credits was $64.9 billion. State EITCs were in addition to this federal amount. About 18 percent of federal tax returns for 2018 included an EITC, which averaged about $2,460 (see Table 19.2). Not surprisingly given the credit structure, families with children accounted for 75 percent of tax returns with an EITC and nearly 97 percent of the EITC amount. Reflecting the importance of the refundable nature of the credit, 87 percent of the total EITC amount was refunded, with the other 13 percent going to reduce income tax owed. The fraction of tax returns with an EITC had remained essentially the same for the ten years before the Great Recession but increased substantially after the recession and during the economic recovery.

Table 19.2 Federal earned income tax credit

	1990	*2000*	*2010*	*2018*
Percentage of all returns with EITC	11.0%	14.9%	19.2%	17.2%
Number of returns with EITC (millions)	12.6	19.3	27.4	26.5
Amount of EITC (billions)	$7.5	$32.3	$59.6	$64.9
Refundable EITC (billions)	$5.3	$27.8	$54.3	$56.2
Percentage of EITC that was refunded	70.1%	86.1%	91.1%	86.6%
Percentage of EITC returns, families with children	NA	82.3%	75.7%	74.0%
Percentage of EITC amount, families with children	NA	97.8%	97.1%	96.7%
Percentage of EITC refunds, families with children	NA	98.2%	97.5%	97.4%

Source: US Internal Revenue Service, Individual Income Tax Statistics

The states with a state EITC are California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Vermont, Virginia, Washington, Wisconsin, and the District of Columbia. All state government EITCs are based at least partly on the federal credit, at varying matching rates. All states except Delaware, Hawaii, Ohio, South Carolina, and Virginia permit the credit to be refunded if greater than taxes owed. Typically, the income limits for eligibility for the state credits are the same as for the federal EITC. The state credits are mostly a fixed percentage of the federal EITC, varying between 3 percent and 62.5 percent, although most states also specify maximum credit amounts. In Kansas, for instance, the state credit is 17 percent of the federal EITC, with maximum of $913 for families with two children.[16]

Financing health care and welfare services: Policy and structural issues

Role of federal compared to state-local government

The conventional economic wisdom for many years was that subnational governments had limited ability to provide income redistribution because individuals and firms might move among jurisdictions to frustrate any intended redistribution. For instance, a local welfare program that redistributes resources to the jurisdiction's low-income residents would create incentives for high-income residents to leave (to avoid the taxation) and low-income residents to move in (to receive the transfer). Similar incentives, although perhaps to a lesser degree, were expected to operate among states. Interjurisdictional mobility suggests, therefore, that redistribution is more appropriately carried out by the national government. As summarized by Oates (1972, 8):

> The scope for redistributive programs is thus limited to some extent by the potential mobility of residents, which tends to be greater the smaller the jurisdiction under consideration. This suggests that, since mobility across national boundaries is much less than that within a nation, a policy of income redistribution has a much greater promise of success if carried out at the national level.

Essentially, income redistribution has a number of public good characteristics. Welfare or redistributive programs provide benefits not just to direct recipients but also to all in society – as social insurance against an economic calamity for anyone, providing altruistic benefits from helping the needy because they are needy, and as a means of reducing social unrest and related destructive behavior. Because everyone benefits if anyone provides some redistribution, there is an incentive for wealthy individuals to be "free riders" – to have others make the contributions. Moving is just a form of that free-riding behavior that is eliminated if redistribution is provided nationally (so that all wealthy individuals must contribute).

The idea that redistribution provides social benefits suggests a different perspective for thinking about the appropriate role of the national as opposed to state-local government. If the externalities associated with redistributive services are local or regional – that is, if the social benefits from redistribution to a particular population are confined only to other people in that area – then redistribution should be a local or regional service. Whether this is true depends somewhat on the type of social benefit. The concept of social insurance – the social safety net – almost must be national as it should apply no matter where one moves in the nation. Altruistic benefits and concern about social unrest might be local, if individuals

"care" only about people in their state, city, or neighborhood. On the other hand, if individuals "care" about poverty wherever it occurs, then this becomes an additional argument for national provision.[17]

Finally, a number of people have argued that because states and localities are smaller than the nation and it is easier to focus on specific conditions, they might serve as effective laboratories for trying new policies that might eventually be adopted by other states or even become national in scope. Indeed, as we have learned previously in this chapter, increasing flexibility for states to develop and operate different approaches to health and welfare programs has been a theme of policy and legislative change for the past 20 years. Of course, this does not suggest that all those experiments will turn out to be successful or that welfare services should necessarily be provided exclusively by states.

Over the past 60 years, there have been substantial changes in the responsibilities of the federal and state-local governments in providing social welfare programs in the US federal system. The federal government's responsibility for financing these programs has always been dominant but has increased substantially.

The dominance of federal financing is also illustrated by examining the individual programs. The federal government financed about 57 percent of Medicaid expenditures in 2020, and total Medicaid spending was about 70 percent of spending on the five main programs discussed in this chapter. The federal government pays essentially 100 percent of the costs of the SNAP program and funds almost all SSI expenditures (a small percentage representing state supplements). Although data about aggregate amounts of state EITCs are not available, a basic estimate suggests that the federal EITC provides about 87 percent of total EITC benefits.[18] The federal block grant for TANF programs (including state bonuses) was about 53 percent of aggregate spending on TANF. Aggregating these five together, the result is that the federal government provides nearly 70 percent of the financing.

From a programmatic perspective, however, one can argue that the state governments have taken on additional responsibility for designing and operating welfare programs in the United States. Given the uncertainty about whether to provide uniform aid to everyone or to base aid on differential regional preferences, we do some of both. As you learned, the SSI and SNAP programs (as well as Social Security and Medicare for the aged) provide essentially uniform national benefits (except for the small state supplements as part of SSI), and the national government operates these programs. Although a number of states offer EITCs, all these are calculated as a fraction of the federal EITC; thus, the federal government has essentially determined the structure of those tax credits. On the other hand, state governments have substantial flexibility to determine eligibility and benefit levels for the TANF and Medicaid programs, with resulting substantial differences among the states in both eligibility conditions and benefits. The increasing use of waivers in Medicaid to permit state experimentation and state government choice about expanding Medicaid coverage through the ACA has increased state autonomy in implementing welfare plans.

Money versus in-kind support (or subsidies)

In choosing between providing cash or amounts of specific goods or services to welfare recipients, policy makers face a difficult tradeoff. It is a standard and important microeconomic result that cash grants improve the welfare (utility) of recipients the most per dollar spent because cash provides the greatest flexibility to recipients and allows them to spend the welfare payments in ways that are best for each person's circumstances. On the other hand, providing specific goods or services to recipients (such as food, housing, or medical care), or subsidizing the purchase of those commodities, usually increases consumption of the

targeted commodity, restricts the ability of recipients to use welfare funds for less-preferred consumption, and may be more acceptable to taxpayers who fund the welfare programs.

An illustrative comparison between a cash grant (equal to *CG* dollars) and a food grant (equal to *FG* units of food) is shown in Figure 19.4. A low-income household with income I^0 chooses to consume at bundle *Z* on the initial budget line; this household buys F^0 units of food, which costs 25 percent of the household's income, leaving 75 percent of income for consumption of other things. If this household receives a cash grant of *CG* dollars, the new budget is line *YU*. The household can consume the same amount of food and spend all the cash on other things (bundle *X*), spend the entire cash grant on more food (bundle *V*), or buy more food and other things (bundle *W*). Essentially, the household can select any consumption option on the new budget, whatever serves them best.

Alternatively, the household could receive a grant of *FG* units of food, with *FG* equaling the amount of food that can be purchased with *CG* dollars, so both programs cost the same. However, recipients may not sell the food they receive: that is, recipients must consume at least *FG* units of food. In this case, the household can choose any bundle on the budget line *WU*; any consumption option on the segment *YW* (such as bundle *X*) is prohibited by the restriction against selling the food grant. So the food grant reduces the consumption options for the recipients and makes then potentially worse off than they would be with the cash grant.

Neither program insures (or requires) that all of the grant will be spent on food, which occurs if the household selects bundle *V* on the new budget. Although this is possible with either the cash or food grant, it is an unlikely choice. With the cash grant, the expectation is that the household will spend some of the cash on additional food and some on other things (such as clothing, housing, or personal care), perhaps selecting a bundle such as *W*. With the food grant, the household can use the food grant instead of food that it otherwise would have purchased, which frees up income to be spent on other things. A bundle such as *W* seems most likely.

In-kind benefits historically have been more important than cash payments in the US welfare system. In fiscal year 2020, the two major means-tested, in-kind benefit programs (Medicaid and SNAP) swamped the three major cash payment programs (TANF, SSI, and

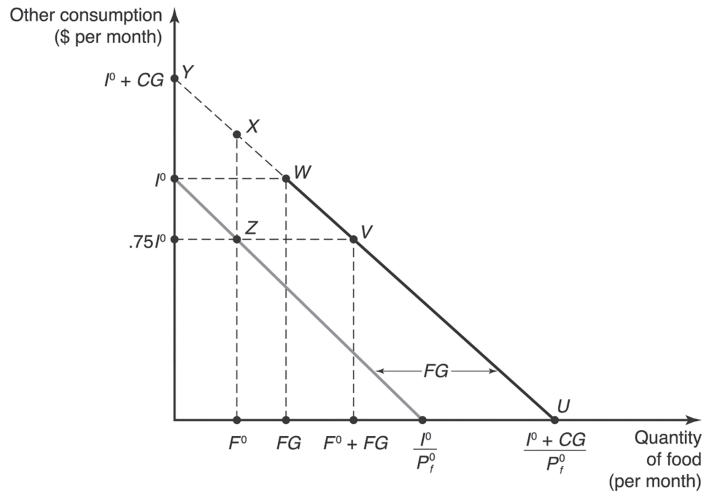


Figure 19.4 Assisting low-income consumers with cash grants or food grants

the EITC) by $705 billion in health care and food subsidy to about $152 billion of cash assistance payments, a ratio of more than 4 to 1.[19] As a result of program changes and the relative growth of different types of welfare spending, the importance of cash assistance in state budgets has declined substantially over time, and the importance of in-kind benefits (especially for health care) has increased correspondingly.

Interstate differences in services: Structure of federal grants to states

One of the most difficult and fundamental issues about welfare policy is the degree to which geographic differences in benefits or support will be tolerated (or are desirable, depending on your point of view). Differences among states are substantial for those programs for which states have leeway in setting eligibility and benefits. A first step in dealing with this issue is considering why different states choose different types and levels of welfare support. The structure of federal grants for health and welfare programs is the first factor to be considered.

As you have learned, the federal grant to the states for Medicaid is an open-ended matching grant, with the federal government share for any state inversely related to state per capita income. On the other hand, the federal grant to states to fund TANF is a lump-sum block grant, with a condition that states also continue to spend a fixed amount of state funds. Importantly, the federal grant for AFDC, the welfare program that preceded TANF, was similar to that for Medicaid – an open-ended matching grant with greater federal shares in lower-income states. In addition, there are a number of other federal categorical grants, some lump sum and some close ended matching, for other social or redistributive services, especially in the areas of education, health, and nutrition. The broad policy issue is what structure of grants is appropriate.

The average matching rate for the previous AFDC grants was 50 to 60 percent, so the state tax price per dollar of benefit was only $.40 to $.50. When those grants were replaced with the TANF block grant, the state tax price for welfare expenditures rose to $1.00. Even if demand for welfare services were price inelastic, one would be concerned about several possible consequences of this change. First, the increase in the marginal cost of providing welfare services in all states could lead to a lower level of support overall. Second, the cost of financing welfare services increased more in low-income than high-income states because the matching grants that were replaced provided larger federal shares for lower-income states. Because benefits were lower in low-income states initially, the concern is that the differences in benefit levels between states could increase, at least initially.

The implication is illustrated in Figure 19.5. The "demand" for providing health or welfare service (that is, the willingness to pay for the service) is lower in lower-income state A than higher-income state B. This reflects the idea that typical or median residents of a higher-income state would be willing to spend more on health or welfare both because they can afford more and because they may receive more benefit.[20] In addition, both demands are quite inelastic with respect to the state share of costs (the state's price).

Suppose the state share of health or welfare costs after federal grants is 30 percent in state A and 50 percent in state B. State A selects welfare level W_A, and state B selects the higher welfare level W_B. The lower state cost (price) in A due to a larger federal grant share is not great enough to offset the lower willingness to provide service in state A, which resulted from the lower income in A. Even more importantly, decreasing the state's cost share further (increasing the federal grant share) will still leave a welfare service difference if willingness to provide service (demand) is insensitive (inelastic) to the state cost.

Indeed, research suggests that this illustration is a quite realistic representation of the circumstances surrounding AFDC. Robert Moffitt (1984) estimated that the elasticity of state

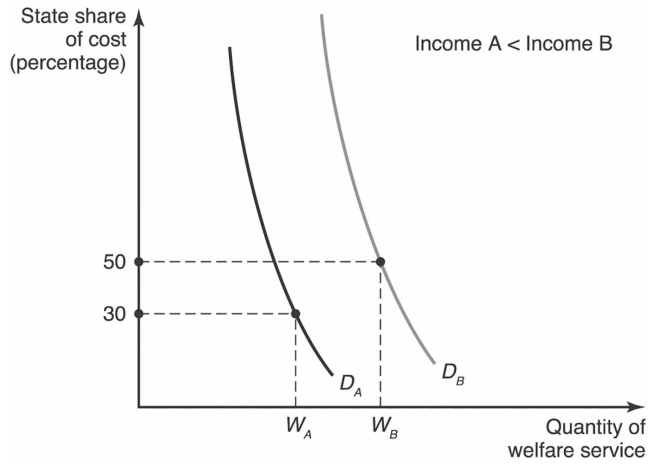


Figure 19.5 State differences in demand for providing welfare service

per capita AFDC benefits with respect to the subsidy rate (federal share) was about .15, which means that a 10 percent increase in the subsidy rate would increase per capita benefits by only 1.5 percent. For instance, if the federal share per dollar spent for state A was increased to $.80 from $.70, the subsidy rate rises by about 14 percent (.10/.70). If the elasticity is .15, then per capita expenditure rises by about 2 percent (.15 ◊ 14). So if the monthly per capita benefit were $100 initially, the new benefit would be $102. Benefits change only a little, even though the federal government is now paying 80 percent of the cost. In these circumstances, increasing the federal grants does little to equalize welfare services among states because the willingness to provide those services is so different. Essentially, residents of lower-income states prefer and can afford less redistribution. There are, therefore, only two broad ways to equalize welfare services – either make the services a federal government responsibility with uniform eligibility and benefit levels, as with SNAP and SSI, or mandate more uniform state services by federal regulations.

Two pieces of evidence suggest why the change in federal grant structure has not and may not greatly reduce welfare benefit levels, at least in the short run. Surveys by Ribar and Wilhelm (1999) and Moffitt (2003) of recent studies of elasticities of welfare benefits continue to show small effects: price elasticities between –.2 and 0 and income elasticities between .2 and .8. With these elasticities, increases in tax prices have a small effect on reducing benefits (just as decreases in prices have little effect increasing benefits, as described in the preceding paragraph).

Howard Chernick (2000) suggests another reason the expenditure effects of the switch from a matching grant to a block grant may be minor. Chernick suggests that there may be some substitutability between cash assistance (through TANF) and SNAP. Food assistance is funded fully by the federal government, whereas the cost of cash assistance is shared between the states and the federal government. Also, increases in income reduce the amount of SNAP support a family is eligible to receive. If a state reduces cash assistance, families can receive more SNAP support – the state saves state resources in providing less cash assistance while all the increased food assistance costs are paid by the federal government.

In contrast to cash assistance programs, the available evidence suggests that state funding for Medicaid is substantially more price sensitive than for cash assistance – with price

elasticities in the range of .6 to .8.[21] These estimates imply, for instance, that if the federal share of Medicaid costs in a state was reduced from 70 percent (state tax price =. 3) to 50 percent (state tax price =. 5), the resulting 67 percent increase in tax price could induce something on the order of a 40 percent reduction in Medicaid spending.[22] Thus, Chernick (2000, 150) argues "that efforts to cap Medicaid, or convert it to a block grant, would lead to very large reductions in Medicaid spending." The reluctance of some states to expand Medicaid as part of the ACA, even though the federal government is paying 100 percent of the expansion costs in the immediate run and 90 percent in the long run, is especially surprising, given this evidence of how states have responded to changes in federal subsidies in the past.

Interstate differences in services: Interstate mobility and migration

One reason to be concerned about state differences in welfare eligibility and benefits is that the differences might induce some individuals to relocate among states, with the possibility of low-income individuals moving to a state to receive greater benefits getting the most attention. Welfare lore is full of anecdotes about "welfare mothers" who move (or pretend to move) to a particular city or state just to become eligible for larger benefits. Indeed, some states in the past enacted residency time requirements for welfare eligibility to reduce the potential for this problem, although such waiting times or differential benefits were subsequently prohibited by the Supreme Court.

This type of mobility poses two potential problems for fiscal federalism and welfare policy. First, if migration to receive benefits occurs, the willingness and ability to provide sufficient welfare support in some states is reduced. If all welfare recipients moved to the highest-benefit state, the other residents of that state could not afford and likely would not be willing to continue that level of support. Substantial recipient migration would tend to equalize benefit levels, frustrating some residents' desire to provide a particular degree of redistribution. Second, if migration occurs, some high-income residents can avoid contributing to national income redistribution. This would result if most recipients were located in only a few states or if higher-income taxpayers migrated to low-benefit states to avoid taxes.

Finally, interstate migration solely for redistributive factors may be inefficient because that migration can impose external costs on other residents of the state. For instance, if many low-income welfare recipients moved to one state that had relatively high welfare benefits initially, the increase in population could create congestion for some current public services (schools, transportation, parks), causing a loss of benefits or higher costs to other residents; drive up land prices (imposing a cost on current housing consumers or other land users); or decrease wages for some types of work by increasing the supply of workers (assuming some welfare recipients work). It is important to emphasize that these problems arise if welfare benefits are the only reason for the migration because then there are no economic benefits to offset these problems.[23]

The evidence of interstate migration for welfare purposes (or other economic purposes, for that matter) is quite ambiguous. For instance, Edward Gramlich and Deborah Laren (1984) reported that only a very small number of AFDC recipients (3 to 7 percent) moved among states over a five-year period, but when moves did occur, they tended to be toward higher-benefit states. Over a very long period of time (the authors' results imply some 45 years for half of all moves to occur), the cumulative effect of these few short-run moves could be a major reallocation of welfare recipients toward higher-benefit states. Rebecca Blank (1988) used data from 1979 to examine interregional migration decisions of female-headed households with children compared to their locations in 1975. She reported that three factors – expected wage income, expected welfare benefits, and migration distance – have a statistically significant effect on moving decisions by these families, although wage

income seems to have the greatest effect. P. Levine and David J. Zimmerman (1995) used 1979 to 1992 data to examine whether high welfare benefits in a state seem to restrain the outmigration of poor, female-headed households with children relative to other groups. They reported no statistically significant difference between the groups, suggesting that single mothers do not tend to remain in states with high welfare benefits. Finally, Gordon DeJong et al. (2005) used data from 1996 to 1999 (after TANF) to examine migration behavior. They report evidence suggesting that poor families tend to move from states with more stringent welfare eligibility or work rules. They also report evidence, however, that when poor families move, they often move to other states with stringent welfare policies. The destination seemed influenced as much by employment opportunities and the availability of social support networks of family and friends as welfare rules, however. Therefore, the evidence supports no single clear conclusion.

It is difficult to use statistical methods to study migration that is intended to receive welfare benefits or escape redistributive taxation and thus why results of statistical studies might be contradictory. First, as we learned earlier in the chapter, it is often difficult to characterize the breadth of state differences in health or welfare programs. One state may have restrictive eligibility rules but high benefits for participants, whereas another state might have the opposite. How does one characterize which might be more attractive? Second, individuals may make location choices – moving or not moving – based on factors other than welfare services and taxes, including such issues as job prospects, family connections, or noneconomic preferences, and it is often difficult to separate those influences statistically. If a poor or unemployed welfare recipient moves to a state with better employment prospects or higher wages, the welfare benefits in such a state are likely to be higher also, although welfare was not the primary reason for the move. Third, the number of people moving between states in any given year is relatively small, in any case. For instance, Edward Gramlich (1987, 17) reports generally that "only a tiny fraction of unemployed workers in high unemployment states leave their states for better job markets in low unemployment states. There is very little labor mobility in the short run."

Concerns about interstate mobility, then, should not prevent states from adopting different health and welfare policies if residents desire. However, over a long period of time, those differences in policies, if they persist, may affect the geographic population distribution. It seems unlikely, however, that interstate migration by itself would be substantial enough to drive a "race to the bottom" in income-support services.

Welfare to work

The relationship between welfare support and employment has been a continual theme in social welfare policy in the United States. A basic concern is whether welfare programs create incentives that discourage work. To counter such incentives, attempts have been made to develop training programs to increase the employability of welfare recipients and to craft assistance programs that also encourage work (such as the EITC). Most recently, of course, requiring assistance recipients to work is a fundamental characteristic of TANF.

The AFDC program that existed from 1935 until just after 1996 included relatively high effective tax rates on earnings, including effective tax rates of 100 percent in some years. In other words, when earnings of AFDC recipients increased by $1, cash assistance benefits were reduced by $1. As a consequence, effective wage rates were zero, and work disincentives were high. To counter this, the federal government instituted mandatory job training and education programs. The Family Support Act adopted in 1988 required states to implement a Job Opportunities and Basic Skills Program (JOBS) by 1990, which was financed by a federal matching grant to the states, although these grants were close ended. (There is

a maximum amount.) These JOBS programs were to be state-designed efforts at education, training, work experience, or job search assistance, particularly for AFDC recipients. Obviously, the success of these plans depends on two factors – the ability to develop marketable skills in current welfare recipients and the ability to place such people in appropriate jobs that provide sufficient income. The difficulty of achieving both should not be underestimated. Follow-up studies of a number of past job-training programs found that they often fell below expectations. In some cases, individuals required basic education before they could succeed in specific training programs; in other cases the training was not tied to specific future-likely job requirements; and in still other cases, an absence of skills or training was not the problem that contributed to welfare participation in the first place.

A second approach has been to use tax credits to encourage work. The EITC is used to supplement income for low-income workers and effectively increases net wages for many workers or imposes lower effective tax rates than they would owe otherwise, both of which create incentives to work compared to the absence of the credit.[24] The federal personal income tax (and some state income taxes) also includes a nonrefundable child-care tax credit that effectively partly offsets child-care costs so that parents may work. The child-care credit reduces income taxes for families whose income rises high enough that tax liability, even after the EITC, becomes positive.

Finally, the current programs that are operated through TANF include several work incentives, as discussed previously. In general, cash assistance recipients are required to engage in work-related activity, including employment, on-the-job training, community service, secondary school attendance, vocational training, or job search. In addition, states can use funds from the TANF block grant to pay work-related child-care and transportation expenses, to fund public service work opportunities for recipients, and to provide hiring incentives to private firms.

What has been the effect of these policy changes on the labor market activity of low-income individuals, especially those who are recipients of benefits through these health and welfare programs? This issue has been examined in a number of recent studies, and the conclusions are remarkably consistent. David Ellwood (2000, 1100) concludes, "The combination of the higher EITC, welfare reform, and a strong economy has led to a truly unprecedented increase in labor market activity by low-income single parents." Bruce Meyer and Dan Rosenbaum (2000, 1057) report

> Between 1984 and 1996 . . . the Earned Income Tax Credit was expanded, welfare benefits were cut, welfare time limits were added and cases were terminated, Medicaid for the working poor was expanded, training programs were redirected, and programs providing subsidized or free child care were expanded. . . . These changes were followed by large increases in the employment rates of single mothers.

Joseph Hotz and John Karl Scholz (2003, 183 and 191, 1920) note,

> Over the last twenty-five years, the EITC has become, by a considerable margin, the country's largest cash or near-cash program directed at low-income families . . .. based on evidence from many studies, the EITC positively affects the labor force participation of single-parent households . . . in aggregate, the positive participation effects appear to be fairly substantial.

David Ellwood's (2000) analysis shows clearly why this happened. In 1986, an unmarried woman with children who worked and earned $10,000 would have ended up with total disposable income of $10,644 after accounting for income and social security taxes,

AFDC and food stamp benefits, the EITC amount, the dependent care tax credit amount, and child-care expenses that the woman would pay. Medicaid also would not have covered this family. If the woman did not work at all, the family would have received net disposable income of $8,804 plus Medicaid coverage. Working increased income by $1,800 but led to the loss of Medicaid coverage. There was little incentive to work. In 1998, the situation was dramatically different. That same unmarried woman with children who earned $10,000 by working received net disposable income (after all of the costs and programmatic benefits) of $14,593 and Medicaid coverage for the children at least. If she did not work at all, net disposable income was $7,717 plus Medicaid. Working and earning $10,000 adds almost $7,000 to net disposable income without substantial loss of Medicaid coverage. Obviously, the combination of welfare, health, and tax programs in 1998 created a much stronger incentive to work than did the program structure in 1986. In Ellwood's simulation, the greatest changes between the situations in 1986 and 1998 were for the EITC and the dependent care tax credit, which had been expanded between that time, and Medicaid, for which eligibility had been expanded to include more working families.[25]

Even with these incentives, individuals must be able to find and hold jobs paying sufficient income to support their families. Thus, the strong national economy during the 1990s provided an ideal time to make changes to health and welfare programs as the number of jobs and national employment increased substantially. The job situation during and after the Great Recession has been much more difficult for low-income workers. Unemployment rose to 10 percent following the recession, and wage differences between workers with less education and those with more have continued to widen. Even if jobs are available, they might be in different geographic locations (even different states) than the concentration of past welfare recipients (what has come to be called the "spatial mismatch" factor). In the early 1990s, President Clinton had set the goal that full-time work at the minimum wage plus the benefits of the EITC and other programs should be sufficient to move a family out of poverty. A full-time job paying $7.25 per hour (the current minimum wage) generates annual income of about $14,500, well below the poverty threshold for a single-parent household.[26] Even with Medicaid and EITC benefits, it seems that President Clinton's goal is achieved only in some cases.

International comparison: Providing health-care services

As we have learned, financing health-care expenditures has become a crucial issue facing all governments in the United States, both federal and state-local. This component of government spending depends on both the magnitude of health-care spending and the role of government or public programs funding that care. As with most components of social welfare services, there are substantial differences among industrialized nations in both the magnitude and role of the public sector in financing health-care services. The relative situation for the United States is easily summarized: health-care spending is substantially higher in the United States than in other industrialized nations, whereas the share of health expenditures financed publicly is lowest in the United States among these nations.

In 2019, health-care expenditures in the United States were 17 percent of GDP, as measured by the OECD.[27] The nations closest in the magnitude of health care spending were Switzerland (12.1 percent) and Germany (11.7 percent). Among other major nations, spending was lower in France (11.2 percent), Canada (10.8 percent), the UK (10.3 percent) and Australia (9.3 percent). Even larger differences in magnitude apply to per capita health expenditures, which were $10,637 in the United States, but only $6,646 in Germany, $5,418 in Canada, $5,154 in France, $4,711 in Australia, and $4,290 in the United Kingdom. It may not be surprising that consumers in the United States spend more on health care than

people in the other nations because income is also higher in the United States. But United States consumers also spend a substantially larger fraction of income on health care, about 57 percent more than consumers in Canada, for instance.

In the United States in 2019, around 49 percent of health expenditure was funded by the public sector (including Medicare, Medicaid, public health services, etc.), whereas about 40 percent was funded by private health insurance, as shown in Figure 19.7. In contrast, the public sector accounted for 85 percent of health-care spending in Germany, 84 percent in France, 78 percent in the United Kingdom, 70 percent in Canada, and 66 percent in Australia. The relatively small role of government in funding health care in the United States is matched among OECD nations by such countries as Chile (50 percent) and Mexico (51 percent). Another interesting fact of the data in Figure 19.6 is that the share of health expenditures financed from private, out-of-pocket payments by individuals is about the same in these other nations. Thus, the greater role for the public sector in such places as the United Kingdom, Germany, France, Canada, and Australia substitutes for the role of private health-care insurance in the United States.

These differences, of course, reflect the fact that many of these other nations have a national public health-care system that provides the great bulk of health-care services in those countries. In contrast, the system of health care providers in the United States is predominantly private, with the role of government to ensure care for low-income individuals and children in families without access to health care and to senior citizens. This fundamental difference is a major source of the Medicaid financing issue facing state governments. Prices for health care are set in the private sector; individuals in consultation with private

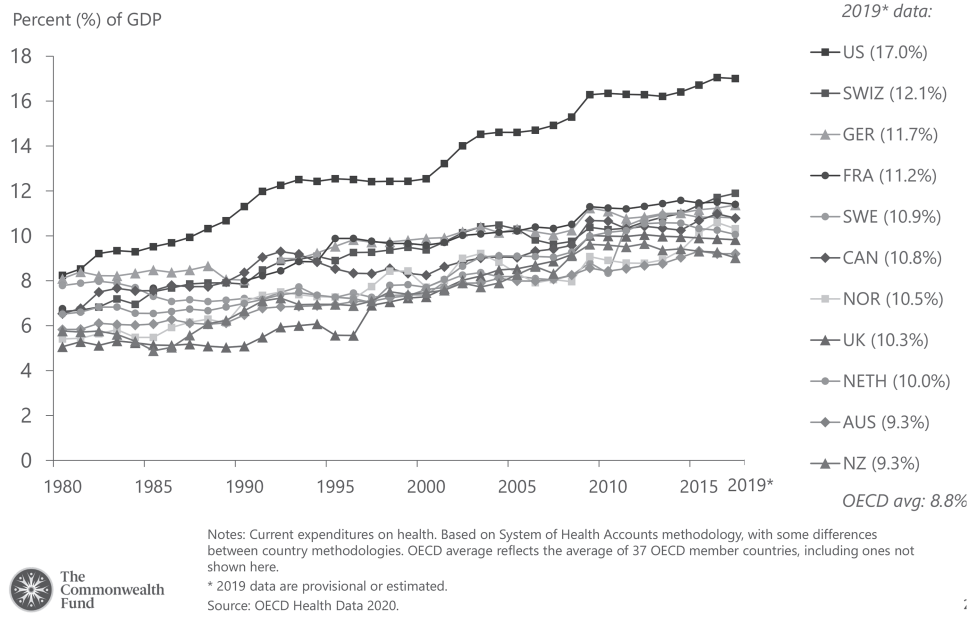


Figure 19.6 Health-care spending as a percent of GDP, 1980–2019 (adjusted for differences in cost of living)

Source: The Commonwealth Fund, www.commonwealthfund.org/sites/default/files/2021-02/Tikkanen_Fields_2020_multinational_comparisons_chartpack.pdf. Reprinted with permission.

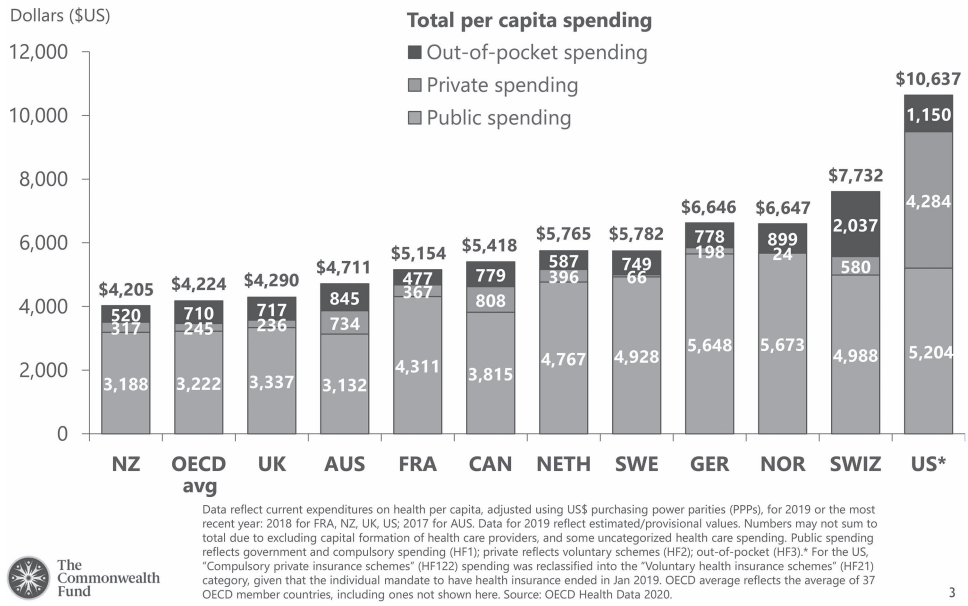


Figure 19.7 Health-care spending per capita by source of funding, 2019 (adjusted for differences in cost of living)

Source: The Commonwealth Fund, www.commonwealthfund.org/sites/default/files/2021-02/Tikkanen_Fields_2020_multinational_comparisons_chartpack.pdf. Reprinted with permission.

health care providers determine what health care services to consume, but government funds a substantial portion of the cost of services for the target population. Many of the policy adjustments to state Medicaid plans are intended to limit prices paid to providers or choices about covered services by consumers.

Summary

About 37 million people in the United States in 2020, which represented approximately 11.4 percent of the population, were living in households with income below the poverty threshold. Among poor individuals or families, poverty is most prevalent among children under the age of 18, with about 16 percent in poor households.

In 2020, nearly 35 percent of people in the United States received health insurance coverage as a result of government programs. Medicare (health care for senior citizens) provided health insurance coverage to about 18 percent of the population, Medicaid (health care for low-income individuals) covered another 18 percent, and health insurance to military personnel covered another 1 percent. Importantly for state and local finances, about 28 million people, representing almost 9 percent of the population, had no health insurance coverage.

Economic conditions and poverty rates differ substantially among the states and also geographically within states. State poverty rates in 2019 varied from 7.3 percent in New Hampshire and 8.9 percent in Utah to more than 15 percent in Mississippi (19.6 percent), Louisiana (19.0 percent), New Mexico (18.2 percent), Kentucky (16.3 percent), Arkansas (16.2 percent), West Virginia (16.0 percent), Alabama (15.5 percent), and Oklahoma (15.2 percent). Similarly, the share of population without health insurance varies substantially among states.

Five major welfare or support programs represent the bulk of public-aid spending. Medicaid finances health care for low-income individuals and families who do not have other health insurance or health benefits. The Supplemental Nutrition Assistance Program (SNAP) allows low-income individuals and families to purchase food using credit provided by government. Temporary Assistance to Needy Families (TANF) and Supplemental Security Income (SSI) provide monthly cash payments to individuals and families with low incomes, disability, or other special circumstances. The federal government and some state governments provide earned income tax credits (EITC) to subsidize earnings of low-income workers.

Of these five major programs, Medicaid is by far the largest, both in terms of the magnitude of spending and the number of recipients. Total Medicaid expenditures were estimated to be $626 billion in 2020. This amount is essentially three times the sum of the amounts spent through the other four programs in 2020 (about $31.6 billion for TANF, $55.9 billion for SSI, about $79.1 billion for SNAP, and $64.1 billion through the federal EITC). More than 76 million persons received direct medical care paid for by Medicaid in 2020, and on average during 2020, about 40 million people received SNAP support, around 2.8 million were in families receiving TANF payments, and approximately 9 million received SSI payments. Nearly 28 million federal tax returns for 2012 included earned income tax credits.

The federal government finances and establishes uniform national standards and benefits for SSI and SNAP. States have substantial policy discretion in determining eligibility and benefits for TANF and Medicaid, which are jointly financed by the federal government and the states. As a result, there are substantial differences among states in eligibility standards and benefit levels for TANF and Medicaid.

Effective January 1, 2014, as part of the Affordable Care Act, states were permitted to expand eligibility for Medicaid to all individuals under the age of 65 – including childless adults – in families with income less than 138 percent of the poverty threshold (133 percent of the poverty threshold with a 5 percent margin of error). The federal government covered 100 percent of the costs for the newly eligible recipients from 2014 through 2016. The federal share was then reduced over time to 90 percent for 2020. At the time of this writing, 38 state governments and the District of Columbia have elected to implement the Medicaid expansion permitted in the ACA.

The evidence of interstate migration for welfare purposes (or other economic purposes, for that matter) is quite ambiguous. Some studies show low-income individuals moving toward higher-benefit states, whereas others show no difference in moving patterns between low-income mothers and others. The location moved toward seems influenced as much by employment opportunities, the availability of social support networks, and distance as welfare policies. It seems unlikely, therefore, that interstate migration by itself would be substantial enough to drive a "race to the bottom" in income-support services.

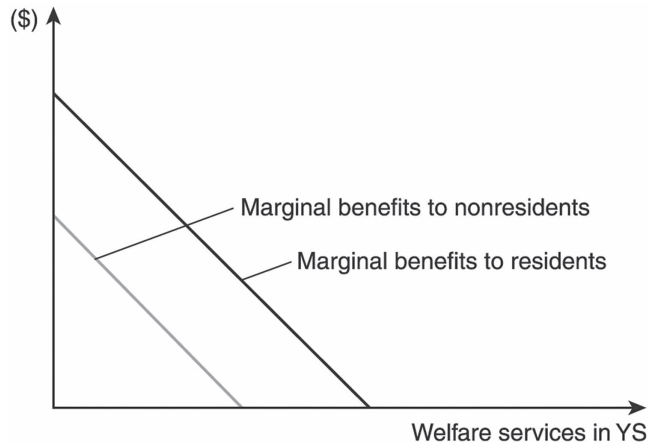
Health-care spending is substantially higher in the United States than in other industrialized nations whereas the share of health expenditures financed publicly is lowest in the United States among these nations. Many of these other nations have a national public health-care system that provides the great bulk of health-care services in those countries. In contrast, the system of health-care providers in the United States is predominantly private, with the role of government to ensure care for low-income individuals and children in families without access to health care and to senior citizens.

Discussion questions

1 States select welfare benefit levels for low-income state residents, subject to federal rules. Suppose that both poor and non-poor state residents demand (benefit from) welfare

services provided by the state government. State and discuss three possible components of the benefits to the non-poor from welfare services. To what extent does each type of benefit arise from (a) helping poor people in the state or (b) helping poor people in all states?

2 Suppose taxpayers who finance welfare care about both poor residents of their states and the poor who live in other states, but to different degrees. Thus, when the residents of Your State select the level of welfare benefits, all residents of YS (both the poor and non-poor) benefit, but residents of other states also benefit because the poor in YS are being helped. (For instance, because of the assistance in YS, poor residents may be less likely to migrate to other states.) Both the marginal benefits to all residents from welfare payments in YS and the marginal benefits to residents of other states are shown in the following figure:



(a) If your state must pay all welfare costs (the marginal cost of a dollar of benefit is $1.00), what level of service is selected?
(b) What level of welfare service in YS is efficient from a national viewpoint, taking into account the benefits to residents of other states?
(c) How might the federal government use intergovernmental grants to induce YS to select the amount of welfare benefits that is efficient from a national perspective?
(d) If the federal government used grants for this purpose, under what conditions would it make sense for the federal grant share to be greater for low-income states than for high-income states? Explain your answer.

3 Old State receives an open-ended matching grant from the federal government to finance Medicaid services to state residents. The federal grant covers 50 percent of state expenditures, and the state has selected a program that provides $5,000 of medical services per recipient per year, on average.

(a) Suppose that it is known that the (absolute value of the) price elasticity for Medicaid services in OS is .5. If the federal matching grant were eliminated so that OS had to pay $1.00 for each dollar of Medicaid expenditures, what would be expected to happen to the average level of Medicaid services selected in OS? Estimate the new expected average benefit amount.
(b) Now suppose the national government gives OS a lump-sum block grant to replace the previous matching grant. OS will receive lump-sum grant funds equal to $2,500 times the initial number of recipients: that is, the same amount of funds as was paid

before. If the total lump-sum grant equals 5 percent of total income in Old State and the income elasticity of demand for Medicaid services is .6, estimate how much average Medicaid spending will now increase.

(c) After the grant substitution – replacing the matching grant with an equal-amount lump-sum grant – is Medicaid spending in OS expected to be the same, greater, or less? Explain why.

4 Find the per capita income in your state (https://fred.stlouisfed.org/release/tables?rid=110&eid=257197). Suppose that a single parent with one child works in your state and earns income equal to one-third of the state per capita income (for instance, earnings of $18,558 in Florida, where per capita income is $55,675). Use the information in this book and your own research about programs through your state government's website to estimate the effect of each of the following fiscal factors for this family:

(a) Federal and state income and social security taxes
(b) EITC
(c) TANF cash assistance payments
(d) SNAP benefits
(e) Medicaid eligibility and coverage.

What is the net economic position for such a family in your state? Assuming full-time work (2,000 hours per year), what is the equivalent hourly wage that such a single parent earns including all benefits?

Notes

1 Ben Casselman and Jeanna Smialek, "US Poverty Fell Last Year as Government Aid Made Up for Lost Jobs," *The New York Times* (September 14, 2021), https://www.nytimes.com/2021/09/14/business/economy/census-income-poverty-health-insurance.html.
2 Franklin D. Roosevelt, Inaugural Address, January 20, 1937.
3 This chapter cannot cover all of the numerous issues about the design of appropriate welfare programs; rather, the focus is on those issues that involve interaction between the federal and state-local sectors or interaction among various subnational governments. Issues not considered in detail, for instance, include the labor supply effects of different welfare structures and the effects on family composition.
4 For individuals over 65, the threshold was $12,413. The threshold for a family with two adults and one child was $20,832, and the four-person (two adults and two children) threshold was $26,246.
5 For instance, suppose the family poverty level is $20,832. If living costs were 20 percent higher in New Hampshire than in Mississippi, the relevant comparison would be the percentage of families in Mississippi with income less than $20,832 compared to the percentage of families in New Hampshire with income less than $24,998, which is a 20 percent higher poverty level than in Mississippi. That is, $20,832 in Mississippi would buy the same consumption as $24,998 in New Hampshire.
6 Herbert Stein (1994) has noted how welfare is only one way government supports specific groups: "[W]elfare . . . is money paid by the federal government to people because they are poor. It does not include money paid to people because they are over 65 years of age, or because they are farmers or because they are veterans, or the special benefits provided because they have health coverage provided by their employers or because they are in the business of producing textiles."
7 States must set payment rates so that health-care service supply is available to Medicaid recipients to the same extent that services are available to the general population.
8 www.medicaid.gov/medicaid/quality-of-care/downloads/beneficiary-ataglance.pdf.
9 NASBO, "Medicaid Expenditures," *State Expenditure Report*, various years.
10 The federal government operates several additional programs besides SNAP to assist low-income individuals or those in special circumstances with food and nutrition. The largest among these are Women, Infants, and Children (WIC), which provided a total of $6.9 billion of benefits to more than 8.6 million pregnant women and children under the age of five in 2013, and school meals programs (lunches,

breakfasts, milk) that provided more than $26 billion of benefits to more than 31 million children in 2013.

11 A household with someone who is aged 60 or older or with a disabled person receiving Social Security, SSI payments, or other specific benefits may have higher income.

12 www.cbpp.org/research/food-assistance/states-are-using-much-needed-temporary-flexibility-in-snap-to-respond-to.

13 TANF also replaced the Job Opportunities and Basic Skills Training Program and the Emergency Assistance Program.

14 Single parents with a child under one and single parents with a child under six and who cannot obtain child care are exceptions.

15 Welfare Rules Databook: State TANF Policies, https://wrd.urban.org/wrd/databook.cfm.

16 Detailed information about the state credits is available at www.ncsl.org/research/labor-and-employment/earned-income-tax-credits-for-working-families.aspx.

17 It is particularly difficult to assess people's attitudes about this issue. If people accept the idea that one should help only those one wants to help personally, the result is redistribution solely through private charity.

18 State EITCs are a percentage of the federal EITC, up to a maximum set in each state. The state credit rate averages about 15 percent of the federal EITC, which suggests that state EITC amounts in 2018 were about $9.7 billion compared to the federal EITC amount of $64.9 billion.

19 This computation does not include other in-kind welfare-related services, including non-cash assistance through TANF, school meals programs, housing subsidies and programs, and so on.

20 For instance, higher-income residents might have more to lose if widespread poverty leads to civil disruption or collapse of the political structure. Alternatively, higher-income individuals might be more altruistic.

21 See Chernick (2000).

22 Tax price rises from .3 to .5, a 67 percent increase (.2/.3). If the price elasticity is .6, benefits fall by about 40 percent (.67 → .6).

23 For instance, if a state had a serious shortage of unskilled labor, then migration would create an economic benefit for that state and the national economy. That benefit could then offset the costs of the migration.

24 Changes in the EITC and Medicaid decreased work incentives for married women with children whose husbands also work.

25 The changes in the EITC and other programs created a modest negative effect on labor participation of some married mothers. If the husband also works, additional earnings by the wife can move the family into the range of the EITC where benefits fall as earnings rise. This effectively imposes a tax on earnings by the woman, reducing the gains from work. See Ellwood (2000).

26 Full-time work is defined as 2000 hours per year; 50 weeks at 40 hours per week.

27 https://www.commonwealthfund.org/sites/default/files/2021-02/Tikkanen_Fields_2020_multinational_comparisons_chartpack.pdf.

Selected readings

"Earned Income Tax Credit Overview." National Conference of State Legislatures, October 14, 2021. www.ncsl.org/research/labor-and-employment/earned-income-tax-credits-for-working-families.aspx.

Ellwood, David T. "Anti-Poverty Policy for Families in the Next Century: From Welfare to Work – and Worries." *Journal of Economic Perspectives*, *14*, No. 1 (Winter 2000): 189–198.

Ellwood, David T. "The Impact of the Earned Income Tax Credit and Social Policy Reforms on Work, Marriage, and Living Arrangements." *National Tax Journal*, *53*, No. 4, Part 2 (December 2000): 1063–1105.

Gais, Thomas, Donald Boyd, and Lucy Dadayan. "The Social Safety Net, Health Care, and the Great Recession." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen, 542–593. Oxford, UK: Oxford University Press, 2012.

"Medicaid Expenditures." *2020 State Expenditure Report, Fiscal Years 2018–2020*. National Association of State Budget Officers, 2020.

Moffitt, Robert, ed. *Economics of Means-Tested Transfer Programs in the United States, Volumes 1 and 2*. A National Bureau of Economic Research Conference Report. Chicago: The University of Chicago Press, 2016. See especially Chapter 1, "The Medicaid Program" by Thomas Buchmueller, John Ham, and Lara Shore-Sheppard; Chapter 2, "The Earned Income Tax Credit" by Austin Nichols and Jesse Rothstein; and Chapter 4, "Temporary Assistance for Needy Families" by James Ziliak.

Schott, Liz, LaDonna Pavetti, and Ife Finch. "How States Have Spent Federal and State Funds Under the TANF Block Grant." *Center for Budget and Policy Priorities*, August 7, 2012.

20 Economic development

Headlines

Each year *Area Development* magazine surveys corporate executives about their expansion, investment, and relocation plans.[1] As part of the survey, the executives also are asked to rate both economic and quality-of-life factors important to site selection. The magazine combines the results indicating a factor is "very important" or "important" to rank the factors. The top 10 site selection factors for both 2020 and 2019 are shown, each of which was identified by more than 75 percent as important or very important.

A consistent result in this survey is the dominant importance of fundamental economic factors – cost of labor, transportation, and energy – whereas state taxes and economic development incentives, although important, clearly are less so than the economic input factors. Also significant is the consistent importance of "quality of life," which includes climate, colleges and universities in the area, crime rate, cultural opportunities, health-care facilities, housing availability, housing costs, ratings of public schools, and recreational opportunities. Many of these characteristics are the direct result of state and local government public services, suggesting that service quality may be more important than taxes for economic development and growth.

Site selection factor	*2020 rank*	*2019 rank*
Availability of skilled labor	1	2
Highway accessibility	2	1
Energy availability and costs	3	7
Quality of life	4	4
Labor costs	5	3
Construction costs	6	5
Corporate tax rate	7	6
Tax exemptions	8	8
State and local incentives	9	14
Shipping costs	10	15

Data availability

The Bureau of Labor Statistics in the US Department of Labor reports employment and unemployment data for states and local areas (www.bls.gov/lau/home.htm). The US Commerce Department's Bureau of Economic Analysis reports information about

DOI: 10.4324/9781003030645-25

income for states and various local areas (www.bea.gov/data/income-saving/personal-income-by-state). These basic economic characteristics are available for a variety of time periods and governmental units.

The Council for Community and Economic Research maintains a database for both the number and characteristics of state economic development incentives (www.c2er.org/state-business-incentives-database/) and for state expenditures for types of economic development activities (www.c2er.org/state-business-incentives-database/). However, both require membership in the organization for full access.

The National Conference of State Legislatures, in cooperation with the Pew Charitable Trusts, provides a database by state of all types of evaluations of economic development incentives (www.ncsl.org/research/fiscal-policy/state-tax-incentive-evaluations-database.aspx).

Competition among states and localities for new investment or business expansion is hardly new. In 1967, George Break wrote "State and local governments have been engaged for some time in an increasingly active competition among themselves for new business."[2] "Increasingly active" in 1967, but it seems to have intensified and received more public and media attention in recent years. Perhaps this is both because the range of incentives offered to potential investors has grown (to include tax-exempt financing and government provision of special services to businesses as well as the more traditional business tax incentives) and because the magnitude of incentives is rising. For many state and local government elected officials, "getting jobs" has become a primary focus of political campaigns and job performance.

The controversy about the equity and efficiency of policies for influencing business investment decisions is particularly important given the increased use of investment incentives due to the heightened competition among subnational governments. Do business incentives influence economic activity, and if so, which types of activity – investment, employment, wages, incomes, land prices – are affected to the greatest degree? Do incentives discriminate among business, treating new businesses differently than existing ones and some industries differently than others? How should one evaluate the success of business incentives, by short-run local economic effects or by long-run changes to overall economic welfare?

There have always been substantial differences among states and different localities in economic conditions. Differences in fiscal policies – taxes and spending – carried out by those governments may be part of the reason for the differences in employment and income. However, we have learned that the opposite is also true: economic conditions influence the demand for state-local government services as well. Moreover, differences in economic conditions among states or regions may themselves influence business investment and location decisions and thus cause changes in future economic conditions. For instance, a firm might be attracted to an area with relatively high unemployment because of the availability of workers willing to accept lower wages than in other places.

The fundamental question is "What accounts for differences in economic conditions such as employment and income among different states and regions?" With some understanding of that issue, it is possible to examine why and how economic conditions in various places change over time. Understanding of that issue leads directly to a series of questions concerning the appropriate policy of state-local governments toward economic development. Do firms and consumers change the location of their economic activity because of general state-local government fiscal policies? Do specific state-local business investment incentives "succeed" in attracting new businesses or investment? If so, who receives the bulk of the

final economic benefit of that new investment? If tax and financial incentives "succeed" in attracting new investment, are they cost effective and fair? These are the public policy issues being debated by the business community and government officials and the issues considered in this chapter.

Interstate differences in economic conditions

In any given year, there are substantial differences in incomes and unemployment rates among the states, as shown in Table 20.1 for calendar year 2020. Of course, 2020 was an unusual year due to the COVID-19 pandemic and resulting recession, but the variation in economic conditions is of interest here rather than the level or amount. State per capita incomes varied from $78,609 in Connecticut to $42,129 in Mississippi, with the average for the nation at $59,510. The coefficient of variation (standard deviation/mean) for state per capita income is .16, meaning that state per capita income varies 16 percent on average around the mean. Similar differences among the states exist in family incomes as per capita incomes. Relatively big income differences remain even if states are grouped together in regions, with regional per capita income varying from $73,179 in New England to $52,096 in the Southeastern states, although in some cases there is as much variation within those regions as among them.

Personal income includes all income regularly received by persons, including wages, salaries, and other labor income; rent; interest; dividends; and transfer payments. The last means that personal income may be maintained or even increase in periods when economic activity declines because of transfer payments such as Social Security, unemployment compensation, welfare programs, and government subsidy or income support payments. Those transfer payments reduce income differences that would otherwise occur.

Differences in nominal incomes may overstate the real differences in purchasing power if the prices of consumer goods (the "cost of living") are generally higher in higher-income states and regions. Not surprisingly, that seems to be the case. An analysis of that issue by Peter Mieszkowski (1979) suggests that regional per capita income differences are reduced by about one-third because of cost-of-living differences. Even with that adjustment, regional income differences still exist, and the state-by-state differences are not reduced nearly as much as differences between regions by consideration of price differences for consumer goods.

The variation in state and regional unemployment rates is similar to that for income. In calendar year 2020, state unemployment rates varied from 4.2 percent in Nebraska to 12.8 percent in Nevada, with the national average standing at 8.1 percent. Among the census regions, unemployment was lowest in the West North Central region (5.7 percent) and highest among the Middle Atlantic and Pacific division states (9.7 percent), although there was also great variation within the regions. The unemployment rate is the ratio of the number of unemployed persons (those not working but looking for work) to the number of unemployed plus employed persons (what is called the labor force). The unemployment rate therefore reflects both the supply of labor in each market and the demand for workers in those markets. Demand for workers depends on the economic conditions of the industries and the wages in each region, and the supply of workers reflects demographic characteristics of the population as well as economic opportunities. Thus, economic growth and higher incomes in a region might not lead to substantial decreases in the unemployment rate if more people begin looking for work or migrate to the region, thus increasing the size of the labor force.

A few states stand out in the economic conditions. Because of the pandemic, travel for both personal and business purposes was greatly limited in 2020, resulting in especially high

Table 20.1 Per capita income and unemployment rates by state

State	*Unemployment rate*	*State*	*Per capita income*
	2020		*2020*
Nebraska	4.2%	Mississippi	$42,129
South Dakota	4.6%	West Virginia	$44,994
Utah	4.7%	New Mexico	$46,338
North Dakota	5.1%	Alabama	$46,479
Iowa	5.3%	Arkansas	$47,235
Idaho	5.4%	Kentucky	$47,339
Maine	5.4%	South Carolina	$48,021
Vermont	5.6%	Idaho	$48,759
Wyoming	5.8%	Arizona	$49,648
Alabama	5.9%	Oklahoma	$49,878
Kansas	5.9%	North Carolina	$50,305
Montana	5.9%	Louisiana	$50,874
Arkansas	6.1%	Tennessee	$51,046
Missouri	6.1%	Missouri	$51,697
Oklahoma	6.1%	Georgia	$51,780
Minnesota	6.2%	Indiana	$51,926
South Carolina	6.2%	Utah	$52,204
Virginia	6.2%	Michigan	$53,259
Wisconsin	6.3%	Montana	$53,361
Georgia	6.5%	Iowa	$53,478
Kentucky	6.6%	Ohio	$53,641
New Hampshire	6.7%	Nevada	$53,720
Maryland	6.8%	Maine	$54,211
Indiana	7.1%	Texas	$55,129
Colorado	7.3%	Wisconsin	$55,593
North Carolina	7.3%	Florida	$55,675
Tennessee	7.5%	Delaware	$56,097
Oregon	7.6%	Kansas	$56,099
Texas	7.6%	Oregon	$56,312
Florida	7.7%	Nebraska	$57,570
Alaska	7.8%	Hawaii	$58,655
Delaware	7.8%	Vermont	$59,187
Arizona	7.9%	South Dakota	$59,281
Connecticut	7.9%	Rhode Island	$60,825
District of Columbia	8.0%	North Dakota	$61,530
Mississippi	8.1%	Pennsylvania	$61,700
Ohio	8.1%	Wyomng	$61,855
Louisiana	8.3%	Virginia	$61,958
West Virginia	8.3%	Minnesota	$62,005
New Mexico	8.4%	Illinois	$62,930
Washington	8.4%	Alaska	$63,502
Massachusetts	8.9%	Colorado	$63,776
Pennsylvania	9.1%	Maryland	$66,799
Rhode Island	9.4%	New Hampshire	$67,097
Illinois	9.5%	Washington	$67,126
New Jersey	9.8%	California	$70,192
Michigan	9.9%	New Jersey	$73,460
New York	10.0%	New York	$74,472
California	10.1%	Massachusetts	$78,458
Hawaii	11.6%	Connecticut	$78,609
Nevada	12.8%	District of Columbia	$86,567
United States	8.1%	United States	$59,510

Source: US Bureau of Economic Analysis; US Bureau of Labor Statistics

unemployment in Nevada, Hawaii, California, and New York. Mississippi and West Virginia are states with both high unemployment and a relatively low per capita income. The District of Columbia has very high per capita income as well as high unemployment, suggesting a substantial division in conditions, with many unemployed but those working earning high incomes. The opposite circumstance exists in Idaho and Utah, where both income and unemployment are low.

Throughout the past century, the differences in per capita income among the states and regions have generally gotten smaller, dramatically between 1930 and the mid-1970s, as depicted in Figure 20.1. This narrowing of income differences has been accompanied by a general realignment of population and economic activity. Per capita income in the Southeast was less than half the national average in 1930, but it was almost 90 percent of the national average in 2020. At the other end of the distribution, per capita income in the Mideast states was about 40 percent greater than the national average in 1930 but only about 18 percent higher in 2020. Although the income differences narrowed substantially, the relative positions of the various regions remained pretty stable. The New England, Mideast, and Far West regions have generally had above-average levels of income, while the Southeast, Southwest, and Rocky Mountain regions have experienced below-average incomes and the Great Lakes and Plains states about average income.

This narrowing of income differences is undoubtedly due to a number of factors. Because wages and salaries account for about 60 percent of personal income, one attractive economic explanation might be a flow of new investment to regions with relatively low wages, resulting in an increase in economic activity, population, and ultimately wages and incomes. At the same time, workers may migrate from low-wage to high-wage regions, reducing the supply of labor in the lower-wage areas. This is certainly what would be expected in the standard competitive economic model, with investors allocating mobile capital to those regions where the highest returns are possible and workers moving, perhaps to a lesser

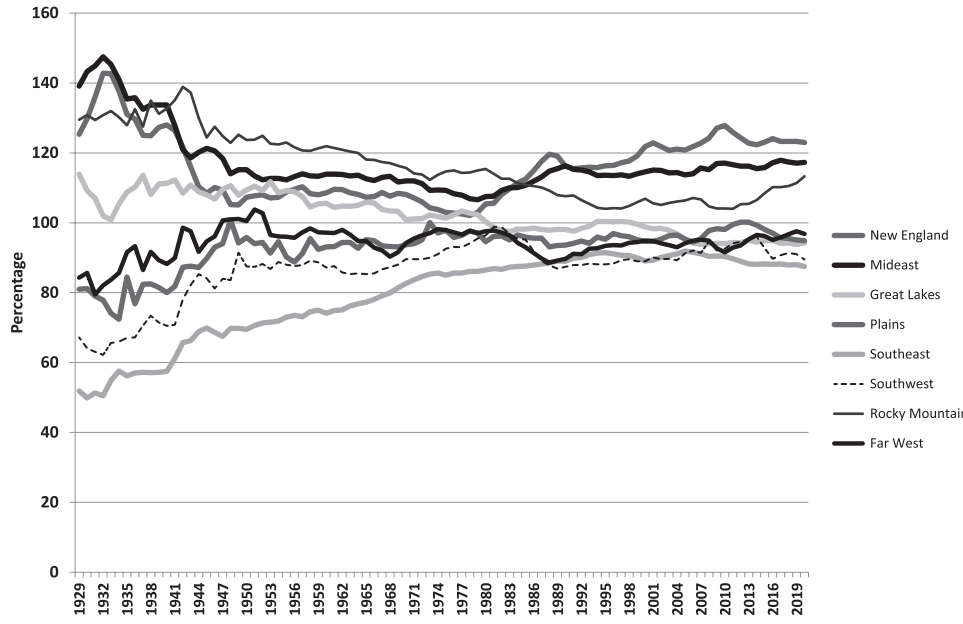


Figure 20.1 Regional per capita income as a percentage of US average

degree, to take advantage of job opportunities. If low wages in a region truly mean low costs (that is, the workers are equally productive as in higher-wage areas), then higher profits might be earned by capitalists who invest in those low-wage areas.

The evidence on this theory is somewhat inconclusive, however. George Borts and Jerome Stein (1964) examined the growth of employment and capital investment among states for the periods 1918–1929, 1929–1948, and 1948–1953 and found that wage differences were only weakly related to changes in investment and not at all related to employment growth. The first issue is more important because a constant level of employment is still consistent with rising wages (and incomes) if the demand for labor is increasing due to new investment. More recently, Timothy Bartik (1991) reported on 42 different studies completed since 1979 on the effect of wage differences on business location and employment among states. He reports that 62 percent of these studies find a statistically significant negative effect of higher wages on economic activity, with an average long-run elasticity of business activity with respect to wages of about –.7 – that is, 10 percent higher wages lead to a decline in economic activity of approximately 7 percent. Again, the combined effect of outmigration of workers from low-wage areas (a decrease in labor supply) coupled with new investment in the region (an increase in the demand for labor) is expected to be an increase in wages, although employment (the quantity of labor) may rise or fall. From this viewpoint, a narrowing of income differences is the natural result of economic forces.

Among the other factors that have likely contributed to this narrowing of income differences are variations in the prices of other important inputs into production, especially land, energy, and transportation services. As with labor, areas with little development and thus relatively low prices for these goods may be attractive to some investors. Capital movements in response to those price differences would again naturally serve to equalize those price differences and thus income differences. Some fiscal policies of the federal government are also thought to have played a role in promoting economic growth in various regions of the country. On one hand, the growth of transfer programs such as Social Security, health insurance, and welfare payments, which stimulate economic growth through demand, has increased income in some areas. Attention has also been directed at decisions about the location of federal (especially military) installations, as well as federal government purchases of goods and materials. The regional pattern of federal government expenditures is believed to have particularly stimulated growth in the Southeastern and Southwestern states. Finally, some analysts have suggested that various social and historical changes such as changes in the pattern of immigration to the United States, the introduction of air conditioning, and improvement in racial relations also have contributed to the dispersion in economic activity.

Contrary to the long-run trend, interstate income differences have widened slightly in the period since 1980, almost entirely because of relative income gains among the New England and Mideast states and decline for the Great Lakes states, as shown in Figure 20.1. The New England and Mideast states gained about 4 percentage points relative to the national average, and the Great Lakes states lost approximately 5 percentage points.

Substantial differences in economic conditions among various regions or areas within states also are common. This is demonstrated by the calendar year 2020 unemployment rates and 2019 per capita incomes for metropolitan areas in Michigan and Texas, shown in Table 20.2. In such a large and diverse state as Texas, unemployment rates varied from 4.9 percent in the Amarillo-Austin area to 11.6 percent in the McAllen-Edinburg-Mission area. Although the variation is smaller in Michigan, it is still substantial, from 6.4 in Ann Arbor to 11.7 in Detroit-Warren-Dearborn. There are also substantial differences in per capita income within states, from $128,766 per person (!) in Midland, Texas, to less than $41,742 in College Station-Bryan, for instance. As with differences among states, the mobility of capital

Table 20.2 Variation of per capita income and unemployment rates among metropolitan areas within selected states

Michigan			*Texas*		
Area	*Unemployment rate, 2020*	*Per capita income, 2019*	*Area*	*Unemployment rate, 2020*	*Per capita income, 2019*
Ann Arbor	6.4%	$60,843	Abilene	5.6%	$45,552
Battle Creek	9.7	40,257	Amarillo	4.9	48,065
Bay City	9.2	43,657	Austin-Round Rock	6.2	61,977
Detroit-Warren-Dearborn	11.7	54,172	Beaumont-Port Arthur	11.2	45,219
Flint	11.2	41,929	Brownsville-Harlingen	10.2	29,928
Grand Rapids-Wyoming	7.4	50,330	College Station-Bryan	5.5	41,742
Jackson	9.0	40,387	Corpus Christi	9.1	45,140
Kalamazoo-Portage	7.4	49,493	Dallas-Fort Worth-Arlington	7.1	58,725
Lansing-East Lansing	7.4	42,495	El Paso	8.3	37,633
Midland	7.5	55,972	Houston-The Woodlands-Sugar Land	8.6	58,890
Monroe	8.9	48,581	Killeen-Temple	6.8	42,855
Muskegon	11.4	39,637	Laredo	8.5	32,466
Niles-Benton Harbor	8.6	48,237	Longview	8.0	42,953
Saginaw	9.9	40,533	Lubbock	5.7	44,169
			McAllen-Edinburg-Mission	11.6	27,415
			Midland	8.0	128,766
			Odessa	11.0	50,161
			San Angelo	6.3	49,308
			San Antonio-New Braunfels	7.3	48,684
			Sherman-Denison	5.9	43,987
			Texarkana	7.2	38,910
			Tyler	6.8	56,292
			Victoria	8.2	48,681
			Waco	6.1	41,723
			Wichita Falls	6.5	44,910
State	9.9%	$49,277	State	7.6%	$53,266

Source: US Census Bureau; Bureau of Labor Statistics

and labor is apparently not sufficient to fully eliminate economic differences among regions within states.

The long-term dispersion of population and economic activity in the United States from the older industrialized areas to regions that were primarily rural and the resulting narrowing of income differences serve as a background against which the role of state fiscal policies can be examined. The main issue in the remainder of this chapter is whether state-local taxes and services contribute to interstate reallocations of economic activity, and if so, how states might alter their fiscal decisions to induce more investment.

Interstate differences in fiscal policy

Magnitude of tax costs

To evaluate whether tax differences among the states influence investment decisions, it is necessary to determine the magnitude of tax differences. The degree of business taxation in

different states has been measured in three primary ways: by the share of total taxes collected from businesses, by the ratio of total business taxes in a state to some measure of total business size or income for a particular year, and by the comparative profitability of "identical" firms located in different states and thus paying different taxes. Each method has advantages and disadvantages, so the information conveyed by each measurement is different and often not consistent with the results of the other methods.

Business tax share

ACIR (1981) estimated the state-local government taxes with "an initial impact on business" for each state for 1977 and then calculated the share of state-local taxes initially collected from business. The list of taxes with "an initial impact on business" included property taxes on business property, sales taxes collected on business purchases of goods and services, gross receipts taxes, business income and value-added taxes, license fees, and taxes on specific business activities, such as severance taxes. ACIR reported that these "business" taxes represented approximately 31 percent of total state-local taxes (34 percent if unemployment insurance taxes were included) and that the business tax share of total taxes had declined steadily from 1957, when taxes with an initial impact on business represented about 37 percent of total state-local taxes. Among the various regions, business taxes were relied on most heavily in the Southwest (41 percent) and least heavily in the Plains states and New England (27 percent).

Robert Tannenwald (2004) reported two sets of estimates for the business share of state and local taxes for 2000. Taxes assumed in these studies to be nominally borne at least partly by businesses include the property tax, sales and gross receipts tax, motor fuels tax, business license taxes, severance taxes, and workers compensation and unemployment insurance taxes, as well as corporate net income taxes. In cases in which the tax is collected from both businesses and individuals (such as property and sales tax), an attempt is made to determine the appropriate division. One tax that might have been included but is not is personal income tax on business income from partnerships, limited liability companies, and similar entities. Estimates from work compiled by Ernst and Young and discussed in Cline et al. (2004) suggest that these taxes collected from business amounted to about 42 percent of total state-local taxes, varying from 81 percent in Alaska to 31 percent in Maryland. Tannenwald's similar calculations put the average share of state-local taxes collected from business at 44 percent, again with large variation from 80 percent in Alaska to 33 percent in Maryland.

James Hines (2003) focused on state corporate income taxes only and calculated the variation in corporate income tax as a share of total state taxes for each state over the period 1977 to 1997. In many states, the level and importance of state corporate income taxes varied substantially from year to year. For instance, over the period 1977 to 2007, state corporate income tax revenue per capita varied by more than 35 percent, on average, around the mean. This suggests first that the state tax burden on corporations measured in this way is highly time dependent and that state corporate income taxes are highly sensitive to economic conditions.

The "tax share" approach has one problem common to many business tax studies: the inability to distinguish between the initial and final burden of a tax. If the ability of businesses to alter behavior and thus shift taxes to consumers or factor suppliers differs among states, then the share of taxes with an initial impact on business will be misleading as to the final tax burdens on business from a state's taxes. This is clearly illustrated in the business tax share data reported by Tannenwald (2004). The states with the highest share of taxes collected from business include Alaska, Wyoming, Texas, and Louisiana, all of which collect a substantial share of their taxes from extracted energy. Much of that tax burden is then shifted to consumers in other states.

In addition, the share of taxes with an impact on business does not necessarily correspond to the level of taxes on business. Even if a state collects a large share of its taxes from businesses, the tax burden on businesses in such a state with a low level of total taxes may be smaller than that in some other state with higher taxes generally but with a smaller business share. If the share of state service benefits enjoyed by businesses is known or at least similar in different states, then the share of taxes conveys information about the potential fiscal advantage of businesses in some states. If businesses "pay" 40 percent of taxes in a state and receive benefits from only 30 percent of state-local expenditures, they may not care that the level of business taxes in that state is low.

Business taxes compared to business income

An alternative approach is taken by William Wheaton (1983), who estimates the level of business tax collections from a set of specific taxes compared to the level of net business income in the state. Net business income is sales less expenses but before federal taxes. Wheaton includes all tax payments for which a business is legally liable – including property, corporate income, unemployment insurance, and specific output taxes – except for sales taxes on business purchases. The last taxes were excluded because he believed that there was no reliable estimate of the fraction of state sales taxes that arise from intermediate goods transactions, even though it makes sense to include those taxes. The estimates are made for all business taxes and all business income in each state (which requires an estimate of total net business income) and for taxes and income of manufacturing firms only (which requires an estimate of manufacturing taxes but not manufacturing net business income, which is available from the Census of Manufacturing). The estimates are based on 1977 data.

Wheaton reports that state-local taxes collected from business represented 7.7 percent of net income for all firms in 1977 on average and 7.9 percent for manufacturing firms alone. Wheaton also found substantial interstate variation in business tax levels. For all businesses, the level of taxation varied from 20.2 percent of net income (in Delaware) to 4.8 percent (in Utah), with an average of about 36 percent variation in state business tax levels around the median level. On a regional basis, the highest level of business taxation occurred in New England (10.2 percent), the Mid-Atlantic states (9.5), and the Pacific Coast (8.7) while the lowest levels were in the East South Central (5.6 percent) and South Atlantic (5.7) states. The pattern for manufacturing firms alone was similar, although the degree of interstate and regional variation in effective business tax rates was greater for manufacturing firms than for all businesses. For instance, manufacturing taxes varied from 14.8 percent of net income in New England to 3.8 percent in the East South Central states.

James Hines (2003) provides a similar but more limited measure, calculating state corporate income taxes as a share of gross state product (GSP), the total value of final production in a state. From 1977 through 1996, state corporate income taxes in aggregate varied from a high of around 1 percent of GSP to a low of about .7 percent. The variation in this measure of business taxes among states is greater than the aggregate variation over time, however. For instance, corporate income tax in Michigan averaged about 1.3 percent of GSP over these years and varied from 1.2 percent to 1.6 percent.

Tannenwald (2004) presents estimates (similar to those of Wheaton from an earlier period) of taxes initially collected from businesses as a percentage of both business profits (net income) and state personal income for 2000. A major difference from Wheaton's analysis is that Tannenwald includes estimates of both general and specific sales taxes on business purchases. The data for 2000 suggest that business taxes represented about 36 percent of business profits and about 4.7 percent of state personal income, with substantial differences among the states. Business taxes were lowest in Maryland, North Carolina, Virginia, and

Massachusetts (3.4 to 3.7 percent of personal income) and highest in Alaska, Wyoming, West Virginia, and North Dakota (7 to 10 percent of personal income).

The Tax Foundation's "Location Matters: 2021" study models the taxes for eight different types of firms in each state, including corporate income taxes, property taxes, sales taxes, unemployment insurance taxes, capital stock taxes, inventory taxes, and gross receipts taxes.[3] Effective tax rates – that is, taxes as a percentage of pretax net income – are calculated both with (for what is called a "new firm") and without (for a "mature firm") available tax incentives. The study shows that effective business tax rates vary substantially among both states and different types of firms. Some of the results suggest the limitations of even a careful study of this type. For example, Wyoming has the lowest effective tax rate for many of the sample businesses, likely because the state relies heavily on taxes on extracted minerals (a severance tax). Effective tax rates for the mature corporate headquarters model firm in the study vary from 6.8 percent to 31.3 percent. The five states with the lowest effective tax rates on corporate headquarter firms are Wyoming, Montana, North Carolina, Nevada, and North Dakota – all states that are the home location of few major corporate headquarters. On the other hand, New York has the highest tax rate on corporate headquarter firms, with California among the top 20 states.

These estimates are all based on the initial magnitude of taxes collected from business rather than the final burden of those taxes. In addition, it is not clear what measure of business activity – net income (profits), sales, personal income, or gross state product – is best to compare against taxes. Because sales equals the total costs of a firm plus profits, sales might be the most appropriate base against which to compare taxes, particularly if firms can shift business taxes to suppliers by paying lower wages, for instance. Because net income is usually between 5 and 10 percent of sales, and given Wheaton's estimate that business taxes are about 8 percent of net income, state-local business taxes would amount to less than 1 percent of total sales on average. Even using Tannenwald's broader measure of business taxes at 36 percent of net income, this suggests business taxes at about 2 to 4 percent of sales. This is consistent with Hines's result that corporate income taxes averaged about .8 percent of GSP.

Comparison of business tax estimates shows how difficult it is to draw clear conclusions. One issue is the direction of causation for tax rates: Do low tax rates contribute to business growth, or does business growth contribute to an increased demand for government services? There is also the issue of the share of taxes from business compared to the level of business taxes. According to Tannenwald's computations, Texas was fourth highest in the share of taxes collected from business (at 59 percent), but only twentieth among the states in business taxes as a percentage of profits. In contrast, New York is twentieth in the share of taxes collected from business, but eighth in terms of business taxes as a percentage of personal income. The high level of business taxes in New York resulted from the high level of taxes and expenditures generally, rather than any decision to adopt a tax structure designed to impose a relatively heavy tax burden on business.

Business taxes and profitability

A third approach to measuring interstate tax differentials does not focus on the tax differences per se but rather on the profit differences that result from operating in different places with different taxes. One common method of doing this is to create hypothetical firms and calculate their profitability under some assumptions about operating procedures for sets of different states' taxes. Most often, these calculations are made for a single year. The single-year tax differences for these representative firms may not be very accurate measures of profit differences over the life of a capital investment, however, because many state and local taxes have time-dependent features that vary from place to place.

A more sophisticated approach to measuring business profitability at various locations has been developed by James Papke and Leslie Papke (1984). The Papkes focus on the profitability of a new investment at various locations over the entire productive lifetime of that investment. For an assumed set of characteristics of a representative firm, Papke and Papke compute the change in profitability that results from a new investment at one location, which allows calculation of the rate of return on that new investment. Because the taxes at that location are carefully modeled, the rate of return on investment at one location can be compared to the return on investment at another, with any difference arising from the tax differences.

Because the Papke measure of the rate of return depends on the assumed characteristics of the sample firm, it is not possible to get one single estimate for each state but rather a different estimate for a given type of firm in different states. For illustration, Leslie Papke (1987) reported the after-tax rates of return on new investment for both the furniture and electric components industries in 20 different states. For furniture, the rates of return varied from 11.9 percent (in New Jersey) to 13.7 percent (in Texas), with an average difference of about 14 percent from the highest to lowest. Thus, it seems that interstate tax differences result in different profits on new investments in different states, even for similar firms, although those differences are not large and could easily be offset by differences in other costs or government services. Because state-local taxes are a relatively small fraction of a firm's total costs, moderately large differences or changes in state-local taxes are required to bring about even small differences or changes in after-tax rates of return.

The Papke measures of profitability tell a somewhat different story than the ACIR, Hines, or Wheaton measures concerning the relative degree of business taxation in different states. For instance, among the 20 states examined by Papke, Michigan had the highest level of business taxes according to the Wheaton measure but the fifth-highest (out of 20) return on new investment. On the other side, Tennessee had the fourth-lowest level of business taxes by the Wheaton measure but the seventh highest by the Papke measure. A large part of the difference in these two measures of comparative business taxes arises from a fundamental difference in concept, which is emphasized in every introductory economics class and should be familiar. Wheaton's method measures the average cost imposed by state-local taxes because it compares all business taxes to net income. In contrast, Papke's method is intended to reflect the influence of taxes on the marginal cost of investment: that is, how much taxes would increase as a result of new investment.

Business taxes and government services

Taxes are used to provide public services, and many public services – such as infrastructure, public safety, and perhaps education – provide direct benefits to businesses. If state differences in business taxes are offset by differences in public services important to businesses, then a measure of net burden or benefit (taxes minus service benefits) might be a more appropriate measure of a state's fiscal policy toward business. In practice, such calculations are difficult, and thus rare, because one must determine which services provide benefits to business and then assign a value to those benefits.

William Oakland and William Testa calculated that tax revenue collected directly from business was 70 percent greater than public services directly required by businesses.[4] The taxes allocated to business include corporate profits taxes; real and personal property taxes on business assets; franchise taxes and business license fees; sales and use taxes and gross receipts taxes on a firm's purchase of equipment, services, and materials; and payroll taxes for which the business is directly responsible. Expenditures for police and fire, corrections, and transportation were assumed to equally benefit the businesses and households, and spending

for public buildings, the legislature, and financial administration were divided between businesses and households proportionate to their relative sizes in the economy. Expenditures for education and welfare were assumed to benefit households. One concern about this approach is that it measured direct financial amounts, not the final economic incidence.

One attempt at comparing all state taxes and service benefits – not just those related to business – was made by *Worth* magazine.[5] Tax burden was measured by state and local taxes as a percentage of personal income, and a state service or benefit index was calculated based on the state's value in 14 different public service/benefit categories. The combined scores provided some interesting changes in state rankings. Wisconsin had the fourth-highest tax burden but was rated the tenth-best state overall fiscally when the service benefits were added. From the opposite viewpoint, Georgia, which had a below-average tax burden, ended up as third-worst-ranked state overall after the service benefits in the state were taken into consideration. High taxes in Wisconsin were offset by unusually strong services and benefits, whereas the low taxes in Georgia seemed unreasonable given the relatively low level of services.[6] However public expenditures are measured and valued, as long as benefits are positive, the notion of taxes as net costs rather than prices can be misleading.

Effect of federal taxes on interstate tax differences

The magnitude of nominal interstate tax differences shown by some measures greatly overstates the effective differences because state-local business taxes are a deductible expense for firms in computing their federal income tax liability. As a result of deductibility, part of any difference in state-local taxes in different locations is offset by higher federal taxes for firms in the lower-tax areas. This point is demonstrated in Table 20.3, which shows a comparison of the net income after local property taxes and federal income taxes for two identical firms located in different states. The firm in state A pays $50,000 in property taxes, which is then deducted from the $200,000 of operating profits to compute federal taxable income, resulting in a federal income tax liability of $52,500 (at a rate of 35 percent and ignoring exemptions and credits). The same firm in state B pays only $30,000 in property taxes but then has a federal tax liability of $59,500. The net effect is that although there is a $20,000 difference in property taxes, there is only a $13,000 difference in net after-tax income. Fully 35 percent of the property tax difference has been offset by the additional federal income tax deduction. It follows that if federal corporate income tax rates are reduced, it has the effect of reducing the value of the federal deduction for state-local taxes and increasing the effective difference in state taxes.

Table 20.3 Effect of the federal tax deduction for state-local taxes on interstate tax differences

Property value, taxes, and profits for an identical firm in two states

Fiscal characteristic	*State A*	*State B*
Property value	$1,000,000	$1,000,000
Property tax rate	$50 per $1,000	$30 per $1,000
Property tax	50,000	30,000
Profit before property tax	200,000	200,000
Federal taxable income	150,000	170,000
Federal income tax (35% rate)	52,500	59,500
Net after-tax income	97,500	110,500
Difference in property tax	+ $20,000	
Difference in federal tax		+ $7,000
Difference in income		+ $13,000

Federal tax deductibility of state-local business taxes not only reduces effective interstate tax differences but also works to negate some of the benefits of state or local tax incentives. In Table 20.3, if state A gave this firm a property tax abatement reducing taxes from $50,000 to $30,000, the firm's federal income tax would increase from $52,500 to $59,500. Thus, the state or local government would have given up $20,000 of property tax revenue, but the firm would only have gained $13,000 in net income; the remaining $7,000 goes to the federal government in the form of a larger federal tax payment. The magnitude of the effect of federal income tax deductibility of state-local business taxes depends directly on the federal marginal tax rate; the higher the rate, the more federal deductibility offsets interstate tax differences and reduces the value of state and local tax incentives.

Types and magnitude of fiscal incentives

The fiscal incentives offered by state-local governments to offset real or perceived business cost differences, whether they arise from tax differences or other factors such as energy or transportation cost differences, are of three basic types: (1) capital financing, usually at below market interest rates; (2) tax reductions through the use of credits, deductions, abatements, or specialized rates; and (3) direct grants of goods or services such as land, worker training, or management advice. Most states offer all these incentives in one way or another, developing a package of specific incentives from the general list for each potential investment project.

Estimates of the magnitude of state-local government economic development incentives vary depending on (1) whether only state government incentives are included or local government incentives, such as property tax abatements, are included as well, and (2) which types of incentives are included, such as tax reductions and direct grants or specific public services provided to firms or general tax structure features that reduce business costs or others. With this understanding, estimates of annual state-local economic development or business incentives vary from about $22 billion (in 2019 dollars) to about $100 billion.[7] To put these estimates into context, the state-local corporate income tax amount in 2019 was $65.7 billion and property taxes were $577 billion.

Financing

State-local governments commonly use their ability to sell tax-exempt revenue bonds to provide low-interest loans to private investors. State or local governments or their development agencies sell bonds at relatively low tax-exempt rates and provide those funds to private firms at either a slightly higher rate (although still less than the firm would pay if it borrowed in the private market on its own) or in exchange for a service fee. Although the Tax Reform Act of 1986 reduced the ability of state-local governments to issue "private purpose revenue bonds," it was not eliminated, at least for many purposes.

Another form of subnational government financial assistance to investors arises because states and localities have major pension funds to finance retirement benefits for government employees. Some state retirement funds are managed by the states themselves; private financial investment firms hired by the states manage others. In either case, the pension fund monies are invested in bonds (both government and corporate), stocks, bank certificates of deposit, money market funds, and other investments to earn a reasonable return on the funds so that the planned retirement benefits can be paid. A number of states have now specified that a certain percentage of the pension fund money may be used to finance new businesses in that state or locality. The pension fund either loans the money to the potential investor in the state or exchanges it for an equity position in the firm. At least in those states with relatively large pension funds, the idea is to increase the available money for new investment in that state.

Government loans to or investments in a new business venture are attractive to the firm if the loan is at a low interest rate, the government will accept a lower return on investment than in the private market, or private loans or investment are simply not available to this firm. In the last instance, a firm may have difficulty getting private financing because the management has little experience or insufficient collateral or because the product is so new that there is no track record. In essence, the venture is judged "too risky" by private investors. For all these types of financing assistance, then, there is a real cost to the government, either in the form of forgone income (a lower return than available elsewhere) or additional risk.

Tax incentives

Nearly every state offers some type of specific tax reduction to at least certain types of businesses. The most common form of tax incentive is probably property tax abatement for firms building new facilities or rehabilitating existing ones. The common approach is a reduction in property taxes of some specified percentage for a certain number of years. The decision to grant property tax abatements and the ultimate financing of the cost may be the responsibility of state government, local governments, or both. Other typical types of tax incentives include income tax credits for investment or research and development expenses and sales tax exemptions for either a business's purchases or its sales.

One criticism of tax incentives is that most, such as property tax abatements and corporate income tax credits, serve to reduce capital costs (or, equivalently, increase the return to capital owners). Consequently, the tax reductions will be relatively more valuable for capital-intensive firms and provide an incentive for all firms to increase the amount of capital used in production compared to other inputs, particularly labor. This potential problem is a particular concern if one of the main objectives of the incentives is to increase employment in the state or locality. If the incentives only attract capital-intensive firms or if the incentives induce firms to use relatively less labor and more capital in production, then the employment gains from the fiscal incentives may not be as great as anticipated.

One possible fiscal incentive is a reduction in the overall level of business taxes in a state for all businesses, for instance, by the substitution of a personal tax (on consumption or income) for those collected from businesses. It is more common for states to offer "targeted tax incentives," which are available only for specific types of firms or firms in specific circumstances. The idea is that general business tax reductions would provide benefits to some firms that have no intention of either expanding or relocating their business; thus, some of the tax reduction is thought to be "wasted" as an economic development device. Targeting tax incentives requires government and the political process to make decisions about what firms are to receive the incentives. Because officials never have complete information about investment options, those governmental decisions may also entail "waste" or error of two types. Government officials may decide to grant tax reductions to firms that would invest in the state or locality anyway, and tax reductions may be denied to firms when the incentive would have influenced the investment location decision. It is not clear, therefore, that targeted tax incentives are any different or any more efficient than general business tax reductions.

Direct grants

States and localities also may provide direct grants of goods or services to firms specific to a firm's production requirements. Governments have long used their eminent domain power to assemble tracts of land for public projects such as roads but, in recent years, have also done

so to provide large blocks of land for commercial or industrial development. In some of these urban renewal projects, the government acquires the land and then gives it or sells it to the private investor at a below-market price. State or local governments may also provide or finance specific training for the new employees of a business willing to invest, expand, or remain in the state or area. A number of studies suggest that many new small businesses lack managerial or financial experience, so some states and localities have begun "incubators," a term for a facility that houses new businesses and provides technical or management assistance for all the firms. The idea is that after the firms are established and the operators gain experience, they have greater likelihood of success on their own.

Clawbacks

A number of states have begun attaching conditions to fiscal incentives, essentially requiring firms that receive incentives to repay the government if the business fails to achieve targeted economic growth projections or promises. For instance, a business might receive a five-year tax reduction in exchange for new investment that promises to generate 1,000 new jobs over those years. If those jobs do not materialize, then the business might have to pay back the amount of reduced taxes. Such provisions are attempts by governments to avoid using public funds to support unsuccessful business ventures, although implementation and enforcement is quite difficult. Many clawback provisions include escape clauses that relieve the business of liability if the problems are due to market forces outside of the business's control. If a subsidized firm has serious financial problems, it may be counterproductive or even impossible to collect repayment for past public incentives.

Incentives for all businesses

Bartik (1991, 1994) reported on a number of new incentives, what he calls "new wave policies," that are intended to encourage innovation and expansion by businesses. Such policies include small business development centers that provide management and financial advice to small business owners and operators, export assistance programs and financing to encourage firms to enter and be successful in foreign markets, university/business interaction involving targeted university research or technology transfer programs from universities, and industrial extension services providing management, marketing, or financial advice and assistance. These new policies are intended more to help firms become more competitive and successful than to attract new investment or jobs from other actual or potential locations.

Application 20.1: Place-based incentives

There are wide disparities in economic conditions within states, as shown in Table 20.2, with some regions, localities, and neighborhoods enduring substantially worse economic conditions than the state overall. At various times, such areas have been referred to as "distressed," "depressed," "high poverty," or "blighted." Typically, these areas, which can be urban or rural, have substantially higher unemployment, lower income, higher poverty rates, and lower property values than the average. Consequently, state and local governments and even the federal government have pursued a number of special economic development programs targeted to such areas.

Enterprise zone programs are one such example.[8] In 2010, 42 states and the District of Columbia operated some 48 different enterprise zone programs encompassing about 3,000 separate zones – areas where special tax, service, or regulatory incentives are available or where greater levels of incentives are available than elsewhere in the state. Most enterprise

zones are small, about two square miles and 4,500 persons at the median, and areas generally have population and economic characteristics suggesting distress. Thus, enterprise zones are an attempt both to increase economic activity in a state and to influence the location of that activity toward economically depressed areas.

A variety of incentives are typically offered in zones. Tax reductions are most common, including property tax abatement of various amounts, reduced state sales tax rates, and personal income tax deductions for zone residents. In many states, employers receive a direct subsidy or tax credit equal to a percentage of wages for new employees who are zone residents. Other common incentives include subsidies for loans to or investments in zone businesses, special job training, reductions in utility prices, and relaxation of environmental or safety regulations. As this list makes clear, some of the incentives are focused particularly on reducing labor costs for firms in the zones (such as employment tax credits), whereas others primarily reduce capital costs (such as property tax abatements).

It is difficult to evaluate the success of enterprise zones for several reasons: the objective of zones is often not clear; it is sometimes problematic to determine the magnitude or importance of the tax incentives offered in zones; and economic changes within zones often are accompanied by changes in the areas surrounding zones, and relating or separating the two is often difficult. Therefore, some of the new investment or employment in zones may have occurred anyway, and some might have moved or otherwise been located in other areas of the state or the same metropolitan area. Of any increase in employment in the zones, only a fraction might go to zone residents, perhaps at relatively low wages. These potential difficulties with enterprise zones have been experienced in practice.

In the United Kingdom, the great bulk of new businesses operating in 24 enterprise zones relocated from nearby areas, thus creating no new economic activity. In the United States, a 1989 survey of state enterprise zones found that 55 percent of new investment was expansion of existing firms, many of which were retail or service firms largely serving the zone. About 17 percent of new investment was relocated from outside the zone or was a new branch of a non-zone business. Only about 26 percent of zone investment represented new businesses.

Alan Peters and Peter Fisher (2002) examined the average effects of 75 enterprise zones located in 13 states for the period 1989 to 1995. Using a model of a hypothetical firm to compute the expected cost reduction from the incentives offered in the zones, they estimate that about 10 percent of the increase in employment in the zones was "induced" by the economic development incentives, whereas 90 percent of the job growth would have occurred anyway. The gain in revenue from the induced jobs is not sufficient to offset the revenue incentives for jobs that they believe would have arisen anyway.

Perhaps the most studied enterprise zone program in the United States is that in Indiana.[9] Surveys of the zones show that a number of new jobs have been established, with about 15 to 20 percent of new jobs in the zones going to zone residents. About one-third of zone businesses are retailers, 30 percent provide business or professional services, and about 19 percent are in manufacturing, although the manufacturers receive the bulk of the tax savings.

Although relative unemployment fell in Indiana enterprise zones, relative income per person and population also declined, suggesting that many of the jobs offered low wages. Papke (2000) finds substantial changes in the nature of capital investment in the zones. Inventories held in the enterprise zones increased substantially in both the short and long runs, which is not surprising since the largest tax incentive provided was exemption from the property tax on inventories. On the other hand, the value of manufacturing machinery and equipment of firms in the zones declined both the short and long terms. Finally, Papke (2000, 87) reports "there is no strong effect of zone designation on the value of real estate." In essence, then, the Indiana enterprise zones induced firms to expand their holding of inventories in the zones but reduce the amount of productive machinery and equipment.

The federal Tax Cuts and Jobs Act of 2017 included provisions for opportunity zones, in which individuals and businesses with unrealized capital gains income could reduce future capital gains taxes by investing those funds in a zone. Governors nominated areas to become zones, which were approved by the US Treasury Department. Twelve percent of US Census tracts were identified as zones, which have lower incomes, higher poverty rates, higher unemployment, lower home values, lower homeownership rates, and lower rent than other eligible areas.[10] The program is relatively new, so full results are not yet known. However, one preliminary analysis of the zones concludes,

> Although OZs were designed to spur job creation, the vast majority of OZ capital appears to be flowing into real estate, not into operating businesses, because of various program design constraints and the undesirability of selling equity from both the business owners' and the investors' perspective.[11]

In part, this results because the capital gains advantages last no more than ten years.

The evidence suggests, therefore, that even targeting development incentives to narrow, defined regions may not have achieved clear economic gains. To correct this problem, Tim Bartik (2020) has identified six ways that these types of programs might be reformed. He suggests that (1) such programs would be better targeted to distressed places; (2) they "should be more targeted at high-multiplier industries, such as high-tech industries"; (3) "incentives should not disproportionately favor large firms"; (4) business services, infrastructure, and land development might be more effective than incentives; (5) policies should be structures based on local conditions and not necessarily the same everywhere; and (6) "place-based jobs policies should be evaluated better," especially using quantifiable conditions and criteria.

Bartik summarizes his findings as follows.

> The targeting of distressed places could be improved with a more extensive research basis for defining distressed places and identifying which programs are most cost effective in different places. But the existing evidence clearly shows that adding jobs in distressed places offers both private and social benefits.
>
> (2020, 122)

Effects of fiscal factors: Theory

Intergovernmental interaction

One fundamental fact about fiscal incentives is that they are offered by most states and at least most of the larger counties and municipalities. If fiscal incentives are available in most locations, then they do not affect the relative cost of businesses in those different locations. Rather, the cost differences among locations that existed without incentives are preserved, although the level of business tax and financing cost is decreased at all locations. The fact that similar fiscal incentives for business come to be offered by nearly all states seems a natural result of interstate competition. The number of states is large enough that collusion among states not to offer fiscal incentives is difficult but not so large that states are unaware of the nature and magnitude of incentives offered by competitors. The result seems to be equivalent to an oligopolistic market in which competitors' offers of lower prices (fiscal incentives) are always matched.

A simplified version of the process as it seems to have worked is shown in Figure 20.2. Beginning in Figure 20.2a, state A offers some business incentives that lower business costs in the state, shown by a downward shift in the supply curve. (Recall that supply represents

marginal costs.) If the incentives are successful and capital is mobile, production costs in A decrease, and output in the state increases. The effect of the lower costs and prices of production in state A is to lessen the demand for production in state B, causing a corresponding decrease in output there. In essence, if state A's incentives are successful, they move economic activity from the competitor state B to state A.

But state B is expected either to respond to the effect of the incentives offered by state A or to see the same opportunity in incentives as state A did. The result, shown in Figure 20.2c, is that state B also offers fiscal incentives that reduce business costs in that state. Thus, the supply curve in B is shifted downward, and production rises. In Figure 20.2c, the incentives offered by B exactly offset those offered by A, so output in B returns to the level that existed before the incentives were offered. In addition, the cost reduction caused by B's fiscal incentives reduces the relative attractiveness of production in state A, causing output in A to return to its original level also. Before the process began, costs in B were higher than in A (C^B_0 is greater than C^A_0), and after the incentives are offered, costs in B are still higher than in A (C^B_2 is greater than C^A_2). Neither state has gained a relative advantage, although business costs have been lowered in both states. Each state had to adopt incentives to avoid losing economic activity to the other, however.

It might be incorrect to conclude, however, that nothing has changed in the world depicted by Figure 20.2. If these governments are providing the same amount of government services after the incentives as before, there has been a redistribution of tax burden; direct business taxes account for a smaller share of total taxes than previously. That redistribution of

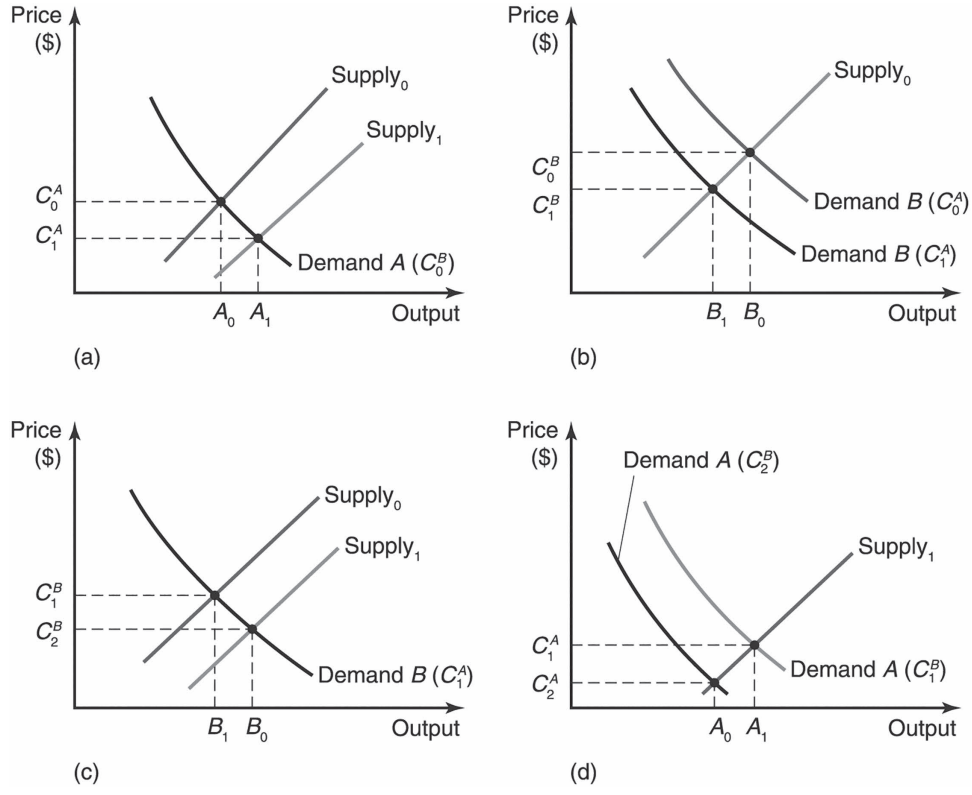


Figure 20.2 State interaction in offering investment incentives

tax burden could alter economic decisions in the overall society. Suppose, for instance, that the tax burden on capital ownership has been reduced and the tax burden on consumption increased. The expected result is a modest increase in saving and thus a larger capital stock in the future than would have been the case without the tax redistribution. In that case, the subnational government fiscal incentives, which resulted from interstate tax competition, would have been equivalent to a federal reduction in capital taxes, such as a reduction in the federal corporate income tax. Although each state acted to improve its competitive position compared to the other states, the result is maintenance of relative costs but a reduction in national business costs. The combined action of all the states and localities effectively comprises a national policy of providing business incentives.

Role of consumer and factor mobility

If individual states or localities are successful in using fiscal incentives to reduce the relative cost of investment or business, the ultimate economic effects and beneficiaries of the incentives depend mostly on the mobility of consumers and factor suppliers.

The mobility case most often considered by economists assumes suppliers of capital (investors) are fully mobile among different locations, whereas suppliers of other factors, especially labor, and consumers do not move among locations in response to economic differences. In this case, the expected effects of fiscal incentives that lower investment or capital costs in one location compared to others are straightforward. The incentive increases the rate of return on investment in that location and thus attracts more capital. Because the increased supply of capital investment at that location reduces the rate of return, the capital inflow will continue until the rate of return is reduced to that available at those locations without any incentives. The obvious result of the incentive is an increased amount of investment in the jurisdiction offering the incentive and a decrease in the quantity of investment at the other locations. The increased amount of investment in the jurisdiction is expected to increase the demand for other factors of production such as labor, which increases the wage in that jurisdiction. If workers are not mobile, then those wage differences persist. If workers are mobile, then the higher wages in the jurisdiction attract new workers from other locations until wages are equalized. The increased investment and production in the jurisdiction with the incentive is expected to decrease the prices of local consumer goods. If consumers are not mobile, then local consumers benefit from these lower prices.

Suppose, for instance, that one locality provides a property tax reduction that is not matched by surrounding communities for new commercial investment. The lower taxes on new commercial buildings make it more attractive than previously to build in that locality, so an increase in the supply of apartment buildings, retail store space, and office buildings is expected. The increase in commercial building has two subsequent effects. First, there is more demand for workers, which results in an increase in wages if more workers do not appear (labor is immobile). Second, the increase in commercial building is expected to reduce commercial rents if more consumers of commercial space do not appear (consumers are immobile). So if apartments and office buildings rented for equal amounts in all the communities before the tax abatement, rents are now lower in the community with the abatement.

This story shows why the assumption of immobile workers and consumers is implausible, at least for regions within states and metropolitan areas. If apartment and office building rents are reduced in one location because of new construction or conversion from other uses, one certainly expects that some individual renters of housing or businesses that lease office space will move to the locality offering lower rents; that is, consumers are mobile. As consumers move to take advantage of the lower rents, the demand for the apartments and office space

increases, driving rents up. The movement of consumers is expected to continue until rents are equal again in all locations.

If consumers move to take advantage of the lower rents, what does that do to the profit position of the investors? If investors or owners of the buildings charge the same rent at all locations, then those in the higher-tax areas (those without abatements) must be earning lower rates of return than those in the lower-tax areas (those with the abatement). That difference in profitability should start another round of capital movement, again toward the jurisdiction with the tax incentive. That increases the supply of capital and reduces rents, which should then start another round of consumer moves.

What force exists that might stop this process before all the investment and economic activity is in one locality? Land is one factor of production that is generally immobile. The increase in the amount of investment in the jurisdiction with the tax incentive and any subsequent increase in demand for space by mobile consumers serve to increase the demand for the available land in the jurisdiction, thus increasing the price of that land. Eventually, land becomes so expensive that additional investment and location in the locality is unattractive, even with the tax abatement.

Who benefits, then, from this process that was instituted by the granting of tax abatements in one locality? Those who own land in the jurisdiction at the time the tax abatement is granted (regardless of where they live) benefit from the increase in the value of the land. Whether consumers of local goods in that jurisdiction, such as individual tenants in rental housing and commercial tenants in office buildings, benefit depends on the mobility of those consumers. If new tenants move into the jurisdiction, then rents are not lowered by the abatement. (Similarly, if tenants move out of the jurisdictions without the abatement, then those that remain are not hurt by the relatively higher taxes that exist in those locations.) Aside from the benefits to landowners, whether benefits go to property owners or property consumers depends on which group is relatively more mobile.

This story of the **capitalization of the fiscal incentive** should be familiar to you because it is the same one discussed in Chapter 12 concerning property tax incidence. It doesn't matter what the source of the higher cost is in some localities – higher property tax rates, lack of a tax abatement program, an absence of subsidized interest rates for borrowing, or higher costs for worker training – as the process of reaction and adjustment to those cost differences is the same. However, the process starts only if some jurisdictions obtain a cost advantage over others and if investors respond to that advantage, which might not happen if all communities offer equivalent incentives or if the incentives generate only relatively small cost differences. In addition, how smoothly the process proceeds compared to the theory depends on many other factors including moving costs, perceptions of market conditions for buyers of a firm's product, the public services available at different locations, the accuracy and cost of information about cost and market differences at various locations, the personal preferences of business owners and managers, and perhaps even inertia. The degree to which investors, workers, and consumers respond to regional or interstate fiscal differences is uncertain and can only be resolved by looking at evidence.

Before we turn to that review of the evidence about fiscal differences and incentives, it may be helpful to review the theoretical possibilities again by referring to Figures 20.3 through 20.5. The effect of a capital subsidy, either from tax abatement or a tax-exempt revenue bond, is shown in Figure 20.3. If the rate of return available in the economy is r_0, the subsidy increases the return available in this jurisdiction to r_1. The higher rate of return available in this jurisdiction attracts more investment, so the amount of capital increases from K_0 to K_1 until the rate of return in the jurisdiction returns to the average level of r_0. (This is equivalent to the analysis of a property tax decrease by one locality discussed in Chapter 12.)

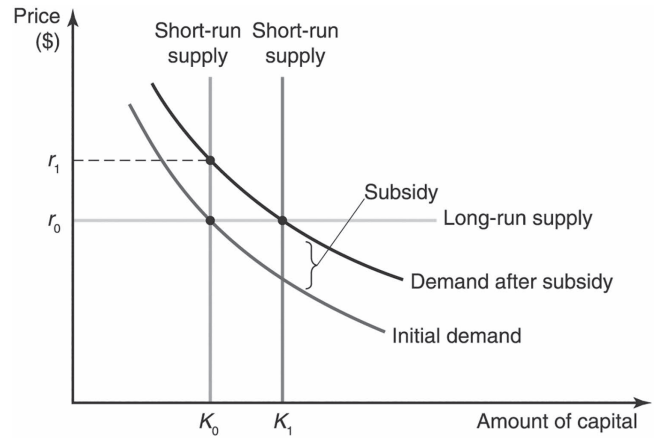


Figure 20.3 Effect of a capital investment subsidy

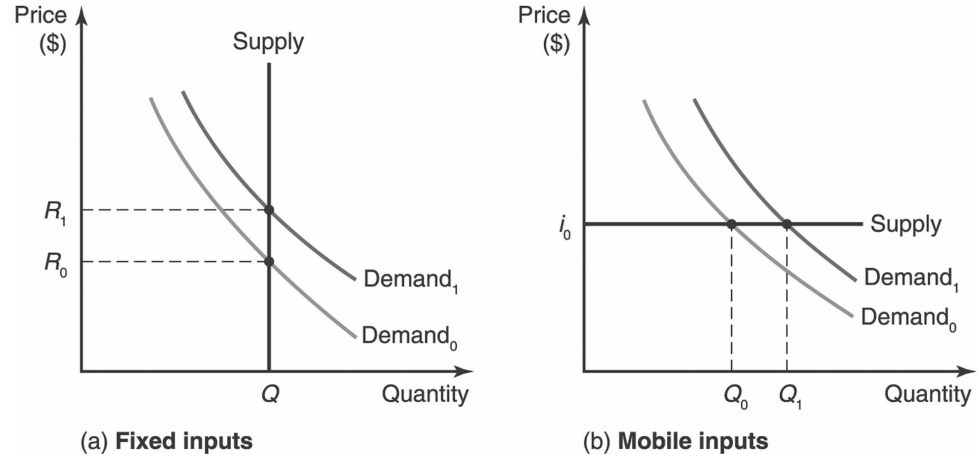


Figure 20.4 Effect of an increase in investment in markets for other inputs

The expected effect of the capital subsidy on the markets for other inputs is shown in Figure 20.4. The increased investment is expected to increase the demand for other inputs, which will increase the price of other inputs that are not mobile – that is, those with a fixed quantity in the jurisdiction – and will increase the quantity of those other inputs that are mobile. For instance, if labor is mobile, then an increase in employment is expected to accompany the increase in investment, whereas because land is not mobile, the rents on land are expected to increase because of the new investment.

If the net effect of the capital subsidy and related input market changes is a reduction in production costs as intended, then the effects on the prices and quantities of outputs are shown in Figure 20.5. For nationally traded goods – those sold outside the local jurisdiction with a price determined in a broader market – the cost decrease causes an increase in production in the jurisdiction but no decrease in price. For local goods – those whose price is determined entirely in the jurisdiction – the cost decrease is expected to induce both an increase in production and a decrease in the price of these local goods.

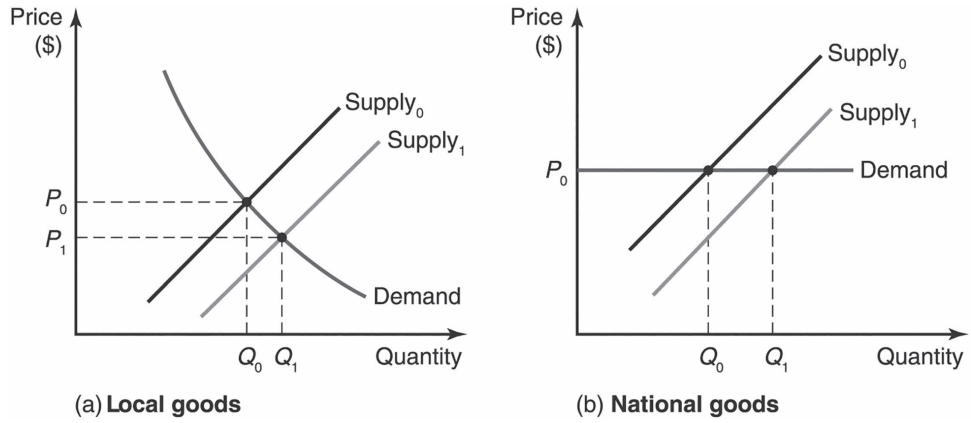


Figure 20.5 Effect of an investment subsidy on prices of consumer goods

Effects of fiscal factors: Evidence

Investment among regions

The evidence concerning the effect of state-local government fiscal policies on investment among states or regions is mixed, with the one consistent conclusion perhaps being that there is no general result – fiscal policies have different effects for industries with different characteristics. Most of the research on this issue has been focused on manufacturing industries and carried out by relating variation in the number of firms, amount of employment, or changes in those measures across states to variations in market, cost, and fiscal factors among the states. Most of the earlier studies of these issues, such as those by John Due (1971), Dennis Carlton (1983), and Roger Schmenner (1982), found that the level of state and local taxes did not have much influence, whereas differences in wages, energy costs, labor skills, and the amount of manufacturing already carried out in a state influenced firms' decisions to locate or expand. The amount of a specific economic activity already being carried out represents what are called **agglomeration economies**: cost advantages that arise when firms producing the same thing are located near each other. For instance, it may be possible to have inputs delivered at lower cost if the supplier can deliver to several firms in one trip.

More recent studies are quite mixed in results, with some finding that subnational government taxes influence business decisions among states or regions. Results often differ depending on the time period of analysis and how the empirical work is structured. Summarizing 99 studies carried out between 1979 and 1991, Bartik (1991, 43) argues, "The long-run elasticity of business activity with respect to state and local taxes appears to lie in the range of −0.1 to −0.6 for intermetropolitan or interstate business location decisions." This suggests that a 10 percent reduction in state business taxes, accompanied by no change in state services and no changes in other states' taxes or services, could lead to a 1 to 6 percent increase in investment, the number of firms, or employment, depending on how business activity is measured. The results of these studies are not unequivocal. About 75 percent of the studies find a statistically significant negative effect of taxes on economic activity, but 25 percent find no effect or even a positive one. The range of measured elasticities is quite large. Bartik concludes that it seems a reasonable conclusion from this research that taxes can exert a small

effect on business decisions and activity (with an expected elasticity of about −0.3), but the effect will be substantially smaller or larger in different cases.

Michael Wasylenko (1997) finds less of an effect of interregional taxes on business activity than is reported by Bartik, concluding "Taxes do not seem to have a substantial effect on economic activity among states" (p. 47). Wasylenko's review of the literature shows

> For the total tax responsiveness of economic activity . . . the median values of the estimates [of elasticities] range from −0.58 to −0.02, with most of the medians clustering around −0.1. Of the thirty-four studies examining business tax elasticities . . . the median values of these elasticity estimates cluster between 0.0 and −0.26, indicating not much responsiveness of economic activity among regions to business taxes.
>
> (p. 45)

One reason for such findings, Wasylenko suggests, is if states have adopted similar tax structures. If tax systems are similar among competing states, then taxes cannot be important in affecting business location decisions. However, if a state's taxes deviate substantially from those in competitor states, then taxes may affect economic activity in those states.

Rather than looking at business investment, William Gale, Aaron Krupkin, and Kim Rueben (2015) examine the relationship between taxes and overall state economic growth. Applying modern econometric methods, they find little consistent relationship between taxes and growth, concluding "that neither tax revenues nor top marginal income tax rates bear any stable relationship – and, indeed, often bear a positive relationship – to economic growth rates across states and over time." Disaggregating the analysis by type of tax, they report property taxes have a consistent negative relationship with growth, whereas income taxes have a positive effect.

Cailin Slattery and Owen Zidar (2020) examine the effect of tax incentives on both employment and economic growth. The firm-specific incentives they examine usually go to large manufacturing firms and firms in the technology and high-skill service industries. They report some increases in direct employment from attracting firms with incentives, but "do not find strong evidence that firm-specific tax incentives increase broader economic growth at the state and local level." Therefore, they find little spillover effect on the broader economy from attracted firms. They argue that in the absence of these broader economic growth effects, incentives should generate equity gains – gains in employment and income for specific workers or areas – to be effective. They conclude, "The lack of clear spillovers and equity benefits suggests potentially large gains from reforms that direct resources to where efficiency and equity gains are largest." That is, better targeted incentives.

There is also substantial evidence that state-local government spending, particularly on education, worker training, or infrastructure, may serve to attract new investment to a state. Among 30 studies reviewed by Bartik, 60 percent find statistically significant positive effects on business activity from measures of state-local public services. In a subsequent review, Fisher (1997, 54) concludes, "[S]ome public services clearly have a positive effect on some measures of economic development in some cases." The most substantial evidence of an effect on economic activity exists for transportation facilities and public safety services, with much greater variability in the research results concerning education services. For instance, Bartik (1989) finds that increased spending for local education and fire protection is positively related to subsequent economic growth, Garcia-Mila and McGuire (1992) find that highway miles per square mile of state area has a positive effect on growth of gross state product, Tannenwald (1996) finds increases in per capita spending on public safety increase business capital investment among states, and Munnell (1990) reports that increased public capital raises the growth rate of private employment.

These results suggest that it is entirely possible that simultaneous increases in state-local taxes and particular public services could lead to increased business investment, employment, or output. For instance, Luce (1994) suggests that increasing local taxes to fund additional public safety or public works spending would increase employment among manufacturing, service, and wholesale trade industries, but not for all industries (especially finance and retail trade). On the other hand, a number of studies find a negative effect of higher welfare spending on business growth. This second result is quite serious because it implies that if a state with a substantial poor population attempts to help that group with welfare programs, it creates a disincentive to the economic growth that might cure the poverty problem in the long run.

Examples from specific studies show how sensitive the results can be to different conditions. Michael Wasylenko and Therese McGuire (1985) examined the percentage change in employment in states from 1973 to 1980 for six industries – manufacturing, wholesale trade, retail trade, utilities, finance, and services. They report that the wage level, electricity prices, and educational attainment of workers generally affected investment in these industries. Among fiscal factors, the overall level of state-local taxes seemed to influence employment growth negatively for manufacturing, retail trade, and services (although the level of any particular tax had no effect), whereas the level of state-local spending on education seemed to affect employment growth positively for the retail trade and financial industries. These results certainly suggest that the magnitude of the effect of fiscal policies on investment will vary by industry, although it is not clear why the level of state-local taxes would influence retail and service investment, industries that are generally dependent on local markets, but not investment in wholesale trade and finance, where more flexibility in locations is expected.

Leslie Papke (1987) examined the relationship between the after-tax rate of return on new investment in a state and the amount of new capital expenditure per worker in the state for a number of different industries in 1978. The effect of state-local taxes is to reduce the rate of return available in a state. She reported that a "significant part of the geographic pattern in investment across industries and states can be accounted for by differences in net profit rates": that is, returns net of state-local and federal taxes. On average, a 1 percent variation in after-tax rate of return is expected to cause about a 2 percent difference in new investment per worker. The sensitivity of new investment to the net return varies greatly by industry, with manufacturing of drugs (elasticity of .75) and blast furnaces being relatively insensitive (elasticity of 1.08) and manufacturing of furniture (elasticity of 3.91) and apparel (elasticity of 4.1) being very sensitive.

Papke's results suggest that higher state-local taxes are expected to reduce new investment. Papke cautions, however, that large changes in state-local tax rates are required to bring about even modest changes in rates of return. For instance, her computations suggest that a 1 percent reduction in the rate of return would require an increase in a state corporate income tax rate from 7 to 15 percent or an increase in effective property tax rates from .7 percent to 5.0 percent (assuming a 7 percent corporate income tax rate). Even those large state tax rate differences would reduce new investment per worker by only about 2 percent in the higher-tax state, on average.

Timothy Bartik (2019) uses a simulation model to estimate the long-run effect of different types of development incentives on both the level of income (both labor and property) of local residents and the distribution of that income. The economic growth model is based on empirical estimates of the relationship between business costs and employment, as well as the effect of different types of incentives on business costs. Type of incentives considered include both traditional tax incentives (corporate tax or property tax breaks) and what he calls "customized services," which includes job training specific to an industry or firm, among others.

The results depend not only on the type and magnitude of incentives but also on how the incentives are financed (reductions in public service spending, increases in other taxes, borrowing, or something else).

Bartik draws a number of policy conclusions based on the simulation results. He finds that customized services, especially specific job training, targeted to smaller local businesses have a greater effect on the level and distribution of benefits than do tax incentives to large, nonlocal firms. He argues that increasing business taxes rather than reducing education spending should finance incentives. Perhaps most importantly, his results suggest that all incentives should be better targeted to firms and industries with the greatest effects. Bartik notes,

> The most important targeting is targeting on high-multiplier firms. But tax incentives should also be targeted on export-base and high-wage firms, on places and time periods of high unemployment, and on hiring the local unemployed. Tax incentives should be more up front, and should not undermine long-term tax bases.
>
> (Bartik, 2019, xviii)

It appears, therefore, that interstate tax differences may influence new investment decisions for branch plants or expansions in some industries. For other industries, interstate tax differences are just too small to have any substantial effect on net profitability in different states, or tax differences are simply not as important as differences in other cost or market factors. Spending on public services and facilities important to business also can influence investment decisions, this time positively, at least for some types of industries in some locations. Other than the direct fiscal policies of state-local governments, there is relatively consistent evidence that labor costs and skills, energy costs, and advantages brought about by a concentration of manufacturing in a location are all important factors in influencing interstate manufacturing investment decisions.

Investment within regions

Studies of business investment decisions within states or metropolitan areas are more consistent in finding that local fiscal policies, especially property taxes, influence the location of new investment. As stated by Michael Wasylenko (1986) in a review of the evidence concerning intraurban location of business, "Tax differentials probably have significant effects on the location of firms and differences in intraregional employment growth" (p. 227). Moreover, Bartik (1991) reports that tax differences have substantially larger effects on economic growth within areas than among them. He suggests that the elasticity of intrametropolitan-area business location with respect to taxes is in the range from −1.0 to −3.0, so a 10 percent tax difference could translate into a 10 to 30 percent change in economic activity. Wasylenko (1997) notes that the smaller the area, the more similar nontax factors (such as labor costs) should be, and thus a greater effect from taxes is expected. He concludes, "The tax elasticities within a region appear to be at least four times the interregional elasticities" (p. 47).

John Anderson and Robert Wassmer (2000) agree that local taxes and local economic development incentives often influence, sometimes substantially, the intrametropolitan location of business activity. They also note that those local government tax incentives may operate by lowering costs and stimulating development in the metropolitan area without affecting the specific jurisdiction in that area chosen for location. Certainly, broad use of incentives by many localities may mitigate the effectiveness of attracting business to particular locations. In that regard, Kenyon et al. (2012) note, "The best evidence on property tax abatement programs indicates they are effective for the first jurisdictions that use such incentives, but once they proliferate across a metropolitan area they no longer promote economic growth."

The other (nontax) factors that are consistently found to affect business location decisions within metropolitan areas, at least for manufacturing firms, are the availability of labor with suitable skills, the availability of sufficient quantities of (usually vacant) land, the quality of the transportation network for transporting both goods and workers, and agglomeration economies.

Analyzing the effect of local tax differentials on business investment decisions is complicated by the fact that some communities in almost every metropolitan area choose to zone out some types of industry. Communities may find the noise, congestion, and environmental pollution that accompany industrial development to be particularly undesirable and thus respond by not supplying many or any industrial development sites. Other communities may allow industrial development but not encourage it by offering tax or other incentives. If communities that effectively preclude development are included with those seeking development in studies of the effect of tax differentials, biased results are expected. If the communities that exclude industrial development by zoning have high tax rates, for instance, statistical studies might attribute the lack of investment to the tax rates when the actual cause is the community's unwillingness to allow development.

To correct this problem, studies of business investment within an area must consider the supply of land by a community for industrial development in addition to the demand for locations or land for development by business firms. This adjustment may be accomplished either by excluding those communities that do not allow development from the studies or by explicitly modeling a community's decision about the amount of development to allow. When either of these adjustments is made in studies of intraurban location decisions, local tax differences are consistently found to be even more important factors in influencing business investment decisions within areas.

For example, Robert Wassmer (1990, 1992) reports estimates of the effects of property tax abatements offered by localities in the Detroit metropolitan area, taking account of different choices by communities about offering abatements. Communities with higher property taxes and more crime tend to offer more or larger tax abatements to offset these characteristics that might otherwise reduce potential businesses' profits. After the choice of abatements is allowed for, Wassmer estimates that additional property tax abatements in those cases attract sufficient investment to increase the local tax base and local property tax revenue.

Besides any direct effects of local business taxes on business location, local taxes may have indirect effects by affecting population and local labor markets. A number of studies, starting with that by Wallace Oates (1969) and followed by many others, have found a negative relationship between local property tax rates and residential housing values and a positive relationship between local government services (especially education) and housing values. These studies have been interpreted as confirming at least the process envisioned by Tiebout (1956), in which individuals move among communities based on fiscal packages. Put another way, the results of these studies are consistent with an outflow of population and thus a decrease in demand for housing in relatively high-tax communities. The results of local business location studies show that firms are attracted to communities where labor is readily available. Relatively high property or personal income taxes may therefore reduce the available supply of labor in a region or raise the wage that employers must pay for a given quantity or quality of workers. In either case, the local personal taxes may indirectly influence business location decisions in that manner.

The results of the studies of housing values suggest that consumers move among communities within a region in response to price differences caused by tax differences. Research by Wheaton (1984) found mobility of consumers of capital in examining the relationship between rental rates for space in commercial buildings in the Boston metropolitan area in

1980 and community effective property tax rates; John McDonald (1993) examined the same issue using 1991 data from Chicago.

Wheaton reported that differences in tax rates had no effect on the relative level of commercial rents in the Boston area communities. In other words, it appears that if landlords attempted to charge higher rents for commercial space in communities with higher taxes, tenants were willing to move to communities with lower tax and thus lower rent. Although Wheaton's research showed that differences in tax rates did not affect rents, differences in building characteristics (age, size, whether located in a complex) and community characteristics (public transit, highways, labor skills) affected commercial rents in the ways expected.

McDonald reported that only about 45 percent of property tax differences among downtown Chicago commercial office buildings were shifted forward to tenants in the form of higher rents. Again, landlords could not charge sufficiently higher rents to offset property tax differences. If rents are the same for similar buildings in high– and low–property tax communities or if rent differences are smaller than tax differences, then the tax difference is being borne at least partly by owners – landlords earn lower rates of return in higher-tax communities. For that to occur requires that consumers of commercial office space be more willing to move within the region than owners of capital are willing to relocate their investments.

Policy issues

Even if fiscal incentives are effective in attracting new investment to a state or locality, there are several other issues that should be considered in order to evaluate incentives fully. First, the use of targeted fiscal incentives rather than decreases in general business taxes means that some businesses in a jurisdiction will be taxed at lower effective rates than others. If the incentives are applied on a case-by-case basis, it is even more likely that otherwise similar businesses – for instance, similar size firms in the same industry – will pay different taxes if one is granted an incentive to avoid a threatened move or to retain an expansion. Although it is a fundamental principle of optimal tax theory that taxpayers who respond to taxes differently should be taxed at different rates, differential taxation of similar businesses creates difficult equity and political concerns.

Second, granting tax reductions to some or even all businesses may create an external cost to other taxpayers. If those businesses consume government-provided goods or services that are not pure public goods – that is, that require additional cost to provide – then the tax structure is moved further away from a benefit tax. Essentially, other taxpayers must bear the marginal costs of services that exclusively benefit the firm's owners. This means that the tax costs imposed on the other taxpayers – individuals only or individuals and some businesses – must be greater than the marginal benefits received by those taxpayers. The external cost therefore leads to inefficient decisions about the amount and mix of government services to provide.

Third, some states and localities elect to offer fiscal incentives because other competing jurisdictions are doing so. By acting to counteract others' fiscal incentives, a state or locality intends to maintain relative business costs at the level before any incentives were granted. This intergovernmental competition leads to a lowering of overall business costs but does not create an incentive for the pattern of investment among the jurisdictions to change. (Businesses may invest more because of the lower taxes but may not change the location of the investment because there is no relative change in taxes among jurisdictions.) One option for states and localities to consider in this case is collusion – mutual agreements not to offer certain types of incentives to certain types of businesses. Such collusion could improve economic efficiency if it prevents the kind of external cost effects noted previously without altering the relative costs of business in different jurisdictions. Of course, as with all attempts

at collusion when there are more than just a few players, enforcement of the agreements would be nearly impossible. Given some antitrust decisions concerning the market power and actions of subnational governments, such agreements might be found to be illegal.[12]

Finally, even if incentives increase business investment, employment, or land prices, it is not clear that overall welfare is improved because these incentives involve costs. For instance, if an increase in investment raises land prices, there has been a transfer from the taxpayers who financed the incentive to landowners, but not everyone is likely to be better off. What if the incentives increase the demand for labor? In the short run there is likely to be an increase in wages and in the long run a permanent increase in employment as supply adjusts. If there was local unemployment initially and workers are not perfectly mobile (perhaps due to moving costs), then the increase in employment might represent an increase in overall economic welfare, but not in all cases. Evidence suggests that in many cases, only a fraction of the increased employment goes to local residents who were previously unemployed; some of the jobs go to new workers who move to the area. An increase in employment of local residents entails the loss of whatever other activity occupied their time, and the new jobs for local residents may not go to the low-income, low-skilled workers who might have been the target of the policy. Finally, an increase in business investment may bring with it an increase in congestion, a worsening of air pollution, and new challenges to public safety.

For all these reasons (and others), Paul Courant (1994) argues emphatically that what is needed is solid benefit-cost analysis of economic development policies, with that analysis including the distributional effects of those policies. What matters, Courant argues, is not whether tax incentives or greater public spending increase business investment or employment, but rather whether those fiscal changes make the residents of a jurisdiction better off.

What is the likely long-run effect of the continuing interstate competition for economic activity on overall state fiscal policy ? Some have suggested that the increased magnitude of interstate fiscal competition will make it more difficult for state fiscal differences to be maintained; essentially, if higher taxes drive away business activity and relatively lower taxes attract it, then in the long run, all states will have to have similar tax burdens (or at least similar net burdens, after the benefits of public services are considered). Indeed, as discussed in Chapter 1, fiscal differences among the states have narrowed substantially over the past 50 years. Some of the narrowing of fiscal differences over this period is the result of growth and changes in the structure of intergovernmental grants and some from the narrowing of regional economic differences (e.g., convergence of state personal income), which has translated into a corresponding narrowing of fiscal differences as well. It also seems likely that interstate competition for economic activity has contributed to the narrowing of tax and spending differences. It seems unlikely, however, that interstate competition will ever fully eliminate interstate fiscal differences because residents of different states are likely to continue expressing different demands for public services.

Application 20.2: Business climate studies and rankings[13]

As a result of the increased attention to state-local taxes and their effect on economic development by business and government, a number of attempts have been made to evaluate and compare business costs – what is often called the "business environment" – in the various states. Over the years, a number of state "business climate" rankings or indexes have been produced. For instance, in the late 1970s and 1980s, Grant Thornton, an accounting and management consulting firm, weighted factors thought to be important for manufacturing investment decisions to compute an overall index of manufacturing business climate for each state. After substantial criticism (including in an earlier edition of this book), that index was abandoned. Peter Fisher (2005) reports that at least eight other indexes of state business,

investment, or living climates have recently been published, including the "State Business Tax Climate Index" published by the Tax Foundation, which is based largely on tax levels, and *Forbes* magazine's "Best Places" rating, which focuses on a broad set of economic and social factors.

For the last Grant Thornton study,[14] 21 different factors were measured, representing the four major categories of state-local government fiscal policies: state-regulated employment costs (unemployment and workers' compensation), labor costs, availability and productivity of resources, and quality of life (education, health care, cost of living, transportation). The factors with the heaviest weight, all reflecting the labor market in the state, were the average annual hourly manufacturing wage (7.14 percent of the total index), the percentage of manufacturing workers who were unionized (6.81 percent), an index representing the size and education level of the labor force (5.78 percent), the average workers' compensation insurance rate per $100 of payroll (5.38 percent), and the percentage change in the average hourly manufacturing wage over the previous five years (5.36 percent). These five factors accounted for more than 30 percent of the overall manufacturing climate index of a state, therefore. The five state fiscal policy factors – the level of taxes; the change in taxes, expenditures, and debt over the previous five years; and the level of state business incentives – represented about 20 percent of the overall index. Other major factors included the educational attainment of the population, energy costs, and the productivity of manufacturing workers.

The states ranked by this process as having the best manufacturing climate for 1986 were North Dakota and Nebraska, and the two with the supposedly worst manufacturing climate were Michigan and Ohio. Interestingly, the states with supposedly the best manufacturing climates had little manufacturing activity and weak state economies, whereas some of the states with the supposedly worst climates were manufacturing centers in the United States and had relatively strong economies at the time of the study. This is not surprising. In a state with little economic activity and substantial unemployment, the demand for labor is relatively low, and thus, one expects wages and other labor costs to be relatively low and perhaps even falling. For instance, Eugene Carlson reported in *The Wall Street Journal* (1987) that both North Dakota and Nebraska had lost manufacturing jobs during that period.

The same economic argument helps explain why states with a large amount of manufacturing activity and relatively high incomes show up with an unfavorable manufacturing business climate. Where there is substantial manufacturing activity, demand for labor is high, and thus, wages and other labor costs are expected to be relatively high and perhaps even rising. In addition, workers in the larger manufacturing firms are more likely than those in smaller firms to be unionized, and manufacturing workers in many cases tend to have a lower overall level of educational attainment than in other commercial activities. Not surprisingly, with high wages and incomes, these states appear as high-cost states.

In short, the Grant Thornton index had the direction of causation reversed. Business investment (because of some factor) caused an increase in demand for labor and wages, rather than low labor costs attracting more investment. There must have been some reasons why manufacturing employment continued to decline in North Dakota and Nebraska and increase in Michigan and Ohio. The answer is that some other factors not captured by the index, perhaps the location of production compared to the location of markets (transportation costs) and financial market centers, were more important for some types of manufacturing.

Peter Fisher's (2005) examination of the other indexes suggests several other difficulties common to many "climate" measures, other than the correct relationship between economic growth and the variables in the index. Indexes may include variables that are not important or not related to business investment or location decisions, some variables may not correctly measure what they are intended to measure, and the weights assigned to components of the index may reflect a desired outcome of the measure rather than the actual relative

importance of that factor to businesses or individuals. As a consequence, Fisher shows that the various climate indexes produce conclusions that are often contradictory, and many of the "climate" measures may be poor predictors of actual economic changes.

For instance, the Tax Foundation's "State Business Tax Climate Index" (Tax Foundation, 2020) includes a large number of measures of tax rates and bases for corporate income, individual income, sales, property, and unemployment taxes. Although the index is quite complicated, Fisher argues that lower tax rates, less progressive rates, and narrower tax bases are favored by the weighting mechanism. For instance, regarding the corporate income tax component, which comprises about 21 percent of the total index, the Tax Foundation argues,

> States that levy neither a corporate income tax nor a gross receipts tax achieve a perfectly neutral system in regard to business income and thus receive a perfect score. States that do impose a corporate income tax generally will score well if they have a low tax rate.

Fisher argues that this index overemphasizes the economic importance of tax levels for economic growth, in some cases measures tax levels incorrectly, and ignores other fiscal and economic factors that may be equally or even more important for growth. For instance, taxes go to finance public services, so it is hard to understand how a zero tax rate would create a "good" business climate if it was accompanied by no public education, no public roads, no public safety service, and so on.

Fisher also notes that states rated as having a favorable business tax climate by the Tax Foundation measure are in some cases rated as high-tax states by other measures, or vice versa. Minnesota has one of the five worst business tax climates according to the Tax Foundation index, but the tenth-lowest overall business tax burden relative to profits (according to Tannenwald, 2004). Wyoming has been number one in the Tax Foundation index every year since 2014, largely because it has neither an individual nor a corporate income tax. Rather, the state relies heavily on severance taxes, which are not in the index. If the index were completely determining of business location decisions or economic growth, one would think that businesses would be flocking to Wyoming.

Forbes magazine produces a list of "Best States for Business," which combines data from other organizations' indexes to create this measure.[15] The *Forbes* index includes business costs (labor and energy costs as well as taxes), labor supply (educational attainment, population changes, and unionization), regulatory environment (labor regulations, right-to-work laws, tax incentives, transportation infrastructure, bond rating), the economic climate (income and unemployment), growth prospects (income and employment forecasts and venture capital investment), and quality of life (crime, poverty, health, educational test results, cultural and recreational opportunities, and weather). The *Forbes* measure is not just about taxes and not even just about the public sector. It attempts to include many factors that may contribute to business or individual location or investment decisions.

Even such a broad-based measure is controversial, however. For instance, it may be appropriate to include the growth of income in the index if individuals or businesses are attracted to areas where income is growing. On the other hand, it may be inappropriate to include income growth if that change in income was caused by population or business growth for other reasons; in that case, it is those other reasons that should be measured. The *Forbes* index is essentially about the current status of a state. For 2019, the top five states were North Carolina, Texas, Utah, Virginia, and Florida, although these states achieved their high rankings for very different reasons. Utah, Virginia, and Florida have relatively high business costs but rank highly in quality of the labor supply, regulatory environment, and quality of life. In

contrast, North Carolina and Texas have very low business costs but do not rank so highly in quality of life. Also, Utah and Virginia seem to be very different in many respects. Interestingly, both Hawaii and Alaska fall in the bottom five states.

Given the discussion of the evidence concerning business investment decisions and economic growth provided earlier in this chapter, one should not be surprised about the controversial and contradictory nature of economic "climate" indexes. Research has not identified a few key factors influencing economic growth broadly in all areas and for all industries. Thus, one should be suspicious of any measure that purports to be able to measure economic attractiveness with a single index number or rating.

Application 20.3: Subsidizing sports for economic development

It has become popular for local governments (and sometimes state governments and even nations) to pursue sports facilities and events in an attempt to attract economic activity or spur long-run development. A few recent cases illustrate the process.

In 2003 and 2004, Major League Baseball (MLB) was looking for a new location for the Montreal Expos team, which was failing financially, and several groups were interested in returning professional baseball to Washington, DC. In negotiations between the District government and MLB, it is reported that the league sought a new publicly funded stadium to move the team to DC. At the urging of the mayor, the District Council approved a plan to build a stadium financed by public borrowing. The adopted legislation identified the following reasons for public financing:

> The ownership, construction, development, or renovation of a publicly financed stadium in the District of Columbia . . . for use primarily for professional athletic team events is a municipal use that is in the interest of, and for the benefit of, the citizens of the District of Columbia because such a publicly-owned stadium or arena will contribute to the social and economic well-being of the citizens of the District of Columbia and significantly enhance the economic development and employment opportunities within the District of Columbia.

The District sold more than $500 million in bonds to finance a stadium that would be owned by a Sports and Entertainment Commission, which would then lease the stadium to the professional team. To pay the bonds, the District levied an additional sales tax of 4.25 percent on tickets for events and the sale of food and merchandise at the stadium. In addition, DC established a "ballpark fee" to be collected from businesses in the District of between $5,500 (for businesses with revenue between $5 and $8 million) and $16,500 (for businesses with revenue above $16 million) annually. Thus, those attending events at the stadium and all large DC businesses pay taxes to fund a stadium used by the privately owned Washington Nationals baseball team.

In 2014, during the time when the city of Detroit was seeking bankruptcy protection in court, the city and state government reached an agreement with the Detroit Red Wings' parent company to build and finance a new arena in the city to replace an existing one. The government will cover 58 percent of the cost of building the new arena, with the state government selling bonds to be repaid from taxes collected on properties in the general area of the arena. The state government will reimburse the city school district for the redirected property tax revenue, but not the city or county. Thus, both state and local taxpayers will bear the majority of the cost of building the new hockey arena, which will be owned by the Detroit Economic Growth Commission and leased to the Red Wings rent-free. Importantly, neither the city nor the commission will receive a percentage of ticket sales, concessions,

parking, or naming rights as it did in the arrangement with the existing arena (Joe Louis Arena, which is also owned by the city).[16]

In 2000 and 2002, the city of Detroit had similarly participated financially in helping construct new baseball and football stadiums in the downtown area, with most estimates putting the public share of the cost at between one-third and one-half. These facilities are owned by the Detroit-Wayne County Stadium Authority but leased to the professional teams (the Detroit Tigers and Detroit Lions) at no cost. Local hotel and rental car taxes, some income from the casinos in Detroit, and county general revenue are dedicated to paying for the bonds sold by government to help finance these venues. Government financing to locate these professional sports venues in the city is part of an economic development strategy centered on a downtown entertainment district (sports, gambling, music, theater, food, and beverages).

Public subsidy of the cost of building sports venues is common, of course, with Rodney Fort (2010) reporting an average public financing share of between 50 and 80 percent. Governments seek to use sports as an economic development tool in other ways as well. Every two years, a city or nation hosts the Winter or Summer Olympics at substantial cost for the prospect of a good reputation or identity and future economic growth. Similarly, cities actively work to attract major annual sporting events, such as the Super Bowl and NCAA basketball championships, anticipating large economic and fiscal benefits. In 2013, the state of Connecticut even purchased a professional tennis tournament to keep the event in New Haven instead of moving to North Carolina.[17]

Although state and local governments continue to believe, apparently, that sports events and venues can provide an economic development boost, the evidence is exactly opposite. In one careful review of the economic benefits to a metropolitan area from having a major professional sports team, Jordan Rappaport and Chad Wilkerson of the Kansas City Federal Reserve Bank (2001) conclude, "[T]he benefit to a host metro area from increased economic activity . . . and increased tax revenues appears to fall far short of the public outlays needed to retain and attract professional sports teams." In an article in the *Journal of Sports Economics* in 2007, Kaveephong Lertwachara and James Cochran conclude, "The results of our research confirm prior research findings – a professional sport team does not have a positive economic impact on the local economy." Robert Baade et al. (2008) studied the local economic impact of college football games over a 30-year period across some 63 metropolitan areas and concluded, "[N]either the number of home games played, the winning percentage of the local team, nor winning a national championship has a discernable impact on either employment or personal income in the cities where the teams play."

These three particular research studies are representative of the entire research literature; sports teams, venues, and events generate little long-run economic benefit, and if benefits exist, they are dwarfed by public costs. So why do governments continue to pursue and subsidize athletics? Perhaps officials and the public do not believe the research results; perhaps aggressive marketing influences them; perhaps there are political benefits from association with teams or major events. One reasonable economic explanation is that residents may enjoy having a local team that they can feel part of and follow, so the objective of subsidizing sports is not economic development anyway.

Application 20.4: Assembling land for public use[18]

Governments, including the federal government as well as states and localities, have legal authority to acquire private property in order to use the property or land for public purposes. This authority follows from the so-called "Takings Clause" of the Fifth Amendment to the US Constitution, which says, in part, "Nor shall private property be taken for public

use, without just compensation." The Fourteenth Amendment extends this provision to the behavior of state and local governments. Called "eminent domain," a series of legislative and court actions have permitted government to "condemn" private property, purchase the property for a fair market price, and then use the land for an alternate public use.

Historically, this power has been used to acquire and assemble land to build highways, schools, parks, or other public works. One can understand the importance of this power; without it, a single private landowner could, for example, force a highway project to be rerouted or even stopped simply by not selling the property. Past court cases extended the eminent domain power to acquiring private property for the purpose of eliminating slums and blight. In recent years, states and localities have increasingly used the eminent domain power to acquire property for economic development purposes, including such projects as convention centers, sports stadiums, corporate parks, and the like. Effectively, the issue is what exactly constitutes "public use."

In 2000, the city of New London, Connecticut, identified plans to develop a hotel, conference center, residences, office and retail space, and park land in an industrial and residential neighborhood that was near a new research facility built by the pharmaceutical firm Pfizer. The city argued that this plan would provide substantial benefits to the community from new jobs, increased revenue, and a stronger local economy. New London had experienced substantial economic and population decline, although the neighborhood itself was not considered "blighted." Rather than pursuing the project itself, however, the city transferred its eminent domain authority to the New London Development Corporation, a nonprofit group of private citizens operating under the authority of the city government, in order to pursue the project. The Development Corporation attempted to purchase 115 property lots for the project, but 15 owners refused to sell. The Development Corporation then condemned those lots, compelling the owners to sell and move. Those owners filed suit to stop the action of the Development Corporation, arguing both that general economic development does not qualify as a "public use" authorized by the Constitution and that the city was effectively using its eminent domain power to assist private individuals and firms rather than for public benefit.

The US Supreme Court decided *Kelo v. New London*, in June 2005 in a 5–4 decision. In a majority opinion written by Justice John Paul Stevens, the court upheld the prior decision of the Supreme Court of Connecticut in finding that "the city's proposed disposition of this property qualifies as a 'public use' within the meanings of the Takings Clause of the Fifth Amendment."

In reaching this opinion, the justices in the majority apparently believed that there would be "appreciable benefits to the community" from the project and that the primary benefit was not going to the developer. However, the court also noted that state governments have the authority to set limits or constraints on the use of eminent domain by local governments.

The decision by the court in *Kelo* has raised a number of issues relevant to economic development. Some critics of the decision think that one needs to distinguish a "public use" from a "public purpose": a road or school clearly seems to be public use, but economic redevelopment of an area may be closer to public purpose. Others are concerned that this decision will encourage governments to expand the use of eminent domain power even further, potentially leading to government serving as the agent for transferring property from one set of owners to another if the government believed that the new owners would be better for the community. Imagine, for instance, a government using eminent domain to acquire a neighborhood of small, inexpensive houses and then giving the land to a developer who would build large, expensive houses. Most analysts and legal scholars would see this type of transfer as an abuse of the authority. Finally, some political officials are proposing changes

in state laws to greatly restrict the use of eminent domain authority in light of *Kelo*, which might be a serious problem for legitimate public-use projects, as explained next.

In fact, 44 states changed laws after this decision, in most cases clarifying or limiting the meaning of "public use" or "public purpose" so as to restrict the power of government to apply eminent domain authority. In a few instances, state courts have limited the authority of government to take property.[19] Thus, this remains a controversial and unsettled policy matter.

Independent of the legal question in the *Kelo* case as to whether this particular project involved an appropriate "public use," eminent domain power clearly serves at least one important economic purpose. As noted by Richard Posner (2005), without this authority, individual property owners can take a "holdout" position and either extract an extraordinary, above-market price for a property or even prevent a legitimate public project from going forward.[20] For instance, if one owner of a key parcel of property waits until all other parcels have been acquired, that owner essentially acquires monopoly power over the proposed public project and can use that power as a "holdout" to receive a higher payment than otherwise. The "holdout" owner's action creates an externality; that action imposes costs on other residents of the jurisdiction or users of the proposed public facility.

Summary

In any given year, there are substantial differences in incomes and unemployment rates among the states and among regions or local areas within states. The differences in per capita income among the states and regions got dramatically smaller between 1930 and the mid-1970s. Contrary to the long-run trend, interstate income differences have widened slightly in the period since 1980, almost entirely because of relative income gains among the New England and Mideast states and decline for the Great Lakes states.

One attractive economic explanation might be a flow of new investment to regions with relatively low wages, resulting in an increase in economic activity, population, and ultimately wages and incomes. However, the prices of land, energy, and transportation services also seem important.

State-local taxes with an initial impact on business represent about 40 percent of total state-local taxes and approximately 4.5 percent of state personal income and seem likely to represent about 2 to 4 percent of total business sales revenue. All measures of state-local business taxes show substantial interstate differences, although the magnitude of those nominal differences overstates the effective differences because state and local business taxes are a deductible expense for firms in computing their federal income tax liability.

Fiscal incentives for investment are offered by most states and the majority of the larger counties and municipalities, including capital financing, tax reductions, and direct provision of funds or services. Estimates of the amount of annual state-local economic development or business incentives vary from about $22 billion (in 2019 dollars) to about $100 billion.

If individual states or localities are successful in using fiscal incentives to reduce the relative cost of investment or business, the ultimate economic effects and beneficiaries of the incentives depend mostly on the mobility of consumers and factor suppliers. However, because incentives may be offered by all states, they often do not affect the relative cost for businesses in those different locations.

The evidence concerning the effect of state-local government fiscal policies on investment between states or regions is mixed, with the one consistent conclusion being that there is no general result – fiscal policies have different effects on industries with different characteristics. There is relatively consistent evidence that labor costs and skills, energy costs, and advantages brought about by a concentration of manufacturing in a location are generally important factors in influencing interstate manufacturing investment decisions.

Studies of business investment decisions within states or metropolitan areas are more consistent in finding that local fiscal policies, especially property taxes, influence the location of new investment. Relatively high property or personal income taxes may also reduce the available supply of labor in a region or raise the wage that employers must pay for a given quantity of workers, thereby indirectly influencing business location decisions.

What is needed is solid benefit-cost analysis of economic development policies, with that analysis including the distributional effects of those policies. What matters is not whether tax incentives or greater public spending increase business investment or employment, but rather whether those fiscal changes make the residents of a jurisdiction better off.

Discussion questions

1 In thinking about the effects of state or local government fiscal policy on economic development, attention is usually focused on what government can do to attract economic activity. Some communities actually discourage or prohibit new industrial or commercial investment, however. What are the gains to the community from new business investment? What are the costs or problems to a community from a new shopping center, for instance? What about a new manufacturing plant? When would a community discourage these types of activities?
2 If localities offer incentives such as tax breaks or tax-exempt financing to firms that provide new investment in the community, a common complaint is that this disadvantages existing firms that receive no similar incentives and yet may be in the same business. Is this correct? Suppose that one community offers an incentive for new investment that is successful in actually attracting new investment. Work through the effects on the return on capital in the community, on the local labor market, and on the land market in the community.
3 If all states offer essentially the same economic development incentives, then no state gains an advantage. Yet this is exactly what seems to happen in many cases. Why might states continue to offer these incentives when it is not to their collective advantage or when the overall effects on economic welfare are negative?
4 The evidence about interstate investment decisions seems to show that state incentives have very different effects for different industries. In some industries, investment is greatly influenced by state incentives; in others, state incentives seem to have little effect. What types of industry would seem to be most likely to have investment decisions easily influenced by tax or financing incentives?

Notes

1 Geraldine Gambale, "35th Annual Corporate Survey: Effects of Global Pandemic Reflected in Executives' Site and Facility Plans," https://files.taxfoundation.org/20210510134130/Location-Matters-2021-The-State-Tax-Costs-of-Doing-Business1.pdf.
2 *Intergovernmental Fiscal Relations in the United States* (Washington, DC: The Brookings Institution, 1967), 23.
3 https://files.taxfoundation.org/20210510134130/Location-Matters-2021-The-State-Tax-Costs-of-Doing-Business1.pdf.
4 See William Oakland and William Testa, "State-Local Business Taxation and the Benefits Principle," *Federal Reserve Bank of Chicago Economic Perspectives, 20* (1996): 2–19.
5 Jeff Blyskal, "The State of State Taxes," *Worth* (November 1994): 82–86.
6 The state with the highest tax burden, New York, also ended up with the lowest overall rating even after service benefits were included. But the lowest tax state, Tennessee, finished in the middle of the pack, rated twenty-second overall.
7 See Batik, 2020.

8 Leslie Papke, "What Do We Know About Enterprise Zones?" in *Tax Policy and the Economy*, ed. J. Poterba (Cambridge, MA: MIT Press, 1993), 37–72; Alan H. Peters and Peter S. Fisher, *State Enterprise Zone Programs: Have They Worked?* (Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 2002).
9 For information about the Indiana experience, see Leslie Papke, "The Indiana Enterprise Zone Revisited: Effects on Capital Investment and Land Values," in *Proceedings of the Ninety-Third Annual Conference on Taxation* (Washington, DC: National Tax Association, 2000).
10 www.taxpolicycenter.org/briefing-book/what-are-opportunity-zones-and-how-do-they-work.
11 www.urban.org/research/publication/early-assessment-opportunity-zones-equitable-development-projects/view/full_report.
12 For a discussion of recent state proposals to agree to limit incentives, see James Hohman, "States use tax incentives to lure companies. Bipartisan support is growing to stop it." https://www.washingtonpost.com/opinions/2021/07/19/state-tax-incentives-congress-plan/.
13 For more information, see Peter Fisher, *Grading Places* (Washington, DC: Economic Policy Institute, 2005); Robert Tannenwald, "Business Tax Climate: How Should It Be Measured and How Important Is It?" *State Tax Notes* (May 13, 1996): 1459–1471.
14 The Eighth Annual Study of General Manufacturing Climates of the Forty-Eight Contiguous States of America (1987).
15 www.forbes.com/sites/samanthasharf/2019/12/19/how-we-rank-the-best-states-for-business-2019/?sh=32a423fb118b.
16 Joe Guillen and J. C. Reindl, "Ilitches to Get All Revenues from New Arena," *The Detroit Free Press* (March 2, 2014).
17 J. B. Wogan, "Why Connecticut Bought a Tennis Tournament," *Governing* (October 18, 2013).
18 See "*Kelo v. New London*," *Wikipedia*, accessed March 30, 2015, http://en.wikipedia.org, and Mears, Bill, "Supreme Court Backs Municipal Land Grabs," www.CNN.com, 2005.
19 www.yalelawjournal.org/forum/looking-back-ten-years-after-kelo.
20 Richard Posner, "The Kelo Case, Public Use, and Eminent Domain-Posner Comment," *The Becker-Posner Blog*, accessed March 30, 2015, www.becker-posner-blog.com.

Selected readings

Anderson, John E., and Robert W. Wassmer. *Bidding for Business*. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 2000.

Bartik, Timothy J. *Making Sense of Incentives: Taming Business Incentives to Promote Prosperity*. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 2019.

Bartik, Timothy J. "Using Place-Based Jobs Policies to Help Distressed Communities." *Journal of Economic Perspectives*, *34*, No. 3 (Summer 2020).

Courant, Paul N. "How Would You Know a Good Economic Development Policy if You Tripped Over One? Hint: Don't Just Count Jobs." *National Tax Journal*, *47* (December 1994): 863–881.

Kenyon, Daphne A., Adam H. Langley, and Bethany P. Paquin. *Rethinking Property Tax Incentives for Business*. Cambridge, MA: Lincoln Institute of Land Policy, 2012.

New England Economic Review, Proceedings of a Symposium on the Effects of State and Local Policies on Economic Development, March/April 1997. This issue includes seven articles and a number of comments about interjurisdictional competition and the fiscal effects on economic development. See particularly the articles "Theories of Interjurisdictional Competition" by Daphne Kenyon; "Taxation and Economic Development: The State of the Economic Literature" by Michael Wasylenko; and "The Effects of State and Local Public Services on Economic Development" by Ronald C. Fisher.

Slattery, Cailin, and Owen Zidar. "Evaluating State and Local Business Incentives." *Journal of Economic Perspectives*, *34*, No. 2 (Spring 2020).

Bibliography

Aaron, Henry J. "What Do Circuit-Breaker Laws Accomplish?" In *Property Tax Reform*, edited by G. Peterson, 53–64. Washington, DC: The Urban Institute, 1973.

Aaron, Henry J. *Who Pays the Property Tax*. Washington, DC: The Brookings Institution, 1975.

Addonizio, Michael F. "Intergovernmental Grants and the Demand for Local Educational Expenditures." *Public Finance Quarterly*, *19* (April 1991): 209–232.

Advisory Commission on Intergovernmental Relations. *State Limitations on Local Taxes and Expenditures*. Washington, DC: Advisory Commission on Intergovernmental Relations, February 1977.

Advisory Commission on Intergovernmental Relations. *Regional Growth: Historic Perspective*. Washington, DC: Advisory Commission on Intergovernmental Relations, 1980.

Advisory Commission on Intergovernmental Relations. *Regional Growth: Interstate Tax Competition*. Washington, DC: Advisory Commission on Intergovernmental Relations, 1981.

Advisory Commission on Intergovernmental Relations. *A Catalog of Federal Grant-in-Aid Programs to State and Local Governments*. Washington, DC: Advisory Commission on Intergovernmental Relations, 1984a.

Advisory Commission on Intergovernmental Relations. *Changing Attitudes on Governments and Taxes*. Washington, DC: Advisory Commission on Intergovernmental Relations, 1984b.

Advisory Commission on Intergovernmental Relations. *Strengthening the Federal Revenue System: Implications for State and Local Taxing and Borrowing*, Report A-97. Washington, DC: Advisory Commission on Intergovernmental Relations, 1984c.

Advisory Commission on Intergovernmental Relations. *Cigarette Tax Evasion: A Second Look*, Report A-100. Washington, DC: Advisory Commission on Intergovernmental Relations, March 1985a.

Advisory Commission on Intergovernmental Relations. *Intergovernmental Service Arrangements for Delivering Local Public Services: Update 1983*. Washington, DC: Advisory Commission on Intergovernmental Relations, October 1985b.

Advisory Commission on Intergovernmental Relations. *Preliminary Estimates of the Effect of the 1986 Federal Tax Reform Act on State Personal Income Tax Liabilities*. Washington, DC: Advisory Commission on Intergovernmental Relations, December 1986.

Advisory Commission on Intergovernmental Relations. *State and Local Taxation of Out-of-State Mail Order Sales*, Report A-105. Washington, DC: Advisory Commission on Intergovernmental Relations, April 1986.

Advisory Commission on Intergovernmental Relations. "Public Attitudes on Governments and Taxes 1994." *Intergovernmental Perspective*, *20* (Summer/Fall 1994): 29.

Advisory Commission on Intergovernmental Relations. *Significant Features of Fiscal Federalism*. Washington, DC: Advisory Commission on Intergovernmental Relations, Various Years.

Agrawal, David R., and William F. Fox. "Taxing Goods and Services in a Digital Era." *National Tax Journal*, *74*, No. 1 (March 2021).

Alamar, Benjamin, Leila Mahmoud, and Stanton Glantz. *Cigarette Smuggling in California: Fact and Fiction*. San Francisco: Center for Tobacco Control Research and Education, University of California at San Francisco, October 2003.

Alm, James, Robert D. Buschman, and David L. Sjoquist. "Rethinking Local Government Reliance on the Property Tax." *Regional Science and Urban Economics*, *42* (4 July 2011): 320–331.

Alper, Neil O., Robert B. Archibald, and Eric Jensen. "At What Price Vanity?: An Econometric Model of the Demand for Personalized License Plates." *National Tax Journal*, *40* (March 1987): 103–109.

American Housing Survey. "AHS Table Creator." 2019. https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html?s_areas=00000&s_year=2019&s_tablename=TABLE1&s_bygroup1=1&s_bygroup2=1&s_filtergroup1=1&s_filtergroup2=1

Anders, Gary C., Donald Siegel, and Munther Yacoub. "Does Indian Casino Gambling Reduce State Revenues? Evidence from Arizona." *Contemporary Economic Policy*, *16* (July 1998): 347–356.

Anderson, Carol. "Squeeze Play." *Governing*, June 2005, pp. 24–26.

Anderson, D. Mark, Kyutaro Matsuzawa, and Joseph J. Sabia. "Cigarette Taxes and Teen Marijuana Use." *National Tax Journal*, *73*, No. 2 (June 2020): 475–510.

Anderson, John E. "Two-Rate Property Taxes and Urban Development." *Intergovernmental Perspective*, *19* (Summer 1993): 19–28.

Anderson, John E. ed. *Fiscal Equalization for State and Local Government Finance*. Westport, CT: Praeger Publishers, 1994.

Anderson, John E. "State Tax Rankings: What Do They and Don't They Tell Us?" *National Tax Journal*, *65*, No. 4 (December 2012): 985–1010.

Anderson, John E., and Shafiun N. Shimul. "State and Local Property, Income, and Sales Tax Elasticity: Estimates from Dynamic Heterogeneous Panels." *National Tax Journal*, *71* (September 2018): 521–546.

Anderson, John E., and Robert W. Wassmer. *Bidding for Business*. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 2000.

Anderson, Nathan B. "Property Tax Limitations: An Interpretive Review." *National Tax Journal*, *59*, No. *3* (September 2006): 685–694.

Andrews, M., William Duncombe, and John Yinger. "Revisiting Economies of Size in American Education: Are We Any Closer to a Consensus?" *Economics of Education Review*, *21* (June 2002): 245–262.

Ang, Andrew, Vineer Bhansali, and Yuhang Xing. "Build America Bonds." *NBER Working Paper No. 16008*. National Bureau of Economic Research, Cambridge, MA, 2010.

Aronson, J. Richard, and John L. Hilley. *Financing State and Local Governments*. Washington, DC: The Brookings Institution, 1986.

Aubry, Jean-Pierre. *2020 Public Plan Investment Update and COVID-19 Market Volatility*. Boston: The Center for Retirement Research, September 2020.

Aubry, Jean-Pierre, Alicia H. Munnell, and Kevin Wandrei. *2020 Update: Market Decline Worsens the Outlook for Public Plans*. Boston: The Center for Retirement Research, May 2020.

Augustine, N., M. Bell, D. Brunori, and J. Youngman, eds. *Erosion of the Property Tax Base*. Cambridge, MA: Lincoln Institute of Land Policy, 2009.

Axelton, Zhuoli, Jeffrey Gramlich, and Brandon Holbrook. "Washington State's New Capital Gains Tax." *Tax Notes State*, July 12, 2021.

Baade, Robert A., Victor Matheson, and Robert Baumann. "The Economic Impact of College Football Games on Local Economies." *Journal of Sports Economics*, *9*, No. 6 (December 2008): 628–643.

Bahl, Roy W. *Financing State and Local Government in the 1980s*. New York: Oxford University Press, 1984.

Bahl, Roy W., and Johannes F. Linn. *Urban Public Finance in Developing Countries*. New York: Oxford University Press, 1992.

Bahl, Roy W., and Walter Vogt. *Fiscal Centralization and Tax Burdens: State and Regional Financing of City Services*. Cambridge, MA: Ballinger Publishing Company, 1975.

Baker, Bruce D. "Doing More Harm Than Good? A Commentary on the Politics of Cost Adjustments for Wage Variation in State School Finance Formulas." *Journal of Education Finance*, *33*, No. 4 (2008): 406–440.

Baldwin, Robert R. "Domestic Preference Litigation: A Review of Developments Since the Decision in *Metropolitan Life Insurance Company v. Ward*." Paper presented at *the National Tax Association-Tax Institute of America Conference in Hartford*, CT, November 1986.

Ballard, Charles L, Paul N. Courant, Douglas C. Drake, Ronald C. Fisher, and Elisabeth R. Gerber, eds. *Michigan at the Millennium*. East Lansing: Michigan State University Press, 2003.

Ballard, Charles L., and John B. Shoven. "The V.A.T.: The Efficiency Cost of Achieving Progressivity by Using Exemptions." In *Modern Developments in Public Finance: Essays in Honor of Arnold Harberger*, edited by M. Boskin, 109–129. Oxford: Basil Blackwell, 1985.

Barr, James L., and Otto A. Davis. "An Elementary Political and Economic Theory of Local Governments." *Southern Economic Journal*, *33* (October 1966): 149–165.

Barrett, Paul M. "Justices Uphold Proposition 13 of California." *The Wall Street Journal*, June 19, 1992, p. A1.

Bartik, Timothy J. "Business Location Decisions in the US: Estimates of the Effects of Unionization, Taxes, and Other Characteristics of States." *Journal of Business and Economic Statistics*, *3* (1985): 14–22.

Bartik, Timothy J. "Small Business Start-Ups in the United States: Estimates of the Effects of Characteristics of States." *Southern Economic Journal*, *55*, No. 4 (April 1989): 1004–1018.

Bartik, Timothy J. *Who Benefits from State and Local Economic Development Policies?* Kalamazoo, MI: W.E. Upjohn Institute, 1991.

Bartik, Timothy J. "Jobs, Productivity, and Local Economic Development: What Implications Does Economic Research Have for the Role of Government?" *National Tax Journal*, *47* (December 1994): 847–861.

Bartik, Timothy J. "Solving the Problems of Economic Development Incentives." *Growth and Change*, *36*, No. 2 (Spring 2005): 139–166.

Bartik, Timothy J. *Making Sense of Incentives: Taming Business Incentives to Promote Prosperity*. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 2019.

Bartik, Timothy J. "Using Place-Based Jobs Policies to Help Distressed Communities." *Journal of Economic Perspectives*, *34* (Summer 2020): 99–127.

Bartle, J., W. B. Hildreth, and J. Marlow, eds. *Management Policies in Local Government Finance*. Washington, DC: International City Management Association, 2012.

Baugh, Brian, Itzhak Ben-David, and Hoonsuk Park. "The 'Amazon Tax': Empirical Evidence from Amazon and Main Street." *NBER Working Paper No. 20052*, April 2014.

Baumol, William J. "Macroeconomics of Unbalanced Growth: The Anatomy of the Urban Crisis." *American Economic Review*, *62* (June 1967): 415–426.

Bavas, Josh. "Rising Tobacco Taxes 'Will Encourage Cigarette Smuggling' say Qld Experts." *ABC News*, May 23, 2014.

Beaton, W. Patrick, ed. *Municipal Expenditures, Revenues, and Services*. New Brunswick, NJ: Rutgers University, 1983.

Beck, John H. "Nonmonotonic Demand for Municipal Services." *National Tax Journal*, *37* (March 1984): 55–68.

Beckmann, Martin. *Location Theory*. New York: Random House, 1968.

Bell, Michael E., and John H. Bowman. "The Effect of Various Intergovernmental Aid Types on Local Own-Source Revenues: The Case of Property Taxes in Minnesota Cities." *Public Finance Quarterly*, *15* (July 1987): 282–297.

Bell, Michael E., David Brunori, and Joan Youngman, eds. *The Property Tax and Local Autonomy*. Cambridge, MA: Lincoln Institute of Land Policy, 2010.

Bell, Michael E., and Ronald C. Fisher. "State Limitations on Local Taxing and Spending Powers: Comment and Re-evaluation." *National Tax Journal*, *31* (December 1978): 391–395.

Bergstrom, Theodore C., and Robert P. Goodman. "Private Demand for Public Goods." *American Economic Review*, *63* (June 1973): 280–296.

Bergstrom, Theodore C., Daniel L. Rubinfeld and Perry Shapiro. "Micro-Based Estimates of Demand Functions for Local School Expenditures." *Econometrica*, *50*, No. 5 (September 1982): 1183–1205.

Berliant, Marcus C., and Robert P. Strauss. "State and Federal Tax Equity: Estimates Before and After the Tax Reform Act of 1986." *Journal of Policy Analysis and Management*, *12* (Winter 1993): 9–43.

Besley, Timothy J., and Stephen Coate. "Centralized versus Decentralized Provision of Local Public Goods." *Journal of Public Economics*, *87* (2003): 2611–2637.

Besley, Timothy J., and Harvey S. Rosen. "Sales Taxes and Prices: An Empirical Analysis." *National Tax Journal*, *52* (June 1999): 157–178.

"Best Places." *Forbes Magazine*. www.forbes.com/2004/05/05/04bestplacesland.html.

Biddle, Jeff. "A Bandwagon Effect in Personalized License Plates." *Economic Inquiry*, *29* (April 1991): 375–388.

Billings, R. Bruce. *Report of the First Review Commission*. Honolulu: Hawaii Tax Review Commission, 1984.

Blackmon, Douglas A. "New Ad Vehicles: Police Car, School Bus, Garbage Truck." *The Wall Street Journal* (February 20, 1996): B1.

Bland, Robert L. "The Property Tax." In *Management Policies in Local Government Finance*, edited by J. Bartle, W. B. Hildreth, and J. Marlow, 171–192. Washington, DC: International City Management Association, 2012.

Blank, Rebecca. "The Effect of Welfare and Wage Levels on the Location Decisions of Female-Headed Households." *Journal of Urban Economics*, *24*, No. 2 (September 1988): 186–211.

Blyskal, Jeff. "The State of State Taxes." *Worth* (November 1994): 82–86.

Boadway, Robin, and Anwar Shah, eds. *Intergovernmental Fiscal Transfers, Principles and Practice*. Washington, DC: The World Bank, 2007.

Boadway, Robin, and Jean-Francois Tremblay. "Reassessment of the Tiebout Model." *Journal of Public Economics*, *96* (2012): 1063–1078.

Borcherding, Thomas E., and Robert T. Deacon. "The Demand for the Services of Non-Federal Governments." *American Economic Review*, *62* (December 1972): 891–906.

Borg, Mary O., and Paul M. Mason. "The Budgetary Incidence of a Lottery to Support Education." *National Tax Journal*, *41* (March 1988): 75–85.

Borg, Mary O., Paul M. Mason, and Stephen L. Shapiro. "The Cross Effects of Lottery Taxes on Alternative State Tax Revenue." *Public Finance Quarterly*, *21* (April 1993): 123–140.

Borts, George H., and Jerome Stein. *Economic Growth in a Free Market*. New York: Columbia University Press, 1964.

Bowen, Howard R. "The Interpretation of Voting in the Allocation of Economic Resources." *The Quarterly Journal of Economics*, *58* (November 1943): 27–64.

Bowman, John H., Daphne A. Kenyon, Adam Langley, and Bethany P. Paquin. *Property Tax Circuit Breakers*. Cambridge, MA: Lincoln Institute of Land Policy, 2009.

Bowman, Woods, Joseph Cordes, and Lori Metcalf. "Preferential Tax Treatment of Property Used for Social Purposes: Fiscal Impacts and Public Policy Implications." In *Erosion of the Property Tax Base: Trends, Causes, and Consequences*, edited by N. Y. Augustine, M. E. Bell, D. Brunori, and J. M. Youngman, 269–294. Cambridge, MA: Lincoln Institute of Land Policy, 2009.

Boyer, Kenneth D. *Principles of Transportation Economics*. Reading, MA: Addison Wesley, 1998.

Boyer, Kenneth D. "Michigan's Transportation System and Transportation Policy." In *Michigan at the Millennium*, edited by C. Ballard. East Lansing: Michigan State University Press, 2003.

Bradbury, Katharine L., Yolanda K. Kodrzycki, and Robert Tannenwald. "The Effects of State and Local Public Policies on Economic Development: An Overview." *New England Economic Review* (March/April 1997): 1–12.

Bradbury, Katherine L., Helen F. Ladd, Mark Perrault, Andrew Reschovsky, and John Yinger. "State Aid to Offset Fiscal Disparities Across Communities." *National Tax Journal*, *37* (June 1984): 151–170.

Braden, Bradley and Stephanie Hyland. "Cost of Employee Compensation in Public and Private Sectors." *Monthly Labor Review*, *116* (May 1993): 14–21.

Bradford, David F., R. A. Malt, and Wallace E. Oates. "The Rising Cost of Local Public Services: Some Evidence and Reflections." *National Tax Journal*, *22* (June 1969): 185–202.

Bradford, David F., and Harvey S. Rosen. "The Optimal Taxation of Commodities and Income." *American Economic Review* (May 1976): 94–101.

Brazer, Harvey E. ed. *Michigan's Fiscal and Economic Structure*. Ann Arbor: University of Michigan Press, 1982.

Brazer, Harvey E., Deborah S. Laren, and Frank Yu-Hsieh Sung. "Elementary and Secondary School Financing." In *Michigan's Fiscal and Economic Structure*, edited by H. Brazer, 411–446. Ann Arbor: University of Michigan Press, 1982.

Break, George F. *Intergovernmental Fiscal Relations in the United States*. Washington, DC: The Brookings Institution, 1967.

Break, George F. ed. *Metropolitan Financing and Growth Management Policies*. Madison: The University of Wisconsin Press, 1978.

Break, George F. *Financing Government Expenditure in a Federal System*. Washington, DC: The Brookings Institution, 1980.

Brennan, Geoffrey, and James Buchanan. "The Logic of Tax Limits: Alternative Constitutional Constraints of the Power to Tax." *National Tax Journal Supplement*, *32* (June 1979): 11–22.

Brien, Spencer T., and David L. Sjoquist. "Do State-funded Property Tax Exemptions Actually Provide Tax Relief? Georgia's HTRG Program." *Public Finance Review*, *42* (September 5, 2014): 608–634.

Brokaw, Alan J., James R. Gale, and Thomas E. Merz. "The Effect of Tax Price on Voter Choice in Local School Referenda: Some New Evidence from Michigan." *National Tax Journal*, *43* (March 1990): 53–60.

Brown, Byron W., and Daniel H. Saks. "The Production and Distribution of Cognitive Skills." *Journal of Political Economy*, *83* (June 1975): 571–593.

Brown, Byron W., and Daniel H. Saks. "The Microeconomics of Schooling." In *Review of Research in Education*, *9*, edited by D. Berliner. Washington, DC: American Educational Research Association, 1981.

Brown, Byron W., and Daniel H. Saks. "Spending for Local Public Education: Income Distribution and the Aggregation of Private Demands." *Public Finance Quarterly*, *11* (January 1983): 21–45.

Brown, Jeffrey R., Robert Clark, and Joshua Rauh. "The Economics of State and Local Pensions." *Journal of Pension Economics & Finance*, *10*, No. 2 (April 2011): 161–172.

Bruce, Donald, and William Fox. "State and Local Sales Tax Revenue Losses from E-Commerce: Estimates as of July 2004." Center for Business and Economic Research. Knoxville: University of Tennessee, July 2004.

Bruce, Donald, William F. Fox, and LeAnn Luna. "State and Local Sales Tax Revenue Losses from E-Commerce." *State Tax Notes*, *33* (August 2009): 511–518.

Bruce, Donald, William F. Fox, and Zhou Yang. "Base Mobility and State Personal Income Taxes." *National Tax Journal*, *63*, No. *2* (December 2010): 945–966.

Brueckner, Jan K. "A Modern Analysis of the Effects of Site Value Taxation." *National Tax Journal*, *39* (January 1986): 49–58.

Brueckner, Jan K. *Welfare Reform and Interstate Welfare Competition*. Washington, DC: Urban Institute, December 1998.

Brunner, Eric J., Mark D. Robbins, and Bill Simonsen. "Information, Tax Salience, and Support for School Bond Referenda." *Public Budgeting and Finance*, *38* (July 2018): 52–73.

Brunori, David, ed. *The Future of State Taxation*. Washington, DC: Urban Institute Press, 1998.

Buchanan, James M. "The Economics of Earmarked Taxes." *Journal of Political Economy*, *71* (October 1963): 457–469.

Buchanan, James M. "An Economic Theory of Clubs." *Economica*, *32* (February 1965): 1–14.

Buchanan, James M. *Public Finance in Democratic Process: Fiscal Institutions and Individual Choice*. Chapel Hill: University of North Carolina Press, 1967.

Buchanan, James M., and Charles J. Goetz. "Efficiency Limits of Fiscal Mobility: An Assessment of the Tiebout Model." *Journal of Public Economics*, *1* (1972): 25–45.

Buchanan, James M., and Gordon Tullock. *The Calculus of Consent*. Ann Arbor: University of Michigan Press, 1962.

Burtless, Gary. "The Economist's Lament: Public Assistance in America." *Journal of Economic Perspectives*, *4* (Winter 1990): 57–78.

Button, K. J., and A. D. Pearman. *Applied Transport Economics*. Amsterdam: Gordon and Breach Science Publishers, 1985.

Campbell, Carla Alexia, Robert A. Hahn, Randy Elder, Robert Brewer, Sajal Chattoadhyay, Jonathan Fielding, Timothy S. Naimi, Traci Toomey, Brinia Lawrence, and Jennifer Cook Middleton. "The Effectiveness of Limiting Alcohol Outlet Density As a Means of Reducing Excessive Alcohol Consumption and Alcohol-Related Harms." *American Journal of Preventive Medicine*, *37*, No. 6 (2009): 556–569.

Candelaria, Christopher A., and Kenneth A. Shores. "Court-Ordered Finance Reforms in the Adequacy Era: Heterogeneous Causal Effects and Sensitivity." *Education Finance and Policy*, *14* (2019): 31–60.

Capeci, John. "Local Fiscal Policies, Default Risk, and Municipal Borrowing Costs." *Working Paper*. Brandeis University, 1990.

Carlson, Eugene. "Los Angeles County Discovers Benefits in Taxable Securities." *Wall Street Journal* (1986): 33.

Carlson, Eugene. "Manufacturing-Climate Rating Sparks Usual Storm in States." *Wall Street Journal* (June 23, 1987): 33.

Carlson, Eugene. "Colorado Fuel Tax Drives Truckers Away." *Wall Street Journal* (February 26, 1988): 17.

Carlton, Dennis. "The Location and Employment Choices of New Firms: An Econometric Model with Discrete and Continuous Endogenous Variables." *The Review of Economics and Statistics*, *65* (1983): 440–449.

Carroll, Robert J., and John Yinger. "Is the Property Tax a Benefit Tax? The Case of Rental Housing." *National Tax Journal*, *47* (June 1994): 295–316.

"Chairman Hits Out at Water Cost." *The Daily Mercury* (September 26, 1992): 9.

Chernick, Howard A. "An Econometric Model of the Distribution of Project Grants." In *Fiscal Federalism and Grants-in-aid*, edited by P. Mieszkowski and W. H. Oakland. Washington, DC: The Urban Institute, 1979.

Chernick, Howard A. "Federal Grants and Social Welfare Spending: Do State Responses Matter?" *National Tax Journal*, *53* (March 2000): 125–152.

Chernick, Howard A. "On the Determinants of Subnational Tax Progressivity in the US." *National Tax Journal*, *57*, No. 1 (March 2005): 93–112.

Chernick, Howard, David Copeland, and Andrew Reschovsky. "The Fiscal Effects of the COVID-19 Pandemic on Cities: An Initial Assessment." *National Tax Journal*, *73*, No. 3 (September 2020): 699–732.

Chernick, Howard, Adam Langley, and Andrew Reschovsky. "Revenue Diversification and the Financing of Large American Central Cities." *Public Finance and Management*, *11*, No. 2 (2011): 138–159.

Chernick, Howard, and David Merriman. "Using Littered Pack Data to Estimate Cigarette Tax Avoidance in NYC." *National Tax Journal*, *66* (September 2013).

Chernick, Howard, and Andrew Reschovsky. "Who Pays the Gasoline Tax?" *National Tax Journal*, *50* (June 1997): 233–259.

Chodorow-Reich, Gabriel. "Geographic Cross-Sectional Fiscal Spending Multipliers: What Have We Learned?" *American Economic Journal: Economic Policy, 11*, No. 2 (2019): 1–34.

Chodorow-Reich, Gabriel, Laura Feiveson, Zachary Liscow, and William Gui Woolston. "Does State Fiscal Relief During Recessions Increase Employment? Evidence from the American Recovery and Reinvestment Act." *American Economic Journal: Economic Policy*, *4*, No. 3 (2012): 118–145.

Citrin, Jack. "Do People Want Something for Nothing: Public Opinion on Taxes and Government Spending." *National Tax Journal Supplement*, *32* (June 1979): 113–129.

Clark, Benjamin Y. "The Impacts of Autonomous Vehicles on Local Government Budgeting and Finance." *National Tax Journal*, *73* (March 2020): 259–282.

Clark, Phil. "Private Activity Tax-Exempt Bonds, 1984." *US Department of Treasury, Statistics of Income Bulletin*, *5* (Winter 85–86): 55–63.

Cline, Robert, William Fox, Thomas S. Neubig, and Andrew Phillips. "Total State and Local Business Taxes: A 50-State Study of the Taxes Paid by Business in FY 2003." *State Tax Notes* (March 1, 2004): 737–750.

Cline, Robert J., and Thomas S. Neubig. "The Sky is Not Falling: Why State and Local Revenues Were Not Significantly Impacted by the Internet in 1988." *State Tax Notes* (July 5, 1999): 43.

Clotfelter, Charles T. "Public Services, Private Substitutes, and the Demand for Protection Against Crime." *American Economic Review*, *67* (December 1977): 867–877.

Clotfelter, Charles T., and Phillip J. Cook. *Selling Hope, State Lotteries in America*. Cambridge, MA: Harvard University Press, 1989.

Clotfelter, Charles T., and Phillip J. Cook. "Redefining 'Success' in the State Lottery Business." *Journal of Policy Analysis and Management*, *9* (Winter 1990a): 99–104.

Clotfelter, Charles T., and Phillip J. Cook. "On the Economics of State Lotteries." *Journal of Economic Perspectives*, *4* (Fall 1990b): 105–119.

Coase, Ronald H. "The Lighthouse in Economics." *Journal of Law and Economics*, *17* (October 1974): 357–376.

Collins, David J., ed. *Vertical Fiscal Imbalance and the Allocation of Tax Powers*. Sydney: Australian Tax Research Foundation, 1993.

Conlin, Michael, and Paul N. Thompson. "Michigan and Ohio K-12 Educational Financing Systems: Equality and Efficiency." *Education Finance and Policy*, *9* (2014): 417–445.

Container Corporation of America v. Franchise Tax Board, *463* US 159 (1983).

Cordes, Joseph J., Robert D. Ebel, and Jane G. Gravelle, eds. *The Encyclopedia of Taxation and Tax Policy*. Washington, DC: Urban Institute Press, 2005.

Cornia, Gary, Kelly D. Edmiston, David L. Sjoquist, and Sally Wallace. "The Disappearing State Corporate Income Tax." *National Tax Journal*, *58* (March 2005): 115–138.

"Costing and Pricing for Local Governmental Services." *Governmental Finance*, *11* (March 1982): 3–27.

Council of Economic Advisers. *Economic Report of the President*. Washington, DC: Council of Economic Advisers, Various Years.

Courant, Paul N. "How Would You Know A Good Economic Development Policy if You Tripped Over One? Hint: Don't Just Count Jobs." *National Tax Journal*, *47* (December 1994): 863–881.

Courant, Paul N., Edward M. Gramlich, and Daniel L. Rubinfeld. "Why Voters Support Tax Limitation Amendments: The Michigan Case." *National Tax Journal*, *33* (March 1980): 1–20.

Courant, Paul N., Michael McPherson, and Alexandra M. Resch. "The Public Role in Higher Education." *National Tax Journal*, *59* (June 2006): 291–318.

Craft, Erik D. "The Demand for Vanity (Plates): Elasticities, Net Revenue Maximization, and Deadweight Loss." *Contemporary Economic Policy*, *20* (April 2002): 133–144.

Craig, Steven, and Robert P. Inman. "Federal Aid and Public Education: An Empirical Look at the New Fiscal Federalism." *Review of Economics and Statistics* (November 1982): 541–552.

Craig, Steven, and Robert P. Inman. "Education, Welfare, and the 'New' Federalism." In *Studies in State and Local Public Finances*, edited by Harvey Rosen. Chicago: University of Chicago Press, 1985.

Cullen, Julie Berry, and Susanna Loeb. "School Finance Reform in Michigan: Evaluating Proposal A." In *Helping Children Left Behind*, edited by J. Yinger. Cambridge, MA: MIT Press, 2004.

Dadayan, Lucy. "States' Addiction to Sins: Sin Tax Fallacy." *National Tax Journal*, *72*, No. 4 (2019): 723–754.

Davies, Daniel G. "The Significance of Taxation of Services for the Pattern of Distribution of Tax Burden by Income Class." In *Proceedings of the 52nd Annual Conference*, 138–146. Columbus, OH: National Tax Association, 1969.

Davis, Kevin C., Victoria Grimshaw, David Merriman, Matthew Farrelly, Howard Chernick, Micaela Coady, Kelsey Campbell, and Susan Kansagra. "Cigarette Trafficking in Five Northeastern US Cities." *Tobacco Control*, *10* (2013): E62–E68.

Deasey Jr., John A. "An Update on National Survey of Production Exemptions Under Sales and Use Tax Laws." In *Proceedings of the Seventy-Ninth Annual Conference*, 296–310. Columbus, OH: National Tax Association, 1987.

DeBartolo, Gil, and Peter Fortune. "The Demand for Public Services: Inferences from Municipal Bond Referenda." *National Tax Journal*, *35*, No. 1 (1982): 55–67.

DeBoer, Larry. "Administrative Costs of State Lotteries." *National Tax Journal*, *38* (December 1985): 479–487.

DeBoer, Larry, Marilyn Hirth, and Timothy Zimmer. "Examining Economies of Scale in School Consolidation." *Journal of Education Finance*, *35* (Fall 2009): 103–127.

DeJong, Gordon F., Deborah Roempke Graefe, and Tanja St. Pierre. "Welfare Reform and Interstate Migration of Poor Families." *Demography*, *42* (August 2005): 469–496.

Denison, Dwight V. "Debt Management." In *Management Policies in Local Government Finance*, edited by J. Bartle, B. Hildredth, and J. Marlowe. Washington, DC: International City/County Management Association, 2012.

DiMassi, Joseph A. "The Effects of Site Value Taxation in an Urban Area: A General Equilibrium Computational Approach." *National Tax Journal*, *40* (December 1987): 577–590.

Donahue, John D. *The Privatization Decision: Public Ends, Private Means*. New York: Basic Books, 1989.

Downes, Thomas A. "Evaluating the Impact of School Finance Reform on the Provision of Public Education: The California Case." *National Tax Journal*, *45* (December 1992): 405–419.

Downes, Thomas A., and Kieran M. Killeen. "So Slow to Change: The Limited Growth of User Fees in Public Education Finance, 1991–2010." *Working Paper*, November 27, 2013.

Downes, Thomas A., and Thomas F. Pogue. "Accounting for Fiscal Capacity and Need in the Design of School Aid Formulas." In *Fiscal Equalization for State and Local Government Finance*, edited by J. Anderson. Westport, CT: Praeger Publishers, 1994.

Downing, Paul B., and Thomas J. DiLorenzo. "User Charges and Special Districts." In *Management Policies in Local Government Finance*, edited by J. R. Aronson and E. Schwartz, 184–210. Washington, DC: International City Management Association, 1981.

Downs, Anthony. *Stuck in Traffic: Coping with Peak-Hour Traffic Congestion*. Washington, DC: The Brookings Institution, 1992.

Drukker, Austin, Ted Gayer, and Alexander K. Gold. "Tax-Exempt Municipal Bonds and the Financing of Professional Sports Stadiums." *National Tax Journal*, *73* (March 2020): 157–196.

Due, John F. *State and Local Sales Taxation*. Chicago: Public Administration Service, 1971.

Due, John F., and John L. Mikesell. *Sales Taxation: State and Local Structure and Administration*. Washington, DC: Urban Institute Press, 1994.

Duncan, Denvil, Venkata Nadella, Ashley Clark, Stacey Giroux, and John Graham. "Searching for a Tolerable Tax: Public Attitudes toward Roadway Financing Alternatives." *Public Finance Review*, *45* (September 2017): 678–700.

Duncombe, William. "Demand for Local Public Services Revisited: The Case of Fire Protection." *Public Finance Quarterly*, *19* (October 1991): 412–436.

Duncombe, William, Jerry Miner, and John Ruggiero. "Potential Cost Savings from School District Consolidation: A Case Study of New York." *Economics of Education Review*, *14*, No. 3 (1995): 265–284.

Duncombe, William, and John Yinger. "Alternative Paths to Property Tax Relief." Chap. 9 in *Property Taxation and Local Government Finance*, edited by W. Oates. Cambridge, MA: Lincoln Institute of Land Policy, 2001.

Duncombe, William, and John Yinger. "Does School District Consolidation Cut Costs?" *Working Paper*, Center for Policy Research, Syracuse University, 2003.

Dye, Richard F. "The Effect of Demographic Change on State and Local Government Budgets." *Policy Forum*, Institute of Government and Public Affairs *20*, November 1, 2007.

Dye, Richard F., and Richard W. England. *Assessing the Theory and Practice of Land Value Taxation*. Cambridge, MA: Lincoln Institute of Land Policy, 2010.

Dye, Richard F., and Therese McGuire. "Growth and Variability of State Individual Income and General Sales Taxes." *National Tax Journal*, *44* (March 1991): 55–66.

Dye, Richard F., Therese McGuire, and Daniel McMillen. "Are Property Tax Limitations More Binding Over Time?" *National Tax Journal*, *58* (March 2, 2005): 215–225.

Ebel, Robert D., and John E. Petersen, eds. *The Oxford Handbook of State and Local Government Finance*. Oxford: Oxford University Press, 2012.

Eberts Randall W., Ellen Kehoe, and Joe A. Stone. "The Effect of School Size on Student Outcomes." Center for Educational Policy and Management. Eugene: University of Oregon, June 1984.

Edmiston, Kelly. "Strategic Apportionment of the State Corporate Income Tax." *National Tax Journal*, *55* (June 2002): 239–262.

The Eighth Annual Study of General Manufacturing Climates of the Forty-Eight Contiguous States of America. Chicago: Grant Thornton Accountants, June 1987.

Eliason, Paul, and Byron Lutz. "Can Fiscal Rules Constrain the Size of Government? An Analysis of the 'Crown Jewel' of Tax and Expenditure Limitations." *Journal of Public Economics*, *166* (October 2018): 115–144.

Elliott, Donald S., and John C. Navin. "Has Riverboat Gambling Reduced State Lottery Revenue?" *Public Finance Review*, *30* (May 2002): 235–247.

Ellison, Glen, and Sara Fisher Ellison. "Internet Retail Demand: Taxes, Geography, and Online-Offline Competition." *NBER Working Paper No. 12242*, May 2006.

Ellwood, David T. "Anti-Poverty Policy for Families in the Next Century: From Welfare to Work – and Worries." *Journal of Economic Perspectives*, *14*, No. 1 (Winter 2000): 189–198.

Ellwood, David T. "The Impact of the Earned Income Tax Credit and Social Policy Reforms on Work, Marriage, and Living Arrangements." *National Tax Journal*, *53*, No. 4, Part 2 (December 2000): 1063–1105.

Evans, William N., Sheila E. Murray, and Robert M. Schwab. "Schoolhouses, Courthouses, and Statehouses After Serrano." *Journal of Policy Analysis and Management*, *16* (Winter 1997): 10–31.

Evans, William N., Sheila E. Murray, and Robert M. Schwab. "The Impact of Court Mandated School Finance Reform." In *Equity and Adequacy in Education Finance: Issues and Perspectives*, edited by H. F. Ladd, R. Chalk, and J. S. Hansen. Washington, DC: National Academy Press, 1999.

Evans, William N., Sheila E. Murray, and Robert M. Schwab. "The Property Tax and Education Finance: Uneasy Compromises." In *Property Taxation and Local Government Finance*, edited by W. Oates. Cambridge, MA: Lincoln Institute of Land Policy, 2001.

Faulk, Dagney. "Do State Economic Development Incentives Create Jobs? An Analysis of State Employment Tax Credits." *National Tax Journal*, *55* (June 2002): 263–280.

Faulk, Dagney, and Michael Hicks. "Local Government Consolidation: Potential Savings Due to Economies of Scale and Efficiency Gains." *Center for Business and Economic Research*, Ball State University, October 2011.

Feenberg, Daniel R., and James M. Poterba. "Which Households Own Municipal Bonds? Evidence from Tax Returns." *National Tax Journal*, *44* (December 1991): 93–103.

Feldstein, Martin. "Wealth Neutrality and Local Choice in Public Education." *American Economic Review*, *65* (1975): 75–89.

Figlio, David N., and Helen F. Ladd. "School Accountability and Student Achievement." In *Handbook of Research on Education Finance and Policy*, edited by Helen F. Ladd and Edward B. Fiske. London: Routledge, 2008.

Fischel, William A. "A Property Rights Approach to Municipal Zoning." *Land Economics*, *54* (1978): 64–81.
Fischel, William A. "Property Taxation and the Tiebout Model: Evidence for the Benefit View from Zoning and Voting." *Journal of Economic Literature*, *30* (March 1992): 171–177.
Fischel, William A. "Homevoters, Municipal Corporate Governance, and the Benefit View of the Property Tax." *National Tax Journal*, *54*, No. 1 (March 2001): 157–173.
Fischel, William A. "Municipal Corporations, Homeowners and the Benefit View of the Property Tax." In *Property Taxation and Local Government Finance*, edited by W. Oates. Cambridge, MA: Lincoln Institute of Land Policy, 2001.
Fischel, William A. *The Homevoter Hypothesis*. Cambridge: Harvard University Press, 2005.
Fischel, William A. ed. *The Tiebout Model at Fifty*. Cambridge, MA: Lincoln Institute of Land Policy, 2006.
Fischel, William A. "Fiscal Zoning and Economists' Views of the Property Tax." *Working Paper*, Lincoln Institute of Land Policy, February 2014.
Fisher, Peter. *Grading Places, What Do the Business Climate Rankings Really Tell Us?* Washington, DC: Economic Policy Institute, 2005.
Fisher, Ronald C. "The Combined State and Federal Income Tax Treatment of Charitable Contributions." In *Proceedings of the 70th Annual Conference*. Columbus, OH: National Tax Association-Tax Institute of America, 1978.
Fisher, Ronald C. "A Theoretical View of Revenue-Sharing Grants." *National Tax Journal*, *32* (June 1979): 173–184.
Fisher, Ronald C. "Expenditure Incentives of Intergovernmental Grants: Revenue Sharing and Matching Grants." *Research in Urban Economics*, *1* (1980a): 201–218.
Fisher, Ronald C. "Local Sales Taxes: Tax Rate Differentials, Sales Loss, and Revenue Estimation." *Public Finance Quarterly*, *8* (April 1980b): 171–188.
Fisher, Ronald C. "Income and Grant Effects on Local Expenditure: The Flypaper Effect and Other Difficulties." *Journal of Urban Economics*, *12* (1982): 324–345.
Fisher, Ronald C. "Taxes and Expenditures in the US: Public Opinion Surveys and Incidence Analysis Compared." *Economic Inquiry*, *23* (July 1985): 525–550.
Fisher, Ronald C. "Macroeconomic Implications of Subnational Fiscal Policy: The Overseas Experience." In *Vertical Fiscal Imbalance and the Allocation of Tax Powers*, edited by David J. Collins, 125–152. Sydney: Australian Tax Research Foundation, 1993.
Fisher, Ronald C. "The Effects of State and Local Public Services on Economic Development." *New England Economic Review, Proceedings of a Symposium on the Effects of State and Local Policies on Economic Development* (March/April 1997): 53–67.
Fisher, Ronald C. "The Changing State-Local Fiscal Environment: A 25-year Retrospective." In *State and Local Finances Under Pressure*, edited by D. Sjoquist, 9–29. Cheltenham, UK: Edward Elgar, 2003.
Fisher, Ronald C. "What Policy Makers Should Know About Property Taxes." *State Tax Notes 51*, No. 8 (February 23, 2009): 591–597 (Reprinted from Lincoln Institute of Land Policy, *Land Lines*).
Fisher, Ronald C. "Major State-Local Policy Challenges: Outside-the-Box Solutions Needed." In *State and Local Fiscal Policy: Thinking Outside the Box*, edited by Sally Wallace, 9–27. Northampton, MA: Edward Elgar Publishing, 2010a.
Fisher, Ronald C. "The State of State and Local Government Finance." *Regional Economic Development*, 4–22. St. Louis: St. Louis Federal Reserve Bank, 2010b.
Fisher, Ronald C. "Governmental Expenditure Implications of Autonomous Vehicles." *National Tax Journal* 73 (March 2020): 235–258.
Fisher, Ronald C. "Declining State and Local Income Taxes." *Tax Notes State*, November 15, 2021, pp. 753–758.
Fisher, Ronald C. "Property Taxes: What Everybody Needs to Know." *Introduction to the Property Tax*. Cambridge, MA: Lincoln Institute of Land Policy, 2021.
Fisher, Ronald C. "Understanding State-Local Revenue: A Taxing Exercise." *Tax Notes State*, January 11, 2021, pp. 137–143.
Fisher, Ronald C., and Charles Ballard. "Economic Analysis of Gross Income Taxes." *US Department of Treasury, Office of Tax Analysis*, November 1986.
Fisher, Ronald C., and Andrew Bristle. "State Intergovernmental Grant Programs." In *The Oxford Handbook of State and Local Government Finance*, edited by R. Ebel and J. Petersen, 213–245. Oxford: Oxford University Press, 2012.

Fisher, Ronald C., and Leslie Papke. "Local Government Responses to Education Grants." *National Tax Journal*, *53* (March 2000): 153–168.

Fisher, Ronald C., and Robert H. Rasche. "The Incidence and Incentive Effects of Property Tax Credits: Evidence from Michigan." *Public Finance Quarterly*, *12* (July 1984): 291–319.

Fisher, Ronald C., and Riley Sullivan. "Why is State and Local Government Capital Spending Lower in the New England States than in Other U.S. States?" *Policy Report 16-1*. New England Public Policy Center, Federal Reserve Bank of Boston, 2016.

Fisher, Ronald C., and Robert W. Wassmer. "An Evaluation of the Recent Move to Centralize the Funding of Public Schools in Michigan." *Public Budgeting and Finance*, *16* (Fall 1996): 90–112.

Fisher, Ronald C., and Robert W. Wassmer. "Economic Influences on the Structure of Local Government in Metropolitan Areas." *Journal of Urban Economics*, *43* (1998): 444–470.

Fisher, Ronald C., and Robert W. Wassmer. "Interstate Variation in the Use of Fees to Fund K-12 Public Education." *Economics of Education Review*, *21* (2002): 87–100.

Fisher, Ronald C., and Robert W. Wassmer. "State and Local Government Debt, 1992–2008." *State Tax Notes*, August 15, 2011, pp. 427–436.

Fisher, Ronald C., and Robert W. Wassmer. "Debt Burdens of California's State and Local Governments." *California Journal of Politics and Policy* (2012): 49–76.

Fisher, Ronald C., and Robert W. Wassmer. "The Issuance of State and Local Debt During the United States' Great Recession." *National Tax Journal*, *67*, No. 1 (March 2014): 113–150.

Fisher, Ronald C., and Robert W. Wassmer. "Analysis of State and Local Government Capital Expenditure During the 2000s." *Public Budgeting and Finance* (January 2015): 3–28.

Fisher, Ronald C., and Robert W. Wassmer. "Does Perception of Gas Tax Paid Influence Support for Funding Highway Improvements?" *Public Finance Review*, *45* (July 2017): 511–537.

Fisher, Ronald C., and Robert W. Wassmer. "Don't Bet on It." *State Tax Notes*, October 22, 2018a.

Fisher, Ronald C., and Robert W. Wassmer. "Property Tax Knowledge and Attitudes." *State Tax Notes*, January 1, 2018b.

Fisher, Ronald C., and Robert W. Wassmer. "Tolls Rule." *State Tax Notes*, July 23, 2018c.

Fisher, Ronald C., and Robert W. Wassmer. "The Resurgence of Property Taxes." *Tax Notes State*, October 14, 2019, pp. 125–128.

Fisher, Ronald C., and Robert W. Wassmer. "Criminal Justice Spending: Perspectives and Comparisons." *Tax Notes State*, July 20, 2020, pp. 301–305.

Flanagan, Ann E., and Sheila E. Murray. "A Decade of Reform: The Impact of School Reform in Kentucky." In *Helping Children Left Behind*, edited by J. Yinger, 195–214. Cambridge, MA: MIT Press, 2004.

Flatters, Frank, J., Vernon Henderson, and Peter Mieskowski. "Public Goods, Efficiency, and Regional Fiscal Equalization." *Journal of Public Economics*, *3* (1974): 99–112.

Fort, Rodney. *Sports Economics*. Hoboken: Prentice Hall, 2010.

Fox, William F. "Reviewing Economies of Size in Education." *Journal of Educational Finance*, *6* (1981): 273–296.

Fox, William F. "Tax Structure and the Location of Economic Activity Along State Borders." *National Tax Journal*, *39* (December 1986): 387–401.

Fox, William F. ed. *Sales Taxation: Critical Issues in Policy and Administration*. Westport, CT: Praeger, 1992.

Fox, William F. "Can the Sales Tax Survive a Future Like Its Past?" In *The Future of State Taxation*, edited by D. Brunori, 33–48. Washington, DC: The Urban Institute Press, 1998.

Fox, William F. "Can State and Local Governments Rely on Alternative Tax Sources?" *Regional Economic Development*. St. Louis: Federal Reserve Bank of St. Louis, 2010.

Fox, William F. "Retail Sales and Use Taxes." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel, and John E. Petersen, 406–428. Oxford: Oxford University Press, 2012.

Fox, William F. "The Influence of Autonomous Vehicles on State Tax Revenues." *National Tax Journal*, *73* (March 2020): 199–234.

Fox, William F., and LeAnn Luna. "State Corporate Tax Revenue Trends: Causes and Possible Solutions." *National Tax Journal*, *55*, No. 3 (September 2002): 491–508.

Fox, William F., LeAnn Luna, and Matthew N. Murray. "How Should a Subnational Corporate Income Tax on Multistate Businesses Be Structured?" *National Tax Journal*, *57* (March 2005): 139.

Fox, William F., and Matthew Murray. "Economic Aspects of Taxing Services." *National Tax Journal*, *41* (March 1988): 19–36.

Freedman, Eric. "Some State Residents Heading South to Save on Liquor." *The Detroit News,* November 13, 1994, p. C1.

Frieden, Karl A., and Stephanie T. Do. "State Adoption of European DSTs: Misguided and Unnecessary." *Tax Notes State*, May 10, 2021.

Gade, Mary N., and Lee C. Adkins. "Tax Exporting and State Revenue Structures." *National Tax Journal*, *43* (March 1990): 39–52.

Galante, Steven P. "Companies Shifting Tax Focus as State Levies Loom Larger." *The Wall Street Journal* (April 20, 1987): 25.

Gale, William G., Aaron Krupkin, and Kim Rueben. "The Relationship Between Taxes and growth at the State Level: New Evidence." *National Tax Journal*, *68* (December 2015): 919–942.

Galligan, Brian, ed. *Federalism and the Economy: International, National, and State Issues*. Canberra: Federalism Research Centre, Australian National University, 1993.

Galper, Harvey, and John Petersen. "An Analysis of Subsidy Plans to Support State and Local Borrowing." *National Tax Journal*, *24*, No. 2 (June 1971): 205–234.

Galper, Harvey, and John Petersen. "The Equity Effects of a Taxable Municipal Bond Subsidy." *National Tax Journal*, *26*, No. 4 (1973): 611–624.

Gambale, Geraldine. "34th Annual Corporate Survey & the 16th Annual Consultants Survey." *Area Development*, *Q1* (2020).

Gamkhar, Shama, and Anwar Shah. "The Impact of Intergovernmental Fiscal Transfers: A Synthesis of the Conceptual and Empirical Literature." In *Intergovernmental Fiscal Transfers: Principles and Practice*, edited by R. Boadway and A. Shah, 225–258. Washington, DC: The World Bank, 2007.

Garcia-Mila, Teresa, and Therese J. McGuire. "The Contribution of Publicly Provided Inputs to States' Economies." *Regional Science and Urban Economics*, *22* (1992): 229–241.

Garcia-Mila, Teresa, Therese J. McGuire, and Robert H. Porter. "The Effect of Public Capital in State-Level Production Functions Reconsidered." *The Review of Economics and Statistics*, *78* (February 1996): 177–180.

Garrett, Thomas A., and Cletus C. Coughlin. "Inter-temporal Differences in the Income Elasticity of Demand for Lottery Tickets." *National Tax Journal*, *62* (March 1, 2009): 77–99.

Getz, Malcolm. *The Economics of the Urban Fire Department*. Baltimore, MD: Johns Hopkins University Press, 1979.

Ghent, Linda S., and Alan P. Grant. "The Demand for Lottery Products and Their Distributional Consequences." *National Tax Journal*, *63*, No. 2 (June 2010): 253–268.

Giertz, J. Fred, and Seth Giertz. "The 2002 Downturn in State Revenues: A Comparative Review and Analysis." *National Tax Journal*, *57*, No. 1 (March 2004): 111–132.

Gill, Brian and Kevin Booker. "School Competition and Student Outcomes." In *Handbook of Research on Education Finance and Policy*, edited by Helen F. Ladd and Edward B. Fiske, 183–200. London: Routledge, 2008.

Gittleman, Maury, and Brooks Pierce. "Compensation for State and Local Government Workers." *Journal of Economic Perspectives*, *26* (Winter 2011): 217–242.

Gleason, Phillip M. "Let the Search Continue: Charter Schools and the Public Interest." *Journal of Policy Analysis and Management*, *38* (Fall 2019): 1054–1062.

Goddeeris, John. "User Charges as Revenue Sources." In *Michigan's Fiscal and Economic Structure*, edited by Harvey E. Brazer, 765–787. Ann Arbor: University of Michigan Press, 1982.

Gold, Steven D. *Property Tax Relief*. Lexington, MA: Lexington Books, 1979.

Gold, Steven D. "Contingency Measures and Fiscal Limitations: The Real World Significance of Some Recent State Budget Innovations." *National Tax Journal*, *37* (September 1984): 421–432.

Gold, Steven D., ed. *Reforming State Tax Systems*. Denver: National Conference of State Legislatures, 1986.

Gold, Steven D. "State Government Experience with Balanced Budget Requirements." *Testimony to the House Budget Committee, US House of Representatives*, May 13, 1992.

Goldhaber, Dan. "Teachers Matter, but Effective Teacher Quality Policies are Elusive." In *Handbook of Research on Education Finance and Policy*, edited by Helen F. Ladd and Edward B. Fiske, 146–165. London: Routledge, 2008.

Gomez-Ibanez, Jose A. "The Federal Role in Urban Transportation." In *American Domestic Priorities: An Economic Appraisal*, edited by J. Quigley and D. Rubinfeld, 183–223. Berkeley: University of California Press, 1985.

Goolsbee, Austan D. "In a World without Borders: The Impact of Taxes on Internet Commerce." *Quarterly Journal of Economics*, *115* (May 2000): 561–576.

Goolsbee, Austan D., Steven Levitt, and Chad Syverson. *Microeconomics*, New York: Worth Publishers, 2014.

Gordon, Nora, and Brian Knight. "The Effects of School District Consolidation on Educational Costs and Quality." *Public Finance Review*, *36* (July 2008): 408–430.

Gordon, Nora, and Brian Knight. "A Spatial Merger Estimator with an Application to School District Consolidation." *Journal of Public Economics*, *93* (June 2009): 752–765.

Gordon, Roger H., and Joel Slemrod. "An Empirical Examination of Municipal Financial Policy." In *Studies in State and Local Finance*, edited by H. Rosen, 53–82. Chicago: University of Chicago Press, 1986.

Gordon, Roger H., and John D. Wilson. "An Examination of Multijurisdictional Corporate Income Taxation Under Formula Apportionment." *Econometrica*, *54* (1986): 1357–1373.

Gordon, Tracy M. "State and Local Fiscal Institutions in Recession and Recovery." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen, 246–270. Oxford: Oxford University Press, 2012.

Gordon, Tracy, Lucy Dadayan, and Kim Rueben. "State and Local Government Finances in the COVID-19 Era." *National Tax Journal* (September 2020).

Grace, Martin F., David L. Sjoquist, and Laura Wheeler. "The Effect of Insurance Premium Taxes on Interstate Differences in the Size of the Property-Casualty Insurance Industry." *National Tax Journal*, *67*, No. 1 (March 2014): 151–182.

Gramlich, Edward M. "Alternative Federal Policies for Stimulating State and Local Expenditures: A Comparison of Their Effects." *National Tax Journal*, *21* (June 1968): 119–129.

Gramlich, Edward M. "Intergovernmental Grants: A Review of the Empirical Literature." In *The Political Economy of Fiscal Federalism*, edited by W. Oates, 219–240. Lexington, MA: Lexington Books, 1976.

Gramlich, Edward M. "Deductibility of State and Local Taxes." *National Tax Journal*, *38* (December 1985a): 447–466.

Gramlich, Edward M. "Reforming US Federal Fiscal Arrangements." In *American Domestic Priorities: An Economic Appraisal*, edited by J. Quigley and D. Rubinfeld, 34–69. Berkeley and Los Angeles: University of California Press, 1985b.

Gramlich, Edward M. "Subnational Fiscal Policy." *Perspectives on Local Public Finance and Public Policy*, *3* (1987): 3–27.

Gramlich, Edward M. "The 1991 State and Local Fiscal Crisis." *Brookings Papers on Economic Activity*, *2* (1991): 249–275.

Gramlich, Edward M. "Let's Hear It for User Fees." *Governing*, January 1993, pp. 54–55.

Gramlich, Edward M. "Infrastructure Investment: A Review Essay." *Journal of Economic Literature*, *32* (1994): 1176–1996.

Gramlich, Edward M., and Harvey Galper. "State and Local Fiscal Behavior and Federal Grant Policy." *Brookings Papers on Economic Activity* (1973): 15–58.

Gramlich, Edward M., and Deborah S. Laren. "Migration and Income Redistribution Responsibilities." *Journal of Human Resources*, *19* (1984): 489–511.

Gramlich, Edward M., and Daniel L. Rubinfeld. "Micro Estimates of Public Spending Demand Functions and Tests of the Tiebout and Median-Voter Hypotheses." *Journal of Political Economy*, *90* (1982): 536–560.

Grasha, Kevin. "Eaton County Passes Juvenile Millage." *Lansing State Journal* (November 3, 2004).

Gravelle, Jennifer. "Who Pays Property Taxes? A Look at the Tax Effects of Property Taxes Across the States." *State Tax Notes* (December 24, 2007): 887–890.

Gravelle, Jennifer, and Sally Wallace. "Overview of the Trends in Property Tax Base Erosion." In *Erosion of the Property Tax Base*, edited by N. Augustine, 17–46. Cambridge, MA: Lincoln Institute of Land Policy, 2009.

Greenblatt, Alan. "The Left Behind Syndrome." *Governing,* September 2004, pp. 38–43.

Greene, Kenneth V., and Thomas J. Parliament. "Political Externalities, Efficiency, and the Welfare Losses from Consolidation." *National Tax Journal*, *33* (June 1980): 209–217.

Greenstein, Robert. *The Earned Income Tax Credit: Boosting Employment, Aiding the Working Poor.* Washington, DC: Center on Budget and Policy Priorities, August 2005.

Gruber, Jonathan. *Public Finance and Public Policy*. New York: Worth Publishers, 2013.

Gulley, O. David, and Frank A. Scott Jr. "The Demand for Wagering on State-Operated Lotto Games." *National Tax Journal*, *46* (March 1993): 13–22.

Hales, David F. Letter to the Editor. *Lansing State Journal* (April 25, 1989): 10A.

Hamilton, Bruce W. "Zoning and Property Taxation in a System of Local Governments." *Urban Studies*, *12* (June 1975): 205–211.

Hamilton, Bruce W. "The Effects of Property Taxes and Local Public Spending on Property Values: A Theoretical Comment." *Journal of Political Economy*, *84* (June 1976a): 647–650.

Hamilton, Bruce W. "Capitalization of Interjurisdictional Differences in Local Tax Prices." *American Economic Review*, *66* (December 1976b): 743–753.

Hamilton, Bruce W. "The Flypaper Effect and Other Anomalies." *Journal of Public Economics*, *22* (December 1983): 347–361.

Hansen, Benjamin, Daniel Rees, and Joseph Sabia. "Cigarette Taxes and How Youths Obtain Cigarettes." *National Tax Journal*, *66* No. 2 (June 2013): 371–382.

Hansen, W. Lee, and Burton A. Weisbrod. "The Distribution of Costs and Direct Benefits of Public Higher Education: The Case of California." *Journal of Human Resources*, *4* (Spring 1969): 176–191.

Hanushek, Eric A. "The Economics of Schooling." *Journal of Economic Literature*, *24* (September 1986): 1141–1177.

Hanushek, Eric A. *Making Schools Work*. Washington, DC: The Brookings Institution, 1994.

Hanushek, Eric A., and Margaret E. Raymond. "The Confusing World of Educational Accountability." *National Tax Journal*, *54* (June 2001): 365–384.

Hardy, Pat. "The Consolidation of City and County Governments: A Look at the History and Outcome-Based Research of These Efforts." *The University of Tennessee Municipal Technical Advisory Service* (October 22, 2012).

Harmon, Oskar. "The Income Elasticity of Demand for Single-Family Owner-Occupied Housing: An Empirical Reconciliation." *Journal of Urban Economics*, *24* (1988): 173–185.

Harrington, David E., and Kathy J. Krynski. "State Pricing of Vanity License Plates." *National Tax Journal*, *42* (March 1989): 95–99.

Hawkins, Richard, Terri Slay, and Sally Wallace. "Play Here, Pay Here: An Analysis of the State Income Tax on Athletes." *State Tax Notes* (November 25, 2002).

Heintz, James. "The Impact of Public Capital on the US Private Economy: New Evidence and Analysis." *International Review of Applied Economics*, *24*, No. 5 (September 2010): 619–632.

Hellerstein, Jerome R. "The *Quill* Case: What States Can Do to Undo the Effects of the Decision." *State Tax Notes* (February 8, 1993): 273–275.

Henderson, J. Vernon. "The Tiebout Model: Bring Back the Entrepreneurs." *Journal of Political Economy*, *93* (April 1985a): 248–264.

Henderson, J. Vernon. "Property Tax Incidence with a Public Sector." *Journal of Political Economy*, *93* (August 1985b): 648–665.

Hendrix, Michelle E., and George R. Zodrow. "Sales Taxation of Services: An Economic Perspective." *State Tax Notes* (February 23, 2004): 641.

Hertert, Linda, Carolyn Busch, and Allan Odden. "School Finance Inequities Among the States: The Problem from a National Perspective." *Journal of Education Finance*, *19* (Winter 1994): 231–255.

Hettich, Walter, and Stanley Winer. "A Positive Model of Fiscal Structure." *Journal of Public Economics*, *24* (1984): 67–87.

Hines, James. "Michigan's Flirtation with the Single Business Tax." In *Michigan at the Millennium*, edited by C. Ballard, 603–628. East Lansing: Michigan State University Press, 2003.

Hirsch, Jerry. "Is Wholesale Change in Alcohol Pricing on Tap?" *Los Angeles Times*. Accessed April 10, 2005. www.latimes.com.

Hirsch, Werner Z. *The Economics of State and Local Government*. New York: McGraw-Hill, 1970.

Hodge, Scott A., J. Scott Moody, and Wendy P. Warcholik. *State Business Tax Climate Index*. Washington, DC: Tax Foundation, 2004. www.taxfoundation.org/sbtci.html.

Hoffman, David. "State Income Taxation of Nonresident Professional Athletes." *State Tax Notes* (October 21, 2002): 187–195.

Holcombe, Randall G. "Concepts of Public Sector Equilibrium." *National Tax Journal*, *34*, (March 1980): 77–80.

Holtz-Eakin, Douglas, and Harvey S. Rosen. "Tax Deductibility and Municipal Budget Structure." In *Fiscal Federalism: Quantitative Studies*, edited by H. Rosen, 107–136. Chicago: University of Chicago Press, 1988.

Horwitz, Sari. "Cigarette Smuggling Linked to Terrorism." *Washington Post*. Accessed June 8, 2004. www.washingtonpost.com.

Hotz, V. Joseph, and John Karl Scholz. "The Earned Income Tax Credit." In *Means-Tested Transfer Programs in the United States*, edited by Robert Moffitt, 141–198. Chicago: The University of Chicago Press and NBER, 2003.

Hoxby, Caroline M. "All School Finance Equalizations Are Not Created Equal." *Quarterly Journal of Economics*, *66* (November 2001): 1189–1232.

Huang, Yao. "A Guide to State Operating Aid Programs for Elementary and Secondary Education." In *Helping Children Left Behind*, edited by J. Yinger, 331–352. Cambridge, MA: MIT Press, 2004.

Huang, Yao, Anna Lukemeyer, and John Yinger. "A Guide to State Court Decisions on Educational Finance." In *Helping Children Left Behind*, edited by J. Yinger, 317–330. Cambridge, MA: MIT Press, 2004.

Hulten, Charles R. "Productivity Change in State and Local Governments." *Review of Economics and Statistics*, *66* (1984): 256–266.

Humphrey, Tom. "Tennessee Lawmakers OK Two-Year Delay for Sales Tax Streamlining." *State Tax Notes* (May 30, 2005): 634.

Hyman, Joshua. "Does Money Matter in the Long Run? Effects of School Spending on Educational Attainment." *American Economic Journal: Economic Policy*, *9* (2017): 256–280.

"Illinois Pension Problem: How Big is it, Really?" *WBEZ 91.5 Chicago*. www.wbez.org/news/illinois-pension-problem-how-big-it-really-109659.

Ingersoll, Bruce. "Keep It Moving." *The Wall Street Journal* (January 20, 1993): R12.

Inman, Robert P. "Testing Political Economy's 'As If' Proposition: Is the Median Voter Really Decisive?" *Public Choice*, *33* (Winter 1978): 45–65.

Inman, Robert P. "The Fiscal Performance of Local Governments: An Interpretive Review." In *Current Issues in Urban Economics*, edited by P. Mieskowski and M. Strasheim, 270–321. Baltimore: The Johns Hopkins University Press, 1979a.

Inman, Robert P. "Subsidies, Regulations, and the Taxation of Property in Large US Cities." *National Tax Journal*, *32* (June 1979b): 159–168.

Inman, Robert P. "Public Employee Pensions and the Local Labor Budget." *Journal of Public Economics*, *19* (1982): 49–71.

Inman, Robert P. "Does Deductibility Influence Local Taxation?" *Working Paper No.85–6*, Federal Reserve Bank of Philadelphia, May 1985.

Inman, Robert P. "Federal Assistance and Local Services in the United States: The Evolution of a New Federalist Fiscal Order." In *Fiscal Federalism: Quantitative Studies*, edited by H. Rosen, 33–74. Chicago: University of Chicago Press, 1988.

Inman, Robert P. "State and Local Taxation Following TRA86: Introduction and Summary." *Journal of Policy Analysis and Management*, *12* (Winter 1993): 3–8.

Inman, Robert P. "States in Fiscal Distress." *Regional Economic Development*, 65–80. St. Louis: St. Louis Federal Reserve Bank, 2010.

Jackson, C. K. "Does School Spending Matter? The New Literature on an Old Question." In *Confronting Inequality: How Policies and Practices Shape Children's Opportunities*, edited by L. Tach, R. Dunifon, and D. L. Miller, 165–186. American Psychological Association, 2020.

Jackson, E. Donley. "State Taxation of Endorsement and Royalty Income of Nonresident Professional Athletes." *Journal of State Taxation*, *16*, No. 4 (April 1998): 1–14. Accessed July 19, 2005, ABI/INFORM Global database. (Document ID: 28519230).

Jay, Christopher. "NSW Crackdown on Bootleg Cigarettes." *Financial Review* (August 6, 1987): 6.

Johnson, David. *Public Choice, An Introduction to the New Political Economy*. Mountain View, CA: Bristlecome Books, 1991.

Johnson, Matthew. "Despite Lower Volume, Taxables Continue Expansionary Trend." *The Bond Buyer*, December 2, 2004.

Kaufman, George, C. "Debt Management." In *Management Policies in Local Government Finance*, edited by J.R. Aronson and E. Schwartz, 302–327. Washington, DC: International City Management Association, 1981.

Kearney, Melissa Schettini. "The Economic Losers and Winners of Legalized Gambling." *National Tax Journal*, *57* (June 2005): 281–302.

Keefe, Jeffrey. "Are Public Employees Overpaid?" *Labor Studies Journal*, *37*, No. 1 (2012): 104–126.

Kenyon, Daphne A. "Implicit Aid to State and Local Governments through Federal Tax Deductibility." In *Intergovernmental Fiscal Relations in an Era of New Federalism*, edited by M. Bell. Greenwich, CT: JAI Press, 1988.

Kenyon, Daphne A. "Effects of Federal Volume Caps on State and Local Borrowing." *National Tax Journal*, *44* (December 1991): 81–92.

Kenyon, Daphne A. "Private Activity Bond Cap: Effects Among the States." *Intergovernmental Perspective*, *19* (Winter 1993): 25–33.

Kenyon, Daphne A. "Theories of Interjurisdictional Competition." *New England Economic Review, Proceedings of a Symposium on the Effects of State and Local Policies on Economic Development* (March/April 1997).

Kenyon, Daphne A. *The Property Tax – School Funding Dilemma*. Cambridge, MA: Lincoln Institute of Land Policy, 2007.

Kenyon, Daphne A. "Providing and Financing K-12 Education." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert D. Ebel and John E. Petersen, 519–541. Oxford: Oxford University Press, 2012.

Kenyon, Daphne A., and Karen M. Benker. "Fiscal Discipline: Lessons from the State Experience." *National Tax Journal*, *37* (September 1984): 433–446.

Kenyon, Daphne A., and John Kincaid, eds. *Competition Among States and Local Governments*. Washington, DC: Urban Institute Press, 1991.

Kenyon, Daphne A., and Adam H. Langley. *Payments in Lieu of Taxes: Balancing Municipal and Nonprofit Interests*. Cambridge, MA: Lincoln Institute of Land Policy, November 2010.

Kenyon, Daphne A., Adam H. Langley, and Bethany P. Paquin. *Rethinking Property Tax Incentives for Business*. Cambridge, MA: Lincoln Institute of Land Policy, 2012.

Kenyon, Daphne, and Semida Munteanu. "Effects of Reducing the Role of the Property Tax in Funding K-12 Education." *Lincoln Institute of Land Policy*, November 2021.

Kettl, Donald F. *Sharing Power: Public Governance and Private Markets*. Washington, DC: The Brookings Institution, 1993.

Killian, Larita, and Dagney Faulk. "Policy Brief: Special Districts and Local Government Reform." Center for Business and Economic Research. Muncie, IN: Ball State University, March 2012.

King, A. Thomas. "Estimating Property Tax Capitalization: A Critical Comment." *Journal of Political Economy*, *85* (April 1977): 425–432.

King, David. *Fiscal Tiers*. London: George Allen & Unwin, 1984.

King, David. "Intergovernmental Fiscal Relations: Concepts and Models." In *Intergovernmental Fiscal Relations*, edited by R. Fisher, 19–60. Boston: Kluwer Academic Publishers, 1997.

Kioko, Sharon. "Structure of State-Level Tax and Expenditure Limits." *Public Budgeting & Finance* (Summer 2011): 43–58.

Kirk, Robert, and William Mallett. "Funding and Financing Highways and Public Transportation." Congressional Research Service, May 11, 2020.

Kirk, Victor. "Who's Winning the Amazon Tax Battle." *Governing.com*, November 2011.

Knight, Brian. "Supermajority Voting Requirements for Tax Increases: Evidence from the States." *Journal of Public Economics*, *76*, No. 1 (April 2000): 41–67.

Knight, Brian. "Endogenous Federal Grants and Crowd-out of State Government spending: Theory and Evidence from the Federal Highway Aid Program." *The American Economic Review* (March 2002): 71–92.

Kohler, Heinz. *Intermediate Microeconomics*. Glenview, IL: Scott, Foresman, 1982.

Kolbe, T., B. D. Baker, D. Atchison, J. Levin, and P. Harris. "The Additional Cost of Operating Rural Schools: Evidence From Vermont." *AERA Open* (January 2021).

Ladd, Helen F. "Local Education Expenditures, Fiscal Capacity, and the Composition of the Property Tax Base." *National Tax Journal*, *28* (June 1975): 145–158.

Ladd, Helen F. "An Economic Evaluation of State Limitations on Local Taxing and Spending Powers." *National Tax Journal*, *31* (March 1978): 1–18.

Ladd, Helen F. "State Responses to the TRA86 Revenue Windfalls: A New Test of the Flypaper Effect." *Journal of Policy Analysis and Management*, *12* (Winter 1993): 82–103.

Ladd, Helen F., ed. *Local Government Tax and Land Use Policies in the United States*. Cheltenham, UK: Edward Elgar, 1998.

Ladd, Helen F. "School-Based Educational Accountability Systems: The Promise and the Pitfalls." *National Tax Journal*, *54* (June 2001): 385–400.

Ladd, Helen F. "How Charter Schools Threaten the Public Interest." *Journal of Policy Analysis and Management*, 38 (Fall 2019): 1063–1071.

Ladd, Helen F., and Edward B. Fiske, eds. *Handbook of Research on Education Finance and Policy*. London: Routledge, 2008.

Ladd, Helen F., and Janet S. Hansen, eds. *Making Money Matter: Financing America's Schools*. Committee on Education Finance, Commission on Behavioral and Social Sciences and Education, National Research Council. Washington, DC: National Academy Press, 1999.

Lafortune, Julien, Jesse Rothstein, and Diane Whitmore Schanzenbach. "School Finance Reform and the Distribution of Student Achievement." *American Economic Journal: Applied Economics*, *10* (2018): 1–26.

Langley, Adam, and Joan Youngman. *Property Tax Relief for Homeowners*. Cambridge, MA: Lincoln Institute of Land Policy, October 2021.

Lankford, R. Hamilton. "Efficiency and Equity in the Provision of Public Education." *The Review of Economics and Statistics*, *67* (February 1985): 70–80.

Larcinese, Valentino, Leonzio Rizzo, and Cecilia Testa. "Changing Needs, Sticky Budget: Evidence from the Geographic Distribution of US Federal Grants." *National Tax Journal*, *66*, No. 2 (June 2013): 311–342.

Leduc, Sylvain, and Daniel Wilson. "Are State Governments Roadblocks to Federal Stimulus? Evidence on the Flypaper Effect of Highway Grants in the 2009 Recovery Act." *American Economic Journal: Economic Policy*, *9*, No. 2 (2017): 253–292.

Lee, Valerie E., and Julia B. Smith. "High School Size: Which Works Best and for Whom?" *Educational Evaluation and Policy Analysis*, *19*, No. 3 (Fall 1997): 205–227.

Lemov, Penelope. "Is There Anything Left to Tax?" *Governing*, August 1993, p. 26.

Lemov, Penelope. "The Weight Line." *Governing*, March 2004, p. 49.

Lemov, Penelope. "My Big Fat Insurance Premium." *Governing*, June 2005, p. 8.

Lemov, Penelope. "The Latest on the Amazon Tax in States, Courts, and Congress." *Governing*, October 24, 2013.

Lenney, Jamie, Byron Lutz, Finn Schüle, and Louise Sheiner. "The Sustainability of State and Local Government Pensions: A Public Finance Approach." BPEA Conference Draft, Spring 2021.

Leonard, Paul A. "Debt Management." In *Management Policies in Local Government Finance*, edited by J. Aronson and E. Schwartz. Washington, DC: International City/County Management Association, 2004.

Lertwachara, Kaveephong, and James J. Cochran. "An Event Study of the Economic Impact of Professional Sport Franchises on Local US Economies." *Journal of Sports Economics*, *8*, No 3 (June 2007): 244–254.

Levine, Phillip B., and David J. Zimmerman. "An Empirical Analysis of the Welfare Magnet Debate Using the NLSY." *NBER Working Paper No. 5264*, September 1995.

Lim, Diane, Joel Slemrod, and Eleanor Wilking. "Expert and Public Attitudes Towards Tax Policy: 2013, 1994, and 1934." *National Tax Journal*, *66*, No. 4 (December 2013): 775–805.

Lindahl, Erik. "Just Taxation – A Positive Solution." In *Classics in the Theory of Public Finance*, edited by R. A. Musgrave and A. T. Peacock. London: Macmillan, 1958.

Luby, Martin J. "Federal Intervention in the Municipal Bond Market: The Effectiveness of the Build America Bond Program and Its Implications on Federal and Subnational Budgeting." *Public Budgeting & Finance*, *32*, No. 4 (2012): 46–70.

Luce, Thomas F., Jr. "Local Taxes, Public Services, and the Intrametropolitan Location of Firms and Households." *Public Finance Quarterly*, *22* (April 1994): 139–167.

Lukemeyer, Anna. "Financing a Constitutional Education: Views from the Bench." In *Helping Children Left Behind*, edited by J. Yinger, 59–86. Cambridge, MA: MIT Press, 2004.

Lundahl, Brad W., Charles Kunz, Cyndi Brownell, Norma Harris, and Russ Van Vleet. "Prison Privatization: A Meta-analysis of Cost and Quality of Confinement." *Research on Social Work Practice*, *19*, No. 4 (July 2009): 383–394.

Lynch, Carolyn D. "The Treasury II Tax Reform Proposal: Its Impact on State Personal Income Tax Liabilities." In *Proceedings of the Seventy-Ninth Annual Conference*, 310–316. Columbus, OH: National Tax Association, 1987.

Mandelbaum, Rob. "Study Suggests Online Sales Tax Bill Could Leave Billions Untaxed." *The New York Times*, December 12, 2013.

Marionneau, Virve, and Janne Nikkinen. "Market Cannibalization Within and Between Gambling Industries: A Systematic Review." *Journal of Gambling Issues*, *37* (January 2018).

Marlowe, Justin. "Capital Budgeting and Spending." In *The Oxford Handbook of State and Local Government Finance*, edited by R. Ebel and J. Petersen, 658–681. Oxford: Oxford University Press, 2012.

Marshall, Jonathan. "How to Break Up Traffic Jams." *Wall Street Journal*, September 15, 1986.

Martin, Lawrence. "Miscellaneous Taxes in Michigan: Sin, Death, and Recreation." In *Michigan at the Millennium*, edited by C. Ballard, 667–680. East Lansing: Michigan State University Press, 2003.

Martinez-Vasquez, Jorge. "Selfishness Versus Public 'Regardingness' in Voting Behavior." *Journal of Public Economics*, *15* (June 1981): 349–361.

Martinez-Vazquez, Jorge, Mark Rider, and Mary Beth Walker. "Race and the Structure of Local Government." *Journal of Urban Economics*, *41* (1997): 281–300.

Mason, Cody. "Too Good to be True: Private Prisons in America." *The Sentencing Project* (January 2012).

Maxwell, James A. *Financing State and Local Governments*. Washington, DC: The Brookings Institution, 1965.

Mazerov, Michael. "Expanding Sales Taxation of Services: Options and Issues." *State Tax Notes* (July 21, 2003): 183.

Mazerov, Michael. *Expanding Sales Taxation of Services: Options and Issues*. Washington, DC: Center on Budget and Policy Priorities, 2009.

McCarty, Therese A., and Stephen J. Schmidt. "Dynamic Patterns in State Government Finance." *Public Finance Review*, *29*, No. 3 (May 2001): 208–222.

McDavid, James C. "The Canadian Experience with Privatizing Residential Solid Waste Collection Services." *Public Administration Review* (September 1985): 602–608.

McDonald, John. "Incidence of the Property Tax on Commercial Real Estate: The Case of Downtown Chicago." *National Tax Journal*, *46* (June 1993): 109–120.

McEachern, William A. "Collective Decision Rules and Local Debt Choice: A Test of the Median-Voter Hypothesis." *National Tax Journal*, *31* (June 1978): 129–136.

McGuire, Therese J., and C. Eugene Steuerle. "A Summary of What We Know – and Don't – About State Fiscal Crises." *State Tax Notes* (August 4, 2003): 357–361.

McIntyre, Robert S., Robert Denk, Norton Francis, Matthew Gardner, Will Gomaa, Fiona Hsu, and Richard Sims. *Who Pays? A Distributional Analysis of the Tax Systems of All 50 States*. Washington, DC: Institute on Taxation and Economic Policy, 2003.

McLure, Charles E. "Commodity Tax Incidence in Open Economies." *National Tax Journal*, *17* (June 1964): 187–204.

McLure, Charles E. "Tax Exporting in the US: Estimates for 1962." *National Tax Journal*, *20* (March 1967): 49–77.

McLure, Charles E. "The 'New View' of the Property Tax: A Caveat." *National Tax Journal*, *30* (March 1977a): 69–75.

McLure, Charles E. "Taxation of Multijurisdictional Corporate Income: Lessons of the US Experience." In *The Political Economy of Fiscal Federalism*, edited by W. Oates, 241–259. Lexington, MA: Lexington Books, 1977b.

McLure, Charles E. "The State Corporate Income Tax: Lamb in Wolves' Clothing." In *The Economics of Taxation*, edited by H. J. Aaron and M. J. Boskin, 327–348. Washington, DC: The Brookings Institution, 1980.

McLure, Charles E. "The Elusive Incidence of Corporate Income Tax: The State Case." *Public Finance Quarterly* (October 1981): 395–413.

McLure, Charles E. "Medicaid Moving Forward." *The Henry J. Kaiser Family Foundation*, June 17, 2014. http://kff.org/medicaid/fact-sheet/the-medicaid-program-at-a-glance-update/.

Megdal, Sharon B. "A Model of Local Demand for Education." *Journal of Urban Economics*, *16* (1984): 13–30.

Megdal, Sharon B. "The Flypaper Effect Revisited: An Econometric Explanation." *The Review of Economics and Statistics*, *69* (May 1987): 347–351.

Menchik, Paul. "Michigan's Personal Income Tax." In *Michigan at the Millennium*, edited by C. Ballard, 535–557. East Lansing: Michigan State University Press, 2003.

Merriman, David. "The Micro-geography of Tax Avoidance: Evidence from Littered Cigarette Packs in Chicago." *American Economic Journal: Economic Policy*, *2*, No. 2 (2010): 61–84.

Merriman, David, and Mark Skidmore. "Did Distortionary Sales Taxation Contribute to the Growth of the Service Sector?" *National Tax Journal*, *53*, No. 1 (2000): 125–142.

Metcalf, Gilbert E. "Tax Exporting, Federal Deductibility, and State Tax Structure." *Journal of Policy Analysis and Management*, *12* (Winter 1993): 109–126.

Metcalf, Gilbert E. "Lifecycle vs. Annual Perspectives on the Incidence of a Value Added Tax." *Tax Policy and the Economy*, *8* (1994): 45–64.

Metcalf, Gilbert E. "Assessing the Federal Deduction for State and Local Tax Payments." *National Tax Journal*, *64* (June 2, 2011): 565–590.

Meyer, Bruce D., and Dan T. Rosenbaum. "Making Single Mothers Work: Recent Tax and Welfare Policy and Its Effects." *National Tax Journal*, *53* (December 2000): 1027–1061.

Michigan Department of the Treasury, Taxation and Economic Policy Office. *The Michigan Single Business Tax, 1999–2000*. Lansing: Taxation and Economic Policy Office, August, 2003.

Mieskowski, Peter M. "The Property Tax: An Excise Tax or a Profits Tax?" *Journal of Public Economics*, *1* (1972): 73–96.

Mieskowski, Peter M. "Recent Trends in Urban And Regional Development." In *Current Issues in Urban Economics*, edited by P. Mieszkowski and M. Straszheim, 3–39. Baltimore, MD: The Johns Hopkins University Press, 1979.

Mieskowski, Peter M., and George R. Zodrow. "The Incidence of a Partial State Corporate Income Tax." *National Tax Journal*, *38* (December 1985): 489–496.

Mieskowski, Peter M., and George R. Zodrow. "Taxation and the Tiebout Model." *Journal of Economic Literature*, *27* (September 1989): 1098–1146.

Mikesell, John L. "Patterns of Exclusion of Personal Property from American Property Tax Systems." *Public Finance Quarterly*, *20* (October 1992): 528–542.

Mikesell, John L. "The Future of American Sales and Use Taxation." In *The Future of State Taxation*, edited by D. Brunori, 15–32. Washington, DC: The Urban Institute Press, 1998.

Mikesell, John L., Daniel R. Mullins, and Sharon N. Kioko. "How Does the Depression-Designed Retail Sales Tax Cope with the New Economy? A Tax for the New and a Tax for the Old." *National Tax Journal*, *74*, No. 1 (March 2021).

Mikesell, John L., and Justin M. Ross. "After *Wayfair*, What are State Use Taxes Worth?" *National Tax Journal*, *72* (December 2019): 801–820.

Mikesell, John L., and C. Kurt Zorn. "Impact of the Sales Tax Rate on Its Base: Evidence from a Small Town." *Working Paper*, Bloomington, Indiana University, 1985.

Mikesell, John L., and C. Kurt Zorn. "Revenue Performance of State Lotteries." In *Proceedings of the 78th Annual Conference*, 159–169. Columbus, OH: National Tax Association-Tax Institute of America, 1986.

Miller, Merton H. "Debt and Taxes." *Journal of Finance*, *32* (1977): 261–275.

Moffitt, Robert A. "The Effects of Grants-in-Aid on State and Local Expenditures: The Case of AFDC." *Journal of Public Economics*, *23* (April 1984): 279–305.

Moffitt, Robert A. *Incentive Effects of the US Welfare System*. Madison: The University of Wisconsin, Institute for Research on Poverty, 1990a.

Moffitt, Robert A. "Has State Redistribution Policy Grown More Conservative?" *National Tax Journal*, *43* (June 1990b): 123–142.

Moffitt, Robert A. ed. *Means-Tested Transfer Programs in the United States*. A National Bureau of Economic Research Conference Report. Chicago: The University of Chicago Press, 2003.

Mohring, Herbert, and Mitchell Harwitz. *Highway Benefits: An Analytical Framework*. Evanston, IL: Northwestern University, 1962.

Monk, David H., and Emil J. Haller. "Predictors of High School Academic Course Offerings: The Role of School Size." *American Educational Research Journal*, *30*, No. 1 (Spring 1993): 3–21.

Morgan, William E., and John H. Mutti. "The Exportation of State and Local Taxes in a Multilateral Framework: The Case of Business Taxes." *National Tax Journal*, *38* (June 1985): 191–208.

Moulder, Evelina. *Financing Parks and Recreation: User Fees and Fund-Raising as Revenue Sources*. Washington, DC: International City/County Management Association, 2002.

Moulder, Evelina. *Contracting for Service Delivery: Local Government Choices*. Washington, DC: International City/County Management Association, 2004.

Moulton, Jeremy G., Bennie D. Waller, and Scott A. Wentland. "Who Benefits from Targeted Property Tax Relief? Evidence from Virginia Elections." *Journal of Policy Analysis and Management*, *37*, No. 2 (2018): 240–264.

Mueller, Dennis C. *Public Choice II*. Cambridge, UK: Cambridge University Press, 1989.

Mullins, Daniel R. "Fiscal Limitations on Local Choice: The Imposition and Effects of Local Government Tax and Expenditure Limitations." In *State and Local Fiscal Policy: Thinking Outside the Box?* edited by S. Wallace, 201–265. Northampton, MA: Edward Elgar, 2010.

Munnell, Alicia H. "Why Has Productivity Growth Declined? Productivity and Public Investment." *New England Economic Review* (January/February 1990): 3–22.

Munnell, Alicia H. "Infrastructure Invest and Economic Growth." *Journal of Economic Perspectives*, *6* (1992): 189–198.

Munnell, Alicia H., Jean-Pierre Aubrey, Josh Hurwitz, and Laura Quinby. "Comparing Compensation: State-Local Versus Private Sector Workers." *Center for Retirement Research at Boston College*, September 2011.

Munnell, Alicia H., Jean-Pierre Aubry, Josh Hurwitz, and Madeline Medenica. "The Funding of State and Local Pensions: 2012–2016." *Center for Retirement Research*, Boston College, July 2013.

Murnane, Richard J. "An Economist's Look at Federal and State Education Policies." In *American Domestic Priorities: An Economic Appraisal*, edited by J. Quigley and D. Rubinfeld, 118–147. Berkeley: University of California Press, 1985.

Murnane, Richard J., and Frank Levy. "Will Standards-Based Reforms Improve the Education of Students of Color?" *National Tax Journal*, *54* (June 2001): 401–415.

Musgrave, Richard A. *The Theory of Public Finance*. New York: McGraw-Hill, 1959.

Musgrave, R. A., and A. T. Peacock, eds. *Classics in the Theory of Public Finance*. London: Macmillan, 1967.

Mushkin, Selma, ed. *Public Prices for Public Products*. Washington, DC: The Urban Institute, 1972.

Mutti, John H., and William E. Morgan. "The Exportation of State and Local Taxes in a Multilateral Framework: The Case of Household Type Taxes." *National Tax Journal*, *36* (December 1983): 459–476.

Nagourney, Adam. "Two-tax Rise Tests Wealthy in California." *The New York Times*, February 6, 2013.

National Association of State Budget Officers. *Budget Processes in the States*. Washington, DC: National Association of State Budget Officers, January 2002.

National Association of State Budget Officers. *2003 State Expenditure Report*. Washington, DC: National Association of State Budget Officers, 2004.

National Association of State Budget Officers. *Capital Budgeting in the States*. Washington, DC: National Association of Stage Budget Officers, 2014.

National Bellas Hess v. Illinois Department of Revenue, *386* US 753 (1967).

National Conference of State Legislatures. *Final Report, Task Force on No Child Left Behind*. Denver: National Conference of State Legislatures, February 2005.

National Governors Association and National Association of State Budget Officers. *The Fiscal Survey of States*. Washington, DC: National Governor's Association and National Association of State Budget Officers, December 2004.

Neenan, William B. *Urban Public Economics*. Belmont, CA: Wadsworth Publishing, 1981.

Nellen, Annette. "Now is a Good Time to Start Fixing the Sales Tax Base." *Tax Notes State* (2020): 987–1000.

Nelson, Jon P. "Advertising Bans, Monopoly, and Alcohol Demand: Testing for Substitution Effects Using State Panel Data." *Review of Industrial Organization*, *22* (2003): 1–25.

Nelson, Michael A. "Decentralization of the Subnational Public Sector: An Empirical Analysis of the Determinants of Local Government Structure in Metropolitan Areas of the US." *Southern Economic Journal*, *57* (October 1990): 443–457.

Nelson, Richard R. "Roles of Government in a Mixed Economy." *Journal of Policy Analysis and Management*, *6* (Summer 1987): 541–557.

Netzer, Dick. *Economics of the Property Tax*. Washington, DC: The Brookings Institution, 1966.

Netzer, Dick. "New Hampshire Tries Harder Marketing Liquor with Spirit." *Wall Street Journal* (October 8, 1985): 33.

Netzer, Dick. "Differences in Reliance on User Charges by American State and Local Governments." *Public Finance Quarterly*, *20* (October 1992): 499–511.

Nguyen-Hoang, Phuong. "Tax Limit Repeal and School Spending." *National Tax Journal*, *66* No. 1 (March 2013): 117–148.

Nichols, Mark W., and Mehmet Serkan Tosun. "The Income Elasticity of Gross Casino Revenues: Short-Run and Long-Run Estimates." *National Tax Journal*, *56*, No. 4 (December 2008): 635–652.

Niskanen, William A. "The Peculiar Economics of Bureaucracy." *American Economic Review*, *58* (May 1968): 293–305.

Novy-Marx, Robert, and Joshua D. Rauh. "The Liabilities and Risks of State-Sponsored Pension Plans." *Journal of Economic Perspectives*, *23*, No. 4 (Fall 2009): 191–210.

Oakland, William H. "Earmarking and Decentralization." In *Proceedings of the Seventy-Seventh Annual Conference*, 274–277. Columbus, OH: National Tax Association, 1985.

Oates, Wallace E. "The Effects of Property Taxes and Local Public Spending on Property Values: An Empirical Study of Tax Capitalization and the Tiebout Hypothesis." *Journal of Political Economy*, 77 (November 1969): 957–971.

Oates, Wallace E. *Fiscal Federalism*. New York: Harcourt Brace Jovanovich, 1972.

Oates, Wallace E. "The Effects of Property Taxes and Local Public Spending on Property Values: A Reply and Yet Further Results." *Journal of Political Economy*, *81* (July 1973): 1004–1008.

Oates, Wallace E. ed. *The Political Economy of Fiscal Federalism*. Lexington, MA: Lexington Books, 1977.

Oates, Wallace E. "Fiscal Decentralization and Economic Development." *National Tax Journal*, *46* (June 1993): 237–243.

Oates, Wallace E. ed. *The Economics of Fiscal Federalism and Local Finance*. Northampton, MA: Edward Elgar Publishing, 1998.

Oates, Wallace E. ed. *Property Taxation and Local Government Finance*. Cambridge, MA: Lincoln Institute of Land Policy, 2001.

Oates, Wallace E. "On the Theory and Practice of Fiscal Decentralization." *IFIR Working Paper No. 2006–05*, May 2006.

Oates, Wallace E., and William A. Fischel. "Are Local Property Taxes Regressive, Progressive, or What?" *National Tax Journal*, *69*, No. 2 (2016): 415–434.

Oates, Wallace E., and Robert M. Schwab. "Land Taxes and Urban Development." *National Tax Journal*, *50* (March 1997): 1–21.

OECD/UCLG. 2016. "Subnational Governments Around the World: Structure and Finance." Organization for Economic Cooperation and Development.

Oster, Emily. "Are All Lotteries Regressive? Evidence from the Powerball." *National Tax Journal*, *57* (June 2004): 179–187.

O'Sullivan, Arthur, Terri A. Sexton, and Steven M. Sheffrin. "Differential Burdens from the Assessment Provisions of Proposition 13." *National Tax Journal*, *47* (December 1994): 721–729.

"Outline of the Michigan Tax System." Lansing: Citizens Research Council, 2014.

Pack, Janet Rothenberg. "Privatization of Public-Sector Services in Theory and Practice." *Journal of Policy Analysis and Management*, *6* (Summer 1987): 523–540.

Papke, James A., and Leslie E. Papke. "State Tax Incentives and Investment Location Decisions: Microanalytic Simulations." In *Indiana's Revenue Structure: Major Components and Issues, Part II*, edited by J. Papke. West Lafayette, 60–114. Indiana: Purdue University Press, 1984.

Papke, Leslie. "Subnational Taxation and Capital Mobility: Estimates of Tax-Price Elasticities." *National Tax Journal*, *40* (June 1987): 191–203.

Papke, Leslie. "Interstate Business Tax Differentials and New Firm Location." *Journal of Public Economics*, *45* (1991): 47–68.

Papke, Leslie. "What Do We Know About Enterprise Zones?" In *Tax Policy and the Economy*, edited by J. Poterba, 37–72. Cambridge, MA: MIT Press, 1993.

Papke, Leslie. "Tax Policy and Urban Development: Evidence from the Indiana Enterprise Zone Program." *Journal of Public Economics*, *54* (May 1994): 37–49.

Papke, Leslie. "The Indiana Enterprise Zone Revisited: Effects on Capital Investment and Land Values." In *Proceedings of the Ninety-Third Annual Conference on Taxation*, 83–87. Washington, DC: National Tax Association, 2000.

Papke, Leslie. "Pension Plan Choice in the Public Sector: The Case of Michigan State Employees." *National Tax Journal*, *57*, No. 2 (2004): 329–339.

Papke, Leslie. "The Effects of Spending on Test Pass Rates: Evidence from Michigan." *Journal of Public Economics*, *89* (2005): 821–839.

Parry, Ian W. H., Margaret Walls, and Winston Harrington. "Automobile Externalities and Policies." *Journal of Economic Literature*, *45*, No. 2 (June 2007): 373–399.

Pechman, Joseph A. *Who Paid the Taxes, 1966–85*. Washington, DC: The Brookings Institution, 1985.

Peers, Alexandra. "Tax Bill's Crackdown on Municipal Bonds Angers Local Officials." *Wall Street Journal* (October 22, 1986).

Peters, Alan H., and Peter S. Fisher. *State Enterprise Zone Programs: Have They Worked?* Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 2002.

Phares, Donald. *Who Pays State and Local Taxes*. Cambridge: Oelgeschlager, Gunn, and Hain, 1980.

Plummer, Elizabeth. "Evidence on the Incidence of Residential Property Taxes Across Households." *National Tax Journal*, *56* (December 2003): 739–753.

Poole, Robert W., Jr., and Philip E. Fixler, Jr. "Privatization of Public-Sector Services in Practice: Experience and Potential." *Journal of Policy Analysis and Management*, *6* (Summer 1987): 612–625.

Popp, Anthony V., and Charles Stehwien. "Indian Casino Gambling and State Revenue: Some Further Evidence." *Public Finance Review*, *30* (July 2002): 320–330.

Posner, Richard. "The Kelo Case, Public Use, and Eminent Domain – Posner Comment." *The Becker-Posner Blog*, 2005. www.becker-posner-blog.com.

Poterba, James M. "Explaining the Yield Spread Between Taxable and Tax-Exempt Bonds: The Role of Expected Tax Policy." In *Studies in State and Local Public Finance*, edited by H. Rosen, 5–49. Chicago: University of Chicago Press, 1986.

Poterba, James M. "Capital Budgets, Borrowing Rules, and State Capital Spending." *Journal of Public Economics*, *56* (1995): 165–187.

Poterba, James M. "Retail Price Reactions to Changes in State and Local Sales Taxes." *National Tax Journal*, *44* (June 1996): 165–176.

Poterba, James M. "Demographic Structure and the Political Economy of Public Education." *Journal of Policy Analysis and Management*, *16* (1997): 48–66.

Poterba, James M., and Kim Rueben. "State Fiscal Institutions and the US Municipal Bond Market." In *Fiscal Institutions and Fiscal Performance*, edited by James Poterba, 181–208. Chicago: University of Chicago Press, 1999.

Povich, Elaine S. "Why States are Struggling to Tax Services." *STATELINE, The Pew Charitable Trusts*, June 27, 2017.

Preston, Anne E., and Casey Ichniowski. "A National Perspective on the Nature and Effects of the Local Property Tax Revolt, 1976–1986." *National Tax Journal*, *44* (June 1991): 123–146.

Propheter, Geoffrey. "Property Tax Exemptions for Nonprofit Hospitals: What are They Worth? Do They Earn Them? Evidence from New York City." *Public Budgeting and Finance*, *39*, No. 2 (June 2019): 3–22.

The Public Fund Survey. www.publicfundsurvey.org/publicfundsurvey/index.htm.

Rafuse, Robert W. Jr. "Cyclical Behavior of State-Local Finances." In *Essays in Fiscal Federalism*, edited by Richard A. Musgrave, 63–121. Washington, DC: The Brookings Institution, 1965.

Ramsey, Frank P. "A Contribution to the Theory of Taxation." *Economic Journal*, *37* (1927): 47–61.

Raphaelson, Arnold H. "The Property Tax." Chap. 10 in *Management Policies in Local Government Finance*, edited by J. R. Aronson and E. Schwartz, 110–122. Washington, DC: International City/County Management Association, 2004.

Rappaport, Jordan, and Chad Wilkerson, "What Are the Benefits of Hosting a Major League Sports Franchise?" *Economic Review*, Federal Reserve Bank of Kansas City (2001): 55–84.

Reed, W. Robert, Cynthia Rogers, and Mark Skidmore. "On Estimating Marginal Tax Rates for US States." *National Tax Journal*, *64*, No. 1 (March 2011): 59–83.

Reischauer, Robert P. "General Revenue Sharing-The Program's Incentives." In *Financing the New Federalism*, 40–87. Baltimore, MD: The Johns Hopkins University Press, 1975.

"Report of Minnesota's Mileage-Based User Fee Policy Task Force." December 2011. https://angel.msu.edu/section/default.asp?id=SS14-PPL-891-001-97CS9X-EL-38–676.

Reschovsky, Andrew, and Michael Wiseman. "How Can States Most Effectively Meet Their School Financing Responsibilities?" In *Fiscal Equalization for State and Local Government Finance*, edited by J. Anderson, 85–126. Westport, CT: Praeger Publishers, 1994.

Ribar, David, and Mark Wilhelm. "The Demand for Welfare Generosity." *Review of Economics and Statistics*, No. 1 (February 1999): 81.

Rice, Jennifer King, and Amy Ellen Schwartz. "Toward an Understanding of Productivity in Education." In *Handbook of Research on Education Finance and Policy*, edited by Helen F. Ladd and Edward B. Fiske. London: Routledge, 2008.

Riddle, Wayne, and Liane White. "Variations in Expenditures Per Pupil within the States: Evidence from Census Data for 1989–90." *Journal of Education Finance*, *19* (Winter 1994): 358–362.

Ring, Raymond J., Jr. "Consumers' Share and Producers' Share of the General Sales Tax." *National Tax Journal*, *52*, No. 1 (March 1999): 31–92.

Rivlin, Alice. *Reviving the American Dream: The Economy, the States, and the Federal Government*. Washington, DC: The Brookings Institution, 1992.

Rodgers, James D. "Sales Taxes, Income Taxes, and Other Revenues." In *Management Policies in Local Government Finance*, edited by J. R. Aronson and E. Schwartz, 152–183. Washington, DC: International City Management Association, 1981.

Romer, Thomas, and Howard Rosenthal. "Bureaucrats versus Voters: On the Political Economy of Resource Allocation by Direct Democracy." *Quarterly Journal of Economics*, *93* (1979a): 563–587.

Romer, Thomas, and Howard Rosenthal. "The Elusive Median Voter." *Journal of Public Economics*, *12* (1979b): 143–170.

Romp, Ward, and Jakob De Haan. "Public Capital and Economic Growth: A Critical Survey." *Perspektiven der Wirtschaftspolitik*, *8* (April 2007): 6–52.

Rosen, Harvey S. *Public Finance*. 5th ed. Boston: Irwin/McGraw-Hill, 1999.

Rosen, Harvey S., and Ted Gayer. *Public Finance*. New York: McGraw-Hill/Irwin, 2010.

Rosen, Harvey S., and David J. Fullerton. "A Note on Local Tax Rates, Public Benefit Levels, and Property Values." *Journal of Political Economy*, *85* (April 1977): 433–440.

Ross, Justin M., and Wenli Yan. "Fiscal Illusion from Property Reassessment? An Empirical Test of the Residual View." *National Tax Journal*, *66*, No. 1 (March 2013): 7–32.

Rothbart, Michah. "The Impact of School Choice on Public School Budgets: Evidence from Open Enrollment in New York City." *Public Budgeting and Finance*, *40* (Winter 2020): 3–37.

Roy, Joydeep. "Impact of School Finance Reform on Resource Equalization and Academic Performance: Evidence from Michigan." *Education Finance and Policy*, *6*, No. 2 (Spring 2011): 137–167.

Rubenstein, Ross, and Benjamin Scafidi. "Who Pays and Who Benefits? Examining the Distributional Consequences of the Georgia Lottery for Education." *National Tax Journal*, *55* (June 2002): 223–238.

Rubinfeld, Daniel L. "The Economics of the Local Public Sector." In *Handbook of Public Economics*, edited by A. J. Auerbach and M. Feldstein, Vol. 2, 571–645. New York: Elsevier Science Publishers B.V., 1987.

Russell, Nicole. "Are Casinos Still a Safe Bet?" *Governing*, September 2013, p. 9.

Samuelson, Paul A. "The Pure Theory of Public Expenditure." *Review of Economics and Statistics*, *36* (November 1954): 387–389.

Sappington, David E. M., and Joseph E. Stiglitz. "Privatization, Information, and Incentives." *Journal of Policy Analysis and Management*, *6* (Summer 1987): 567–582.

Savas, E. S. *The Organization and Efficiency of Solid Waste Collection*. Lexington, MA: Lexington Books, 1977.

Savas, E. S. *Privatization: The Key to Better Government*. Chatham, NJ: Chatham House Publishers, 1987.

Schmenner, Roger. *Making Business Location Decisions*. Englewood Cliffs, NJ: Prentice-Hall, 1982.

Schott, Liz, LaDonna Pavetti, and Ife Finch. "How States Have Spent Federal and State Funds Under the TANF Block Grant." *Center for Budget and Policy Priorities*, August 7, 2012.

Schrank, David, Bill Eisele, and Tim Lomax. *The Urban Mobility Report*. College Station, TX: Texas Transportation Institute, The Texas A&M University System, 2012.

Scott, Charles E., and Robert K. Triest. "The Relationship Between Federal and State Individual Income Tax Progressivity." *National Tax Journal*, *46* (June 1993): 95–108.

Serrato, Juan Carlos, and Owen Zidar. "The Structure of State Corporate Taxation and its Impact on State Tax Revenues and Economic Activity." *Journal of Public Economics*, *167* (November 2018): 158–176.

Sexton, Terri. "Assessment Limits as a Means of Limiting Homeowner Property Taxes." In *Erosion of the Property Tax Base*, edited by N. Augustine. Cambridge, MA: Lincoln Institute of Land Policy, 2009.

Shah, Anwar. *The Reform of Intergovernmental Fiscal Relations in Developing and Emerging Market Economies*. Washington, DC: The World Bank, 1994.

Shearing, Clifford D. "The Relation Between Public and Private Policing." In *Modern Policing: Crime and Justice*, edited by M. Tonry and N. Morris, Vol. 15, 399–434. Chicago: University of Chicago Press, 1992.

Shribman, David. "Colorado Business Groups Leave Ranks of Anti-Tax Forces, Urge Higher Taxes." *Wall Street Journal* (April 14, 1986): 60.

Siegel, Michael, William DeJong, Alison B. Albers, Timothy S. Naimi, and David H. Jernigan. "Differences in Liquor Prices Between Control State-operated and License-state Retail Outlets in the United States." *Addiction*, *108* (February 2013): 339–347.

Siegfried, John J., and Paul A. Smith. "The Distributional Effects of a Sales Tax on Services." *National Tax Journal*, *44* (March 1991): 41–53.

Silva, Fabio, and Jon Sonstelie. "Did *Serrano* Cause a Decline in School Spending?" *National Tax Journal*, *48* (June 1995): 199–215.

Sjoquist, David L. ed. *State and Local Finances Under Pressure*. Northampton, MA: Edward Elgar, 2003.

Sjoquist, David L. "A Comparison of the Fiscal Structure of States with and Without an Income Tax." In *State and Local Fiscal Policy 'Out of the Box,'* edited by Sally Wallace, 67–97. Northampton, MA: Edward Elgar, 2010.

Sjoquist, David L., and Rayna Stoycheva. "Local Revenue Diversification: User Charges, Sales Taxes, and Income Taxes." In *The Oxford Handbook of State and Local Government Finance*, edited by Robert Ebel and John Petersen, 429–462. Oxford: Oxford University Press, 2012.

Sklansky, David. "The Private Police." *UCLA Law Review*, *46* (April 1999): 1165–1287.

Slattery, Cailin, and Owen Zidar. "Evaluating State and Local Business Incentives." *Journal of Economic Perspectives*, *34* (Spring 2020): 90–118.

Slemrod, Joel. "The Optimal Progressivity of the Minnesota Tax System." In *Final Report of the Minnesota Tax Study Commission*, Vol. 2, 127–137. Minneapolis: Butterworth Legal Publishers, 1986.

Slemrod, Joel. "The Role of Misconceptions in Support for Regressive Tax Reform." *National Tax Journal*, *59* (March 2006): 57–75.

Small, Kenneth A., Clifford Winston, Jia Yan, Nathaniel Baum-Snow, and José A. Gómez-Ibáñez. "Differentiated Road Pricing, Express Lanes, and Carpools: Exploiting Heterogeneous Preferences in Policy Design." *Brookings-Wharton Papers on Urban Affairs* (2006): 53–96.

Smith, James K, Ann T. King, and Kathryn B. Reeves. "State Income Taxation of Nonresident Professional Athletes." *Journal of State Taxation*, *16* (July 1997): 1–8.

Snell, Ronald K. "Earmarking State Tax Revenues." *Intergovernmental Perspective*, *16* (Fall 1990): 12–16.

Snell, Ronald K. *State Balanced Budget Requirements: Provisions and Practice*. Denver: National Conference of State Legislatures, March 2004.

Sostek, Anya. "Alarm Aggravation." *Governing*, October 1998, p. 34.

Stein, Herbert. "Welfare Cutting as Welfare 'Reform.'" *The Wall Street Journal* (December 5, 1994): A14.

Stein, Robert M. "Alternative Means of Delivering Municipal Services: 1982–1988." *Intergovernmental Perspective*, *19* (Winter 1993): 27–30.

Steiner, Peter O. "The Public Sector and the Public Interest." In *Public Expenditure and Policy Analysis*, 3–41. Boston: Houghton Mifflin Company, 1983.

Strauss, Robert. "Pennsylvania's Local Property Tax." *State Tax Notes* (June 4, 2001): 1963–1983.

Suits, Daniel B. "Gambling Taxes: Regressivity and Revenue Potential." *National Tax Journal*, *30* (March 1977): 19–35.

Suits, Daniel B. "The Elasticity of Demand for Gambling." *Quarterly Journal of Economics*, *93* (February 1979): 155–162.

Suits, Daniel B., and Ronald C. Fisher. "A Balanced Budget Constitutional Amendment: Economic Complexities and Uncertainties." *National Tax Journal*, *38* (December 1985): 467–477.

Sunley, Emil. "State and Local Governments." In *Setting National Priorities, The Next Ten Years*, edited by H. Owen and C. Schultze, 371–409. Washington, DC: The Brookings Institution, 1976.

Swain, John A., and Walter Hellerstein. "The Political Economy of the Streamlined Sales and Use Tax Agreement." *National Tax Journal*, *58* (September 2005): 605–619.

Swope, Christopher. "Streamlining's Speed Bump." *Governing*, April 2004a, p. 50.

Swope, Christopher. "Brought To You By . . ." *Governing*, October 2004b, pp. 46–48.

Tannenwald, Robert. "Business Tax Climate: How Should It Be Measured and How Important Is It?" *State Tax Notes* (May 13, 1996): 1459–1471.

Tannenwald, Robert. *Massachusetts Business Taxes: Unfair? Inadequate? Uncompetitive?* Boston, Mass.: Federal Reserve Bank of Boston, Discussion Paper No. 04–4, 2004.

Temple, Judy. "Limitations on State and Local Government Borrowing for Private Purposes." *National Tax Journal*, *46* (March 1993): 41–52.

Temple, Judy. "The Debt/Tax Choice in the Financing of State and Local Capital Expenditures." *Journal of Regional Science*, *34* (1994): 529–547.

Tideman, Deborah. "Pressure Mounts for User-Pays Water." *The Weekend Australian* (October 3–4, 1992): 9.

Tiebout, Charles M. "The Pure Theory of Local Expenditures." *Journal of Political Economy*, *64* (1956): 416–424.

Toder, Eric, and Thomas S. Neubig. "Revenue Cost Estimates of Tax Expenditures: The Case of Tax-Exempt Bonds." *National Tax Journal*, *38* (September 1985): 395–414.

Tosun, Mehmet Serkan, and Mark Skidmore. "Interstate Competition and State Lottery Revenues." *National Tax Journal*, *57* (June 2004): 163–178.

Tritz, Karen. "Medicaid Expenditures, FY 2002 and FY 2003." In *Congressional Research Service Report for Congress*. Washington, DC: Centers for Medicare and Medicaid Services, 2005.

US Congress. *State Sales Taxation of Internet Transactions*. Washington, DC: Congressional Research Service, Report for Congress, January 11, 2005.

US Department of Commerce. *Survey of Current Business*. Washington, DC: US Department of Commerce, various issues.

US Department of Labor. *Consumer Expenditure Survey, Interview Survey*. Washington, DC: US Department of Labor, various years.

US Department of Labor. *Employment and Earnings*. Washington, DC: US Department of Labor, various issues.

US Department of the Treasury. *Economic Analysis of Gross Income Taxes*. Washington, DC: US Department of Treasury, 1986.

US Executive Office of the President, Office of Management and Budget. *Special Analyses, Budget of the US Government, Fiscal Year 1986*. Washington, DC: US Office of Management and Budget, 1985.

US House Budget Committee. "State Government Experience with Balanced Budget Requirements: Relevance to Federal Proposals." *Testimony of Steven D. Gold*, May 13, 1992.

US Internal Revenue Service. *Individual Income Tax Statistics, Publication 1304*, *2003* Washington, DC: Internal Revenue Service, 2004.

Vickrey, William S. "Pricing in Urban and Suburban Transport." *American Economic Review* (May 1963): 452–465.

Walczak, Jared. "Ohio's Commercial Activity Tax: A Reappraisal." *Tax Foundation*, September 26, 2017.

Wallace, Sally, ed. *State and Local Tax Policy: Out of the Box?* Cheltenham, UK: Edward Elgar, 2010.

Wallace, Sally, and Barbara Edwards. "State Income Tax Treatment of the Elderly." *Public Budgeting and Finance*, *24*, No. 2 (Summer 2004): 1–20.

Wallace, Sally, and Daniel Mullins. "The Effects of Changing Demographics on State Fiscal Structure." *Public Finance Quarterly*, *24*, No. 2 (April 1996): 237–262.

Wallis, John J. "A History of the Property Tax in America." Chap. 5 in *Property Taxation and Local Government Finance*, edited by W. Oates. Cambridge, MA: Lincoln Institute of Land Policy, 2001.

Walsh, Michael J. "A Note on Border Tax Effects: Additional Evidence." *Working Paper*, Michigan State University, 1986.

Walsh, Michael J., and Jonathan D. Jones. "More Evidence on the 'Border Tax' Effect: The Case of West Virginia." *National Tax Journal*, *41* (June 1988): 261–265.

Walters, Jonathan. "The Benchmarking Craze." *Governing,* April 1994, pp. 33–37.

Wang, Shu, David Merriman, and Frank Chaloupka. "Relative Tax Rates, Proximity, and Cigarette Tax Noncompliance: Evidence from a National Sample of Littered Cigarette Packs." *Public Finance Review*, *47*, No. 2 (March 2019): 276–311.

Warner, Mildred E., and Amir Hefetz. "Trends in Public and Contracted Government Services: 2002–2007." *Reason Foundation, Policy Brief 80*, August 2009. www.reason.org.

Wassmer, Robert W. "Local Fiscal Variables and Intra-Metropolitan Firm Location: Regression Evidence from the United States and Research Suggestions." *Environment and Planning C: Government and Policy*, *8* (1990): 283–296.

Wassmer, Robert W. "Property Tax Abatement and the Simultaneous Determination of Local Fiscal Variables in a Metropolitan Area." *Land Economics*, *68* (1992): 263–282.

Wassmer, Robert W. "Property Taxation, Property Base, and Property Value: An Empirical Test of the 'New View.'" *National Tax Journal*, *46* (June 1993): 135–159.

Wassmer, Robert, and Ronald Fisher. "State and Local Government Debt, 1992–2008." *State Tax Notes* (August 15, 2011): 427–436.

Wasylenko, Michael. "Local Tax Policy and Industry Location: A Review of the Evidence." In *Proceedings of the Seventy-Eighth Annual Conference*, 222–228. Columbus, OH: National Tax Association, 1986.

Wasylenko, Michael. "Taxation and Economic Development: The State of the Economic Literature." *New England Economic Review, Proceedings of a Symposium on the Effects of State and Local Policies on Economic Development* (March/April 1997): 37–52.

Wasylenko, Michael, and Therese McGuire. "Jobs and Taxes: The Effect of Business Climate on States' Employment Growth Rates." *National Tax Journal*, *38* (December 1985): 497–512.

Wayne, Leslie. "How Delaware Thrives as a Corporate Tax Haven." *The New York Times*, June 30, 2012.

Weaver, R. Kent. *The Structure of the TANF Block Grant*. Policy Brief # 22. Washington, DC: The Brookings Institution, 2002.

Weiner, Jennifer. *State Highway Funding in New England: The Road to Sustainability*. Boston: New England Public Policy Center, Boston Federal Reserve Bank, 2014.

Weinstein, Barbara. "The Michigan Liquor Control Commission and the Taxation of Alcoholic Beverages." In *Michigan's Fiscal and Economic Structure*, edited by H. Brazer, 720–754. Ann Arbor: University of Michigan Press, 1982.

Wen, Hefei, Jason Hockenberry, and Janet Cummings. "The Effect of Medicaid Expansion on Crime Reduction: Evidence from HIFA-waiver Expansions." *Journal of Public Economics*, *154* (October 2017): 67–94.

West, Martin R., and Paul E. Peterson. "The Adequacy Lawsuit: A Critical Appraisal." In *School Money Trials: The Legal Pursuit of Educational Adequacy*, edited by M. West and P. Peterson. Washington, DC: Brookings Institution Press, 2007.

Wheaton, William C. "Interstate Differences in the Level of Business Taxation." *National Tax Journal*, *36* (March 1983): 83–94.

Wheaton, William C. "The Incidence of Interjurisdictional Differences in Commercial Property Taxes." *National Tax Journal*, *37* (December 1984): 515–528.

White, Otis. "A Garden on Steroids." *Governing*, September 2004, p. 10.

Whitty, James. "Oregon's Mileage Fee Concept and Road User Fee Pilot Program, Final Report." *Oregon Department of Transportation* (November 2007).

Wicksell, Knut. "A New Principle of Just Taxation." In *Classics in the Theory of Public Finance*, edited by R. T. Musgrave and A. T. Peacock, 72–118. New York: St. Martin's Press, 1967.

Wilde, James A. "The Expenditure Effects of Grants-in-Aid Programs." *National Tax Journal*, *21* (September 1968): 340–348.

Wiseman, Michael. *Proposition 13 and Effective Property Tax Rates in San Francisco*. Research Papers in Economics, no. 86–88. Berkeley: University of California at Berkeley, February 1986.

Wooldridge, Jeffrey M. *Introductory Econometrics, A Modern Approach*. Cincinnati: South-Western, 2013.

Yinger, John. "Capitalization and the Theory of Local Public Finance." *Journal of Political Economy*, *90* (1982): 917–943.

Yinger, John. "Inefficiency and the Median Voter." In *Perspectives on Local Public Finance and Public Policy 2*. Greenwich, CT: JAI Press, 1985.

Yinger, John, ed. *Helping Children Left Behind: State Aid and the Pursuit of Educational Equity*. Cambridge, MA: The MIT Press, 2004.

Young, Cristobal, and Charles Varner, 2011. "Millionaire Migration and State Taxation of Top Incomes: Evidence from a Natural Experiment." *National Tax Journal*, *64*, No. 2, 255–284.

Young, Douglas J., and Agnieska Bielinska-Kwapisz. "Alcohol Taxes and Beverage Prices." *National Tax Journal*, *55* (March 2002): 57–73.

Youngman, Joan. *A Good Tax: Legal and Policy Issues for the Property Tax in the United States*. Cambridge: Lincoln Institute of Land Policy, 2016.

Zax, Jeffrey S. "The Effects of Jurisdiction Types and Numbers on Local Public Finance." In *Fiscal Federalism: Quantitative Studies*, edited by H. Rosen, 79–103. Chicago: University of Chicago Press, 1988.

Zelio, Judy. *A Guide to Property Taxes: The Role of Property Taxes in State and Local Finances*. Denver, CO: National Conference of State Legislatures, 2004.

Zhao, Bo. "Estimating the Cost Function of Connecticut Public K–12 Education: Implications for Inequity and Inadequacy in School Spending." Working Paper No. 20-6, Federal Reserve Bank of Boston, 2020.

Zimmerman, Dennis. "Resource Misallocation from Interstate Tax Exportation: Estimates of Excess Spending and Welfare Loss in a Median Voter Framework." *National Tax Journal*, *36* (June 1983): 183–202.

Zimmerman, Dennis. *The Private Use of Tax-Exempt Bonds*. Washington, DC: Urban Institute Press, 1991.

Zimmerman, Dennis. "Tax-exempt Bonds." *The Encyclopedia of Taxation and Tax Policy*, edited by Joseph J. Cordes, Robert D. Ebel, and Jane G. Gravelle, 443–445. Washington, DC: Urban Institute Press, 1999.

Zodrow, George R. ed. *Local Provision of Public Services: The Tiebout Model after Twenty-five Years*. New York: Academic Press, 1983.

Zodrow, George R. "The Property Tax as a Capital Tax: A Room with Three Views." *National Tax Journal*, *54*, No. 1 (March 2001): 139–156.

Zullo, Roland, Xi (Belinda) Bi, Yu (Sean) Xiaohan, and Zehra Siddiqui. "The Fiscal and Social Effects of State Alcohol Control Systems." Institute for Research on Labor, Employment, and the Economy. Ann Arbor, MI: University of Michigan, May 2013.

Index

Note: Page numbers in *italic* indicate a figure and page numbers in **bold** indicate a table on the corresponding page.

Aaron, Henry 291–293
access (capital) costs: ability to pay 165, 282, 326, 334–338; allocating 161
accountability issues 438, 441–442
Adjusted Gross Income (AGI) 335
administration cost 108–109, 242–243, 243–244
advantage of joint consumption 106
Affordable Care Act 493–494
agglomeration economies 536
airline delays 474–475
airport congestion 474–475
alcoholic beverages 387–390
allocation 22; access (capital) costs 161; congestion costs 162–163; tax bases among jurisdictions 363–367; transportation funds 477–479; use (operating) costs 161–162
all-or-nothing choice 83–84; *see also* monopoly models
alternatives: business tax bases 360, 362–363; financing transportation 458–466; to gasoline taxes 466–469; models of demand 52–53; voting methods 77–80
Amazon laws 323
American Recovery and Reinvestment Act (ARRA) 140, 186, 490
applications 407; business taxes 367–368, 375–376; capital investment, borrowing, and debt 233–235; demand for government goods and services 60–61; economic development 515–549; education 409–448; health and welfare 482–513; individual income taxes 339–341, 345–349; intergovernmental grants 200–202, 204–205; microeconomic analysis 30–35, 38–41; organization of subnational government 114–118; pricing of government goods 166–176; principles of tax analysis 254–257; property tax 281–283; public choice without mobility 80–81; revenue from government monopoly 385–386, 400–402; sales and excise tax 313–317, 322–324; supply of goods and services 134–137, 140–142, 148–150; transportation 450–480
assessment: assessed value 265; assessment ratio rule 265; educational results 437–442
assumptions: Tiebout model 90–93

balanced-budget incidence 242
balanced budget requirements 148
Baumol hypothesis 130–134, 152
benefit taxation 37–38
benefit view 294–295
Bergstrom-Goodman study 58
block grants 188; *see also* intergovernmental grants
bond 216
bond counsel 217
border effects 319–322
borrowing 214–219, *218*, 229–233, *230*, 235–236; application 233–235; data availability 209–210; headlines 209; policy issues 228–229; supply of goods and services 147–148; tax exemption for state and local bond interest 219–228, **219**, **222**, *223*, **226**–**227**
Break, George 185, 332, 339, 516
budgets: balanced-budget incidence 242; balanced budget requirements 148; budget incidence 395; *see also* public school budgets
Build America Bonds 201, 232
business climate studies and rankings 542–545
business demand for government service 60–61
business income: compared to business taxes 523–524
business taxes 358, 376–377; application 367–368, 375–376; business tax share 522–523; compared to business income 523–524; data availability 358; economic analysis 368–375; and government services 525–526; headlines 357–358; and profitability 524–525; reliance

on 358–360, **359**; structure issues 360–367, **361**–**362**, **365**–**366**

call provision 217
capital, public 231–232
capital costs *see* access (capital) costs
capital investment 226–233; and borrowing 214–219, *218*, 226; composition of 213–214, *213*, **214**; data availability 209–210; headlines 209; magnitude of 210–213, *212*–*212*; policy issues 228–233, *230*
capitalization 98; of the fiscal incentive 534–535; Tiebout model 99
capital taxes: property taxes as 283–284
casinos 396–397
categorical grants 186; and general grants 191–193; *see also* intergovernmental grants
charges *see* user charges
charter schools 413, 442–443
Children's Health Insurance Program (CHIP) 483, 491–492
cigarettes 322–324
"circuit-breaker" property tax credits or rebates 279–280
classified property tax 266
clawbacks 529
clustering 111–113
coefficient of dispersion 271
coefficient of variation 414
compliance costs 109
congestion costs 162–163, 470–473
constant returns to scale 13
consumer mobility 533–535
consumer output 125
consumer's surplus 27
consumer theory 82
consumption: compared to produced output 127–128
consumption taxes 303–304; structure issues 306–312
consumption-type VAT 319, 362, 363, 374–375, 377
control method 387
coordination: among different states 338–339; federal-state tax base 336–337, **337**
corporate taxation 368–369; aggregate view 369–370; incidence and efficiency effects of 368; single-state view 370–371
corrections/prisons 11, 129–130, **130**, 134–137, 213, 525
correspondence principle 109–110, 118, 119n8
costs: access (capital) costs 161; administration cost 108–109, 242–243, 243–244; compliance costs 109; congestion costs 162–163, 470–473; and criminal justice 134–137; decision-making costs 111–113; efficiency cost 243, 259; government costs 133–134; marginal cost of property taxes 280; marginal social cost 26; of private-purpose bonds 224–226; and productivity 130–134; tax costs 521–522; use (operating) costs 161–162
Courant, Paul 146, 232, 542
COVID/pandemic 140–142, 181, 183, 201, 450, 495, 517
credit rating 217
credits 336; homestead 278–280; sales tax credits to exemptions 326–327
criminal justice 134–137

data availability: business taxes 358; capital investment, borrowing, and debt 209–210; demand for state and local government goods and services 48; economic development 515–516; education 410; health and welfare 483; individual income taxes 332; intergovernmental grants 181–182; organization of subnational government 104–105; pricing of government goods 156; principles of tax analysis 241; property tax 261–262; public choice through mobility 88; public choice without mobility 68; revenue from government monopoly and regulation 379–380; sales and excise taxes 303; state and local government finance 3–4; supply of state and local goods and services 123–124; transportation 451
dead-weight loss 243
debt 235; application 234; and capital investment 210, 215–219; data availability 209–210; headlines 209; and policy issues 231, 233; and tax exemption for state and local bond interest 225–228, **226**–**227**
decision-making costs 111–113
declining performance 428–429
deductibility 343–345
deductions 335; for state or federal income taxes 337
default 216
demand: application 60–61; data availability 48; and desired government service 82–83; evidence for state-local services 53–59, **53**, **55**, *56*; headlines 47; understanding and measuring 48–53, *50*–*51*; using elasticity to characterize 62–64, **62**, *63*, **64**; variations in 105–106
destination principle 309
development *see* economic development
differential incidence 242
differential taxation 284–286; by location 286–287
digital advertising tax 367–368
direct grants 528–529
"directly produced" output 125
discriminatory business taxes 375–376
distribution: concerns 35; policy 20–22
district power equalizing 417
diversity 4; of subnational governments 13–17
Duncombe and Yinger 115–116

earned income tax credits (EITC) 483, 488, 496–503, 506–508, 511, 514n18, 514n24–25
e-commerce 311–312, 329n13–14

econometrics 54
economic analysis: efficiency 317–322, 341–345, 368–375; equity 324–327, 341–345, 368–375; property tax 283–284
economic conditions: interstate differences in 517–521
economic development 516–517, 548–549; application 529–531, 542–548; data availability 515–516; effects of fiscal factors 531–541, *532*, *535–536*; headlines 515; interstate differences in economic conditions 517–521, **518**, *519*, **521**; interstate differences in fiscal policy 521–529, **526**; policy issues 541–542
economic effects of state aid 419–422
economic growth 231–232
economic issues: fiscal federalism 105–109; revenue for state and local governments 242–243
economics of government monopoly 380–385
economic theory 188–194
economies of scale 106–108, 109
economy, national: and fiscal results 137–140
education 410–411, 447; application 425–428, 435–437, 442–443; assessing results 437–442; data availability 410; environment 411–416, **411**, *412–413*, *415*; financing 167–171, 416–425; headlines 409; international comparison 443–446, **443**, *444–445*; production of 428–435, **431**
effective rate 268
efficiency 242–243, 247–249; economic analysis 317–322, 341–345, 368–375; efficiency cost 243, 259; efficiency rule for public goods 35–38; efficient quantity 159; gross receipts taxes 371; of a subsidy 250–251; of tax exemption 222–223; *see also* market efficiency
elasticity of demand 48–53; using elasticity to characterize demand 62–64
elementary-secondary education 61, 185, 213–214, 410–416, 435–437, 442–443; *see also* education
employment 128–130
environment, education 411–416
equity: economic analysis 324–327, 341–345, 368–375
evidence: assessing and accountability 441–442; demand for state-local services 53–59; educational production 432–434; fiscal factors 536–541; government costs 133–134; government productivity 133; grants 195–196; public choice 99–101
excess burden 243, 259
excise taxes 327–328; application 313–317, **313**, **316**, 322–324, **322**; consumption tax structure issues 306–312, **307**; data availability 303; economic analysis 317–322, *318*, *320*, 324–327, **325**; headlines 302; reliance on consumption taxes 303–305, **304**, *305*
exemptions 325–326; homestead 278–280; tax exemption for state and local bond interest 219–228, **220**, **222**, *223*, **226–227**
expenditures 14–15; categories 11–12; compared to produced output 127; health and welfare 488–489; tax and expenditure limits 142–148
externalities (or spillovers) 29–30, 37–41, 92–93, 110–115, 199–200, 205–206; benefit 30–35; effects 29; versus preferences 110–111; spatial 106

factor markets 253–254
factor mobility 533–535
failure *see* market failure
farmland 280
federal governments: federal aid 461–466; federal deductibility and progressivity 343–345; federal income tax changes 223–224; federal revenue sharing 204–205; federal-state tax base coordination 336–337; financing health care and welfare services 500–501; financing transportation 453–455
federal grants 7–11, 15–18, 21–23, 182–184, 199–205, 351–352; financing transportation 461–466; structure of grants to states 503–505
federal taxes: effect on interstate tax differences 526–527
financial advisor and underwriter 217
financing 527–528; Affordable Care Act 493–494; earned income tax credits 498–500, **499**; intergovernmental grants for education 416–425; Medicaid 489–494; policy and structural issues 500–508; public higher education 167–176, *168*; sports facilities 233–235; state attempt to reform education finance 425–428; Supplemental Nutrition Assistance Program 494–495; Supplemental Security Income 497–498; Temporary Assistance for Needy Families 496–497; transportation 452–456, 458–466; welfare and health-care services 489–508
fire protection 29, 37–39, 107–112, 126–127
fiscal capitalization: Tiebout model 97–99
fiscal characteristics: subnational public sector 7–13
fiscal choice 68–71; monopoly models of 78–80
fiscal effects of grants 188–194; evidence 194–196; *see also* intergovernmental grants
fiscal factors: evidence 536–541; theory 531–536
fiscal federalism 45, 113; demand for state and local government goods and services 47–66; economic issues of 105–109; organization of subnational government 104–119; public choice through mobility 87–103; public choice without mobility 68–85
fiscal incentives: types and magnitude of 527
fiscal policy: interstate differences in 521–529
fiscal results: and the national economy 137–140
fiscal role: subnational governments 18–22
fiscal system: US, grants in 182–185

fiscal zoning: Tiebout model 95–97
flypaper effect 196, 198–199
food, state sales tax on 255–257
foundation aid 416–417
Fox, William 312–315, 359, 436
fuel taxes 455–456, 460, 463, 467–469, 472, 478–480
full faith and credit 216
fungible 192

gambling 391–392
gasoline taxes: alternatives to 466–469; *see also* fuel taxes
general grants 187; and categorical lump-sum grants 191–193; *see also* intergovernmental grants
general obligation (GO) bonds 216
general sales tax 306
goods and services *see* state and local goods and services
Gordon and Knight 116–117
government costs: evidence 133–134
government goods *see* state and local government goods and services
government monopoly 402–403; alcoholic beverages 387–390, **389**; application 385–386, 400–402; casinos 396–397; data availability 379–380; economics of 380–385, *382–384*; gambling and lotteries 391–396, **392**; headlines 379; marijuana 390–392; operation of 386–400, **387**, **389**, **392**, *398*; revenue potential 399–400; sports betting 397–399, *398*; utilities 386–387, **387**
government organization *see* organization of subnational government
government productivity: evidence 133
government provision: methods of 37
government size: optimal 109–113
government spending: international comparison 17–18
government structure: international comparison 113
graded property tax 295
Gramlich and Rubinfeld 76, 100
Gramlich-Galper study 58–59
grants-in-aid *see* intergovernmental grants
Great Recession 10–12, 17, 121; capital investment 212–220, 227–232, 264, 277; education 427; health and welfare 485, 490, 495, 508; individual income taxes 333; intergovernmental grants 182, 186, 200–205; supply of state and local goods and services 129, 138–141
Greene and Parliament 114–115
gross income-type VAT 361, 363
gross receipts tax 360–361, 363; current use 372; incidence and efficiency of 371
guaranteed tax base (GTB) aid 417–419

Haig-Simons income 334
Hawaii General Excise Tax 372
headlines: business taxes 357–358; capital investment, borrowing, and debt 209; demand for state and local government goods and services 47; economic development 515; education 409; health and welfare 482; individual income taxes 331; intergovernmental grants 181; microeconomic analysis 25; organization of subnational government 104; pricing of government goods 154–155; principles of tax analysis 241; property tax 261; public choice through mobility 87–88; public choice without mobility 68; revenue from government monopoly and regulation 379; sales and excise taxes 302; state and local government finance 3; supply of state and local goods and services 123; transportation 450
health 483–484, 510–511; Affordable Care Act 493–494; data availability 483; earned income tax credits 498–500, **499**; financing 489–508; headlines 482; international comparison 508–510, *509–510*; magnitude of expenditures 488–489, **489**; Medicaid 489–494; policy and structural issues 500–508, *502*, *504*; and poverty 484–488, *485–487*; Supplemental Nutrition Assistance Program 494–495; Supplemental Security Income 497–498; Temporary Assistance for Needy Families 496–497
higher education, public: and user charges 167–170; *see also* education
highways 1, 11–12; capital investment 213–214, 229; demand for state and local government goods and services 60–61, 67; economic development 547; intergovernmental grants 201–202; microeconomic analysis 37–39; principles of tax analysis 241; revenue from government monopoly and regulation 385; supply of state and local goods and services 130, 133; transportation 450–468, 471–481; user charges 156–158, 175; voting 75
homestead "circuit-breaker" tax credits or rebates 279–280
homestead exemptions and credits 278
homogeneous communities 97–99
horizontal equity 242, 257, 334
housing 287–288

incentives 528; for all business 529; incentive effects 341–343; place-based 529–531
incidence 242–243, 246–247; gross receipts taxes 371; state corporate income taxes 368; of a subsidy 250–251
income effect 188, 317
income elasticity 54, 63–64
income taxes 353–354; application 339–341, 345–349; changes 223–224; the choice of state taxes 349–352, *352*; data availability 332; deductions 281; economic analysis 341–345, **342–343**; headlines 331; international

comparison 352–353, **353**; Michigan 309–310; net 362; reliance on 332–334, *333*, **333**; structure issues 334–339, **335**, **337**
increasing returns to scale 14, 33–35
indifference curve 82–84; analysis of grants 206–207
infrastructure 228–229
in-kind support: versus money 501–503
Inman, Robert 80–81, 199–202
inputs 431–432
insurance: discriminatory business taxes 375–376
interest, bond 219–228
intergovernmental grants 205–206; application 200–202, 204–205; data availability 181–182; for financing education 416–425; fiscal effects of 188–196, *189*, **190**, *192*, **194**; headlines 181; grants in the US fiscal system 182–185, *183–184*, **184**; indifference curve analysis of 206–207, *206*; international comparison 202–204, **203**; policy 198–200, *200*; purposes of 185–186; and tax money 196–198, *197*; types of 186–188, *187*
intergovernmental interaction 531–533
international comparison: education 443–446; government spending 17–18; government structure 113; grants 202–204; health-care services 508–510; pricing of government goods 176–177; supply of goods and services 150–151; transportation 456–457; types of subnational government taxation 352
interstate differences 16–17; in economic conditions 517–521; in fiscal policy 521–529; in services 503–506; in taxes 526–527
interstate mobility and migration 505–506
investment: effects of fiscal factors 536–541; transportation 475–476; *see also* capital investment
investors: nature of 221–222
Iowa: school district consolidation in 116–117
itemized deductions 335

K–12 education: and user charges 170–171; *see also* education

labor 287
Ladd, Helen 437–442
land 288; land value taxation 295–297; for public use 546–548
levying: levy limit 143; methods of levying congestion charges 472–473
license plates 400–402
license system 388
Lincoln Institute for Land Policy 105, 261, 268, 283
Lindahl equilibrium 38
local consumer goods 287–288
local public good 109
long-term debt 216; *see also* debt
lotteries 392–396
lump-sum grants 186, 189–191; and general grants 191–193; *see also* intergovernmental grants

majority voting 71–77
marginal cost of property taxes 280
marginal income tax rate 220
marginal revenue 381; product of labor 131
marginal social benefit 26
marginal social cost 26
marginal tax rate 341
marijuana 390–391
market efficiency 26–30, *27–28*, *30*; application 30–34, *31–32*, *34*, 38–41; distributional concerns 35; efficient provision of public goods 35–38, *36*; headlines 25
market failure 28, 37; *see also* market efficiency
Maryland: digital advertising tax 367–368
matching grants 186; and lump-sum grants 189–191; and tax effort 193–194; and tax relief 191; *see also* intergovernmental grants
maximum allowed level of expenditure 143
maximum property tax 143
measurement: demand 48–53; government services 124–130; inputs 431–432; outcomes 429–431
median voter theorem 50–52, 73–75; characteristics of 75–77
Medicaid 488, 489–493; and the Affordable Care Act 493–494
methods of government provision 37
Michigan: business tax experience 374–375; individual income tax 309–310; state attempts to reform education finance 425–428
microeconomic analysis 26–30, *27–28*, *30*; application 30–34, *31–32*, *34*, 38–41; distributional concerns 35; efficient provision of public goods 35–38, *36*; headlines 25
migration 505–506
mileage fee 467–469
millage 266
mills 266
mobility 4, 81–82, 88–89, 101–102, 346–349, 505–506; alternative voting methods 77–80, *79*; application 80–81; consumer 533–535; data availability 68, 88; evidence 99–101; factor 533–535; fiscal choices 68–71, *70*; headlines 68, 87–88; indifference curve approach to voting models 82–84, *83–84*; majority voting 71–77, *72*, *74*; Tiebout hypothesis 89–90, *90*; Tiebout hypothesis, evaluation of 90–95, **91**, *94*; Tiebout hypothesis, extensions of 95–99
money: grant money and tax money 196–198; versus in-kind support 501–503
monopoly models 78–80; all-or-nothing choice 83–84; *see also* government monopoly
monopsony 389
multimarket tax analysis 252–255; state sales taxes on food 255–257
multiple regression analysis 55
multistage gross receipts tax 307

national economy: and fiscal results 137–140
natural monopolies 34; user charges with 163–165
net income tax 362, 363; *see also* income tax
net income-type VAT 361, 363
New York: school district consolidation in 114–116
nonguaranteed bond 216
nonmatching grants 186; *see also* intergovernmental grants
nonresidents 339–341

Oates, Wallace 100, 195, 110–112, 295–297
OECD 4, 17–19, 150–151, 202–203, 410, 483, 508–509
Ohio Commercial Activity Tax 373–374
open method 388
operating costs *see* use (operating) costs
operation of government monopoly: alcoholic beverages 387–390, **389**; casinos 396–397; gambling and lotteries 391–396, **392**; marijuana 390–391; revenue potential 399–400; sports betting 397–399, *398*; utilities 386–387, **387**
optimal government size 109–113
optimal sales tax structure 317–319
optimal transportation pricing 470–476
organization of subnational government: data availability 105–106; economic issues of fiscal federalism 105–109; headlines 105; international comparison 113, **113**; optimal government size 109–113, *111–112*; policy applications and cases 114–118, *115*
origin principle 309
output, produced: compared to consumption 127–128; compared to expenditures 127

Pareto efficiency 26
parking fees and parking meters 167
parks *see* public parks and recreation areas
partial-equilibrium analysis 244
payments in lieu of taxes (PILOTS) 281–283
pension funding crisis 148–150
percentage tax 249
perfectly elastic 62
perfectly inelastic 62
performance, school: declining 428–429; and size 435–437
personal exemptions 335
personal property 268
physical ingredient rule 308
Pigouvian tax 249
place-based incentives 529–531
plurality voting 77
point voting 77
policy 114–118, 228–229; allocation 22; analysis 407; criminal justice 134–137; distribution 20–22; economic development 541–542; education 422–425, 435; financing health care and welfare services 500–508; fiscal 521–529; intergovernmental grants 198–200; stabilization 19–20; transportation 476–477
poverty 484–488
preferences: versus spillovers 110–111
price effect 188, 317
price elasticity 53–54, 62–63
price inelastic 53, 62
pricing, transportation 470–476
pricing of government goods 177–178; application 166–176, *166*, *168*; data availability 156; headlines 154–155; international comparison 176–177; theory of user charges 159–166, *160*, *162–163*; types and use of charges 156–159, **157**, *158*, **159**
prisons *see* corrections/prisons
private-purpose bonds 215, 216; costs of 224–226
produced output: compared to consumption 127–128; compared to expenditures 127
producer's surplus 27
production: criminal justice 134–137; education 428–435; government services 124–130; production function 124–127; stage of 307–309
productivity: and costs 130–134
profitability: and business taxes 524–525
profits tax 363
progressivity 243, 343–345, 346–349
property assessment 268–271; evaluating results 271–272; limits on values 273–274
property tax 288–298, **290**–**291**, **293**, *296*; application 281–283; data availability 261–262; differential taxation 284–287, *284–285*; economic analysis 283–284; headlines 261; homestead exemptions and credits 278–280; income tax deductions for 281; labor 287; land 288; local consumer goods 287–288, *288*; process of 264–278, *265–266*, **271**, **274**, *276*, **277**; reliance on 262–264, *263–264*; special assessment of farmland 280; Tiebout model 93–95; uniform national property tax 284
property tax relief or reduction measures 278
property values: alterative responses to rising values 275–277
public capital 231–232
public choice 45, 81–82, 88–89, 101–102; alternative voting methods 77–80, *79*; application 80–81; data availability 68, 88; demand for state and local government goods and services 47–66; evidence 99–101; fiscal choices 68–71, *70*; headlines 68, 87–88; indifference curve approach to voting models 82–84, *83–84*; majority voting 71–77, *72*, *74*; organization of subnational government 104–119; public choice through mobility 87–103; public choice without mobility 68–85; Tiebout hypothesis 89–90, *90*; Tiebout hypothesis, evaluation of 90–95, **91**, *94*; Tiebout hypothesis, extensions of 95–99
public goods 32–33; efficiency rule for 35–38; local 109

public higher education: and user charges 167–170; *see also* education
public infrastructure 228–229
public parks and recreation areas 174–175
public safety 39–42, 129, 135–137, 537–538
public school budgets: voting for 80–81
public transit 142, 163–165, 451, 461
public use, land for 546–548
pyramid 307

real property 268
recapture 418
recession: and the COVID pandemic 140–142; state and local governments in response to 200–202
reciprocal deductibility 337
recreation areas *see* public parks and recreation areas
refuse collection and disposal services 173–174
regressivity 243, 291–294
regulation 402–403; alcoholic beverages 387–390, **389**; application 385–386, 400–402; casinos 396–397; data availability 379–380; economics of 380–385, *382–384*; gambling and lotteries 391–396, **392**; headlines 379; marijuana 390–392; operation of 386–400, **387**, **389**, **392**, *398*; revenue potential 399–400; sports betting 397–399, *398*; utilities 386–387, **387**
reliance on business taxes 358–360
reliance on income taxes 332–334
reliance on property taxes 262–264
remedies, assessment 440–441
responsibility 439–440
revenue 15–16, 239, 402–403; alcoholic beverages 387–390, **389**; application 385–386, 400–402; casinos 396–397; data availability 379–380; economics of 380–385, *382–384*; federal revenue sharing 204–205; gambling and lotteries 391–396, **392**; headlines 379; marijuana 390–392; operation of 386–400, **387**, **389**, **392**, *398*; revenue bond 216; revenue potential 399–400; revenue sources 12–13; sports betting 397–399, *398*; transportation 455–456; utilities 386–387, **387**

sales taxes 327–328; application 313–317, **313**, **316**, 322–324, **322**; consumption tax structure issues 306–312, **307**; credits 326–327; data availability 303; economic analysis 317–322, *318*, *320*, 324–327, **325**; on food 255–257; headlines 302; optimal structure 317–319; reliance on consumption taxes 303–305, **304**, *305*; on services 313–317
Samuelson rule 37
schools: district consolidation in Iowa 116–117; district consolidation in New York 114–116; size and performance 435–437; *see also* education; public school budgets
selective sales taxes 316–317
separate accounting 364
services: sales tax on 313–317; *see also* state and local government goods and services
sewer *see* water and sewer services
single-market tax analysis 244–252
single-peaked preferences 72
size 7–11; optimal government size 109–113; schools 435–437
smuggling 322–324
spatial externalities 106
special assessment of farmland 280
specific allocation 364
specific grants 186; *see also* intergovernmental grants
spillovers *see* externalities
split-rate property tax 295
sports: sports betting 397–399; sports facilities 233–235; subsidizing for economic development 545–546
stability: Tiebout model 93–95
stabilization policy 19–20
stage of production 307–309
standard deduction 335
standard deviation divided by the mean 414
state aid: economic effects of 419–422
state and local bond interest 219–228
state and local government: financing health care and welfare services 500–501; microeconomic analysis 38–39; in recession response 200–202; *see also* subnational government
state and local government finance 4–5, 22–23; data availability 3–4; diversity of subnational governments 13–17, *13*, **14**–**15**, **17**; fiscal characteristics of the subnational public sector 7–13, **7**, *8–10*, *12*; fiscal role of subnational governments 18–22, *19*; headlines 3; international comparison 17–18, *18*; and structures of subnational government 5–6, *5–6*
state and local government goods and services 121, 177–178; application 60–61, 134–137, 140–142, *142*, 148–150, 166–176, *166*, *168*; and business taxes 525–526; data availability 48, 123–124, 156; evidence about demand for 53–59, **53**, **55**, *56*; headlines 47, 123, 154–155; international comparison 150–151, 176–177; measurement and production of government services 124–130, **126**, **128**, *129*, **130**; the national economy and fiscal results 137–140, *138–139*; productivity and costs 130–134, *131–132*; tax and expenditure limits 142–148, *145*; theory of user charges 159–166, *160*, *162–163*; types and use of charges 156–159, **157**, *158*, **159**; understanding and measuring demand 48–53, *50–51*; using elasticity to characterize demand 62–64, **62**, *63*, **64**
state sales tax on food: multimarket analysis 255–257
statistical analysis 54–57
structural issues: financing health care and welfare services 500–508

structure *see* government structure; tax structure
subnational government: data availability 105–106; diversity of 13–17; economic issues of fiscal federalism 105–109; financing transportation 453–455; fiscal characteristics 7–13; fiscal role 18–22; headlines 105; international comparison 113, **113**; optimal government size 109–113, *111–112*; policy applications and cases 114–118, *115*; structure of 5–7; types of taxation 352–353
subsidy: incidence and efficiency of 250–251; versus money 501–503; subsidizing sports for economic development 545–546
substitution effect 317
sumptuary taxes 316
supermajority voting 77–78
Supplemental Nutrition Assistance Program (SNAP) 488, 494–495
Supplemental Security Income (SSI) 488, 497–498
supply: application 134–137, 140–142, *142*, 148–150; data availability 123–124; headlines 123; international comparison 150–151; measurement and production of government services 124–130, **126**, **128**, *129*, **130**; the national economy and fiscal results 137–140, *138–139*; productivity and costs 130–134, *131–132*; tax and expenditure limits 142–148, *145*

taxable debt 232–233
taxable income 335
tax analysis: administration cost 243–244; application 255–257, *256*; data availability 241; economic issues 242–243; headlines 241; multimarket tax analysis 252–254, *252–254*; single-market tax analysis 244–252, *245–248*, *250–251*
tax and expenditure limits 142–148
taxation versus monopoly 384–385
tax base 306–307, 336; allocating tax bases among jurisdictions 363–367; alternative business tax bases 360, 362–363; federal-state tax base coordination 336–337; guaranteed tax base aid 417–419
tax bill 267
tax costs: magnitude of 521–522
tax credits 336; *see also* credits
tax effort 193–194
taxes, payments in lieu of 281–283
taxes on food 255–257
tax exemption 219–228
tax incentives 528
tax incidence 242–243, 324–325
tax levy 267
tax location 309–312
tax money: and grant money 196–198
tax rates 339
tax relief: and matching grants 191; property 278
tax revenue: limit on 143
tax structure: business tax structure issues 360–367; consumption issues 306–312, **307**; income tax structure issues 334–339; optimal sales tax structure 317–319, *318*
technology 125
Temporary Assistance to Needy Families (TANF) 488, 496–497
tennis courts 166–167
throwback provision 365
Tiebout hypothesis 89; evaluation of 90–95; extensions of 95–99
transportation 451–452, 479–480; application 466–469, *469*, 476–479, *478*; data availability 451; financing 452–456, *453*, **453**–**455**, *456*, 458–466, **458**, *459*, **464**–**465**; headlines 450; international comparison 456–457, *457*; optimal pricing 470–476, *470*, *473*, *475*
two-part price 164
two-rate property tax 295

uniform national property tax 284
unit excise tax 244–246
unit of evaluation 438–439
use (operating) costs 161–162
user charges 177–178; application 166–176, *166*, *168*; data availability 156; financing transportation 458–461; headlines 154–155; international comparison 176–177; theory of user charges 159–166, *160*, *162–163*; types and use of charges 156–159, **157**, *158*, **159**
use taxes 306, 309–312
use-value assessment 280
utilities 386–387

vaccination 30–35
value added 439
value-added tax (VAT) 361–362
vertical equity 242, 257
Vickrey, William 452, 468, 471
voting: indifference curve approach 82–84; majority voting 71–77; plurality voting 77; point voting 77; for public school budgets 80–81; supermajority voting 77–78; voter participation 52

Washington Business and Occupation Tax (B&O tax) 372–373
water and sewer services 229–233; and user charges 171–172
welfare 483–484, 510–511; Affordable Care Act 493–494; data availability 483; earned income tax credits 498–500, **499**; financing 489–508; headlines 482; international comparison 508–510, *509–510*; magnitude of expenditures 488–489, **489**; Medicaid 489–494; policy and structural issues 500–508, *502*, *504*; and poverty 484–488, *485–487*; Supplemental Nutrition Assistance Program 494–495; Supplemental Security Income 497–498; Temporary Assistance for Needy Families 496–497; welfare to work 506–508