Alfred Nobel University

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MICROECONOMICS

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The book introduces the reader to the main problems of microeconomic analysis. It contains an exposition of the theory of consumer choice and consumer behavior, reveals a model for achieving its equilibrium. Considerable attention is paid to the theory of production and the mechanism of selecting its volumes, which maximize the producer's profit in the conditions of various market models. This is a description of the company's behavior on the market of goods and resources. The book is based on a course of lectures given by the authors to students of the Alfred Nobel University

For applicants, teachers, all those interested in economic issues.

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Zadoia A.

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CONTENT

INTRODUCTION

The modern market economy requires an economist to have extensive knowledge not only of the basics of economic theory, but also of in-depth knowledge of their special sections. Microeconomics, as a special component of economic theory, has been studied in educational institutions of Ukraine since the mid-1990s. For a long time, both applicants and teachers used educational literature published in our country and abroad based on the translation of American and German textbooks. Recently, domestic teaching aids have also appeared, which, in our opinion, are quite interesting.

However, there is an urgent need for such an edition, which, on the one hand, would contain the fundamental provisions of microeconomics, and on the other hand, would not contain excessive detail, which does not allow a novice economist to grasp the microeconomic system as a whole. It should be available to every student in terms of its volume and price. Awareness of this need prompted the authors to prepare the publication of this book.

The first edition of the book in the English was published in the early 2010s.[1] Now there is a need to revise and update the textbook, taking into account new circumstances and the latest achievements of microeconomic science. We decided on the electronic version of the publication to make the book as accessible as possible to applicants and all those interested in economic science. Since the teaching of the microeconomics course in English is widely implemented in Ukraine today, the authors decided to prepare an English-language edition that would be adapted to the conditions of studying microeconomics by Ukrainian students.

The basis of the book is a course of lectures given to students of the Alfred Nobel University. Therefore, the language of the book is the language of live classroom communication. The authors tried to find a presentation style that was understandable for the reader, and examples to demonstrate certain microeconomic regularities were taken from everyday life.

The proposed microeconomics course consists of an introductory lecture and five sections. The introductory lecture introduces the reader to microeconomics as a component of economic theory and as a certain system of economic relations, which is the subject of study of this cource. The first two parts are devoted to the theory of behavior of the main counterparties of the microsystem: the consumer and the producer ("Theory of Consumer Behavior " and " Theory of a Manufacturer Behavior "). The theory of consumer choice, the model of achieving equilibrium by the consumer, the mechanism of formation of market demand and its elasticity are disclosed here. When

[1] Microeconomics / A.O.Zadoya, S.V.Kuz'minov, O.A.Kosyakina. Dnipropetrovsk: DUEL, 2011. 290 p.

analyzing the theory of production, special attention is paid to the formation of costs and the dependence of product dynamics on the dynamics of costs of production factors. The regularities of the formation of production costs in the short-term and long-term periods are also analyzed.

The third part "Commodity Market" reveals the behavior of the manufacturer in the markets of finished products. The four topics included in this section are devoted, respectively, to the firm's decision-making about prices and production volumes under different market models: pure competition, pure monopoly, monopolistic competition, and oligopoly.

Since the company is not only a producer of products, but also a consumer of resources, a special section of the course ("Market of Resources") reveals the origin of demand for resources and the mechanism of price formation for them.

The fifth section "Analysis of General Equilibrium and Efficiency" concludes the book, which examines the mechanism of achieving general equilibrium and provides an assessment of the effectiveness of the functioning of the market system at the micro level.

The proposed course of lectures is designed to provide only basic knowledge of microeconomics, which will be deepened by studying other courses.

Chapter 1.
SUBJECT AND METHOD OF MICROECONOMICS

The purpose of the introductory lecture on the course "Microeconomics" is to clarify the features of the object that is the subject of study of this section of economic theory, and the specifics of the methods of cognition used in it.

1.1. Microeconomics in the system of economic sciences

Microeconomics is a branch of economic theory that studies the activities of individual economic entities. They can be individual consumers, workers, capital investors, firms, etc. On the one hand, it explains how and why decisions are made by individual business entities, and on the other hand, it studies the interaction of entities in the process of forming larger structures - industry markets.

As an independent section of economic theory, microeconomics was formed in the late 19th and early 20th centuries. However, its formation went through a long stage of evolutionary development. The principles of microeconomic analysis are found even in classical political economy. Thus, using the dual methodology of economic analysis, Adam Smith investigates the external forms of manifestation of economic phenomena, determines the functional dependence of many values and thereby lays the foundations of functional analysis. In the period of late classicism, many economists use this method, which often leads to fundamental discoveries in microeconomics. Such scientists as T. Malthus and J. B. Say are rightfully considered the forefathers of microeconomics. Malthus' law of diminishing returns and Say's theory of three factors of production are still used in microeconomic analysis. However, despite all the significance of microeconomic discoveries by representatives of late classicism, the formation of the science of "microeconomics" took place much later and is primarily associated with neoclassicism.

In the second half of the 19th century, the formation of an economy with a predominantly market mechanism of its regulation was completed. Under these conditions, the study of practical issues becomes particularly relevant, which caused the shifting of aspects from the clarification of general principles of political economy to the analysis of problems of economic practice. Qualitative analysis, as a rule, is replaced by quantitative.

The development of microeconomic analysis can be represented by highlighting the stages of its evolution:

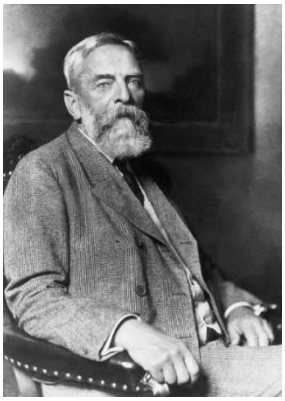
Heinrich Gossen (1810-1858)

- ***1st stage (1845-1990)***. Within its framework, the foundations of microeconomics are laid, and the main methodological principles of research are formed. The most famous representatives of this stage are:

a) Heinrich Gossen (1810-1858) is a German economist, the founder of the theory of marginal utility, who first used the psychological factor in the analysis of the economic behavior of subjects and formulated the laws of satisfying human needs;

b) Austrian school (Karl Menger, Friedrich Wieser, Eugen Behm-Bawerk), whose representatives enriched economic science with the discovery of the principle of marginal utility and proposed a quantitative (cardinalist) approach to its definition;

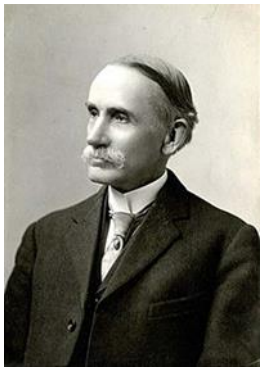
Karl Menger (1840-1921)



Friedrich Wieser (1819-1911)

Eugen Behm-Bawerk (1851-1914)

c) John Bates Clark, a representative of the American school, who raised the question of the need to determine marginal utility not only in relation to consumption items, but also to factors of production, thereby modifying the theory of marginal utility into the theory of marginal productivity of production factors.

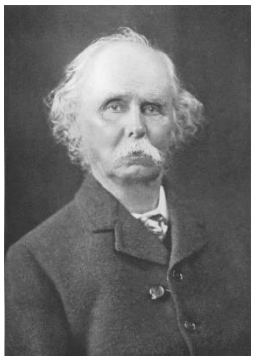


John Bates Clark (1851-1938)

- 2nd stage (1890-1933). At this stage, microeconomics is divided into separate areas of economic research based on the systematization and generalization of the ideas of the late classics, Austrian and American schools. After the publication of A. Marshall's work "Principals of Economics" (1890), the science received its first name - "Economics". Representatives of the second stage can be considered:

a) Alfred Marshall, who proposed a compromise option for determining the market price - marginal utility and production costs; formulated the laws of supply and demand; devoted a significant part of his research to the study of the motives of the behavior of individual business entities;

b) mathematical school (William Stanley Jevans, Francis Edgeworth, Leon Walras, Vilfredo Pareto). This school for the first time widely used the apparatus of mathematics as a tool of economic research and made an attempt to describe the market of competitive goods as a closed system of rigid quantitative interdependencies. She proposed a qualitative (ordinalist) approach to determining marginal utility and substantiated the theory of general economic equilibrium.



Alfred Marshall
(1842-1924)

William Stanley Jevans
(1835-1882)

Francis Edgeworth
(1845-1926)

Leon Walras
(1834-1910)

Vilfredo Pareto
(1848-1923)

- 3rd stage (1933 - to the present time). Microeconomics develops on its own basis and is supplemented by the following discoveries: income and substitution effect (E. Slutsky, D. Hicks, P. Samuelson); theory of imperfect competition (J. Robinson); the theory of monopolistic competition (E. Chamberlin); game theory (J. Nash, O. Morgenlitern, J. von Neumann).

However, even today, when microeconomics is recognized all over the world, probably tens of thousands of studies and hundreds of textbooks have been written on

this discipline, it should be understood that the division into microeconomics and macroeconomics is somewhat conditional. Knowledge of each section of economic theory involves understanding the interrelationship and interdependence of micro- and macro-phenomena. For example, the labor market is a market of one of the resources, and therefore it is studied in microeconomics. At the same time, this is one of the main problems of macroeconomics, as it is related to unemployment and social stability of society as a whole.

It is quite common among non-specialists to equate microeconomics with enterprise economics. In fact, these sciences only partially intersect: both study decision-making by enterprises regarding their market behavior. However, each of them has its own specific problems, of which there are many more. For example, microeconomics studies the behavior of households, consumer preferences, market demand and market supply, leaving aside the issue of the organizational decision-making mechanism at enterprises, their organizational forms, indicators of the financial state of the enterprise, etc., which are studied in the course of enterprise economics.

Like any other economic science, microeconomics seeks answers to the main questions facing any economic system. This is, first of all, the question "what to produce?". The manufacturer always has the possibility of alternative production. Therefore, in order to choose an acceptable production option, it is necessary to know the needs of the consumers. After all, the ultimate goal of any production is to satisfy needs. Therefore, one of the key problems of microeconomics is the study of the motives of consumer behavior, the theory of consumer choice.

Another question that microeconomics tries to answer is "how to produce?". The manufacturer must decide which resources and in what quantity to involve in the production process. By studying the theory of production, microeconomics helps to clarify the mechanism of distribution of resources between enterprises and branches of production.

The question "to whom and what results will production bring?" is not left out of the attention of microeconomics. This is related to the study of income and its distribution for current and future consumption.

The search for answers to the listed questions allows microeconomics to realize its functions, among which the following should be highlighted:

1. ***Explanation of observed phenomena***. Every science has its own theoretical postulates, as starting positions, accepted as axioms. Let's say, for mathematics, this is the concept of a point, starting from which you can determine what a line, plane, figure, etc. is. For microeconomics, such a "point" is the thesis that when choosing behavior options, economic subjects pursue the goal of maximizing their profit. Of course, in

life we also encounter irrational behavior of subjects. However, it can be considered as a deviation from the norm. Rational behavior is typical for most business entities.

It should be noted that profit can be both current and prospective. Economic life is characterized by the contradiction between current and prospective profit. This has been called the "Robin Hood effect". By robbing rich merchants and distributing their property to the poor, Robin Hood improved the lives of the latter. Ultimately, however, merchants stopped supplying goods to the area altogether, which led to a sharp rise in prices and a worsening of the lives of the poor.

2. ***Forecasting the behavior of economic entities***. The effectiveness of the implementation of this function of microeconomics depends on the accuracy of the initial provisions, which are the basis of the forecast. They represent the economic regularities formulated in the course of research. Using the laws studied in the course of microeconomics to predict the behavior of economic entities, it is necessary to understand that these laws act as trends and will not necessarily work in every specific case.

Explanation of economic phenomena and prediction of behavior belong to the so-called **positive analysis**. It is also possible to approach microeconomic problems from the standpoint of **normative analysis**, which involves assessing the correctness or incorrectness of actions and answering the question "how should it be?". However, this approach is closely related to economic policy and goes beyond the objectives of the microeconomics course.

1.2. Methodology of microeconomics: theories and models

Both general scientific methods and special ones are used in microeconomic research. The final task of such research is the development of theories and models.

Microeconomic studies, as a rule, begin with the collection and study of the facts of economic life. Their generalization, selection of the most essential and abstraction from secondary ones, research of cause-and-effect relationships allows to establish the motives of the behavior of economic subjects and to build a model. **An economic model** is a system of relationships between economic variables that allows you to predict the outcome. In other words, it is used to predict how changes in economic conditions will lead to changes in economic outcomes. **Economic variables** are natural quantities that can be measured in some way, or amounts of money that can take on a number of possible values.

Conclusions from economic models are expressed in the form of hypotheses, i.e. statements about causes and effects that need to be confirmed or denied by facts.

The purpose of economic modeling is to try to help understand how this or that sector of the economy functions. It would be a mistake to think that the more the model resembles the real process, the better it is. The criterion for the usefulness of an economic model is not the degree of its correspondence to real economic processes, but the correspondence of the forecasts obtained with its help to real events. Therefore, the model should be simplified as much as possible, which will allow to expand the scope and efficiency of its use. For example, if the glow at sunset makes it possible to predict the windy weather for the next day with considerable probability, then such a simple model is much more useful than one built on a complex study of the directions of air currents with the help of probes, satellites, etc.

The construction of the model is associated with the loss of part of the information about the object under investigation. This allows you to abstract from its secondary elements, to concentrate on the main components of the system and their interrelationships. Known values that are entered into the model in a ready form are called **exogenous**; values that are obtained within the framework of the model when solving the task are called **endogenous**.

The simplest type of economic-mathematical modeling is modeling in two-dimensional space - with the help of graphs. This method is most often used in microeconomics.

A key premise of building economic models is the reference to the fact that economic entities try to maximize their benefit. At the same time, we are talking about the net benefit, as the difference between the total result and the costs that were incurred to achieve it. It should be noted that for an economist, costs are not just sums of money or hours of work, but those **benefits obtained from possible alternative options for using resources**.

In the construction of microeconomic models, a technical tool called "**marginal analysis**" is widely used. It is the study of how each additional operation that is performed over a period of time affects the goal that a person seeks to achieve. Examples of such marginal quantities can be marginal costs (costs necessary to increase the result by one unit) or marginal utility (utility brought by the consumption of an additional unit of good). A rational subject should continue to search for better solutions until the marginal benefit equals the marginal cost. Just in this case, he will achieve the maximum realization of his goal.

Functional analysis is of great importance in microeconomics. In the course of its implementation, a characteristic feature that interests us is highlighted in the investigated phenomenon, and then the search for factors that influence it begins. After such factors are established, the method of their interaction with the selected characteristic, i.e. the function, is determined. It should be emphasized that the

clarification of the functional relationship is important even in cases where the clear definition of cause-and-effect relationships between the studied phenomena is complicated.

The equilibrium approach to the study of dynamic phenomena and processes is another important feature of microanalysis. Considering the constant dynamics of economic phenomena, microeconomics tries to study their state, which is characterized by relative stability, i.e. equilibrium. Equilibrium means that there are no internal tendencies to change the existing state. If the situation changes radically with slight changes in the external environment, such an equilibrium is called **unstable**. If when such external changes occur in the system itself, forces reviving the equilibrium appear, it is called **stable** (Fig. 1.1). Of course, changes in external conditions can be significant. Then such an economic system will move from one equilibrium state to another similar state. Establishing the way of interaction of the directly contacting forces in this interaction, the analysis of the results of their mutual influence and stable functioning in the external environment, which is dynamically changing, and then the prerequisites for the emergence and disintegration of such systems and the transition to new ones is one of the key directions of the development of microeconomics.

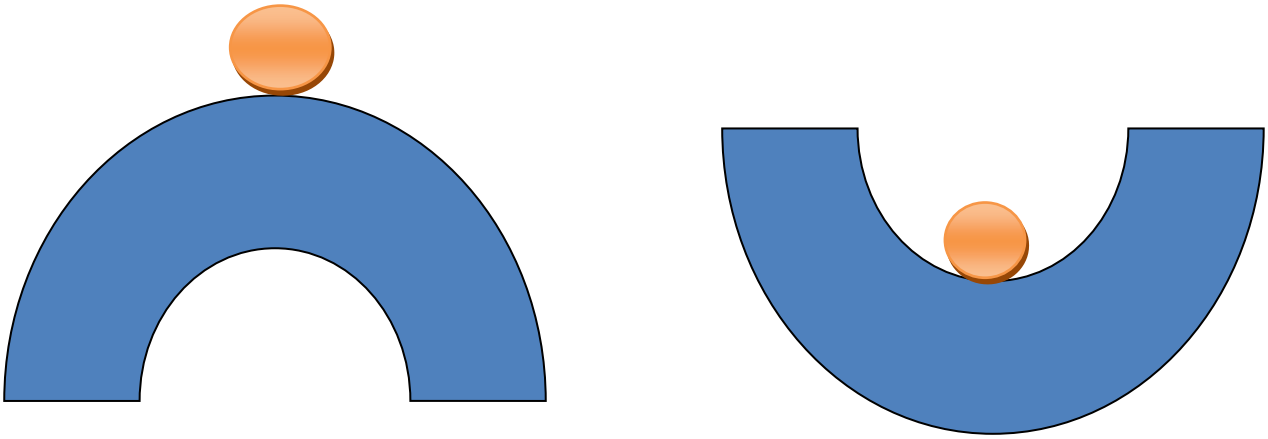


Fig. 1.1 Unstable and stable equilibrium

The method of **statics** and the method of **dynamics** have become especially widely used in microeconomic research. The method of statics involves the comparison of different equilibrium states, while the transition from one equilibrium to another remains outside the analysis. The dynamics method, on the contrary, requires the analysis of the actual process of transition from one state of equilibrium to another.

1.3. Microsystem and its main characteristics

Microsystem is the object of microeconomic research. Since the microsystem acts as a system of economic relations between economic entities, it can be analyzed in three aspects: by clarifying which entities enter into these relations, what these relations are about, and what is the main content of these relations.

The main entities of the microsystem include:

a) ***households***. It is a group of people who pool their incomes, own common property and make economic decisions together. A family is the most characteristic example of a household. However, the role of a household in the microeconomy can be performed by an individual who independently forms and uses his income without entering into any associations with other citizens. The role of households in the microeconomic system is double one. On the one hand, they are consumers of final goods and bearers of final needs. The economic system functions precisely to satisfy these needs. Therefore, in the final goods market, households act as buyers on the demand side. On the other hand, households are the owners of resources that supply them for production purposes. Therefore, in the resource market, households turn into sellers, form a supply;

b) ***enterprises (firms).*** They are any business entities engaged in productive consumption of resources and producing goods or services for the sake of profit. It should be noted that the concept of "enterprise" in microeconomics is much broader than, say, it is defined in legislation. If it is important for a legislator that an enterprise must be a legal entity, undergo state registration, etc., then for a researcher of microeconomic problems, all this is of no significant importance. The main thing for him is that the enterprise independently makes decisions about production, acquisition of resources, prices and sales markets and is guided by the choice of alternative options in order to maximize profit;

c) ***the state***. In the microsystem, it is considered as a set of authorities that performs the role of coordinator and regulator of economic life. The microsystem researcher abstracts from the fact that the state is the owner of a significant number of enterprises, organizes the production of goods for public use, etc. The most essential for him is its coordinating role.

The resources of production and its results are **the objects** on which relations are formed in the microsystem. As in other branches of economic theory, in microeconomics labor, capital, natural resources (land) and entrepreneurial abilities are analyzed as **resources. Labor** is the purposeful activity of a person capable of changing natural matter to give it the form necessary for consumption. All means of production created by person in the previous production processes are considered as

capital in microeconomics. **Natural resources** include those groups of labor items that were previously not amenable to processing or the forces of nature used in the production process. Most often, they are called the generalizing word "l**and**". **Entrepreneurial abilities** are the special abilities of individuals to consciously take risks, mobilize resources, organize them in the production process and creatively use them for the sake of profit.

Taking into account the following properties of resources is of particular importance for understanding the motives of the behavior of economic entities and building appropriate models:

- *scantiness*. As a rule, microeconomics deals not with absolute, but with relative limitation of resources. This does not mean that this or that resource does not exist at all, but that there is no possibility of obtaining it under the previous conditions. Increasing the involvement of this resource in production will be more expensive for firm. Although in some cases, microeconomics specifically examines situations that arise as a result of absolute resource limitations;

- *interchangeability (substitutability)*. This means that to a certain extent, some types of resources can be mixed with others. For example, a ditch can be dug with the help of an excavator with a small amount of labor or with shovels by hand, but in the latter case a much greater amount of labor is required. Most often, in microeconomics, substitution of two types of resources is considered: capital and labor;

- *complementarity*. Effective use of each resource is possible only at the certain ratio with others. Although resources are able to replace each other, this ability is limited: it is practically impossible to completely replace labor with capital or vice versa.

As a result of production activity in microeconomics, **a thing (a material product) or a service** is considered. Quantitatively, it can be characterized both with the help of natural indicators and in value terms. The value expression largely depends on the prices in which the result is calculated. They can be current, i.e. such as they were at the time of calculation, or comparable, fixed at a certain level. In microeconomics, both the first and second options are used.

If we consider the microeconomic system from the point of view of the content of the economic relations that are formed in it, it turns out that the microsystem is a **market system**. The market is a way of interaction of economic subjects, which is based on the price system and competition. This is a special mechanism for coordinating economic activities.

The market relationship established between the seller and the buyer has some distinctive features:

- *equal status of participants*. This means that neither the seller nor the buyer should have the ability to non-economically force the counterparty to enter into an exchange relationship. Of course, this does not exclude the monopoly position of one of the participants in the market relationship, but in this case enforcement will have economic character;

- *the use of the principle of economic benefit as the basic criterion for the feasibility of joining the market*. It is possible to single out three main rules by which exchange participants are guided: 1) exchange must bring benefit; 2) everyone tries to make a deal with the maximum benefit for himself; 3) it is better to make a deal with a lower benefit, than to refuse it aa all;

- *full economic responsibility of participants for their actions*. If freedom is one side of the subject's market position, then full self-responsibility is the opposite. When an economic entity chooses a counterparty without coercion, of its own free will, it must, of course, bear responsibility for its choice.

The sphere of exchange can be imagined as the movement of two opposite flows: goods and money. A visual diagram of the circulation of goods and money (Fig. 1.2) will help to better visualize the market system in a generalized form and understand the logic of building a microeconomics course.

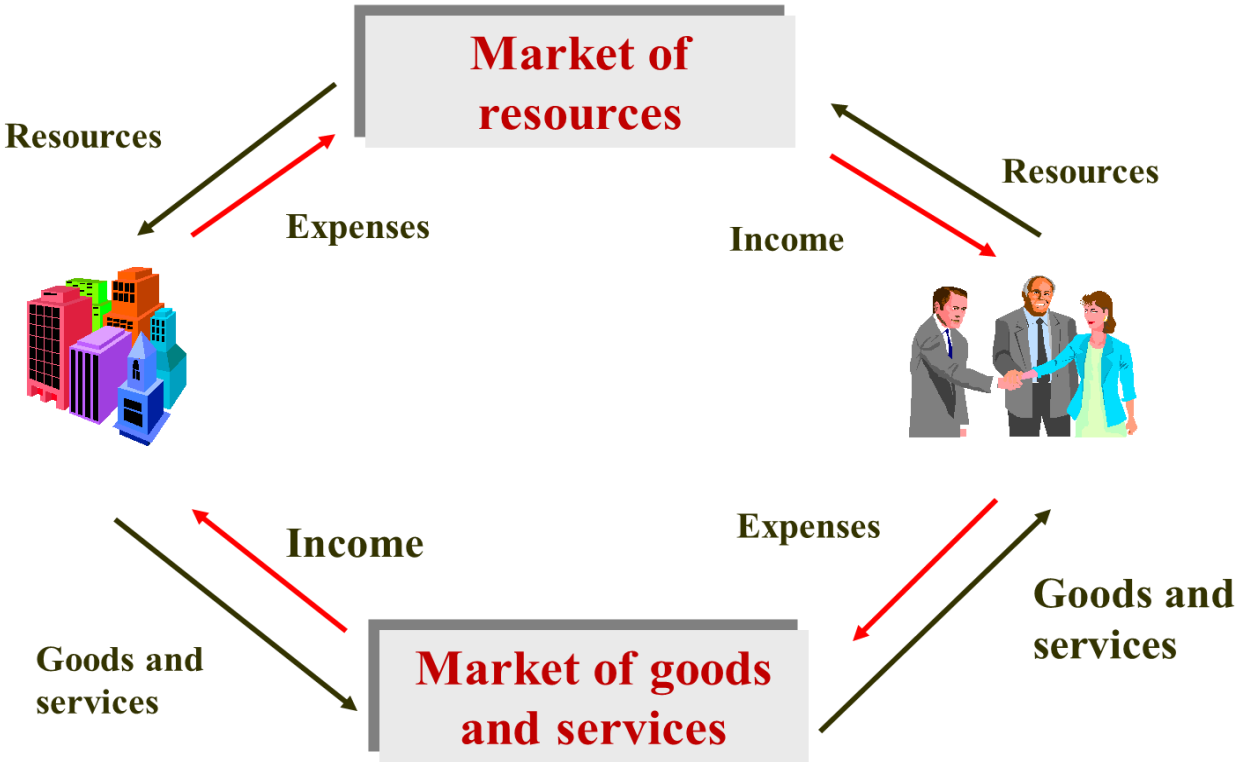


Fig. 1.2. Circulation of goods and money

The behavior of economic entities in the market largely depends on the state of the competitive environment. Therefore, in microeconomic analysis, special attention is paid to competition, considering separately the markets of pure competition, monopolistic competition, oligopoly and pure monopoly.

The normal state of the microsystem is its focus on achieving equilibrium of both individual subjects, primarily the consumer and producer, and the system as a whole. Finding out of the mechanisms of establishing and restoring the equilibrium state of the microsystem is the main task of the section of economic theory called "microeconomics".

The main terms and concepts

General problems of the economy
Microeconomics
Macroeconomics
Functions of microeconomics
The Robin Hood’s effect
Positive and normative analyses
Methodology of microeconomics
Economic model
Economic variables
Subjects of microeconomics
Marginal analysis
Resources and their properties

Part 1.
THEORY OF CONSUMER BEHAVIOR

Chapter 2.
THEORY OF CONSUMER CHOICE

Each of us as a consumer is faced with the problem of choice every day: which dishes to complete our lunch in the student canteen, to go to the university by trolleybus, bus or fixed-route taxi, which book in economics to buy? Frim time to time we make a choice, not realizinf, why it is exactly this one. It occurs as a subconscious fact. In reality consumer choice can be modeled quite precisely. There is a section of microeconomics which explains the behavior of the consumer, the mechanism of choosing one or another set of products that he/she is ready to purchase on the market. The task of this chapter is to outline the main provisions of the theory of consumer choice, i.e. to give scientific explanations for how the consumer spends his/her revenue to maximize satisfaction.

2.1. Consumer preferences

Did you see, how visiters read menu in a restaurant, cafe or bar? As a rule, they firstly pay attention to the left part, where the offered dishes are listed, and stop at some of them. They then compare their previous selection with the right-hand part, where the prices are listed, and at least roughly determine whether they can place the appropriate order for the amount of money they have. This observation provides the key to understanding the rather complex process of consumer choice, the general scheme of which is shown in fig. 2.1.

First of all, it should be borne in mind that the consumer will choose only what he/she needs. It is pssible to say that consumer choice is based on people's needs. ***Needs are a state of satisfaction, which consumer seeks to maintain or a state of dissatisfaction that he/she would like to change***.

The consumer can satisfy his needs with the help of a different set of products. For example, you can satisfy your hunger with a sandwich with sausage or a sandwich with cheese. Depending on the tastes, the consumer prefers one of them. Therefore, human needs, superimposed on the specifics of the individual, are transformed into preferences. ***Consumer preferences are the ranks that the consumer sets for***

alternative options for satisfying needs. Those options that, in the opinion of the consumer, are better able to satisfy his/her needs will occupy higher places in this "ranking table". Thus, appearing on the market, the consumer must choose how best to satisfy his/her needs without spending more than his budget allows**.**

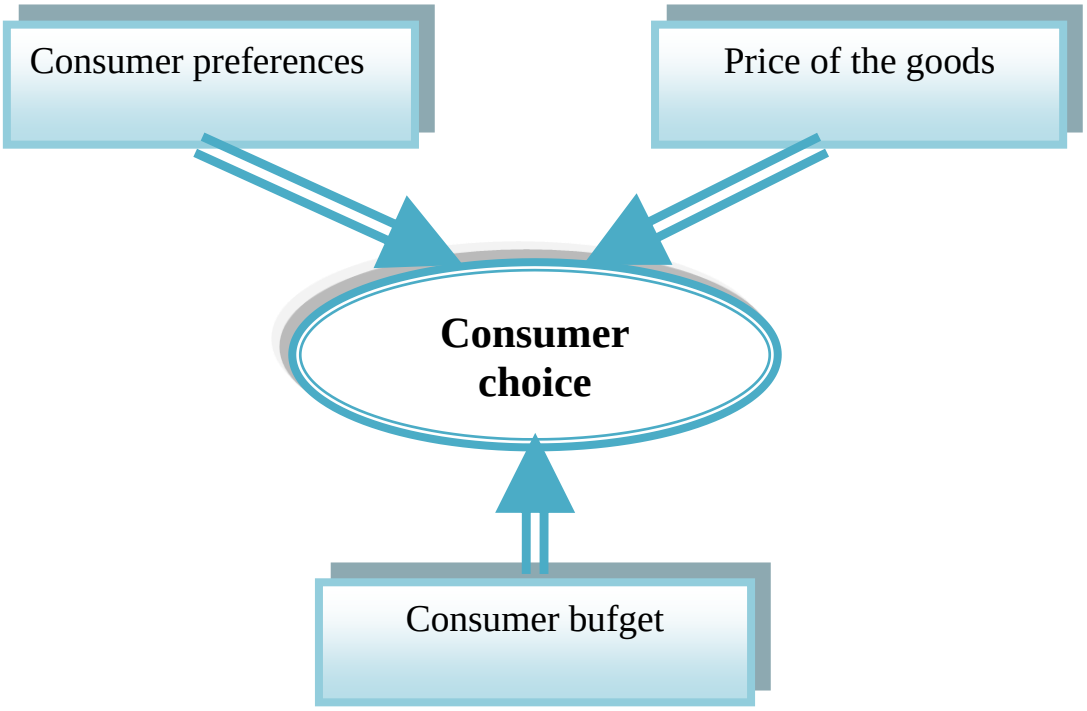


Fig. 2.1. Factors of consumer choice

These remarks provide sufficient grounds for building a model of consumer choice. However, this model, like any other, involves the adoption of certain assumptions, initial references, which make it possible to better understand it and limit the conditions under which the conclusions made with its help will be most likely. These assumptions are:

1. The consumer's ability to range alternatives to satisfy his/her needs. If there are two sets of goods (*A* and *B*), then the consumer may prefer one of them or recognize that they are equivalent for him/her:

$$A > B;\ A < B;\ A = B.$$

2. Consumer preferences are transitive. If the consumer prefers set *A* over set *B*, and set *B* over set *C*, then he/she prefers set *A* over set *C*:

$$if\ \ A > B,\ a\ B > C\ ,\ then\ \ A > C.$$

3. *A larger quantity of the product is more attractive to the consumer than a smaller quantity*. This link assumes that when building a model of consumer behavior, we assume that his/her needs for a particular product are not fully satisfied, because after reaching full saturation of needs with a certain product, it turns into an anti-good, and another dependence is triggered: the less anti-good, the better for the consumer.

2.2. The utility function and indifference curves

Giving any ranks to alternative variants of the satisfying needs, the consumer starts from a subjective idea of the usefulness of various goods for him/her. ***Utility is the satisfaction that a consumer receives from consuming goods or services or from any activity.*** According to the majority of modern researchers, utility is not subject to quantitative measurement (*ordinalist point of view*), therefore goods, as carriers of a certain utility for the consumer, can only be measured ordinarily: the consumer is able to determine the order, the sequence in which he/she would choose these goods for satisfaction his/her needs. There is also another point of view (*cardinalist*) which allows for the quantitative measurement of utility. Such a measurement is quite arbitrary, since there is no clearly defined unit of measurement. Therefore, in the future, for the comparison of different utilities, we will use conditional points that the consumer assigns to goods.

Utility is an exclusively individual concept: what may be highly useful for one consumer may be perceived as anti-good for others. Someone values a cup of strong coffee in the morning above all else, while someone will not drink it under any circumstances.

Economic theory assumes that there is a certain functional relationship between utility and the quantity of consumed products. It is reflected by ***the utility function***, as a ratio between the volume of consumed goods and services and the level of utility achieved by the consumer:

$$U = f(Q_x, Q_y, \ldots, Q_n),$$

where U – utility; Q_x, Q_y, …, Q_n – volumesmof the appropriate consumed goods.

To build a model of consumer behavior, let's introduce another assumption: let the consumer to form his set only at the expense of two goods (*X* and *Y*). Then the utility function can be presented in a simplified form:

$$U = f(Q_x, Q_y).$$

If a student's weekly food consumption consists of pizza (goods *Y*) and hamburgers (goods *X*), then it is possible to find such sets of them which have the same utility for the consumer. The list of such sets forms a ***consumer grid*** (Table 2.1).

Таблиця 2.1.

A grid of the consumer

Set of goods	N_1	N_2	N_3	N_4
Hamburgers, units	8	10	12	14
Pizza, units	20	12	6	2

According to the table 2.1, we can build a corresponding graph (Fig. 2.2). The curve on this graph is called the indifference curve. ***The indifference curve for a certain consumer is all those combinations of goods that provide the same level of satisfaction***. The consumer does not see any difference between sets of goods N1, N2, N3, N4.

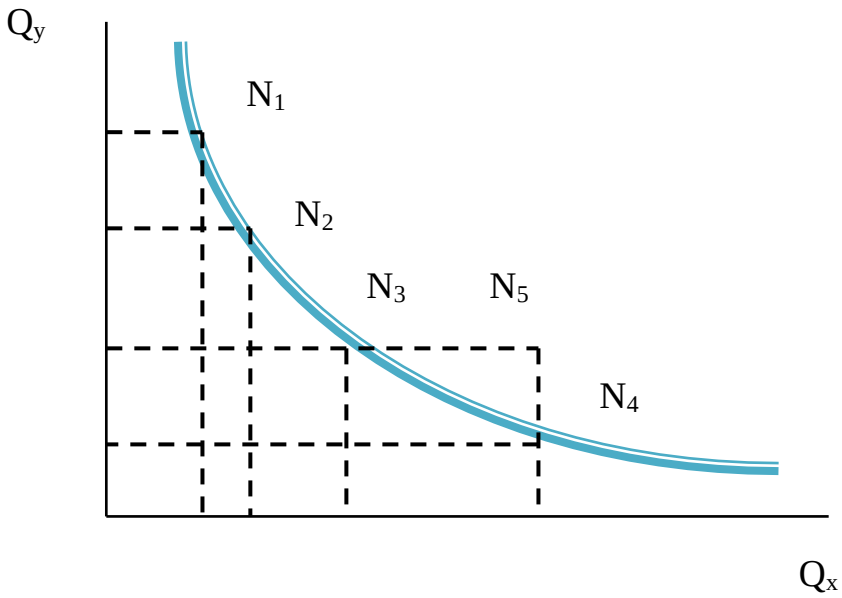


Fig. 2.2. The indifference curve

The set of goods corresponding to the coordinates of point N_5 provides a level of consumer satisfaction greater than any set belonging to the indifference curve. However, other sets can be found that have the same utility as the set at point N_5. Therefore, an indifference curve can be drawn through any point corresponding to a certain set of goods. These curves form ***a map of indifference curves*** (Fig. 2.3).

A map of indifference curves has certain properties:

1. Sets of goods on the curves more distant from the origin correspond to a higher degree of consumer satisfaction than those lying on curves less distant.

2. Indifference curves do not intersect. If we assume that the indifference curves U_1 and U_2 intersect, then they have a common point *A*. Then the set of goods *A* has the same utility as the set *B* belonging to the curve U1 and the set *C* contained in the curve U_2 . According to the principle of transitivity B=C. However, this is impossible because these points belong to different indifference curves.

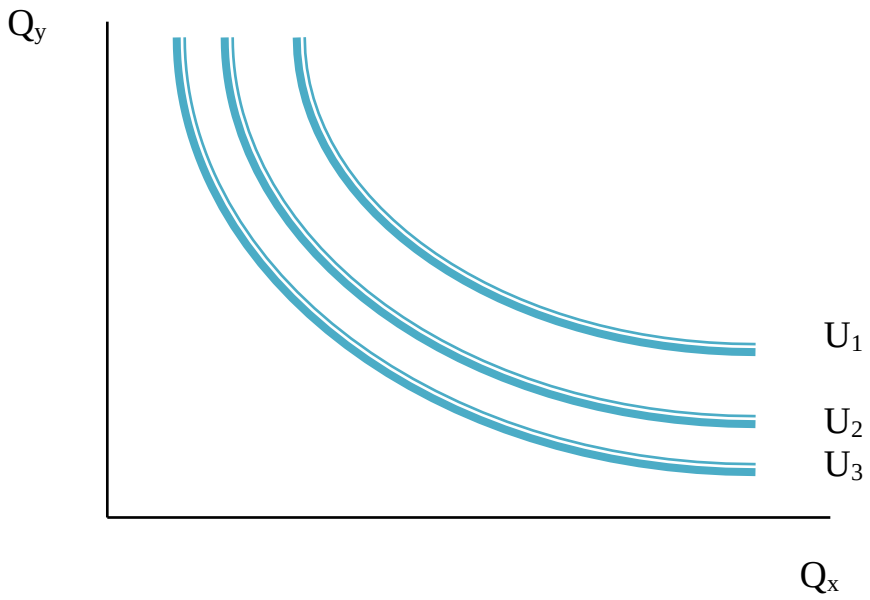


Fig. 2.3. The map of indifference curves

Analyzing indifference curves, it is necessary to pay attention to the ability of goods to interchange. A decrease in the consumption of hamburgers by a certain amount can be compensated by an increase in the consumption of pizza and vice versa. At the same time, the consumer will be on the same indifference curve, i.e., he/she will receive the same satisfaction. ***The marginal rate of substitution is the amount of goods Y that the consumer would give up in order to get one more unit of goods X, staying on this indifference curve***.

As we can see from fig. 2.4, a decrease in the consumption of goods *Y* by ΔQ_y (Q_{y2} - Q_{y1}) is compensated by an increase in the consumption of goods *X* by ΔQ_x (ΔQ_{x2} – Q_{x1}). Therefore, the marginal rate of substitution (MRSxy) can be calculated as follows:

$$MRS_{xy} = -(\Delta Q_y / \Delta Q_x).$$

It is not difficult to see that when moving down the indifference curve, the marginal rate of substitution decreases. This process is based on the ***law of diminishing***

marginal utility. ***Marginal utility (MU)*** is the increase in satisfaction that a person receives from consuming an additional unit of a good. The marginal rate of substitution can be easily expressed by the ratio of the marginal utility of goods *X* and *Y*:

$$\Delta Q_x \, MU_x = -\Delta Q_y \, MU_y;$$
$$MRS_{xy} = -(\Delta Q_y / \Delta Q_x) = MU_x / MU_y.$$

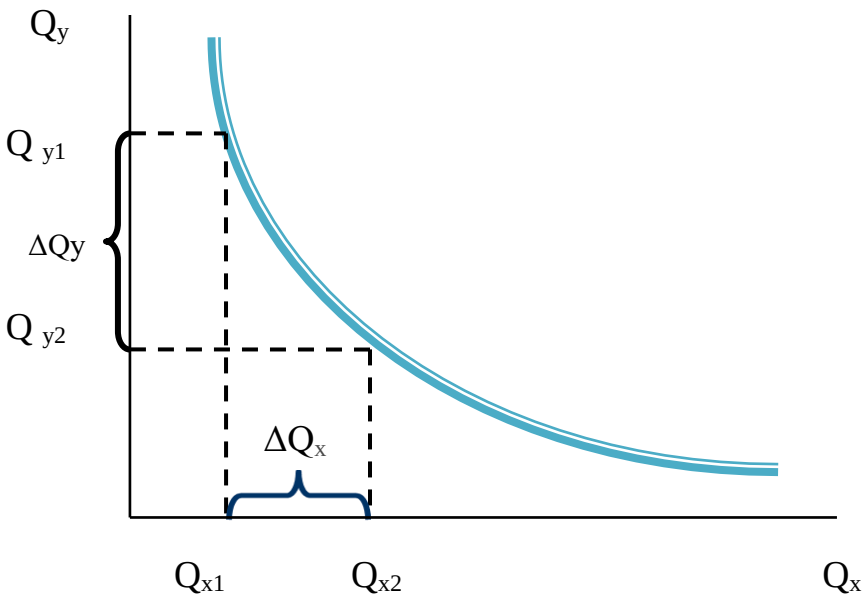


Fig. 2.4. Marginal rate of substitution

Since the degree of satisfaction of the consumer's needs increases when the volume of consumption of a product increases, he/she will have less satisfaction from each new portion than from the previous one. This dependence is reflected by the law of diminishing marginal utility. When moving down the indifference curve, consumption of commodity *X* increases, and its marginal utility decreases, and consumption of commodity *Y* decreases, and its marginal utility increases, so the fraction in the formula will decrease.

2.3. Budget constraints

As mentioned, the consumer's choice depends not only on his/her testes and preferences, but also on the budget. ***The budget is the amount of money that is available to the consumer for spending in a certain period of time***. The consumer's

income and the purchasing power of money (i.e. the prices of goods) determine the ***consumer's budget constraints***.

To analyze the impact of budget constraints on consumer choice, we will introduce some restrictions:

— the consumer spends all income only on the purchase of goods X and Y (in our case, it is pizza and hamburgers);

— the consumer does not make savings and does not include previous savings in expenses;

— the consumer does not give or take loans.

In this case, the consumer's income (I) will be equal to all his/her expenses:

$$I = P_X Q_X + P_y Q_y,$$

where P_x i P_y — prices for hamburgers and pizza, accordingly.

According to the equation, it is possible to determine sets of goods *X* and *Y*, for the purchase of which the consumer will spend the same amount of money. On the condition that I=200 UAH., P_x = 20 UAH., and P_y = 10 UAH., options for possible sets are given in the table 2.2.

Table 2.2

Sets of goods that can be purchased under certain budget constraints

Set of goods	N_1	N_2	N_3	N_4	N_5	N_6
Hamburgers, units	10	8	6	4	2	0
Pizza, units	0	4	8	12	16	20

This dependence can be presented graphically (Fig. 2.5). ***The line of budget constraints*** contained in this graph shows all those sets of goods *X* and *Y* that the consumer's budget allows him/her to purchase. If the consumer wants to buy a set corresponding to the coordinates of point N_7, the budget will not allow him/her to do THAT; if he/she stops at the N_2 set, he/she will not spend all the funds he/she has.

Since the line of budget constraints is straight, it has a constant slope, which can be expressed in terms of the ***marginal rate of substitution***:

$$MRS = -(\Delta Q_y / \Delta Q_x) = P_x / P_y.$$

The steeper the line of the budget constraint, the greater the quantity of good *Y* must be sacrificed to obtain an additional unit of good *X*.

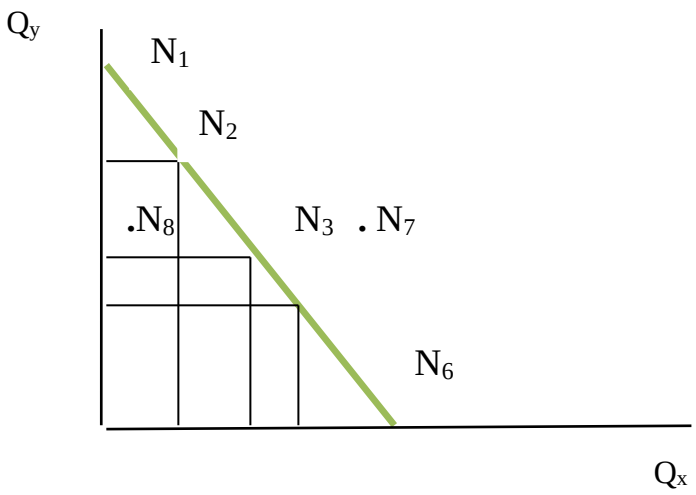


Fig. 2.5. The line of budget constraints

Changes in income and commodity prices change the position of the budget constraint line. If income changes, the curve shifts to the right (increase in income) or to the left (decrease in income). At the same time, the angle of inclination of the line remains unchanged. On the contrary, if the price of the product changes, this leads to a change in the angle of the line: it increases when the price of product X increases and the price of product Y decreases, and decreases if the opposite situation develops on the market (Fig. 2.6).

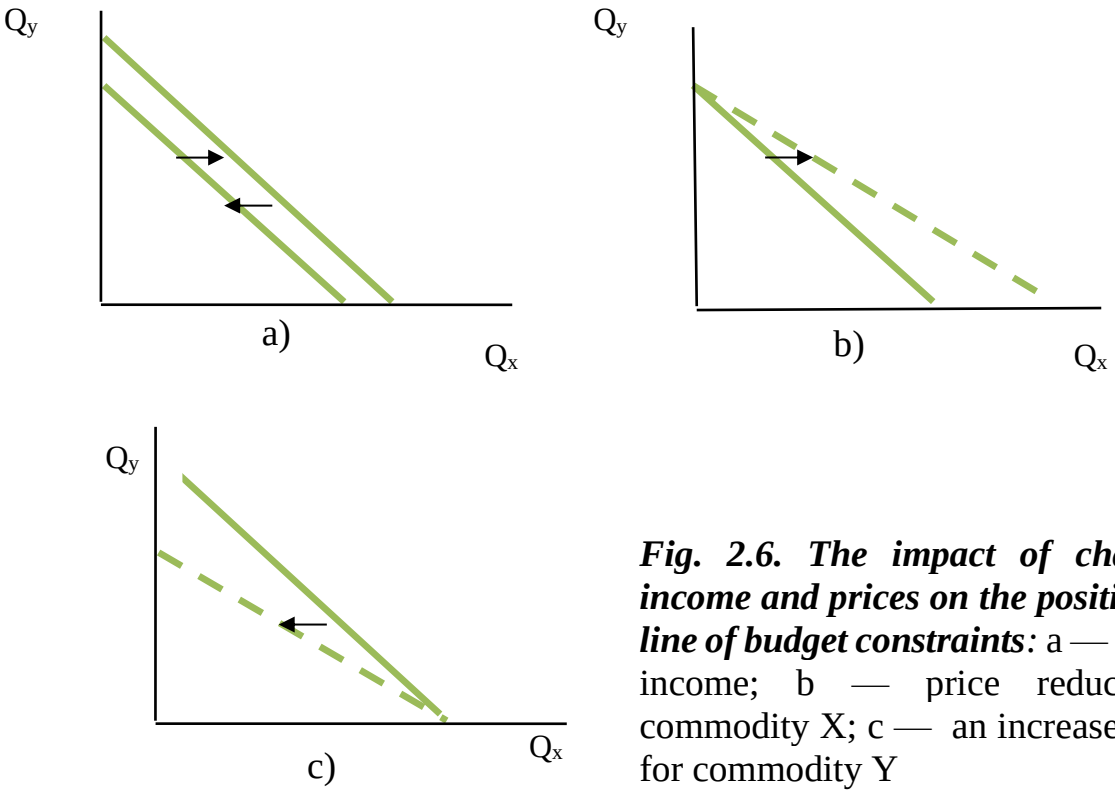


Fig. 2.6. The impact of changes in income and prices on the position of the line of budget constraints: a — change in income; b — price reduction for commodity X; c — an increase in prices for commodity Y

The construction of the consumer's indifference curve and the line of his/her budget constraints makes it possible to determine the consumer's equilibrium position.

2.4. Consumer equilibrium

The consumer maximizes utility in the presence of the certain budget constraints, therefore the task of the consumer behavior model is to explain how preferences, income and prices of goods affect his/her choice. For a visual demonstration of the choice process, let's combine a map of indifference curves and a line of budget constraints of a certain consumer on one graph (Fig. 2.7). As we can see, the budget constraint line crosses the indifference curve corresponding to utility U_1 at points A_1 and A_2. This means that the consumer's income at maximum use allows him to purchase both the first and the second set. Will this mean that at points A_1 and A_2 the consumer will receive the maximum utility that is available to him under existing budget constraints? Obviously not. After all, any point lying on the segment A_1A_2 will be available to the consumer and will have a greater utility than U_1 because it is more distant from the origin of the coordinates. The maximum utility, which is available at a given budget, is achieved when the combination of goods is consumed, which corresponds to the point where the budget line touches the furthest from the origin of the indifference curve.

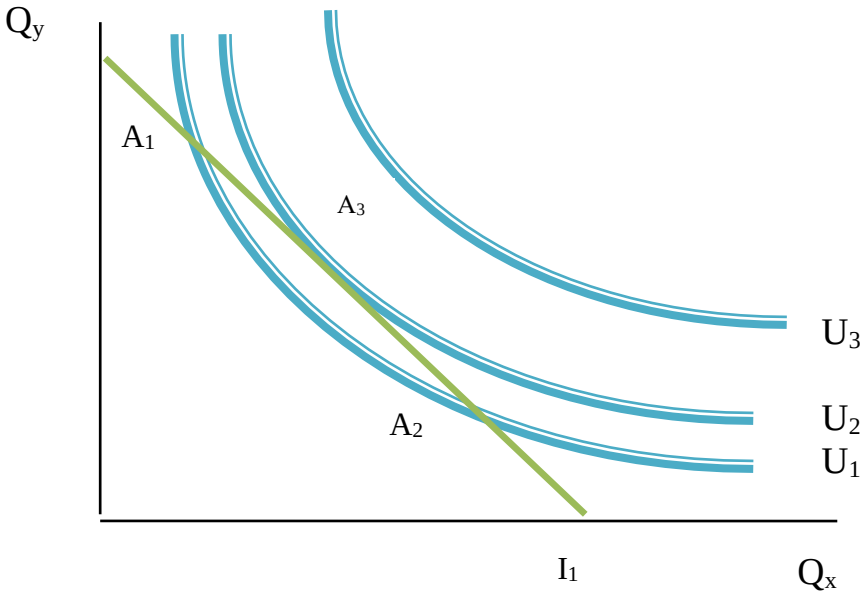


Fig. 2.7. Consumer equilibrium

The consumer's equilibrium corresponds to such a combination of purchased goods that maximizes utility under a given budget constraint. Once a consumer receives such a set, he has no incentive to replace it with another.

The consumer's equilibrium can be given a geometric interpretation. If equilibrium is reached at the point of contact of the line of budget constraints I_1 with the indifference curve U_2, then this means that at point A_3 the slope of these two lines coincides (for reference: the slope of the curve at any point corresponds to the slope of the tangent drawn to it at that point). Then:

$$MU_x/MU_y = P_x/P_y, \text{ or}$$
$$MU_X/P_X = MU_y/P_y.$$

A consumer who maximizes his/her utility will buy two types of goods in such a way that their marginal utilities per monetary unit of price are equal. ***This approach is called the equimarginal principle***.

The use of the equimarginal principle allows predicting consumer behavior under certain conditions. Consider the following situation as an example. Let us have the following information about the set of goods that the consumer has chosen:

$$MU_x = 20$$
$$MU_y = 15$$
$$P_x = 5$$
$$P_y = 4.$$

Is the consumer in a state of equilibrium in this case? If not, in what direction will he change the structure of his consumer set?

To answer the first question, let's compare how much benefit the consumer receives from consuming the last unit of each product per unit price:

$$MU_X/P_X = 20/5 = 4;$$
$$MU_y/P_y = 15/4 = 3{,}75.$$

As we can see, each unit of money spent on the purchase of product *X* brings more utility to the consumer than that spent on the purchase of product *Y* (4>3.75). This means that the consumer has incentives to change the structure of consumption. And these changes will occur in favor of product *X*. As a result of increased consumption of this product, its marginal utility will decrease. Conversely, the redistribution of the

budget in favor of commodity *X* at the expense of reducing the consumption of commodity *Y* will lead to an increase in the marginal utility of the latter. This will happen until the marginal utilities of both goods per unit price are equal, i.e. when the consumer reaches a state of equilibrium.

The consumer's equilibrium, at which he/she will purchase both goods, is called internal. However, it may happen that the consumer will maximize his utility by stopping at the purchase of only one product. Such equilibrium is called angular. For example, one of the students decided to limit the consumption of pizza, then the angle of inclination of the indifference curve will increase significantly, and the line of budget constraints cannot be tangent anywhere. Equilibrium will be reached at the point that corresponds to the maximum possible number of hamburgers that a student can buy depending on his/her budget (Fig. 2.8).

In the given example, the corner equilibrium can turn into an internal one, when the prices for pizza will decrease significantly or for hamburgers will increase significantly. If the consumer does not want to give up hamburgers for pizza at all, then the indifference curve will have the form of a vertical straight line, and the transition from angular equilibrium to internal equilibrium will be impossible at all.

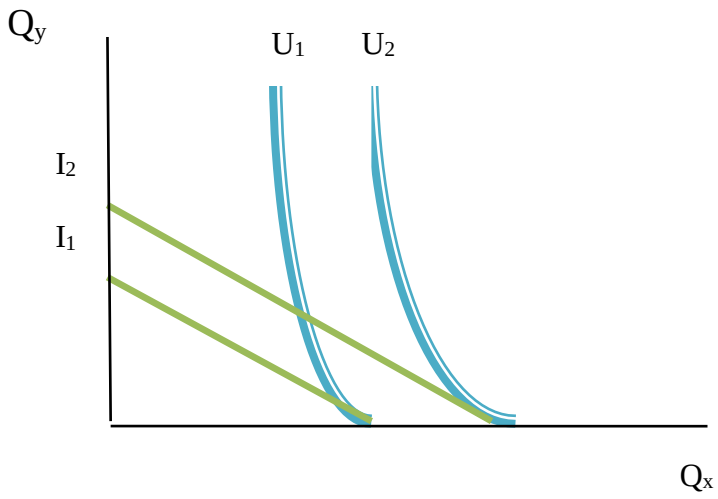


Fig. 2.8. Angular equilibrium of the consumer

The consumer's angular equilibrium will be exclusively when one of the goods is an anti-good, i.e. one that has a negative value of utility for the consumer. In this case, the very nature of the indifference curve will change: instead of falling, it will become increasing. For example, because of some disease, the consumer cannot eat fried meat at all, then he/she will be attracted to the set with fewer hamburgers, and the equilibrium (utility maximization) will be reached at the point corresponding to the

maximum number of pizzas he/she can buy, based on budget. After all, the consumer will never voluntarily purchase an anti-good. Note that almost every good can turn into an anti-good when it is available in such a quantity that fully satisfies the needs of the consumer. The point at which the consumer ceases to consider additional consumption as beneficial is called the ***saturation point***.

It is necessary to pay special attention to the consumption of goods that perfectly complement each other, that is, when the effective consumption of one product without a certain amount of the other is impossible at all (cars and number plates, shoes and their laces, etc.). In this case, neither the change in the price ratio nor the consumer's income will affect the ratio of these goods in the set chosen by the consumer (Fig. 2.9).

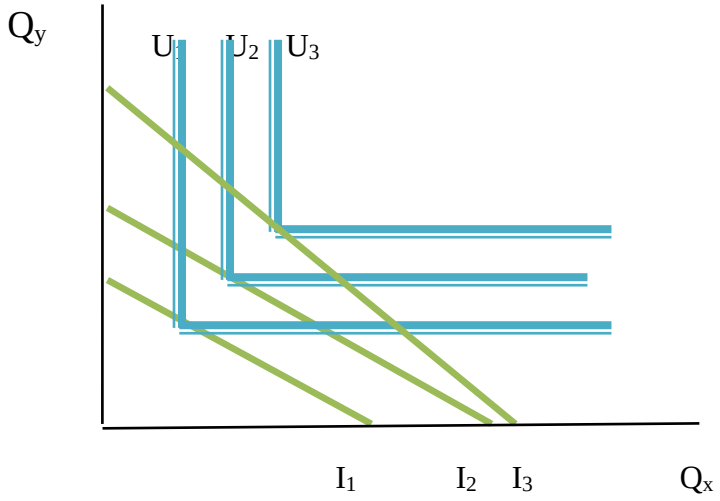


Fig. 2.9. Consumer equilibrium for perfectly complementary goods

The theory of consumer choice has a wide practical application. Marketing research is the most common field of its use. Forecasting the behavior of the consumer, understanding the mechanism of decision-making by him/her on the choice this or that set of goods make it possible to develop a more effective strategy of the firm and make more reasonable economic decisions.

The main terms and concepts

Consumer preferences
Transitivity
Utility
Ratio measured product
Utility function
Indifference curve

Map of indifference curves
Marginal utility
Budget constraints
The line of budget constraints
Consumer equilibrium
Angular equilibrium
Marginal rate of substitution

Chapter 3.
MODELING OF CONSUMER BEHAVIOR ON THE COMMODITY MARKET

In the previous chapter, it was assumed that the consumer makes a choice between only two products: product *X* and product *Y*. Now let's try to bring our model closer to reality. After all, in fact, the consumer chooses a specific product from the whole mass of goods offered to him. Therefore, it is necessary to analyze how the consumer makes a choice, contrasting product X with all other products, how his choice is influenced by income and prices, and how the individual demand for the product is formed as a result.

3.1. The «income-consumption» curves. Engel's curves and laws

If we enter the provision of choosing between this product and all other products into the model of consumer choice, this will, first of all, affect the idea of the structure of budget expenditures. In this case, the formula of the extended budget constraint will take the following form:

$$I = P_x Q_x + \Sigma P_{yi} Q_{yi} \ .$$

Under these conditions, the line of budget constraints will be interpreted somewhat differently. Now, on the graph, on the one hand, there will be the amount of product *X* that the consumer can purchase, based on his/her income, and on the other hand, the expenses in monetary form for the purchase of all other goods (Fig. 3.1). The point of intersection of the budget line with the *Y*-axis will correspond to the general level of consumer income.

The slope of this line will be constant (since it is straight) and will be equal to the tangent of the angle α:

$$tg\ \alpha = I/Q_x = P_x \ .$$

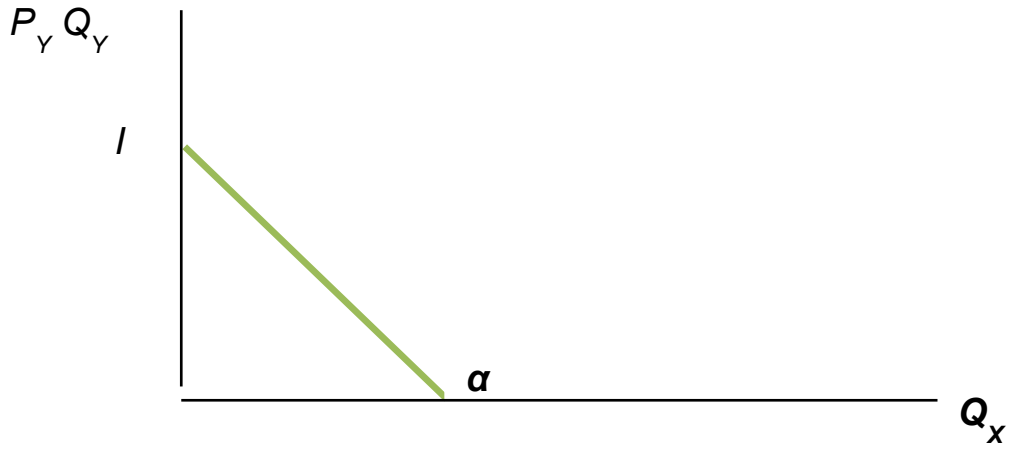


Fig. 3.1. The extended budget constraint line

It is also possible to construct an indifference curve for the consumer taking into account the new assumptions (Fig. 3.2). We draw attention to the fact that in this case the value of all other goods for the consumer acquires a monetary expression.

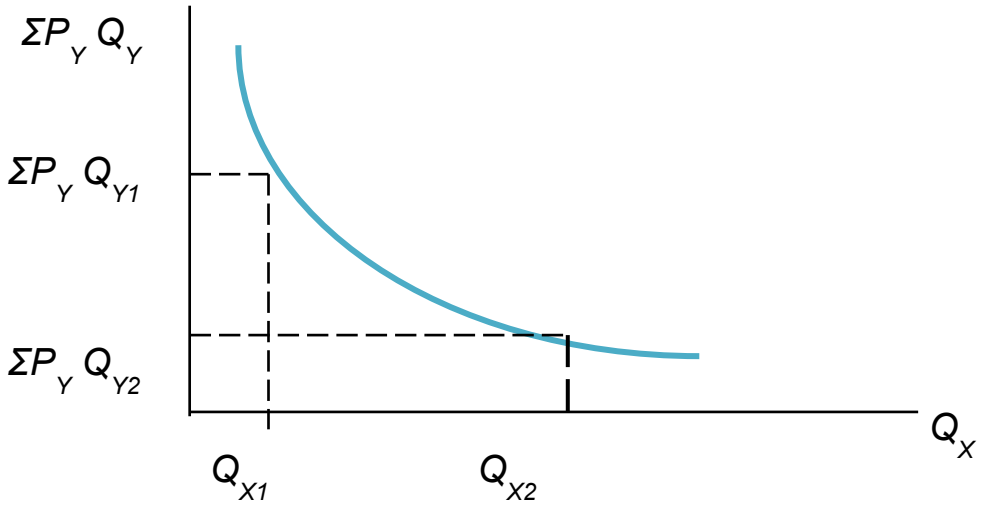


Fig. 3.2. The indifference curve when choosing product X from the entire mass of products

If we assume that the marginal utility of money for the consumer remains unchanged, then the marginal rate of substitution at each point of the indifference curve will be equal to the marginal utility of commodity X, expressed in monetary terms (*MUx*). Therefore, the slope of the indifference curve coincides with the slope of the budget constraint line at the point where the marginal utility of commodity *X*, expressed in money, coincides with the price of commodity *X*. In other words, the consumer's

equilibrium is reached under the condition that the value of the commodity for him and the costs of its acquisition are equal:

$$MU_x = P_x.$$

With smaller volumes of purchases, the marginal utility of the product will be greater than the price, which will create an interest in increasing the amount of product *X*. If purchases are greater than the equilibrium volume, the price of the product will exceed its utility. And this will push the consumer to reduce purchases. Equilibrium will occur when marginal utility, as the maximum amount of money that the consumer would be willing to give up in order to obtain an additional unit of the good, equals its price.

The consumer's decision to purchase product *X* in certain volumes depends not only on his preferences and preferences, but also on the level of income. If we draw a line passing through these points on the graph showing the consumer's equilibrium points at different levels of his income, we will get the ***"income-consumption" curve*** (Fig. 3.3). This curve shows how the amount of good *X* consumed in a certain time will change depending on the change in income and only income.

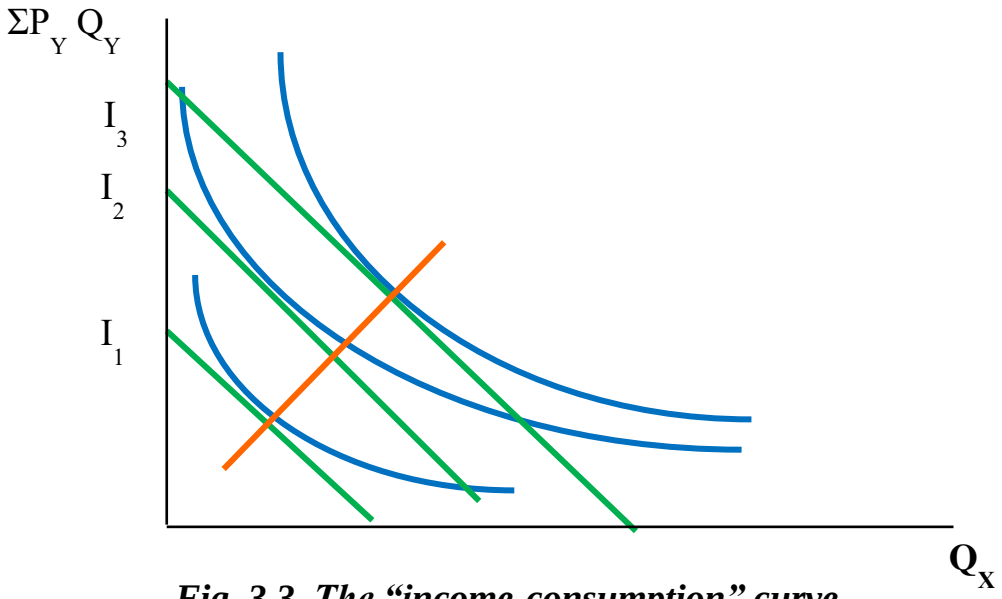


Fig. 3.3. The "income-consumption" curve

The nature of the "income-consumption" curve will depend on the consumer's assessment of the product. ***Superior (high-quality) goods*** are goods that a person consumes in larger quantities as his/her income increases. In turn, superoir goods are

divided into normal (when their consumption grows more slowly than income) and luxury items (when the consumption of goods grows faster than income (Fig. 3.4).

Inferior (low-quality) goods are such goods, the consumption of which decreases as the consumer's income increases. It should be noted that whether a product belongs to the group of superior or inferior depends not so much on its specific properties, but on the consumer's perception of this product. What for one consumer will be a superior product, another consumer will evaluate as the inferior product.

In addition, the evaluation of the product changes depending on the income of the consumer. Thus, at a certain level of income, a trip to another city in one's own car will be perceived as a superior product, and the number of such trips will increase with the increase of the consumer's income. However, when incomes rise to a certain level, the consumer will perceive a trip of several hours as inferior one, will prefer flying by plane, and therefore the trip by own car will turn into inferior goods.

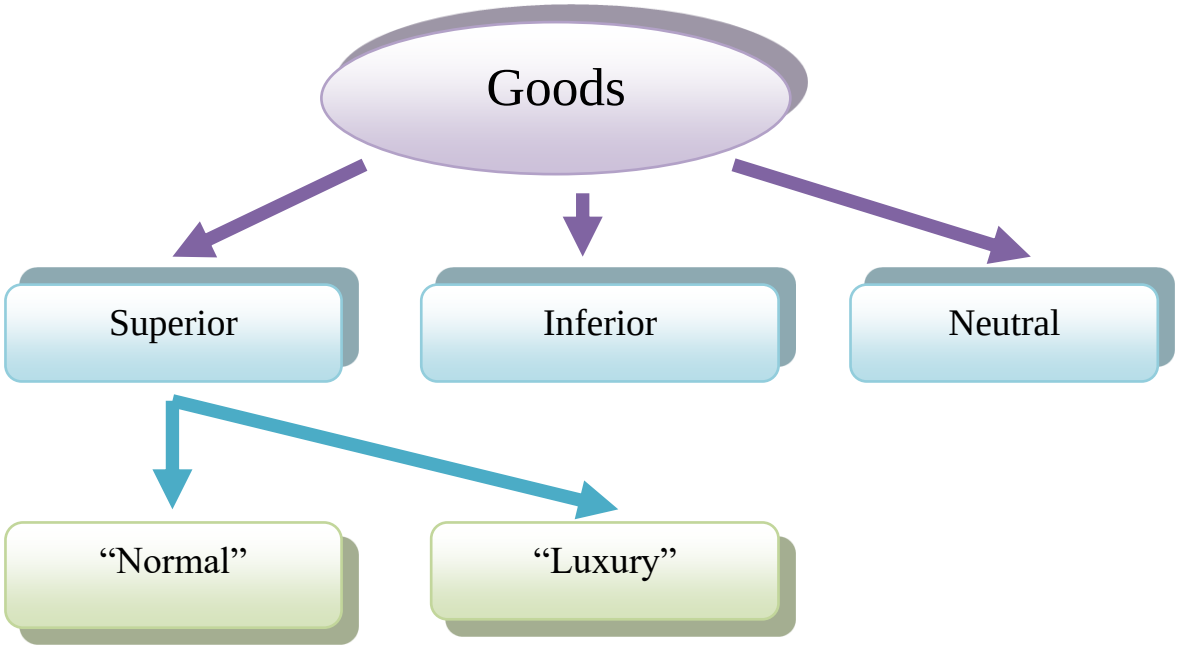


Fig. 3.4. Classification of goods

Thus, for normal goods, the "income-consumption" curve will have an increasing character with a slowdown; for luxury items - a growing character with acceleration; for inferior goods - a declining character.

At the same time, there is a group of goods that cannot be classified as either superrior or inferior. The volumes of their consumption do not depend on the level of the consumer's income. Therefore, the goods of this group were called ***"neutral"***. It includes relatively cheap goods that do not have effective substitutes. It is unlikely that someone will increase or decrease their consumption of, for example, salt as their

income increases. Therefore, the "income-consumption" curve for this group of goods will have the form of a vertical straight line (Fig. 3.5).

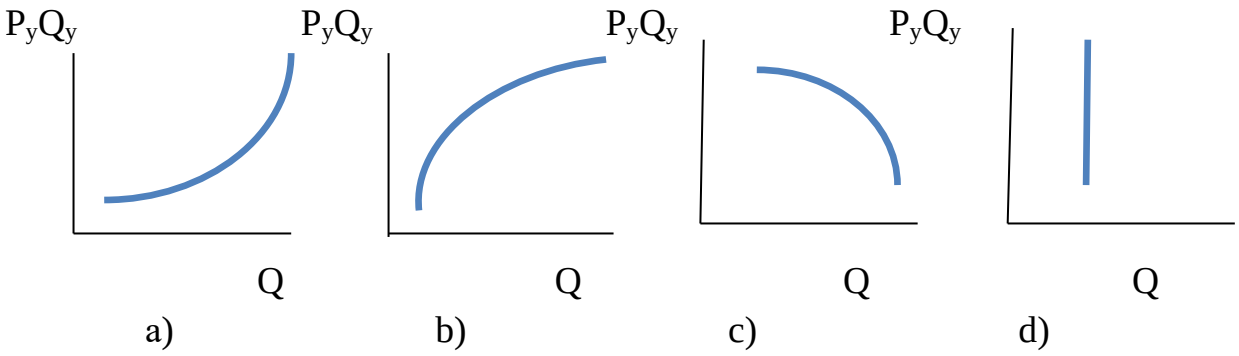
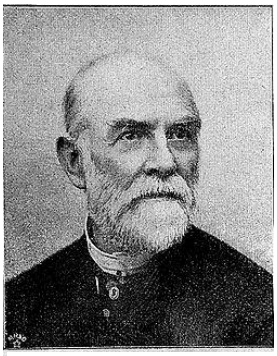


Fig. 3.5. The income-consumption curves for different categories of goods
a) normal goods; b) a luxury item; c) low-quality goods; d) neutral goods

It is easy to move from the "income-consumption" curve to the so-called Engel curves. ***Ernst Engel*** (1821-1896) was an English economist who studied how in the 19th century the nature of consumption of goods and services changed depending on the family income. ***Engel's curve shows the relationship between income and the volume of consumption of a certain product at the same time as other factors affecting demand*** (Fig. 3.6).



Ernst Engel (1821-1896)

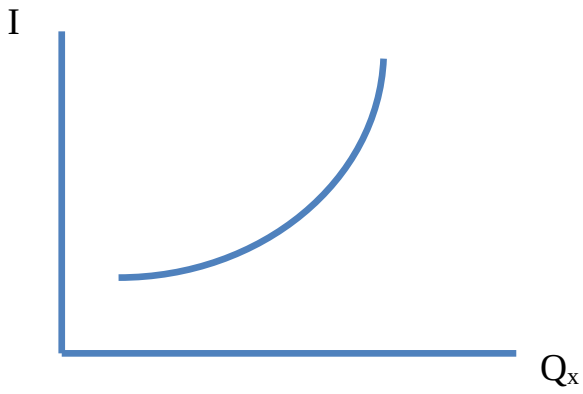


Fig. 3.6. Engel's curve

As already noted, for most superior goods, the Engel curve has an increasing character with attenuation, i.e. a certain increase in income causes a smaller increase in the consumption of commodity *X*. This is primarily explained by the effect of the

law of diminishing marginal utility. However, for a certain group of goods, the Engel curve can increase with acceleration. This group includes luxury goods, the consumption of which increases faster than the income of the consumer. These dependencies were noticed by Engel and formulated in the form of laws that entered economic theory as ***Engel's laws***:

1. With unchanged prices for all goods, the share of the family budget spent on consumer products tends to decrease as family incomes increase.

2. Consumption of educational, legal, medical, and leisure services tends to grow faster than incomes.

And although these laws were discovered more than 100 years ago, it is easy to see their validity by observing our today life.

3.2. The «price-consumption» curves and deduction of the demand curves

When studying income-consumption curves and Engel curves, we assumed that only income changes and all other demand factors remain constant. If we change the source links, fix it as constant income, and enter it into the model as an economic price variable, we can build a "price-consumption" curve.

A decrease in the prices for commodity *X* will lead to the turning of the budget constraints curve to a new point of its intersection with the *X* axis, which is more distant from the origin. If income and prices of other goods remain unchanged, then the point of intersection with the *Y*-axis will remain the previous one.

The "price-consumption" curve shows how the volume of purchases of commodity X (points *F1, F2, F3* in Fig. 3.7) ***changes when moving to another level of prices for this commodity with all other demand factors unchanged***.

From the "price-consumption" curve, we can go to the individual demand curve. The tangent of the angle of inclination of the lines of budget constraints corresponds to the price of product *X*. It is easy to see that the decrease in the angle of inclination (decrease in prices and product *X*) is accompanied by an increase in the volume of purchases of this product. The dependence between the price of the product (P_x) and the size of its desired purchases for the consumer reflects the demand curve (Fig. 3.8).

Demand is the quantities of the product that the consumer is willing and able to purchase at certain prices during a certain period. A demand curve and a price-consumption curve are two different ways of describing how the quantity purchased of a good changes when its price changes (assuming other factors remain the same).

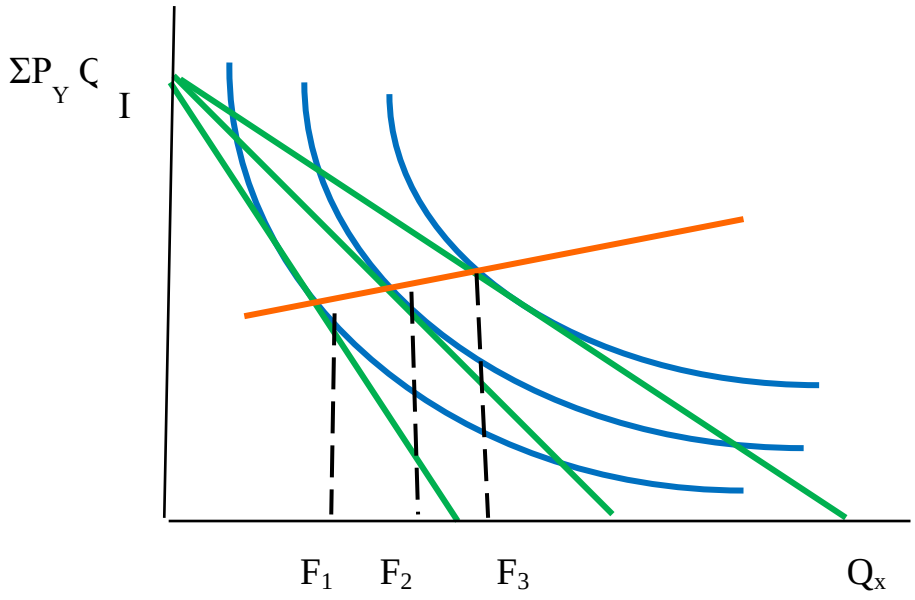


Fig. 3.7. The "price-consumption" curve

Since the relationship between product prices and the amount of demand for it is quite stable, we can talk ***about the law of demand, which states that with the increase in the price of a product, the amount of demand for it decreases, and a decrease in prices is accompanied by an increase in the amount of the product that the consumer wants to purchase***.

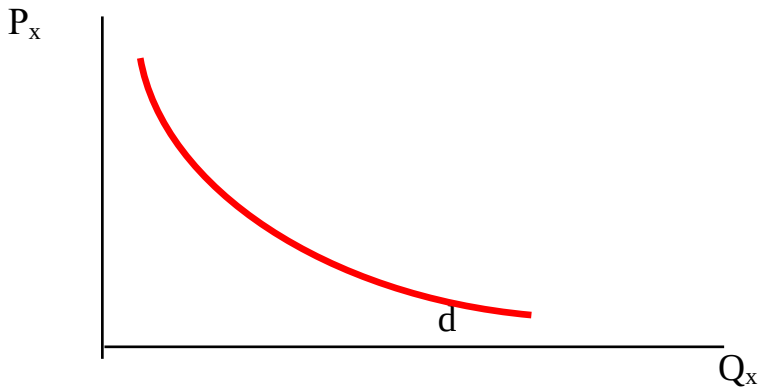


Fig. 3.8. Individual demand curve

3.3. Income effect and substitution effect. Giffen paradox

If the price of goods *X* changes, the consumer's ability to purchase different sets of goods also changes. On the one hand, a decrease in the price of product *X* makes it more attractive to the consumer, as it becomes cheaper relative to substitute products. On the other hand, the release of funds from the cheaper purchase of product *X* allows

the consumer to expand his/her consumption of other products as well. In this way, the consumer's real income grows, although his/her nominal income remains preliminary.

The consumer's reaction to such an increase in real income will depend to a large extent on his/her attitude to the consumer qualities of the product. In order to model the consumer's behavior, one should distinguish the action of two effects, which is observed when the price of one of the goods changes.

The income effect is only those changes in consumption that are caused by a change in the consumer's real income under the influence of price movements. As it was found out earlier, the growth of income has a contradictory effect on the consumption of superior and inferior goods: if with the growth of income, the consumption of superior goods increases, then the consumption of inferior goods decreases.

The substitution effect is only those changes in the consumption of a product that are the result of changes in the prices of this product relative to the prices of other products. This effect works equally for both superior and inferior goods. In a generalized form, the effects of income and substitution are given in Table 3.1.

.

Table 3.1

Action of the income effect and substitution effect

Effect	***Superiror goods***	***Inferior goods***
Effect income: - the price decreases - the price increases	consumption increases consumption decreases	consumption decreases consumption increases
Effect substitution: - the price increases - the price decreases	consumption decreases consumption increases	consumption decreases consumption increases

These two effects work simultaneously. Therefore, the real direction of changes in consumption will act as a net effect of income and substitution effects. As we can see from the table, in relation to quality goods, both effects work in the same direction. In this case, it is somewhat easier to predict changes in consumption depending on changes in the price of the product. A different picture emerges when analyzing the impact of price changes on the consumption of inferior goods: the direction of the impact of income and substitution effects is opposite. Depending on which effect works

more strongly, price dynamics and consumption dynamics will have the same or opposite direction.

If the substitution effect has a greater influence, then as the price of commodity *X* increases, the consumption of commodity *X* decreases, and when price decreases, the consumption increases. However, there may be a situation where the income effect prevails. Then, when the price increases, consumption also increases, and a decrease in price causes the same direction of changes in consumption.

The latter situation is quite rare. Inferior goods for which the income effect prevails over the substitution effect are called Giffen goods, and the increase in consumption of this products with an increase in their price is called Giffen paradox.

Robert Giffen (1837-1910)

Robert Giffen (1837-1910) is an English scientist who discovered that poor workers in England increased their consumption of cheap, low-quality food products (in particular, rye bread) when their prices rose. The same situation can be observed when analyzing the structure of consumption of low-income sections of the population of Ukraine during the economic crisis of the 1990s.

Giffen goods should simultaneously meet the following requirements:

- to be the inferior goods in the consumer's mind;
- to be a significant part of his/her expenses.

Giffen's paradox, at first sight, seems exception in the law of demand. But upon closer examination, as we have found out, it is precisely the interaction of substitution and income effects that causes this development.

There are more examples of alleged exceptions to the law of demand, when an increase in the purchase of a particular product is observed as prices rise. Yes, some consumers may equate price increases with product quality improvements and respond by increasing their purchases. In conditions of instability of the economic situation, price increases can be perceived as a harbinger of an inflationary jump. Therefore, in order to make a profit, consumers will try to buy more of the product at today's prices, before they have risen so much. However, all these actions can be easily explained based on the theory of consumer behavior.

The main terms and concepts

Income-consumption curve
Superior goods
Normal goods

Luxury items
Inferior goods
Neutral goods
Engel's curve
Engel's laws
The "price-consumption" curve
Demand
Demand curve
Income effect
Substitution effect
Giffen goods
Giffen's paradox

Chapter 4.
MARKET DEMAND AND ITS ELASTICITY

Until now, we were talking about individual demand and the demand for a specific product of an individual. However, in the market, all these individual demands are combined into market demand. The task of this chapter is to find out how it is formed and to determine ways of measuring the power with which certain factors affect the amount of goods that the consumer is ready to purchase.

4.1. Market demand curves

Market demand is formed as the total demand of all consumers. Depending on consumer preferences and incomes, their desire and ability to purchase goods at the same prices will differ. In the table 4.1 shows conditional data on the individual demand of three consumers for product *X*. ***Market demand is the sum of individual demands corresponding to a certain price leve***l. In other words, ***these are the quantities of goods that all consumers are ready to purchase at certain price***s.

Table 4.1

Formation of market demand

The price of goods *X*	Demand of the consumer 1 d_1	Demand of the consumer 2 d_2	Demand of the consumer 3 d_3	Market demand D
$P_1 = 15$	-	-	10	10
$P_2 = 10$	-	10	20	30
$P_3 = 5$	10	20	30	60
$P_4 = 2$	25	50	60	135

As can be seen from Table 4.1, at the price P_1, only consumer 3 will be interested in purchasing product *X*, therefore the market demand will coincide with the individual demand of consumer 3. When the price drops to the level of P_2, market demand will be formed by two consumers, and at the price P_3 and P_4 - all three consumers.

The market demand curve shows the total demand of all consumers at any price (Fig. 4.1). It arises by compiling individual demands. Since individual demand curves have a negative slope, the market demand curve will also have a corresponding slope.

Market demand, on the one hand, depends on all those factors that affect individual demand, and on the other hand - on the number of bearers of this demand, i.e. on the number of consumers (Fig. 4.2).

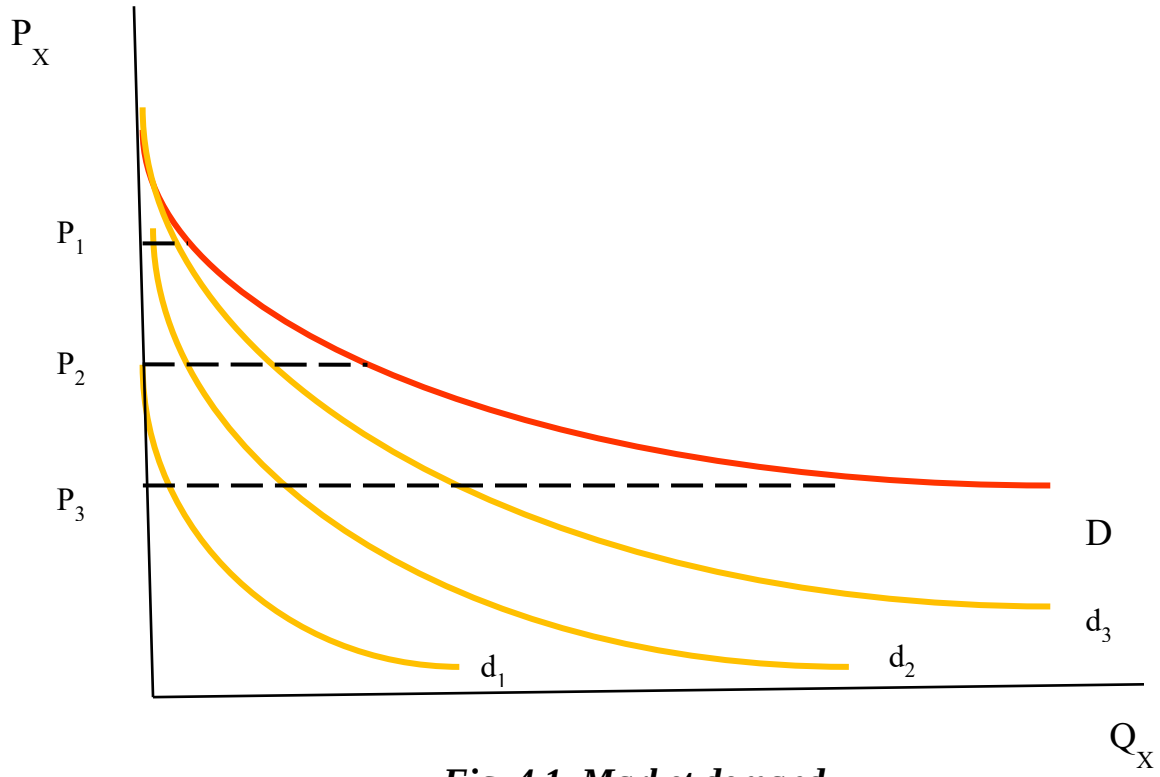


Fig. 4.1. Market demand

The amount of demand, i.e. the movement of a point along the constant demand curve, is affected exclusively by the price of the product. All other factors, which depend on the amount of goods that consumers are ready to purchase, belong to ***non-price factors.*** Their action leads to the movement of the demand curve itself on the graph to the right (increase in demand) or to the left (decrease in demand).

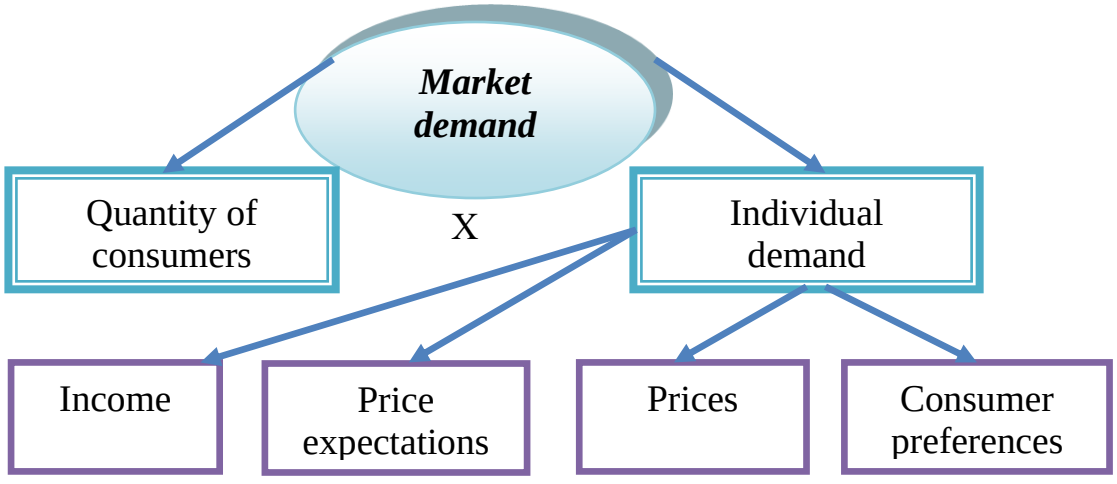


Fig. 4.2. Market demand factors

Non-price factors of market demand include:

- change in consumer preferences under the influence of changes in consumer needs, fashion or advertising;
- price changes for other goods, in particular, substitute goods or complementary goods;
- the number of consumers entering the market of this product;
- price expectations of buyers;
- consumer incomes.

In real life, none of the listed factors act in isolation, in their pure form. They are intertwined, forming a complex and contradictory system, but understanding the mechanism of action of each of them provides the key to understanding many events of real economic life.

4.2. Price elasticity of demand and its use

Until now, we were talking only about the direction of influence of this or that factor on demand. But the practical use of the acquired knowledge also requires the ability to measure the power with which a certain factor affects the volume of the consumer's desired purchases. This problem is solved by estimating the elasticity of demand.

As it is known, the price affects the amount of demand. ***Price elasticity of demand is an indicator of the percentage change in the volume of demand for a 1% change in the price of a product along a given curve of its demand***. It shows the sensitivity of the volume (magnitude) of demand to changes in the price of the product, provided that all other factors affecting demand remain unchanged:

$$Ed = \frac{\Delta Qd/Qd}{\Delta P/P}$$

Elasticity is closely related to indicators of the slope of the demand curve. But if the latter gives the ratio between the decrease or increase in the volume of purchased goods in natural terms depending on the change in prices per 1 dollar, hryvnia or mark, then elasticity demonstrates a more universal dependence - a percentage change.

Since the demand curve has a negative slope, the price elasticity of demand varies from zero to minus infinity. For practical use, the price elasticity of demand is taken, as a rule, by the modulus: $|E_d|$. The greater the value of this indicator, the greater the price elasticity. If:

$0<|E_d|<1$ – demand is inelastic;

$|E_d| = 1$ – demand is with unit elasticity;

$1 <|E_d|< -\infty$ – demand is elastic.

Price elasticity of demand depends on a number of factors, including:

- *presence of goods-substitutes*. The more there are goods that can effectively replace each other, the more actively the demand reacts to changes in their prices. Examples can be cars of the same class or different types of soft drinks. On the contrary, if there is no product on the market that could serve as a good substitute for the existing one, then a change in its prices almost does not cause corresponding fluctuations in sales volumes. This, say, can be insulin for diabetics;

- *the adaptation time to price changes*. In the short-term period, demand is less elastic than in the long-term, because it takes time to find substitute goods and change the consumption structure;

- *the part of the consumer budget spent on the product*. Here the dependence is reversed: the greater the fate, the lower the elasticity and vice versa.

Calculations of price elasticity of demand have a fairly wide practical use both for forecasting consumer spending and for conducting the firm's price policy. It is important for the seller to know how much money the consumer is willing to spend on the purchase of a given product at different price levels, because the consumer's expenses are nothing but the seller's gross income:

Total payments of the buyers = PQ = Total income of the sellers.

The prize of the seller from the price increase for the goods and his/her loss from caused by this price growth of the volume of sale reduction are shown in fig. 4.3. If the area of the figure $P_1P_2N_2V$ (gain from rising prices) is greater than the area of the figure $Q_2Q_1N_1V$ (loss from a decrease in sales), then the seller's total revenue will increase. If the area of the last figure is larger, then as the price increases, the total income of the seller will decrease. This or that result will depend on the price elasticity of demand: if $|E_d|>1$ – the seller loses; if $|E_d|<1$ - the seller wins.

In a generalized form, the effect of elasticity of demand on the reaction of the consumer's total costs for the purchase of goods depending on the price change is submitted in Table 4.2. We note additionally that if the elasticity is zero, i.e. the demand does not respond to a change in price, acting as absolutely inelastic, then the increase or decrease in the seller's income will be directly proportional to the change in price.

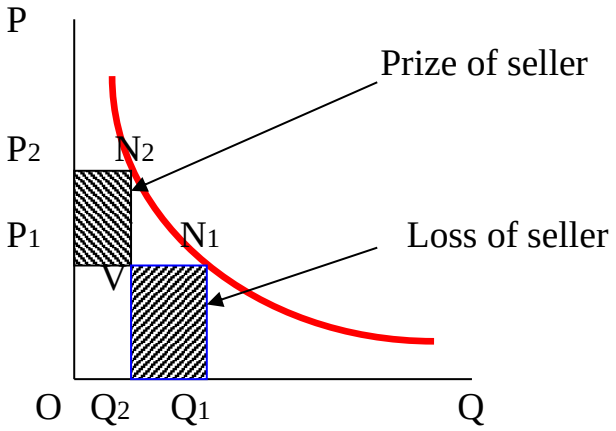


Fig. 4.3. Prize and loss of the seller when the price is increased

Table 4.2

The effect of price elasticity of demand on the total income of the seller

Demand elasticity by price	Attribute of elasticity	Change of the total revenue at the price reduction	Change of the total revenue at the price increase
Elastic demand	$E_d > 1$	+	-
Demand with unit ekasticity	$E_d = 1$	0	0
Inelastic demand	$E_d < 1$	-	+

Business practice is rich in examples of using indicators of price elasticity of demand to make economically sound decisions. Quite often, the implementation of some economic actions require constant costs. Then the entrepreneur's profit will depend only on the volume of revenue, i.e. on the amount of money that buyers will agree to pay for the offered product. A concert at a stadium is a classic example of such situation. Organizers' expenses for renting the arena, artists' fees, advertising, etc., practically do not depend on the number of spectators who will come to the concert, so they can be considered as constant. On the other hand, the number of viewers, and therefore the revenue, depends on the ticket prices. What should organizers be guided by when setting prices for entrance tickets?

It can be assumed that the prices should be such as to fill the stadium as much as possible without leaving a single empty seat. But at the same time, the maximum revenue will not necessarily be achieved. If the demand for tickets is inelastic, then a price increase will reduce the number of spectators to a lesser extent than an increase in price, and therefore total revenue will increase. This will continue until unit elasticity

is reached. A further price increase will lead to a faster decrease in viewers and, as a result, to a decrease in revenue. *Thus, revenue reaches its maximum value at prices corresponding to the unit value of demand elasticity*. That is why we can observe empty halls at concerts of famous artists, half-empty airplane cabins and train carriages, etc. In this case, the capacity of one or another capital is underutilized, but the entrepreneur's revenue is maximized.

4.3. Calculation of price elasticity of demand for the separate point on the demand curve

The price elasticity of demand can be measured for infinitesimally small changes in price at each point on the demand curve. The need for such calculations is confirmed, in particular, by the fact that on the same part of the curve, when using the traditional methodology, the elasticity will be different if prices increase and if they decrease. For example, let's take the following situation:

P_1 = 10 UAH; Q_1 = 200 units;
P_2 = 12 UAH; Q_2 = 150 units.

If the price increased from UAH 10 to UAH 12, the elasticity of demand will be calculated as follows:

$$E_d = [(150-200)/200] : [(12-10)/10] = - 1,25.$$

If we consider the situation when the price decreases from UAH 12 to UAH 10, then the value of the elasticity of demand will be different:

$$Ed = [(200-150)/150] : [(10-12)/12] = -2.$$

Using average values of price and quantity demanded to calculate percentage changes will correct the calculation somewhat, but it will not give accurate results for practical use, since the elasticities at the beginning of the curve section and at the end of the curve are significantly different. That is why it is necessary to calculate the elasticity for each point of the demand curve.

For the begining, let's assume that we are dealing with a linear demand curve. It has a constant slope at all points ($\Delta Q/\Delta P$ = const), but not constant elasticity. The latter can be calculated through the ratio of segments on the price axis. In Fig. 4.4 $\Delta P = -P_1C$;

$P = OP_1$; $\Delta Q = P_1E = OQ$; $Q = OQ$. Then the calculation of price elasticity of demand will take the following form:

$$Ed = (\Delta Q/Q) : (\Delta P/P) = (\Delta Q/\Delta P) : (P/Q) =$$
$$= (- OQ/P_1C) : (OP_1/OQ) = - OP_1/P_1C.$$

The last expression was called ***the distance formula***. It is used to calculate point elasticity.

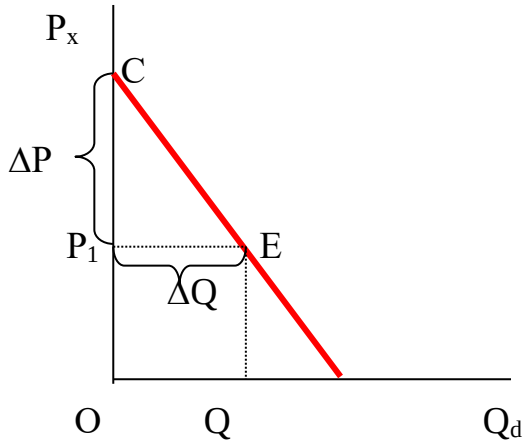


Fig. 4.4. Point price elasticity of demand for a linear demand curve

The obtained results may be used for demand curves with non-linear dependence. To do this, at the point where elasticity needs to be determined, a tangent to the demand curve is drawn and the ratio of the segments on the price axis is determined: the segment from the origin to the price level corresponding to the point on the demand curve, and the segment from this price level to the point of intersection of the tangent with the axis prices

4.4. Nonprice elasticity of demand

The general approach to measuring the elasticity of demand is preserved even when it comes to the influence of other, nonprice factors on it. Among them, incomes and prices for other goods occupy a special place.

Income elasticity of demand can be defined as the ratio between the relative change in demand and the relative change in consumer income (I). In fig. 4.5 shows an increase in demand (shift of the curve to the right) by ΔQ (Q_2-Q_1), which is caused by an increase in income by ΔI (I_1-I_2). Then the income elasticity of demand will be equal to:

$$Ei = (\Delta Q/Q) : (\Delta I/I).$$

Income elasticity of demand can take on a variety of meanings:

$Ei > 0$ - *for normal goods;*

$Ei > 1$ – *for luxury goods;*

$Ei < 0$ – *for inferior goods.*

If the income elasticity of demand is zero, it means that the consumption of this product does not depend on the level of the consumer's income at all. Such goods were discussed in the previous chapter.

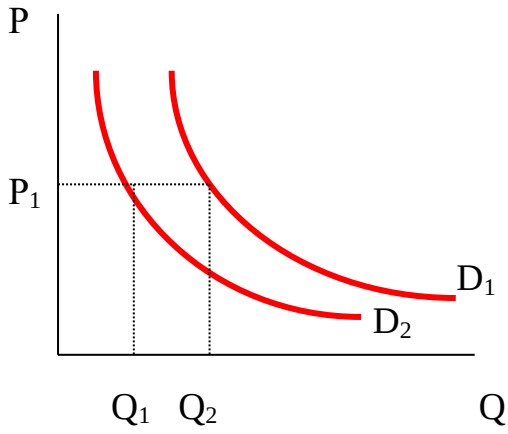


Fig. 4.5. Income elasticity of demand

The prices of other goods (P_y) also affect demand, and the extent of this influence is shown by the corresponding coefficient of elasticity, which was called ***cross-elasticity of demand.*** The cross-elasticity of demand shows the percentage change in the quantity of goods *X* purchased in response to a one-percent change in the price of some goods *Y*:

$$Ec = (\Delta Q_x/Q_x) : (\Delta P_y/P_y).$$

If the elasticity has a positive value, then this indicates that as the price of goods *Y* increases, the demand for good *X* increases. This relationship is characteristic of substitute goods. The better the substitute is able to replace this product, the closer will be the relationship between its prices and the demand for the studied product, which means the greater the value of elasticity. For example, the interchangeability of two

varieties of rye bread is quite high. Therefore, even a small price increase for one of them will cause a sharp increase in demand for the other.

Complementary goods are characterized by a negative value of elasticity of demand. The greater the presence of one good determines the meaning of acquiring another, the higher the value of elasticity will be. As an example, we can cite the relationship between prices for filling gas cylinders and the demand for road gas stoves, film prices and the demand for cameras, etc.

The elasticity will be zero for goods that are not related to each other in any way at all.

4.5. Consumer prize

As it was clarified earlier, the consumer will buy a product in the market only if its price does not exceed the marginal utility of the product for the consumer, expressed in money. However, quite often the situation may be such that the price is lower than the marginal utility. In this case, the consumer receives a certain prize. Clarification of the mechanism of obtaining prize by the consumer is the purpose of this section.

Let for a certain consumer the marginal utility of each additional unit of the product, expressed in money, will have the form presented in Table 4.3, and the actual price of this product on the market will be 40 UAH.

Table 4.3

Marginal utility of the product, expressed in money

Number of product units	1	2	3	4	5
Marginal utility expressed in money (UAH)	100	80	60	40	20

If the consumer buys four units of the product at the market price, his/her total costs will be UAH 160, while the total utility of the purchased product is UAH 280. (100+80+60+40=280). The difference between the maximum price that the consumer is willing to pay for an additional unit of the product and its market price is called **the consumer's prize**. The maximum price is the marginal utility of an additional portion of the product, expressed in money. For the considered case, when purchasing four units of the product, the consumer's profit will be UAH 120. It will be the same when purchasing three units (240 – 120 = 120). Therefore, the fourth unit is the marginal unit

of the product, which the consumer may or may not buy. In a state of equilibrium, the consumer will buy the product as long as his profit increases.

The consumer's prize can be represented graphically. Fig. 4.6 shows the decreasing marginal utility of the product with increasing volumes of its purchase. If the consumer can buy three or four units of the product at the price of UAH 40, then his/her prize will be equal to the area of the shaded figure.

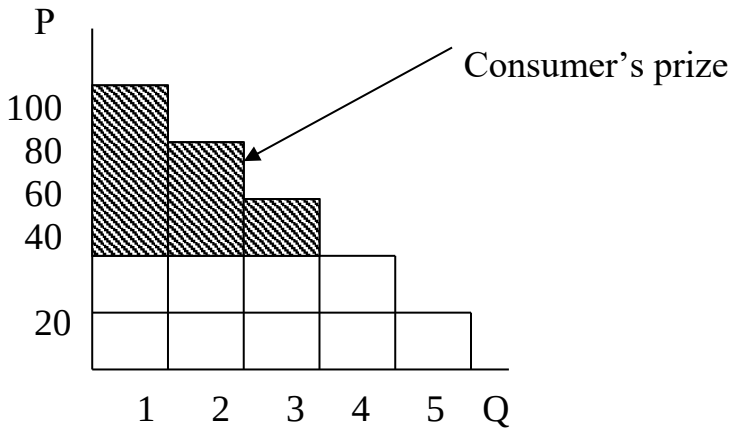


Fig. 4.6. The prize of the individual consumer

The same conclusions can be obtained from the analysis of market demand and the total prize of consumers. ***The total prize of consumers*** is the difference between the maximum amount of money that could be paid for a certain amount of goods and the actual expenditure of consumers. It will be equal to the area of the figure bounded by the price axis, the market price line and the market demand curve (Fig. 4.7).

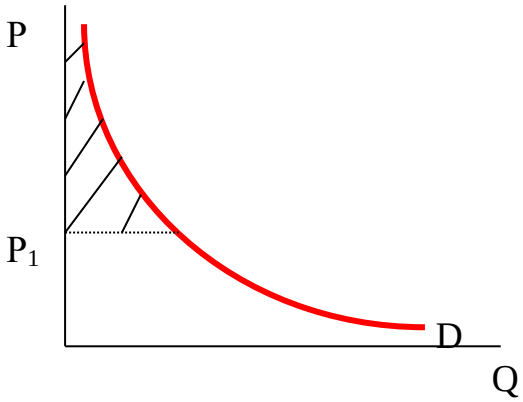


Fig.4.7. The total prize of consumers

The concept of consumer prize can be applied to estimate the tax burden on consumers as a result of, say, an increase in value added tax. The adoption of such a decision by the state will lead to an increase in prices compared to the previous period,

the loss of part of the consumer's prize and an increase in revenues to the state budget. However, the increase of the latter will be smaller than the loss of prize by consumers. This is clearly visible in Fig. 4.8.

If the tax is increased by ΔT, prices will rise to P_2, which will lead to a decrease in sales and a loss of consumer prize. It will correspond to the area of the figure P_1P_2EM. At the same time, budget revenues will increase by an amount corresponding to the area of the rectangle P_1P_2EC. Thus, the prize lost by consumers, but not received by the state in the form of additional revenues to the budget, is equal to the area of the *CEM* figure. It will create an additional tax burden. Similarly, it is possible to determine the additional prize of consumers in the case of the expansion of state subsidies.

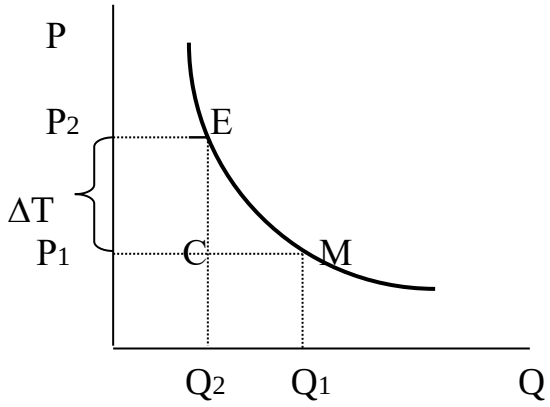


Fig. 4.8. Tax burden

At the end of the consideration of the theory of consumer behavior, it should be noted that the practical use of the model requires a quantitative assessment of the consumption function and the elasticity of demand at each moment of time for specific consumers. The most common methods of such assessment are market experiments, surveys of consumers to find out their intentions, and statistical models.

Market experiments and consumer surveys are used by firms to obtain information about how the volume of demand responds to changes in prices and other factors. The disadvantage of the last method is that the actual results may not match the answers to the questions. There are difficulties in obtaining a representative sample. Otherwise, the results will be insignificant.

The main terms and concepts

Market demand
Market demand curve
Price elasticity of demand
Factors of elasticity of demand

Income elasticity of demand
Cross elasticity of demand
Consumer prize
Tax burden

Part 2.
THEORY OF A MANUFACTURER BEHAVIOR

Chapter 5.
THEORY OF PRODUCTION

The counterparty of the consumer (buyer) in the market is the seller. Since in modern society, the absolute majority of goods are the result of production activities, then behind the seller there is necessarily a producer. Using limited resources (labor, capital, land and entrepreneurial skills), he/she organizes the production of a certain volume of products and supplies them to the market. What is the manufacturer guided by when choosing a product for production, determining the volume of its delivery to the market, what factors can affect the number of offered products, how is the manufacturer's equilibrium achieved? To answer these important questions for economic theory and business practice, it is necessary to start the analysis by clarifying the essence of the production process itself..

5.1. Production and production function

Production is the process of using labor and equipment (capital) together with natural resources and materials to create the necessary products and services. Production services of labor, capital, land and entrepreneurial abilities are called ***factors of production*** (Fig. 5.1).

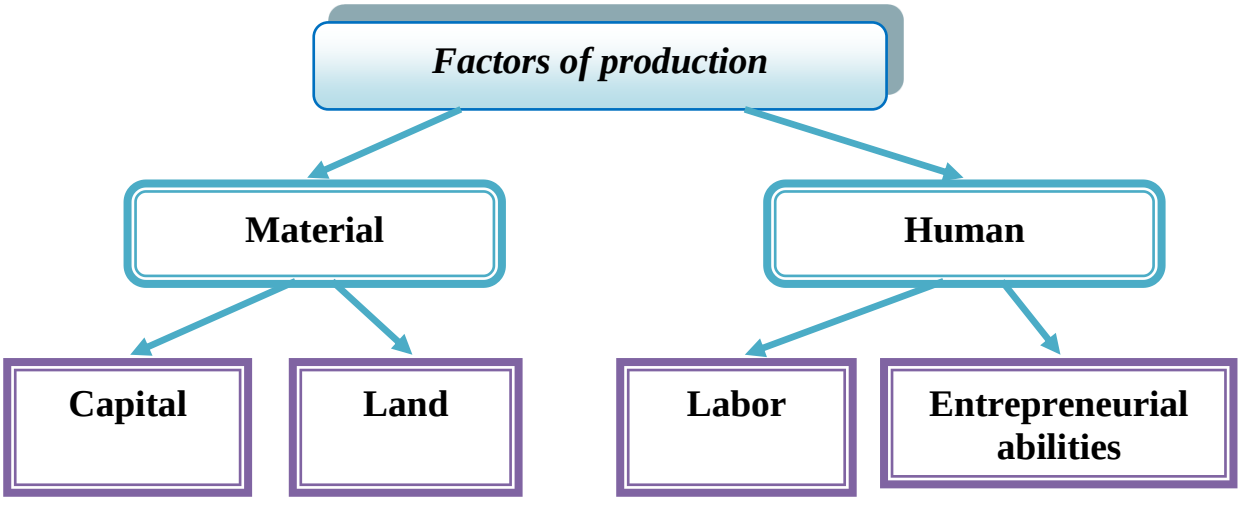


Fig. 5.1. Classification of production factors

At the same time, production can also be characterized as a certain system of relations between people. They can be of an organizational and economic nature (foreman - worker, company director - shop manager, worker - worker, etc.) or socio-economic (owner - non-owner, shareholder - shareholder, creditor - borrower, etc.). Visually, production as a combination of a productive system and a system of relations is presented in fig. 5.2.

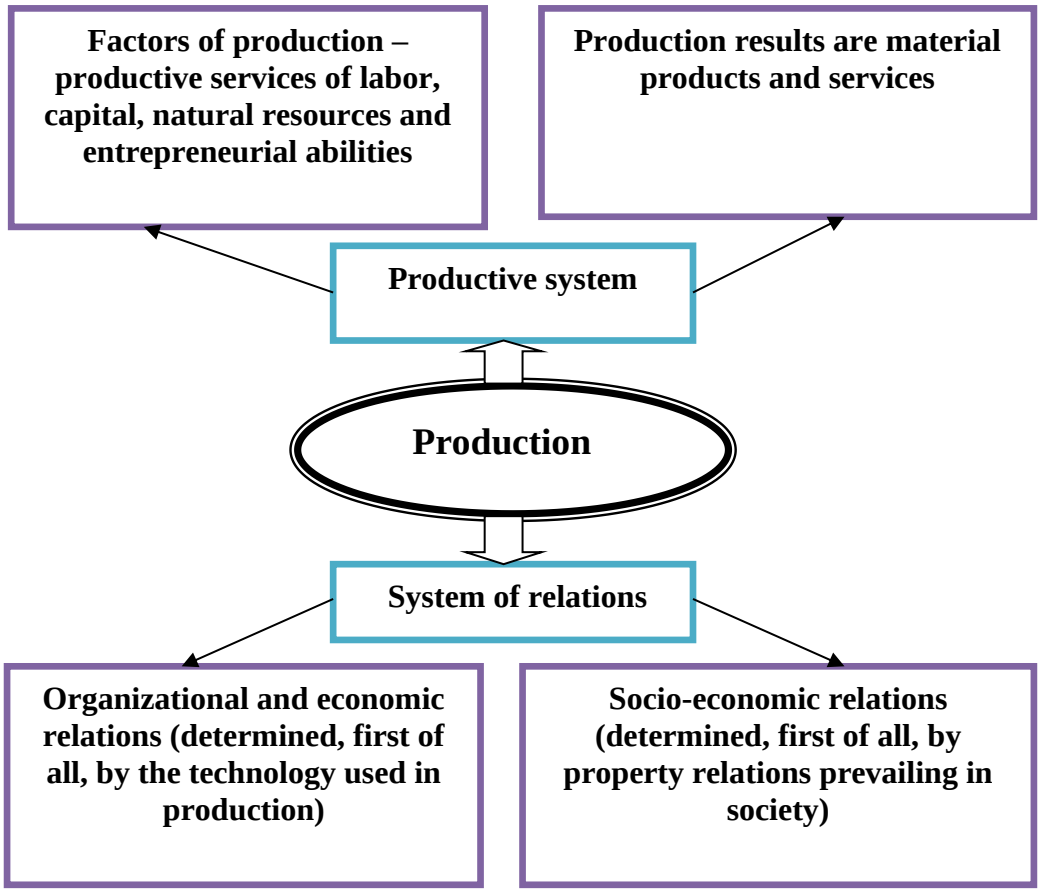


Fig. 5.2. Production as a productive system and a system of relations

Socio-economic relations in production are determined, first of all, by the prevailing property relations. Special sections of the course on the basics of economic theory are devoted to their study. Therefore, socio-economic relations are not the subject of study in microeconomics. It studies, mainly, production as a productive system capable of supplying a certain amount of goods to the market, while spending some money and consuming certain amounts of resources.

The ability of production to produce goods at the appropriate costs of production factors is determined above all by the technology used in it (note that it is under the influence of technology, first of all, that organizational-production relations

are formed). ***Technology*** is the practical application of knowledge about ways to produce products and services. It is materialized in:

- new equipment samples;
- new production methods;
- new labor organization;
- raising the general educational and professional level of training of employees.

In real life, technology is constantly improving, which leads to changes in the production process. However, to simplify the model of producer behavior at this stage of our analysis, let us assume that technological change does not occur. This assumption will not change the motives of the producer's behavior, but it will simplify the process of cognition.

If the technology remains unchanged, it is reasonable to assume that there is a stable relationship between a certain amount of resources used in the production process and the maximum amount of goods that can be produced under these conditions. This dependence is demonstrated by ***the production function***. ***The production function is the relationship between any set of production factors and the maximum possible volume of output produced using this set of factors:***

$$Q = f(L, K, M),$$

where: Q – volume of manufacture; L – labor; K- capital; M – materials.

With constant technology, the production function has a number of properties that determine the relationship between the volume of output and the amount of used resources:

1. There is a limit to the increase in production volumes, which can be achieved by an increase in the costs of one resource under other unchanged conditions: if, for example, K,M is const, and only L grows, then $\Delta Q \rightarrow 0$.

2. There is a certain mutual complementarity of factors of production, i.e. the effective functioning of each of them requires the presence of a certain amount of the other. At the same time, it is possible to replace a certain amount of one factor with a certain amount of another factor without reducing production volumes. However, such a replacement has its limits.

3. Changes in the use of production factors are more elastic in the long term than in the short term.

The short run is a period of production during which some factors of production cannot be changed (most often capital). The ***long run*** is the period during which the producer has enough time to change all factors of production.

If you simplify the production function somewhat, analyzing the dependence of production volumes only on the amount of labor and capital, then you can draw up a ***production grid*** - a table describing the production function for a certain maximum volume of output that can be realized with each combination of production factors (Table 5.1).

Table 5.1

Production grid

Capital, hours / *Labour, hours*	100	200	300	400
	Output, units			
100	20	30	35	38
200	30	85	150	210
300	55	150	210	270
400	65	180	250	315

It is easy to see that the same volume of products can be obtained with different ratios of production factors: 150 pcs. at K=300; L=200 and when K=200; L=300; 210 pcs. at K=400; L=200 and when K=300; L=300, etc. It is possible to graphically depict all those combinations of production factors that give the same production result. The curve obtained in this way is called ***isoquant*** (Fig. 5.3).

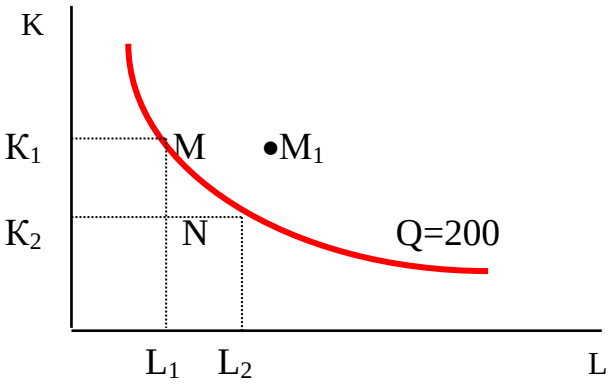


Fig.5.3. Isoquant

An isoquant is a curve that shows all the different combinations of resources that can be used to produce a given amount of output. By definition, isoquants are similar to indifference curves. Just as indifference curves reflect alternative options for consumer choice that provide a certain level of utility, isoquants reflect alternative

options for combinations of resource costs for the production of a certain volume of products.

The isoquant shows that the ratio of factors that correspond to the coordinates of points M and N will ensure a production volume of 200 units. However, with the combination of M1, the volume of production will exceed the specified one. Through this point, as well as through any other, you can draw your isoquant. In this case, we will get a map of isoquants (Fig. 5.4).

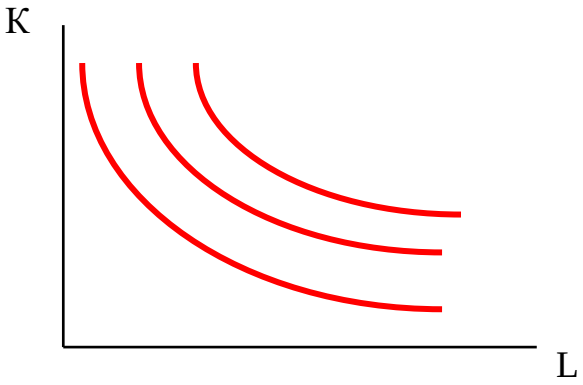


Fig. 5.4. The map of isoquants

An isoquant map is a series of isoquants that reflect the maximum output for any set of production factors. Like indifference curves, isoquant curves on the same map never cross. Each isoquant located further from the origin corresponds to a larger volume of production. Isoquants have the form of concave curves. This means that a reduction in capital costs requires an increase in labor costs to maintain a constant production volume.

5.2. The law of diminishing marginal productivity

A change in production volumes means a transition from one combination of production factors to another, located on different isoquants. In the short run, an increase in production volumes is possible due to the additional use of labor at unchanged capital costs. Therefore, production volumes can move along line AB in Fig. 5.5. A producer can use more labor when moving from one isoquant to another. At the same time, the ratio of capital and labor costs (K/L ratio) changes.

In order to find out how changes in the K/L ratio affect the efficiency of their use, it is necessary to introduce a number of concepts characterizing production results:

- ***the total product of the variable factor of production***, in our case, labor (TP_L) is the amount of goodss produced with a certain amount of this factor under other constant conditions;

- ***the average product of the variable factor of production*** (AR_L) is the ratio of the total product of the variable factor to the amount of this factor used in production:

$$AR_L = TP_L/L.$$

This indicator can be considered the productivity of a variable factor;

- ***the marginal product of a variable factor*** (MP_L) is the change, ceteris paribus, of the total product of this factor when the quantity of the factor changes per unit:

$$MP_L = \Delta TP_L/\Delta L.$$

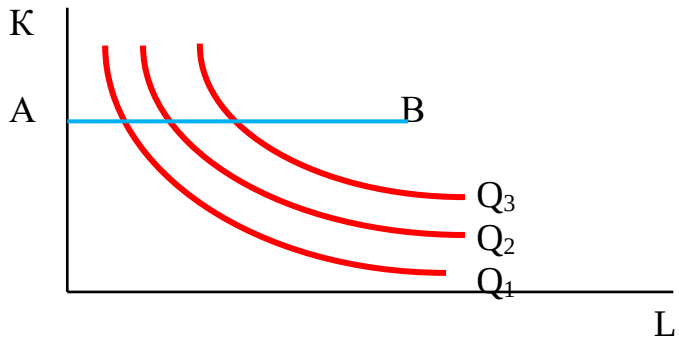


Fig. 5.4. Changes in production volumes in the short-term period

Table 5.2 shows conditional data characterizing the dynamics of socks production volumes depending on the increase in labor costs at unchanged capital costs (K = 50 machine hours). They more or less accurately reflect the direction of changes in indicators in real production conditions.

The aggregate product of a variable factor increases as labor costs increase. However, this growth is slowing down. Moreover, there comes a point when increasing the use of labor does not increase, but decreases the overall results of production. It means that the production process is oversaturated with labor that cannot find effective use for a given amount of capital. In our example, this occurs when the ratio K/L = ½.

The noted dependencies can be shown graphically. Fig. 5.6 shows the curve of the aggregate product. It reflects how output changes when one of the factors of production changes, while the others remain unchanged.

The average product of a variable factor can be determined by measuring the slope of a ray drawn from the origin through the corresponding point of the total product curve. So, the slope of the beam *OA* can be determined through the ratio of the coordinates of point *A:* Q_1/L_1. And it will be nothing more than an average product at this point.

Table 5.2

Changes in the production of socks depending on the increase in labor costs

Labor hours (L)	TP	AP	MP
10	35	3.5	3.5
20	90	4.5	5.5
30	180	6.0	9.0
40	272	6.8	9.2
50	355	7.1	8.3
60	420	7.0	6.5
70	455	6.5	3.5
80	480	6.0	2.5
90	495	5.5	1.5
100	480	4.8	-1.5

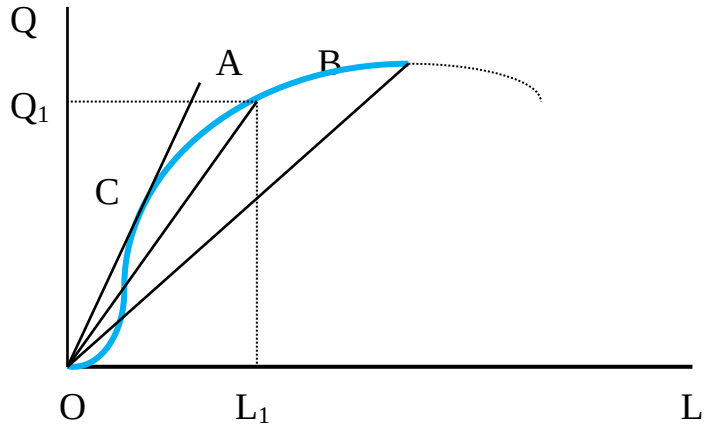


Fig. 5.6. Curve of the total product of the variable factor

The average product will reach its maximum when using the amount of labor that corresponds to the point of contact of the ray emanating from the origin and the total product curve. In Fig. 5.6, this is point C.

If we draw tangents to each point on the total product curve and find the tangents of the angles they form with the X axis, we will get the marginal product. The average and marginal product curves are presented in Fig. 5.7.

Average product will increase until marginal product is greater than it. If a new portion of the resource is involved in production and its productivity is higher than average, then such involvement will, of course, increase the average indicator as well. On the contrary, if the marginal productivity of the variable factor turns out to be less than the average, then the new involvement will reduce the average indicators.

Therefore, *the average product of the variable factor will reach its maximum value at the point of intersection of the curves of the average and marginal products, that is, when* ***AR=MR***. In our example, this point is somewhere in the range of labor costs from 50 to 60 man-hours.

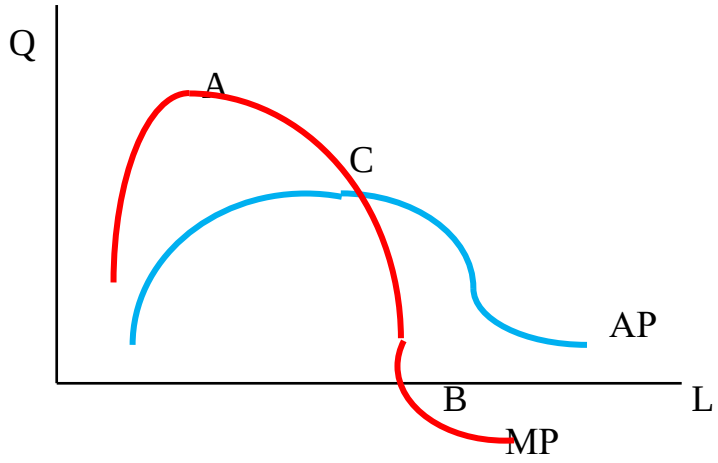


Fig. 5.6. Average and marginal product curves

Attention should be paid to one rather important dependence of the direction of the dynamics of the marginal product on the increase of the variable factor. The marginal product reaches its maximum at point *A* and then begins to decrease. Moreover, after reaching zero at point *B*, the marginal product takes on a negative value. From this moment, the total product begins to decrease as the variable factor increases. This dependence is quite stable, which allows us to consider it an economic law. ***The law of diminishing marginal productivity*** is that starting from a certain volume, an increase in the use of one of the factors of production, while other factors remain unchanged, is accompanied by a decrease in the marginal product of this factor. This means that the increase in output is limited if only one factor changes. The point of diminishing marginal productivity is the limit of use of a variable factor at which its marginal product begins to decrease.

The effect of the law of diminishing marginal productivity becomes obvious if we take as an example the cultivation of potatoes on the homestead or in the country. If you double the number of hours of work on it against the normal level, then the volume of harvested potatoes will increase in a smaller proportion. If such dependence did not exist, then, as economists aptly state, all the world's agriculture could be placed on one hectare of land, concentrating all labor costs there.

Clarifying the dynamics of production volumes depending on the dynamics of a variable factor for a specific production has an important practical value. First of all, it is used to determine the limits within which it is expedient to conduct production from

the point of view of rationalizing the use of factors. Three stages of production can be distinguished for the short run period:

- *the first stage*: from the beginning of production until the average product reaches its maximum value. It is characterized by an excess of capital and a lack of labor, which leads to overspending of resources and, as a rule, to losses for the entrepreneur;

- *the second stage*: from the maximum value of the average product to reaching the zero value of the marginal product. This stage is the most attractive for the manufacturer, as a normal balance of production factors is achieved;

- *the third stage*: after the marginal product reaches zero value. On it, production becomes oversaturated with labor and also most often leads to losses for the manufacturer (Fig. 5.7).

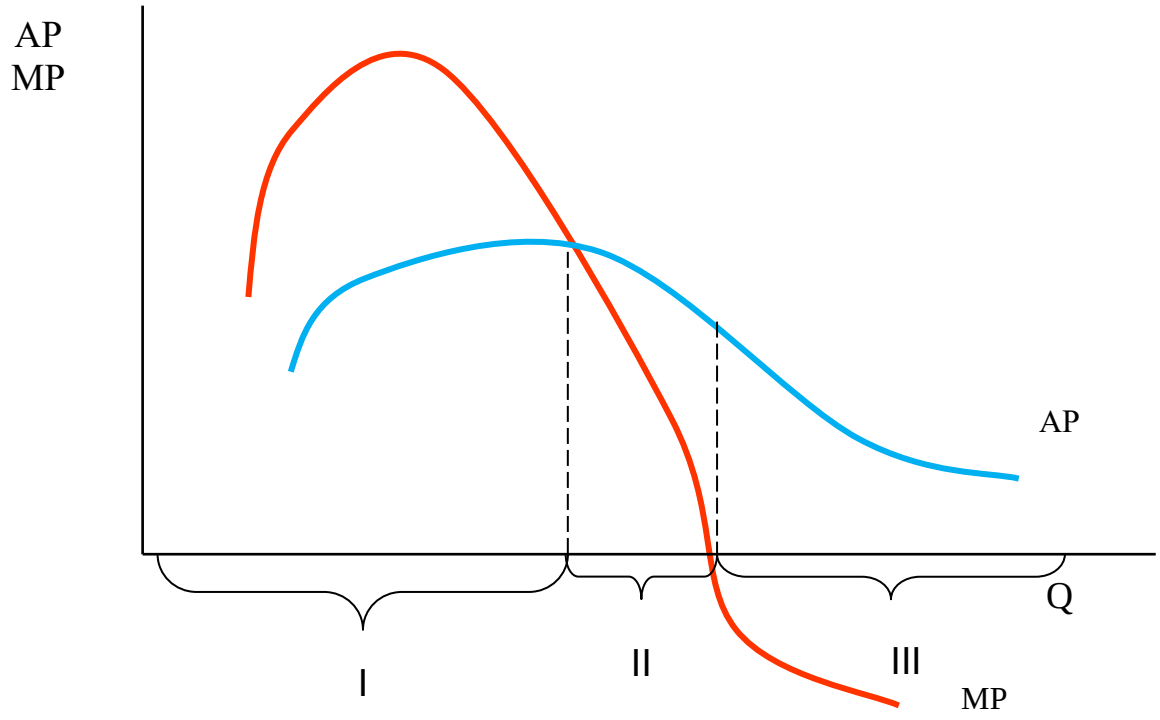


Fig. 5.7. Stages of production

Decision-making to optimize the structure of production costs may be another area of use of the researched regularities. Suppose that there are two departments that produce the same products. How to maneuver the redistribution of a fixed amount of labor between them in the short-term period to achieve greater volumes of production?

To answer the question, it is necessary to compare the marginal products of the variable factor in these two districts. If with a certain division of labor between the districts $MR_1 > MR_2$, then the resources should be redistributed in favor of the first district, if the ratio is the opposite ($MR_1 < MR_2$) - in favor of the second district. The

entrepreneur will receive the maximum volume of products from two sites when the marginal products at the two sites are equal: $MP_1 = MP_2$. The ability to estimate the marginal products of a variable factor and maximize the results of its use is one of the components of the art of management.

5.3. Substitution of production factors

Isoquant analysis can be used to determine the possibilities of substituting one factor of production for another in the process of their use. ***The marginal rate of technological substitution of capital by labor*** ($MRTS_{LK}$) is determined by the amount of capital that can be replaced by each unit of labor without causing a change in production volumes:

$$MRTS_{LK} = -\Delta K/\Delta L.$$

The shape of the isoquant (convex to the origin of the coordinate system) shows that the marginal rate of technological substitution decreases when moving down along the isoquant. This means that each hour of human labor is able to replace a smaller and smaller amount of capital. The reason for the decrease in the marginal rate of technological substitution is that the factors of production tend to complement each other. Each of them cannot do what the other can do, or if they can, it is worse than its.

The marginal rate of technological substitution of factors of production can be calculated not only through comparison of their increments, but also through marginal products. Indeed, if capital decreases from K_1 to K_2 and labor increases from L_1 to L_2 (Fig. 5.3), the producer remains on the same isoquant, then this means that the following equality will be fair:

$$\Delta L\ MP_L = -\ \Delta K\ MP_K$$

Then:

$$MRTS_{LK} = -\Delta K/\Delta L = MP_L / MP_K$$

Since the derived dependence characterizes the slope of the isoquant at each point of the curve, in the further explanation it will be used by us to substantiate the producer's equilibrium point.

Although the decreasing marginal rate of technological substitution of capital by labor is characteristic of the absolute majority of production processes, there are a number of exceptions where this dependence is somewhat different. Let's consider a few of them.

1. ***Factors of production can be used only in a certain proportion***. For example, we can name the ratio of computers and PC operators. If the number of hours of computer operation during the working day is fixed, then an increase in the number of operators will not lead to an increase in production volumes. The reverse statement will also be true: if the number of operators is fixed, then it is impossible to achieve an increase in production volumes due to an increase in the number of computers. In this case, the isoquant will have the form of a right angle, and the marginal rate of technological substitution will be zero (Fig. 5.8).

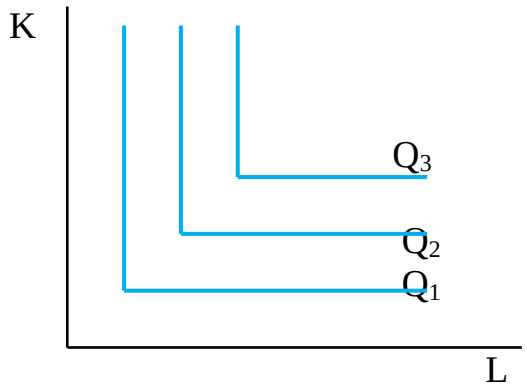


Fig. 5.8. Isoquants with a fixed proportion of production factors

2. ***Complete substitution of production factors***. Under such a condition, the isoquant would have the form of a straight line with a constant slope equal to 1. However, this situation should be considered only as a theoretical abstraction: in real life, a complete substitution of production factors is in principle impossible.

5.4. Return to the scale of production

In contrast to the short run, in the long run, all factors of production are variable. If we maintain the assumption that only two factors (labor and capital) are used for production and the technology remains unchanged, then the growth of production in the long run can be considered as occurring with an unchanged ratio of production factors. This will mean that production will increase when the use of its factors will increase along the ray directed from the origin of coordinates (Fig. 5.9). At the same time, there are several options for the reaction of the average product to an increase in the scale of production: 1) increasing; 2) neutral; 3) decreasng. Here various consequences of the so-called effect of scale of production are manifested.

The growing reaction of the average product occurs to ***the positive effect of the growth of the scale of production (increasing return to the scale)***. It can be achieved due to the following factors:

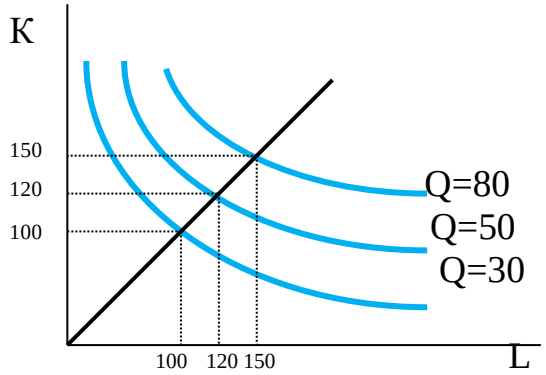


Fig. 5.9. Increase in production in the long run

1. Division of labor. Deeper internal specialization is possible at larger enterprises, which has the effect of increasing labor productivity and, accordingly, reducing costs.

2. Improvement of management. In-depth specialization also extends to managerial activities. The appearance of managers who are specially engaged in marketing, advertising, supply, organization of scientific and technical works, etc., allows to increase the efficiency of the enterprise as a whole, which is manifested in the growth of the average product.

3. Increasing the scale of production most often does not require a proportional increase in all resources. For example, the lecturer's time consumption will not increase if there are not one but two groups of students in the lecture hall.

The neutral reaction of the average product to the increase in the scale of production means that regardless of the size of the enterprise and the volume of products produced at it, the average productivity of the factors remains unchanged (constant return to the scale).

At the same time, such a situation is also possible when the increase in the scale of production has ***a negative effect on the average product***: its level decreases (***decreasing return ti the scale)***. The fact is that an increase in production can lead to the emergence of problems faced by the enterprise. This is, first of all, the significant inertia of large systems and their loss of flexibility, which is extremely necessary in the conditions of an unstable market. In addition, the firm can go beyond the threshold of manageability: too large sizes create a cumbersome management system, develop bureaucratic tendencies, which negatively affects the effectiveness of management decisions.

When analyzing the dynamics of the average product in the long-term period for the same enterprise in different areas of increased production volumes, as a rule, all of the listed reactions are revealed. Their combination largely depends on the specifics of the industry, the market situation, etc. However, this will be discussed in more detail in the next chapter.

The main terms and concepts

Production
Expenditure of production factors
Technology
Production function
Short run period
Long run period
Production grid
Isoquant
Map of isoquants
Total product of a variable factor
Average variable factor product
Marginal product of variable factor
Stages of production
The law of the diminishing marginal productivity
Marginal rate of technological substitution
The effect of scale of production
Increasing return to the scale
Constant return to the scale
Decreasing retuen to the scale

Chapter 6.
COSTS AND OUTPUT

In the previous chapter, the dependences between the costs of production factors in natural terms (man-hours of labor and machine-hours of capital) and the volume of the made product, which is described by the production function, were clarified. However, in market conditions, when production is of a commodity nature, the costs of production factors receive a value expression. In this case, expences of production factors are transformed into production cost. Therefore, first of all, it is necessary to find out their essence and wayss of measurement.

6.1. Production costs

Production costs are the cost of production factors used to create a certain volume of products. In economic theory, there are different approaches to defining the category "cost". Thus, supporters of the labor theory of value (A. Smith, D. Ricardo, K. Marx) believe that value is labor embodied in a commodity. However, today the concept of opportunity cost is more common in economic theory in general and in microeconomics in particular. It is from the standpoint of this concept that production costs will be considered in the following presentation.

How can you estimate the opportunity cost of getting an excellent grade on your microeconomics exam? To get it, you had to give up other options for using your free time: watching an interesting TV show, sleeping or going to a party with friends. Therefore, it is possible to consider that the excellent mark costs you the most valuable loss that could have been avoided by alternative use of the time spent for training to exam.

If we judge by analogy, ***the opportunity cost of the means spent for production*** is determined by the largest possible income that could be obtained from this money if it were invested in something else.

It should be emphasized that economists distinguish between external (accounting or obvious) and internal (latent) costs**.** ***External costs*** are monetary payments to suppliers of resources that do not belong to the owners of the enterprise. This is the sum of all payments made by an entrepreneur to attract the necessary economic resources. They include salaries for employees, interest on received loans, rent for land or other property, payment for rendered services, etc.

Internal costs are monetary payments that could be received by the owners of the enterprise in the alternative use of resources owned by them. The entrepreneur uses

his/her own money, which he/she could put in a bank for deposit, he/she can use his/her own premises, which could be rented out and bring the appropriate income, etc. Thus, by using his/her own resources for the organization of production activities, the entrepreneur loses a certain monetary benefit that he/she could receive in other options for the use of resources. External and internal costs form the ***economic costs*** of an entrepreneur. In the further explanation, we will talk exclusively about economic costs.

Particular attention should be paid to the fact that economic costs include ***normal profit as payment for the entrepreneur's performance of business functions***. Its size is determined by the level of profitability, which is normal or average for a certain industry, that is, the level that keeps an entrepreneur in this industry.

Another form of profit is ***economic (net) profit***, which is the additional income of an entrepreneur as a result of his/her more efficient activity in a certain industry. Not all entrepreneurs receive this form of profit, and it does not apply to expenses. In microeconomics, unless otherwise specified, it is usually economic profit. The relationship between these concepts is shown in Fig. 6.1.

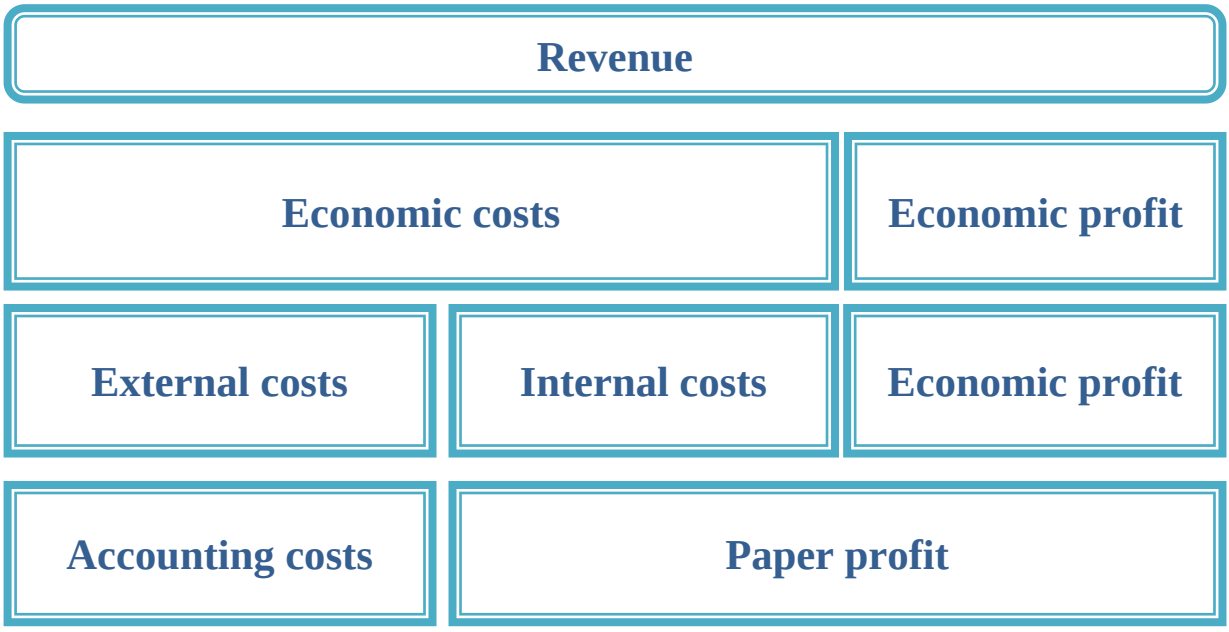


Fig. 6.1. Classification of costs and profits

In order to better explain the importance of just economic costs and economic profit (not accounting profit) for making economically justified decisions, let's give the following example. Let there be some consulting firm in which his own and his wife provide consulting services. For its organization, the owner purchased equipment worth UAH 100,000, took a loan from a bank (UAH 50,000), hired three employees, to whom he pays wages of UAH 12,000 each. per month, and also pays for various services UAH 50,000 per year. The company is located in an apartment owned by an

entrepreneur. Does it make sense to engage in this type of activity if the total annual income of the company is UAH 1,000,000?

To answer the question, let's first calculate the accounting costs. As can be seen from the table. 6.1, they consist of wages of employees, loan interest, depreciation deductions and other payments for services to third-party organizations. The total amount of these costs is UAH 507,000. Then the accounting profit will be UAH 493,000. You may get the impression that this type of activity is quite efficient and profitable, since the accounting profit is almost 100% in relation to costs. However, for a reasonable conclusion, it is necessary to analyze what income the entrepreneur would have received if he had used his resources in an alternative way. For this, it is necessary to calculate internal costs.

Table 6.1

Accounting and economic costs of the consulting firm

Articles of expenditure	Accounting costs (UAH.)	Economic costs (UAH.)
Wages of employees (3 * 12 000 *12)	432 000	432 000
Interest for using credit (10% річних)	5 000	5 000
Depreciation deductions (20% per year)	20 000	20 000
Other payments for services to third-party organizations	50 000	50 000
Implicit salary of the owner (15 000*12)	-	180 000
Implicit salary of the wife (12 000*12)	-	144 000
Interest on capital (8% річних)	-	8 000
Implicit rent for the apartment (8 000*12)	-	96 000
Normal profit	-	75 000
Total:	**507 000**	**1 010 000**

Having given up work in their own consulting firm, the entrepreneur and his wife could go to work for hire and receive a salary, put the money spent on equipment in a deposit and receive interest on it, rent out an apartment and receive rent. In addition, the normal profit for this type of activity is UAH 75,000. for a year. The total amount of the alternative cost of the involved own resources (internal costs) is UAH 503,000. This amount could be received by the owners of the firm if they decided on other use

of resources. Since it exceeds the accounting profit, it turns out that it is not advisable to create a consulting firm.

A similar conclusion can be drawn by comparing economic costs with the total income of the firm. It turns out that the company not only does not bring economic profit, but, on the contrary, its activity is associated with economic losses (1,000,000 - 1,010,000 = - 10,000).

Thus, income *that compensates only economic costs is already sufficient to create conditions of interest in production activity, as it brings the entrepreneur a normal profit.* The excess of income over economic costs is economic profit.

6.2. Costs function and producer's equilibrium

Economic costs depend on the amount of used resources (their costs) and prices for the services of production factors. Then it is possible to establish the relationship between production volumes and the minimum possible costs necessary for its production. This dependence is called ***the cost function***:

$$C = f(P_L, L, P_K, K),$$ де

C – costs; L, K – expences of labor and capital; P_L, P_K - prices of the appropriate resouces.

With the help of the cost function, you can solve both direct and inverse problems: minimizing costs for a given volume of production or maximizing production at given costs.

It is easy to see the relationship between the cost function and the production function: the latter is supplemented by taking into account the prices of the relevant production resources.

The total (aggregate) costs (TC) for production can be calculated as the sum of costs for the purchase of each factor:

$$TC = P_L L + PK_K.$$

At fixed resource prices, there are different sets of capital and labor that can be purchased at the same cost. The graphical representation of these sets is called ***isocosts.*** The isocost is a line that reflects capital and labor costs, at which production costs remain unchanged (Fig. 6.1).

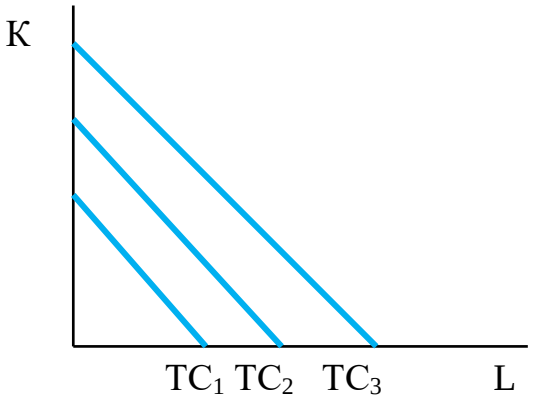


Fig. 6.1. Isocosts

Each level of labor and capital costs has its own isocost. The slope of any isocost from the isocost family is equal to (-ΔK/ΔL). It can also be expressed through the ratio of prices:

$$-\Delta K/\Delta L = P_L/P_K.$$

A change in the price of labor or capital can change the slope of the isoquant. Variants of such changes are shown in Fig. 6.2: an increase in the price of capital and a decrease in the price of labor increases the angle of inclination; the decrease in the angle of inclination occurs when the price of labor increases and the price of capital decreases.

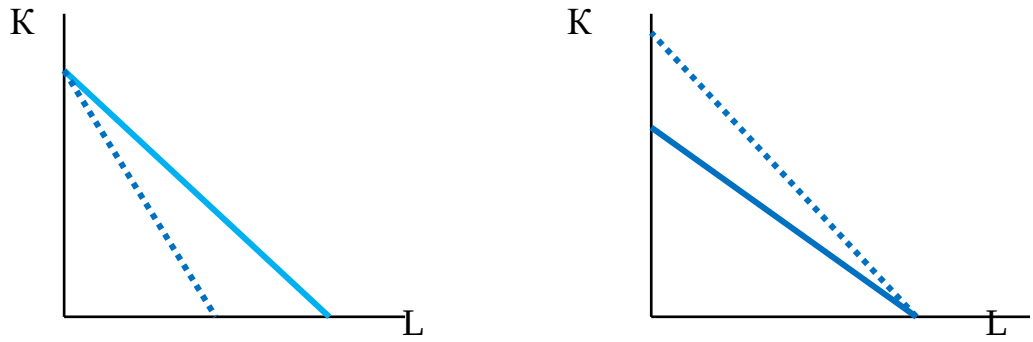


Fig. 6.2. The change in the slope of the isocost under the influence of:
a) increase in the price of labor; b) decrease in the price of capital

Which of the proposed isocost set of capital and labor will provide the maximum amount of product? To answer this question, it is necessary to combine the isocosts with the map of isoquants (Fig. 6.3).

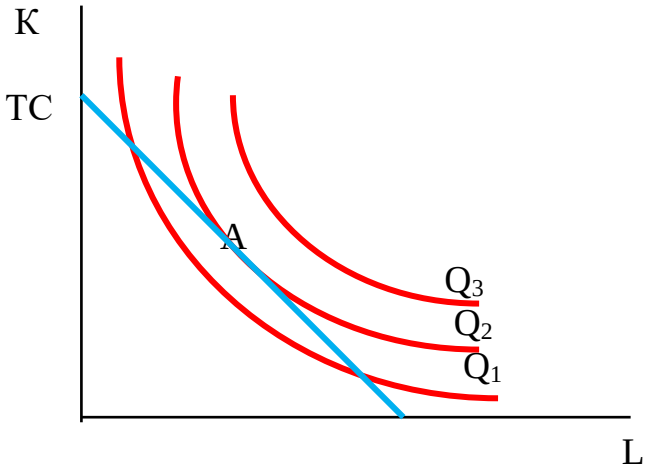


Fig. 6.3. Maximization of production volumes at given costs

To find production volumes that minimize costs at a given production volume, it is necessary to combine a fixed isoquant (production volume) with an isocost map (family). The amount of costs to which the isocost corresponds, which is tangent to the given isoquant, is the minimum cost (Fig. 6.4).

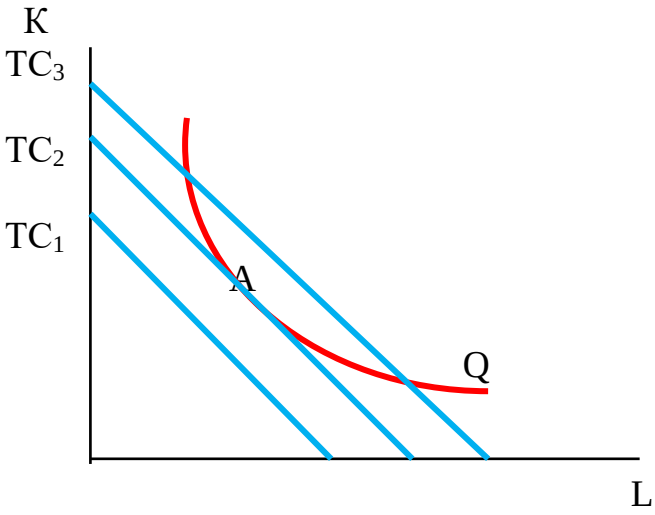


Fig. 6.4. Minimization of costs for a given volume of production

If the consumer almost always solves the question of maximizing utility within his/her budget, then the manufacturer, depending on the market situation, will solve either the problem of maximizing output for a given cost or minimizing costs for a given volume. So, if he/she works for an unlimited market, capable of accepting all the products that the manufacturer is able to supply to it. then under these conditions it is important to achieve the maximum output for a given amount of costs. If the manufacturer concluded an agreement on the supply of a fixed batch of products, then the task of cost minimization is solved.

The condition for determining the maximum production volumes at the specified costs (as well as the minimum costs for the specified production volume) is the same slope of the isocost and the corresponding isoquant, which has a common point with the isocost and is farthest from the origin of the coordinates (point *A* in Fig. 6.3 and 6.4).

The slope of the isoquant is determined by the marginal rate of technological substitution, and the isocost is determined by the ratio of labor and capital prices. Then ***the equilibrium condition of the producer*** (his/her state in which he/she does not want to change the ratio of capital and labor involved in the production process) can be expressed as equality:

$$MRTS_{LK} = P_L / P_K.$$

Since $MRTS_{LK} = MP_L / MP_K$, the equation will be valid:

$$MP_L / MP_K = P_L / P_K, \text{ or}$$
$$MP_L / P_L = MP_K / P_K.$$

The equality reflects ***the principle of least costs***, the essence of which is that the production of a given volume of products with minimal costs requires that the resources that are used at the same time have the same value of the marginal product per unit cost of the resource. If the marginal product per unit of costs of one factor exceeds the marginal product of another factor, the firm can obtain an increase in production for sale without additional funds due to a change in the ratio of production factors.

If we connect the points corresponding to the combinations of production factors that minimize costs at different given volumes of production, we will get the so-called ***growth trajectory*** (Fig. 6.5).

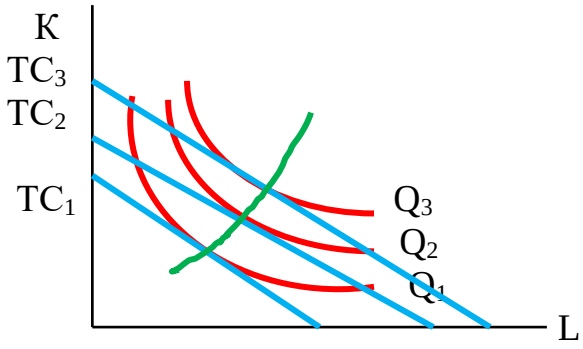


Fig. 6.5. Growth trajectory

The growth trajectory shows how the ratio of production factors that provide minimum costs changes when production volumes increase.

6.3. Short run costs

When analyzing the formation of costs in the short run, it is necessary to divide them into fixed and variable. ***Fixed costs (FC)*** do not depend on production volumes. Moreover, they exist even when production stops altogether. The fact is that, as follows from the very definition of the short run, it is insufficient to change, first of all, the amount of capital. Examples of fixed costs may be the expenses conected with payment of rent, interes for received credit, depreciation, etc.

Variable costs (VC) are the costs of variable resources used to produce a given volume of output. These include the wages of workers, expenses for the purchase of raw materials, electricity for production purposes, etc.

Indicators of not only total costs, but also averages costs are widely used in microeconomic analysis: average total *(ATC)*, average fixed *(AFC)* and average variable *(AVC)* costs:

$$ATC = TC / Q$$
$$AFC = FC / Q$$
$$AVC = VC / Q$$

A special role in the study of the behavior of the manufacturer on the market belongs to the ***marginal costs***, which are calculated as the ratio of the increase in total costs to the increase in production volumes. In other words, marginal costs show what additional costs it costs for manufacture of an additional unit of product produser spends:

$$MC = \Delta TC / \Delta Q.$$

Marginal costs in the short run do not depend on fixed costs. Only variable costs affect their level.

To find out the laws of the dynamics of costs depending on the volume of production, we will use the conditional data on the production of chairs, which are presented in Table 6.2. Based on them, we can build the corresponding curves.

Since fixed costs do not depend on changes in production volumes, their curve on the graph will look like a straight line that runs parallel to the production volume axis (Fig. 6.6). The image of the curve of variable costs mirrors the shape of the curve of the aggregate product of the variable factor. Each point of this curve corresponds to the minimum labor costs required to produce the corresponding amount of output. The curve will have the appearance of a rising line with gradual attenuation. Somewhere in the future, it will reach a tipping point, after which further growth in variable costs will not be accompanied by growth in production volumes. However, this part of the curve cannot be a component of the cost function, because it does not meet the requirement of its definition (it will not be the minimum cost necessary to obtain a given volume of production, since it can be obtained at a lower cost).

Table 6.2

Production costs

Q	FC	VC	TC	MC	ATC
0	200	0	200	-	-
1	200	100	300	100	300
2	200	196	396	96	198
3	200	295	495	99	165
4	200	400	600	105	150
5	200	515	715	115	143
6	200	646	846	131	141
7	200	794	974	148	142
8	200	960	1160	166	145
9	200	1150	1350	190	150
10	200	1370	1570	220	157

The curve of total costs shows changes in the total cost of factors used in production, depending on the increase in production volumes. It will have the same shape as the curve of variable costs, but will pass higher by the amount of fixed costs.

Average costs for any volume of production is equal to the tangent of the angle of inclination of the ray drawn from the origin through the corresponding point on the curve of total costs (for example, point *N*). The minimum value of the average costs is at the point where the angle of inclination of the beam will be the smallest, i.e at the point of its contact with the curve of total costs (point *M)*. The same can be said about average variable costs. If you build their curve, it will gradually approach the curve of average aggregate costs (Fig. 6.7).

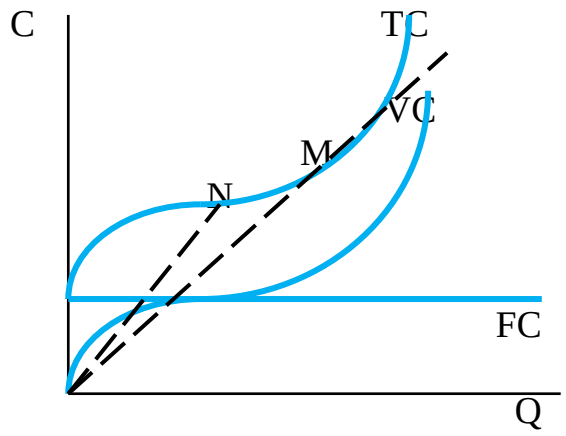


Fig. 6.6. Curves of total, fixed and variable costs

Marginal costs are the slope of the total costs curve, i.e. the tangent of the angle of the tangents drawn to each point of the curve. Marginal costs first decrease (in our example to the second unit of production), and then begin to increase as production volumes increase.

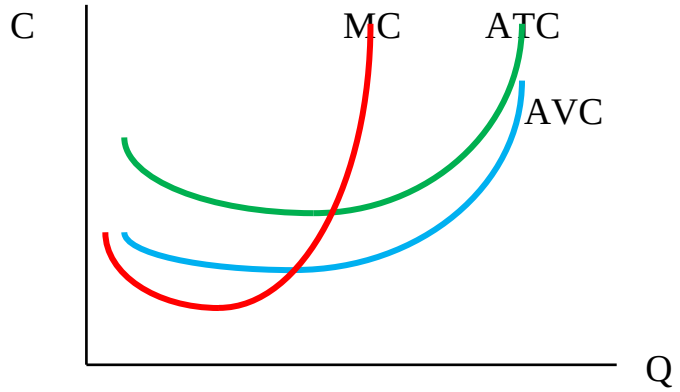


Fig. 6.7. Curves of average and marginal costs

It is important for further research to find out the relationship between the dynamics of average and marginal costs. As long as marginal costs are less than average, producing an additional unit of output will reduce average costs. If the production of an additional unit costs more than average costs, then an increase in production volumes will lead to an increase in average costs. Thus, ***average costs will be minimal when they are equal to marginal costs***. That is, the curves of marginal and average costs will cross at the point of the minimum value of the average costs (Fig. 6.7). For our example, the intersection point is between the sixth and seventh units of production.

Cost changes in the short run reflect the effect of the law of diminishing marginal productivity of a variable factor. As long as the firm can find all the necessary resources

at constant prices, changes in costs in the short run can be fully explained by changes in the average and marginal product of the variable factor. The U-shaped curve of average total and variable costs reflects the fact that in production the average product first increases and then decreases. The minimum point of average variable costs coincides with the maximum point of the average product.

6.4. Long run costs

When analyzing costs in the long run, it should be borne in mind that in this case there is no division into fixed and variable costs: all costs may change depending on the volume of production. You can refuse the lease or return the loan, sell the fixed assets or, on the contrary, buy new ones. Therefore, in the long run, the problem of optimizing the size of the enterprise comes to the fore.

There is a certain connection and dependence between the dynamics of costs in the short run and long run. To demonstrate it, we will give the following example. Let there be certain production modules (production sites), each of which is able to ensure the production of 5 thousand chairs per year at minimum average costs. The level of these costs is different for each module. Then the capacity of the enterprise will depend on the number of modules put into operation. Fig. 6.8 shows the average cost curves for each of the modules.

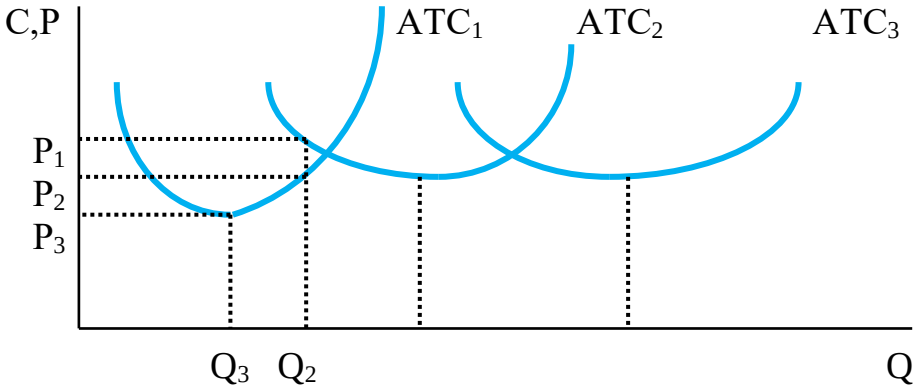


Fig. 6.8. Adjustment to market conditions in the long run

Let the market demand be 7,000 chairs (Q_2). This volume can be obtained both with the help of one production module, remaining within the framework of the short run, and with the commissioning of the second, i.e. through the long run. In the first case, production volumes will not correspond to those at which the minimum level of average costs is reached (P_3 = USD 9). They will increase to USD 12 per chair. If you

follow the second path, then part of the volume (5,000 pcs.) can be produced at minimal costs (USD 9), and the other (2,000 pcs.) at costs equal to the corresponding point on the ATC_2 curve (P_1 = USD 15).

To determine a more attractive option for production development, you should find one that minimizes total costs for a given volume. In the first case, they will be equal to:

$$TC_1 = P_2Q_2 = 12 \text{ x } 7\,000 = \text{USD } 84\,000.$$

In the second case, they can be calculated as follows:

$$TC_2 = P_3Q_3 + P_1(Q_2 - Q_3) = 9 \text{ x } 5\,000 + 15 \text{ x } 2\,000 = \text{USD } 75\,000.$$

Thus, from the point of view of minimizing total costs for obtaining a given production volume, the second option of development is more attractive, which involves the transition from a short-term to a long-term period.

Just as average product can increase, decrease, or remain the same depending on the volume of production, average costs also respond differently to the effect of scale. This reaction largely depends on the specifics of the industry, the market situation, directions for improving production technology, etc. Fig. 6.9 shows the three most typical situations.

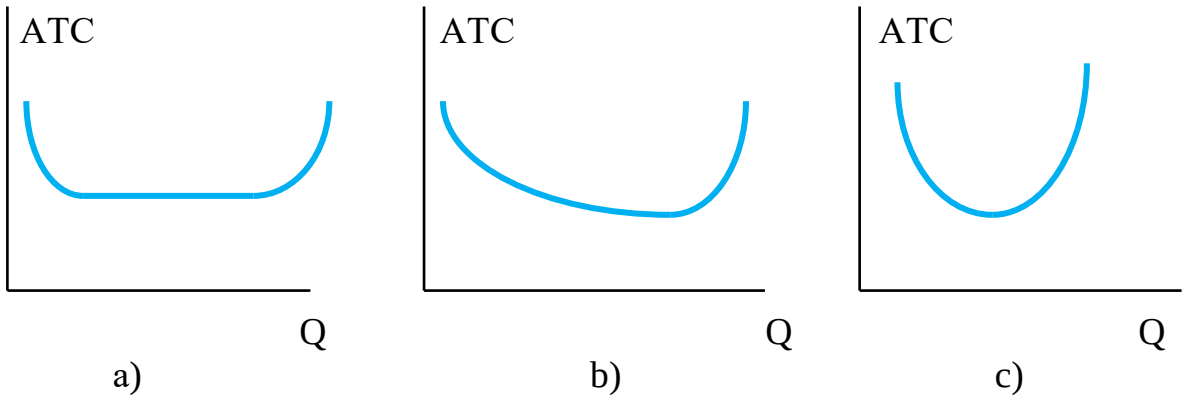


Fig. 6.9. Variants of long run dynamics of average costs

In the variant shown in Fig. 6.9.a, a relatively short period is observed when the growth of production is accompanied by a decrease in costs, i.e. the positive effect of the scale of production is exhausted quite quickly. But at the same time, there is a wide range of production volumes, in which a constant level of average costs is maintained. In such industries, enterprises of different sizes can be equally viable.

Another situation is shown in Fig. 6.9.b. Here you can observe the long-working effect of increasing the scale of production. In such industries, advantages are obtained by large enterprises.

On the contrary, in the third case, the positive effect of the scale of production is quickly transformed into a negative one. Therefore, it is important for an entrepreneur to correctly assess the limits of effective expansion of production. Existing barriers to growth make it possible for small businesses to function effectively in such industries.

However, the effort to minimize costs is only one side that determines the behavior of the manufacturer. The formation of the real scale of production both in the short run and in the long run is ultimately determined by the opportunities to maximize economic profit. To do this, it is necessary to compare production costs with revenues and it will be the subject of the next section of the course.

The main terms and concepts

Opportunity cost of the used resources
Economic costs
Implicit costs
External costs
Internal costs
Cost function
Isocost
Producer's equilibrium
Principle of the least costs
Total costs
Growth trajectory
Costs in the short run
Variable costs
Fixed costs
Average costs
Average variable costs
Average fixed costs
Marginal costs
Costs in the long run

Part 3.
COMMODITY MARKET

Chapter 7.
MARKET OF PERFECT COMPETITION

When choosing the scale of production, manufacturers are guided by the motive of profit maximization. However, the dynamics of revenue, as one of the decisive factors of profit, largely depends on the market situation, first of all, on the prevailing type of competition. As you know, depending on the competitive environment, markets are divided into the following four groups: the market of pure (perfect) competition, the market of monopolistic competition, the market of oligopoly and the market of pure monopoly. Therefore, the problem of choosing production volumes and profit maximization should be considered separately for each market situation.

7.1. Features and conditions of perfect competition

The most important features by which different market models are distinguished are: the number of seller firms on the market; type of product offered for sale; possibilities of price control by sellers; conditions for additional producers entering and exiting the industry; the method of competition, which is predominant in this market (Table 7.1).

Table 7.1

Market models

Feature	***Perfect competition***	***Imperfect competition***		
		Monopolistic competition	***Oligopoly***	***Pure monopoly***
Number of sellers	***A lot of***	Many	*Few*	*One*
Commodity	Standard	*Differentiated*	Doesn't matter	Has no substitutes
Ability of a seller to set the market price	No	Insignificant	Depends on competitors	Ultimate
Terms of entry into the industry	free	enough free	restricted	blocked
Tools of competition	Cost	Price, advertising, differentiation	Non-price	Social

For a market of pure (perfect) competition, these characteristics should be as follows:

1. ***There are a lot of sellers who compete with each other on equal terms***. The concept of "a lot" has no quantitative expression. It can be thousands, tens or even hundreds of thousands. The main thing is that the share of each of them in the market should be so small that an increase or decrease in the sales volume of any of them would not affect the market situation in general.

Of course, such conditions do not occur often. However, agricultural product markets in developed countries, stock exchange trading, or the sale of foreign currency at exchange offices correspond to this characteristic with a certain convention.

2. ***Standard products offered for sale***. This means that the consumer does not distinguish the product of one seller from the product of another, even if they actually have differences. Therefore, it does not matter to him/her from which of the sellers to buy the goods.

3. ***Lack of opportunity for an individual seller to influence the market price***. Of course, the seller is able to offer his/her products at lower prices, compared to those prevailing on the market. However, this, firstly, will not affect the market price at all, since the fate of an individual seller in the market is small, and secondly, it will contradict the original assumption of profit maximization as the main motive for the behavior of economic subjects. After all, in the latter case, the seller's profit will decrease compared to the option of selling the product at the market price. He/she has no choice but to sell goods at market prices. Therefore, the seller in conditions of perfect competition is most often called "the one who agrees with the price."

4. ***Free entry into and exit from the industry***. The market will be competitive only when there are no legal, technological, financial or other obstacles that could prevent the emergence or disappearance of new firms that produce a certain product. This feature of perfect competition should be especially emphasized, since it is precisely this that underlies the explanation of the mechanism of adaptation of the industry to market requirements in the long run.

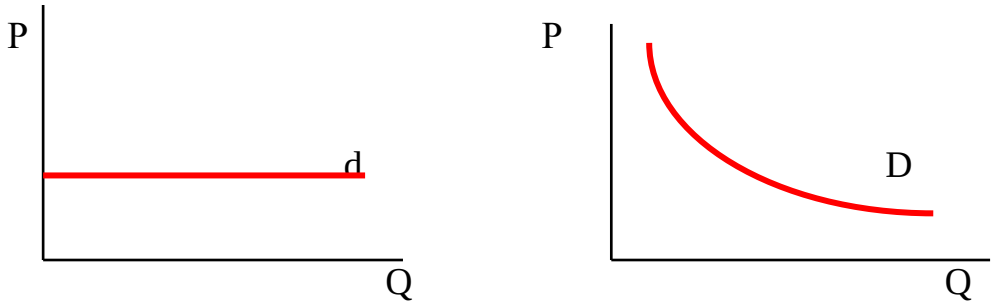
5. ***Absence of non-price competition***. Product differentiation is usually the basis for non-price competition. Since the products are standard in the competitive market, there are no grounds for non-price competition.

A comparison of the listed features with the existing competitive environment in the real economy shows that pure competition is a unique phenomenon. Today, there are almost no areas where all these signs can be found. However, this does not mean that perfect competition does not deserve a special analysis. Why?

First, there are several areas (industry markets) where the situation is more similar to pure competition than to any other market model. Secondly, in order to learn

more complex market situations, it is necessary to start the analysis with the simplest options, which include the market of perfect competition.

In conditions of pure competition, as already noted, the firm cannot conduct its own pricing policy. It can only adapt to the prices that have developed on the market at the moment. A very important conclusion follows from this: no matter how many products a competing firm offers for sale, it will not affect the market price in any way. In other words, in contrast to market demand, the demand curve faced by an individual competitive producer is completely elastic (Fig. 7.1).



a) demand curve for a competitive firm **b) market demand curve**

Fig. 7.1 Difference between market demand and demand for a competitive firm

Such a difference between market demand and demand in relation to an individual competitive firm seems to once again warn the researcher about the fallacy of a widespread statement: what is true in relation to an individual member of an association is always true in relation to the whole association.

Peculiarities of demand for the product of a competitive firm are also manifested through the dynamics of the main indicators characterizing its income, depending on sales volumes. Such indicators include:

1. ***Total (aggregate) revenue (TR)*** is the total revenue from the sale of all products.

2. ***Average revenue (AR)*** is total revenue per unit of product sold:

$$AR = TR/Q.$$

3. ***Marginal revenue (MR)*** is the increase in total revenue that results from the sale of one more unit of the product**:**

$$MR = \Delta TR/\Delta Q.$$

Graphically, the dependence of the dynamics of the listed indicators on production volumes is presented in Fig. 7.2.

The total income of a competing firm will grow in direct proportion to the volume of sales. The unit price, average and marginal revenue in a competitive market will always be equal to each other.

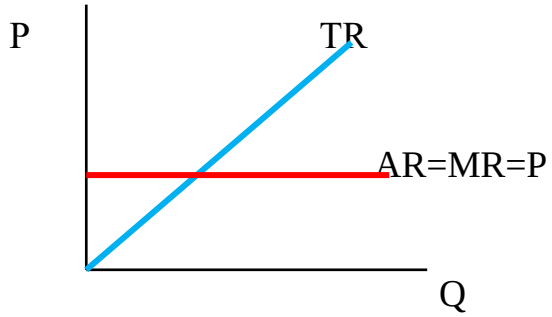


Fig. 7.2. Total, average and marginal revenue of a competitive firm

Clarifying the general features of the competitive market and the peculiarities of the firm's functioning on it and the formation of its income provides sufficient grounds for developing a model for the firm's choice of production volumes that provide it with maximum profit. Such a model has its own specifics for short run and long run. Therefore, we will consider these two situations separately.

7.2. Profit maximization in the short run

Since capital remains unchanged in the short run, adjusting the company's production volumes to market conditions to maximize profits or (and this also happens quite often) minimize losses is achieved by maneuvering variable costs.

Building a model of producer behavior requires finding out the mechanism for finding answers to the following three questions:

- is it worth or not to produce the product;
- if worth, how much;
- what profits or losses will this production bring?

In microeconomics, there are two approaches to finding answers and making decisions: based on the comparison of total revenue and total costs or marginal revenue and marginal costs. Let's examine each of them separately.

A firm should produce a certain amount of products if it brings it economic profit, or if the losses will be smaller than in the case of stopping production. The firm will make an economic profit if the total revenue greater than the total costs. Therefore, if the difference between the firm's total revenue and total costs at some level of

production is positive, the firm is better off producing than ceasing production. In this case, it will solve the problem of profit maximization.

It is a more difficult matter when, for any volume of production, total costs exceed total revenue. Under these conditions, it is necessary to look for a solution that minimizes losses. If the firm stops production, its losses will be equal to fixed costs. Therefore, under the condition of general unprofitability of production, it is worth producing a certain volume of products, if the total losses of the firm will be less than fixed costs. It is not difficult to see that such a result will occur when total revenue exceeds variable costs:

$$TC - TR < FC$$
$$(FC + VC) - TR < FC$$
$$VC < TR$$

Thus, in a generalized form, the answer to the first question will have the following form: it is advisable for the firm to carry out production in the short run, provided that it receives an economic profit or when its losses are less than fixed costs. At the same time, it should be borne in mind that unprofitable production can be considered only as a temporary phenomenon, as a respite taken by the company to make more radical decisions aimed at eliminating fixed costs and stopping production altogether or reducing costs and making a profit.

Bearing in mind the general principle of the producer's behavior, it is quite easy to answer the second question: in the short run, the firm should produce such a volume of products at which it maximizes its profits or minimizes losses.

To answer the third question, a comparison of total revenue and total costs is necessary at the selected volume of production: the economic profit or loss of the firm will be equal to the difference between total revenue and total costs.

We will analyze the data given in Table 7.2 and draw conclusions regarding the desired production volumes and their results.

If the market price is UAH 147. for one chair (and we continue to consider the example discussed in the previous topic), then in this case the total revenue (TR_1) during the production of 5-7 chairs will bring economic profit (EP_1). Therefore, the firm should start production. The company will get the maximum profit if it stops at the production of six chairs. It will be equal to UAH 36.

At the market price of UAH 130 total revenue (TR_2) will under no circumstances exceed total costs. Therefore, production will always be unprofitable. So is it worth producing at all? To answer this question, let's compare total revenue with variable costs. It exceeds these costs already at the production of the first unit, which leads to a

reduction in losses compared to fixed costs. These losses will be the smallest for the production of five chairs – UAH 65. (compare, if you don't produce goods at all, the losses will amount to UAH 200).

Tabel 7.2

Selection of production volumes in the short run

Q	FC	VC	TC	TR_1	EP_1	TR_2	EP_2	TR_3	EP_3
0	200	0	200	-	-200	-	-200	-	-200
1	200	100	300	147	-135	130	-170	90	-210
2	200	196	396	294	-102	260	-136	180	-216
3	200	295	495	441	-54	390	-105	270	-225
4	200	400	600	588	-12	520	-80	360	-240
5	200	515	715	735	+20	650	-65	450	-265
6	200	646	846	882	+36	780	-66	540	-306
7	200	794	974	1029	+35	910	-84	630	-364
8	200	960	1160	1176	-16	1040	-120	720	-440
9	200	1150	1350	1323	-27	1170	-180	810	-540
10	200	1370	1570	1470	-100	1300	-270	900	-670

Price reduction to UAH 90. makes production altogether inexpedient: in no case do losses become less than fixed costs.

The model of the manufacturer's choice of behavioral options based on the comparison of aggregate costs and gross income can be graphically interpreted (Fig. 7.3).

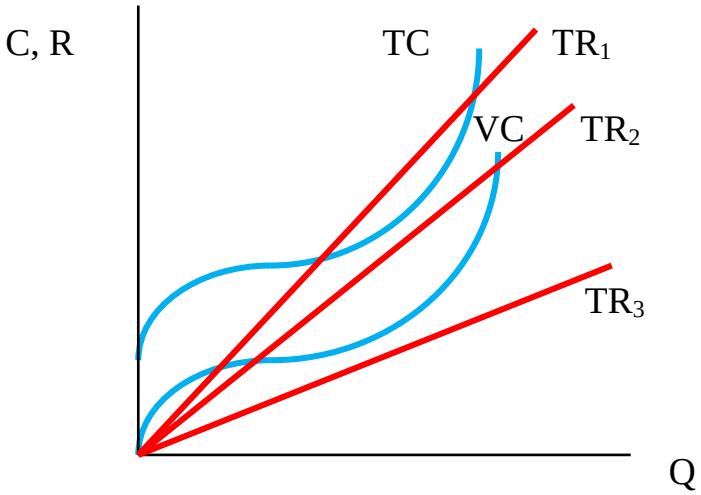


Fig. 7.3. Variants of profit maximization, loss minimization and closing of the firm

If the total revenue line intersects the total cost curve and there is a section above the curve, then the production volumes that correspond to this section will bring economic profit to the firm. It will reach its maximum value at the point where the vertical gap between the gross income line and the aggregate expenditure curve is greatest.

The firm will solve the problem of losses minimization if the total revenue line lies below the total cost curve but crosses the variable cost curve. The minimum losses will be when the vertical gap between the line of total revenue and the curve of total costs reaches the smallest value.

If the total revenue line is located even below the variable cost curve, then the firm will have the smallest losses when it stops production.

Similar conclusions can be obtained if marginal revenue is compared with marginal costs. Table 7.3 shows data on marginal costs and marginal revenue depending on the level of market prices. If the price of one chair on the market is UAH 147, then the sale of the first chair will bring the company an additional UAH 147 income, while its additional expenses for the production of this chair amounted to UAH 100. Therefore, the expansion of production in this case will increase the company's income. A similar conclusion can be made in relation to the second, third and other chairs. Therefore, *any unit of production, the marginal revenue from the sale of which exceeds the marginal costs associated with its production, should be produced*.

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Table 7.3

Marginal costs and marginal revenue

Q	AFC	AVC	ATC	MC	MR_1	MR_2	MR_3
0	-	-	-	-	-	-	-
1	200	100	300	100	147	130	90
2	100	98	198	96	147	130	90
3	67	98	165	99	147	130	90
4	50	100	150	105	147	130	90
5	40	103	143	115	147	130	90
6	33	108	141	131	147	130	90
7	29	113	142	148	147	130	90
8	25	120	145	166	147	130	90
9	22	128	150	190	147	130	90
10	20	137	157	220	147	130	90

Starting from the seventh chair, the production of each additional portion of the product will cost the manufacturer more than the additional income received from its sale. In this situation, production should be reduced, not increased. Therefore, *if the*

marginal costs of an additional unit of production exceed the marginal revenue from its sale, then the production of this unit should be avoided.

Between the situation of the firm's interest in expanding production and interest in reducing production, there is an equilibrium point when the firm would like to maintain the achieved production volumes. It is not difficult to conclude that *this point will be the volume of production at which marginal costs equal marginal revenue, and the firm will receive maximum profit or minimum loss:*

$$MR = MC.$$

This equation was called the ***rule for determining production volumes***. It has several characteristic features that should be taken into account in further analysis:

- the rule can be applied only if the firm prefers production rather than closure. For the last case, additional comparisons are needed: average variable costs and marginal revenue. When the latter is greater than average variable costs, the firm can maximize profits or minimize costs when making production decisions; when the ratio is reversed, it is more appropriate to stop production;
- the application of the rule is not limited only to the conditions of the competitive market. It can be used with the same success to analyze other models;
- a special case of this rule can be applied for a market with perfect competition:

$$MC = P.$$

Figure 7.4 shows a graphical comparison of marginal revenue, marginal and average costs.

If the marginal revenue line crosses the average cost curve, then the firm is solving the profit maximization problem. Its maximum size is reached at the point where the marginal revenue line and the marginal cost curve intersect (Q_1). In this case, the total amount of profit will be equal to the area of the rectangle formed by the price axis, the marginal revenue line, the production volume line and the line corresponding to the average costs at this production volume.

If the marginal revenue line passes below the average cost curve, but crosses the average variable cost curve, then by choosing a certain volume of production, the firm solves the problem of minimizing losses. They will also be the smallest at the point of intersection of the marginal cost curve and the marginal revenue line. As shown in Fig. 7.4, their size can also be determined by the area of the corresponding rectangle.

If the marginal revenue line does not even cross the curve of average variable costs, then it is more appropriate for her to abandon production and concentrate on finding ways to eliminate fixed costs, which in this situation will be equal to losses.

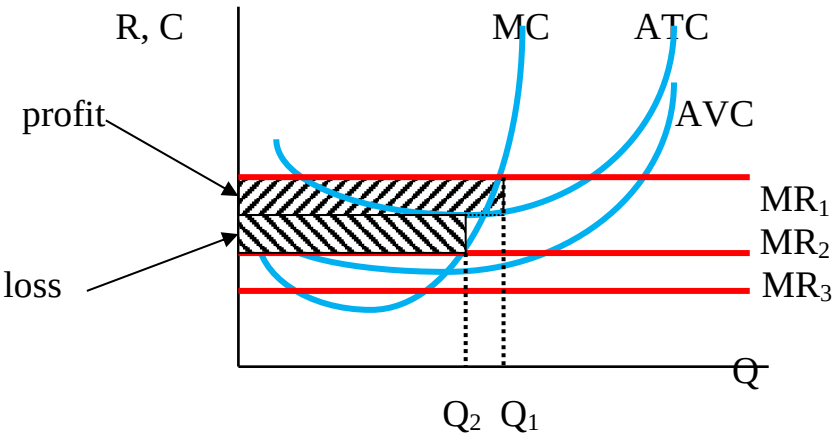


Fig. 7.4. Comparison of marginal revenue, marginal and average costs

Analysis of the relationship between marginal costs and marginal revenue makes it possible to construct the firm's supply curve in the short run. If the price of the product is set below the minimum value of average variable costs, the firm's supply will be zero. The firm will begin production, and accordingly will offer products for sale, starting from the moment when the price exceeds the minimum average variable costs. A further price increase will lead to the production of such a volume of products that will correspond to the coordinates of the point of intersection of the price line (marginal revenue) with the marginal cost curve. Therefore, the *segment of the firm's marginal cost curve, which lies above the average variable cost curve, is its* ***short run supply curve.***

Thus, the use of both the first and the second approach leads to the same conclusions. In a generalized form, the decision-making model that maximizes the company's benefits in the short run is proposed in Table 7.4.

7.3. Profit maximization in the long run

The transition to the analysis of the long run requires a transition from the analysis of the behavior of an individual firm to the clarification of their interaction in the process of formation of the market supply and formation of the market price. This involves the introduction of some new assumptions:

1. We assume that the only way to adjust the industry to the needs of the market in the long run is by attracting new producers to the industry or their exit from the industry.

2. We assume that all firms in the industry have the same or very close cost curves, which makes it possible to talk about a certain average, typical firm.

Table 7.4

A decision-making model for maximizing the benefit of a competitive firm in the short run

Question	The first approach	The second approach
1. Is it worth producing?	Yes, if TR>TC, or TC – TR < FC	Yes, if P >AVC
2. What volume should be produced?	TR – TC - max TC – TR – min	MR = MC
3. Will the firm make an economic profit?	Yes, if TR>TC, no, if TR<TC	Yes, if P>ATC, no, if P <ATC

Let the market price of the chair settle at UH 147 *(P_1)*, which enables a typical firm in the industry to earn an economic profit. How will entrepreneurs in other industries behave in this case? It will be logical to predict that they will try to reorient their activities also to the production of chairs, since it brings not only normal, but also economic profit. As you know, under the influence of an increase in the number of producers, the market supply curve will shift to the right, which will lead to a decrease in the equilibrium market price (Fig. 7.5). Therefore, *the entry of new producers into the industry eliminates the economic profit.*

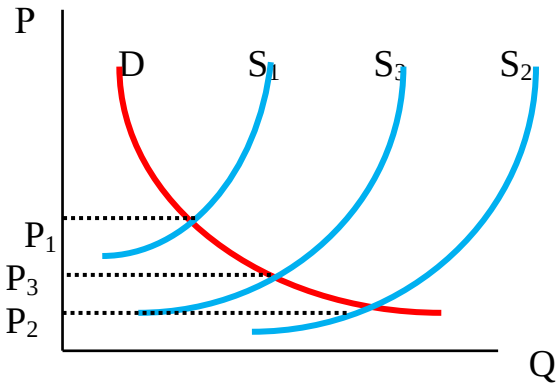


Fig. 7.5. A change in the market price under the influence of a change in supply

If the price falls to the level of P_2, then a typical firm will not be able to make an economic profit. Moreover, it will face the problem of losses (Fig. 7.6), since the price will be lower than the minimum level of average costs. In the long run, there will be an outflow of firms from this industry to those where it is possible to get at least a normal profit. A reduction in the number of producers will reduce market supply, leading to a new price level. Therefore, the *mass outflow of firms from the industry eliminates losses.*

Such inflows and outflows of capital into the industry will eventually lead to a price that will only recover the minimum average cost of production, i.e. a typical firm will earn a normal profit but will not be able to make an economic profit.

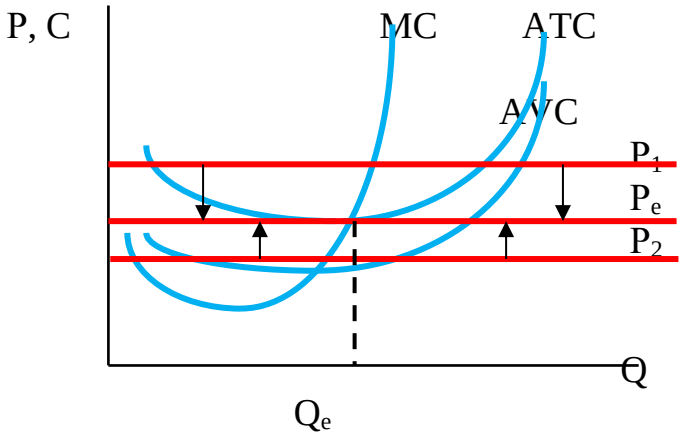


Fig. 7.6. Equilibrium of a competitive firm in the long run

This makes it possible to formulate a general conclusion regarding the achievement of equilibrium by the firm in the long run: ***after all long run adjustments are completed, i.e. when the long run equilibrium is reached, the price of the product will fully correspond to the minimum point of the average aggregate costs of the firm and production will come to the same point.***

7.4. Pure competition and efficiency

As it became clear when explaining the previous question, equilibrium in the long run is achieved when the following equality is established:

$$MR = P = MC = ATCmin.$$

A competitive firm can earn economic profit only in the short run. In the long run, it will simply cover its costs (note: economic costs include normal profits. So there is an incentive to produce!)

Most researchers agree that pure competition best meets the requirements of the efficiency of social production. The effectiveness of a particular market model can be judged based on how it performs the main functions assigned to it. Since society's resources are always limited, the system that, on the one hand, produces the necessary product at the lowest costs, and on the other hand, ensures the optimal distribution of limited resources between industries and individual industries, is considered more efficient. Accordingly, ***production efficiency and resource allocation efficiency*** are distinguished.

The economy of competitive prices is aimed at the distribution of limited resources at the disposal of society in such a way as to maximize the satisfaction of needs.

The production efficiency of a competitive market is realized in the fact that ultimately the price is set at the level of minimum average costs:

$$P = ATCmin.$$

This means that consumers receive the goods they need at the lowest possible prices with the existing production technology.

A competitive firm, driven by the profit maximization motive, will attract resources and produce each good to the point where price equals marginal cost.

$$\boldsymbol{P = MC.}$$

All other things being equal, under perfect competition, consumers will receive a greater quantity of goods than under any variant of imperfect competition. This will mean that resources are allocated most efficiently.

However, it would be a mistake to idealize the competitive market, attributing to it uncharacteristic properties. First of all, it should be borne in mind that the competitive market, due to the structure of production, only mirrors the income structure of society. A competitive firm is oriented to produce what is bought from it. If society has a distorted income structure in favor of the wealthy at the expense of the poor, then the market of pure competition will be ready to offer luxury items at the lowest prices, but will offer basic necessities in limited quantities. And the market is simply not capable of resolving this contradiction.

The limitation of the market mechanism of self-regulation is also manifested in the fact that it is ready to offer only those products that can be paid for by someone.

The company will not produce so-called goods of public use, for the consumption of which it is not possible to receive compensation from the consumer. Therefore, the market mechanism in the modern economy is always supplemented by state regulation.

Orientation to direct profit maximization of a competitive firm quite often leads to the impossibility of an optimal combination of current and future goals (remember the Robin Hood effect discussed in the first chapter). However, despite all these limitations, the competitive market should be recognized as the most efficient market model.

The main terms and concepts

Pure competition
The one who agrees with the price
Total revenue
Average revenue
Marginal revenue
A case of profit maximization
A case of loss minimization
Closing case
MR = MC rule
The supply curve in the short run
Liquidation of economic profit
Production efficiency

Chapter 8.
MONOPOLY MARKET

The direct opposite of a competitive market is a market of pure monopoly (monopoly market), i.e. one where producers are represented exclusively by one seller. This leaves a rather significant imprint on the manufacturer's decision-making model on production volumes that maximize his/her profits. Knowledge of this model, together with the already considered model of the manufacturer's behavior in the competitive market, makes it possible to clarify the mechanisms of making appropriate decisions in the markets of monopolistic competition and oligopoly.

8.1. The main features of pure monopoly

In the previous chapter, we talked about the criteria by which certain market models are distinguished. With respect to the pure monopoly market, they have the following characteristics:

1. ***There is only one manufacturer of a product operating on the market***. This fact means that the statement will be correct: a monopolist firm is a certain branch of production. Then, for the monopoly market, there is no division into demand in relation to an individual firm and market (industry) demand, as well as into the supply of an individual firm and market supply. *For a pure monopolist, these concepts will be synonymous*.

2. ***There is no close substitute for the product produced by the monopolist***. Of course, there are practically no goods that cannot be replaced by something else. However, in relation to the product of the monopolist, it would be fair to assume that the consumer has only two possible options of behavior: *either to refuse to consume this product altogether, or to contact the monopolist for its purchase*.

It should be noted that a pure monopolist has no direct competitors on the goods market. But this does not mean at all that he/she does not enter into competitive relations at all. First of all, it is necessary to take into account the fact that the monopolist, in turn, becomes a buyer in the resource market, where he/she faces a different competitive environment. However, this will be discussed in the next section.

3. ***A pure monopolist sets the price for his product himself***. If we called a competitive firm one that agrees to the price, then a monopolist is one who dictates the price. To understand the mechanism of a monopolist's dictation, it is necessary to

remember how the market price is formed in general. The equilibrium price is the result of the interaction of supply and demand. Since the monopolist's demand coincides with the market demand and can be considered as given, he/she can establish an equilibrium price through supply maneuvering: an increase in supply reduces the price and, conversely, a decrease in supply leads to an increase in prices.

4. ***Entry into the industry of other manufacturers is blocked***. Almost every manufacturer wants to become a monopolist and limit competition in the market for its products. Market monopolization can be achieved in several ways:

1. Growth of the firm due to capitalization of profit, bankruptcy of competitors, their absorption until the firm achieves complete dominance in the industry.

2. The pooling of capitals on a voluntary basis and the transformation of such pooling into a dominant producer. Various forms of monopolistic associations are known, in particular:

- *a cartel*, as the achievement of an agreement on the distribution of sales markets, prices and production quotas while maintaining production and commercial independence by each participant;

- *a syndicate*, as the creation of a special joint unit by participants who retain production independence, which carries out supply and sales operations for all members of the association;

- *a trust* in which previously independent enterprises of the same industry are united, losing both commercial and production independence.

However, any monopolist will be able to maintain its monopoly position only if entry into this industry for other producers is reliably blocked. Therefore, blocking entry into the industry, establishing appropriate barriers is a prerequisite for the existence of a pure monopoly. Barriers to entry are relevant not only to the case of pure monopoly, but also to oligopoly or monopolistic competition, and therefore deserve special attention.

These barriers can take different forms:

a) *scale of production*. As a rule, a monopolist firm is a rather large enterprise, and therefore, in order to create a worthy competitor, it is necessary to invest significant funds, which is beyond the power and is not advisable for the absolute majority of potential competitors;

b) *legal barriers*. These are certain legal norms that regulate this or that type of activity. The most common among them are patents (the exclusive right to produce a product or use some technology) and licenses (the right to engage in some type of activity);

c) *ownership of the most important types of resources*. You can maintain your monopoly position on the market by seizing those types of resources that are used to

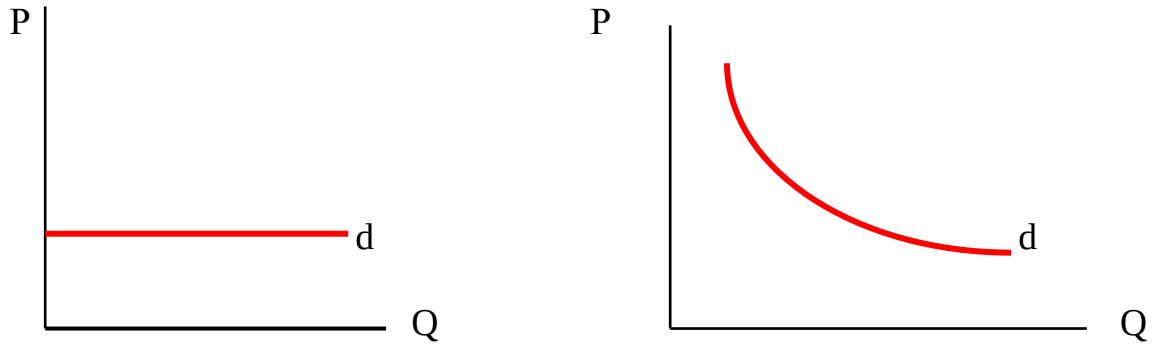
produce the monopolist's products. This works in the case when the limitation of resources is absolute and they have no close substitute;

d) *unfair competition*. Some monopolistic firms use methods of fighting competitors, which not only do not comply with the code of honor of an entrepreneur, but are also prohibited by law in most countries. It can be pressure on suppliers of raw materials, trade unions, banks, seduction of leading personnel, a price war aimed at bankrupting a competitor, etc. However, it is quite difficult to identify a violator of the law and apply the appropriate punishment to him.

The analyzed features of the monopoly market reveal a decisive influence on prices and volumes of production by the monopolist.

8.2. Determination of the price and volume of production by the monopolist

The decisive difference between pure competition and pure monopoly lies in the peculiarity of the demand curve (Fig. 8.1): if for a competitive firm it has a completely elastic character (a straight line), then for a pure monopolist it has a falling character.



a) demand for a competitive firm **b) demand for a pure monopolist**

Fig. 8.1. Differences in demand for a competitive firm and a pure monopolist

The downward-sloping nature of the demand curve significantly affects the development of a model of monopolist behavior in the market when choosing production volumes. First of all, it should be borne in mind that the selling price of an additional unit of production for a monopolist always exceeds the additional income received from its sale (marginal revenue). The fact is that the manufacturer will not be able to sell more products without reducing their price. However, he/she will be forced to simultaneously reduce the price not only for an additional unit of production, but also for the entire sales volume. If in a competitive market the seller's marginal revenue is formed only at the expense of the profit from the increase in the volume of sales,

then for a pure monopolist this profit is reduced by the amount of the loss from the decrease in the price of the previous volume of products sold.

Let the monopolist at the price P_1 = *UAH 150* can sell 40 units of the product. To increase the volume of sales to 50 units, he/she is forced to lower the price to P_2 = *URA 140*. The increase in total revenue *(*ΔQ) will be UAH 1,000, and the marginal revenue will be UAH 100, while the price of an additional unit sold will be UAH 140.

In fig. 8.2, where the described situation is displayed, it can be seen that the loss of revenue from a price decrease is equal to the area of figure *ABCD* (S_1), and additionally received revenue from an increase in sales volume is equal to the area of figure *DKNM* (S_2). Depending on the ratio of these planes, the marginal revenue can be a positive value ($S_2 > S_1$), a negative value ($S_2 < S_1$) or equal to zero ($S_2 = S_1$).

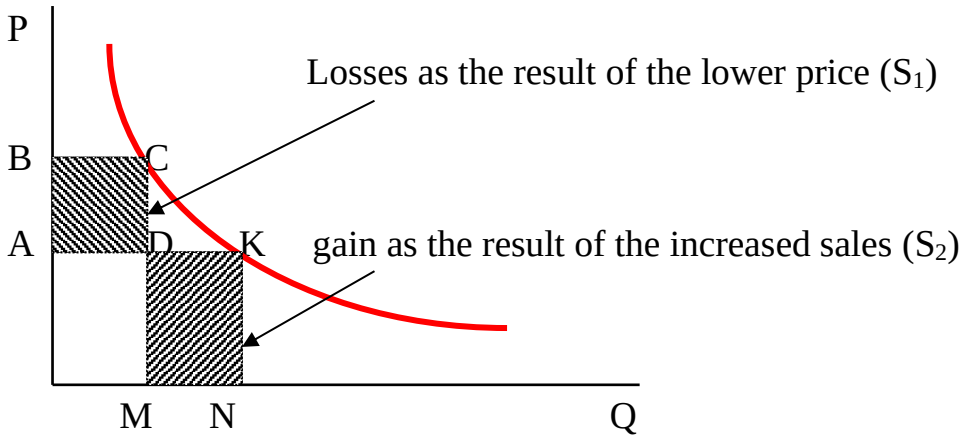


Fig. 8.2. Formation of the marginal product of a pure monopolist

Let's continue to consider the example of a company that produces chairs, which was discussed in the previous capter. Suppose that it does not work in a competitive market, but is a pure monopolist. Then the increase in sales volume will be accompanied by a decrease in price, as shown in table 8.1.

It should be noted that the tota revenue of a monopolist firm does not always increase with an increase in sales volume: the sale of the ninth and tenth units of production is accompanied by a decrease in total revenue. It is not difficult to see that the dynamics of total revenue is closely related to the level of marginal revenue. If the marginal revenue has a positive value, then the total revenue increases with an increase in sales volumes. If marginal revenue takes on a negative value, then total revenue decreases:

$$MR > 0 \quad TR \uparrow;$$
$$MR < 0 \quad TR \downarrow.$$

Table 8.1

The main indicators of the monopolist firm's activity

Q	P	TR	MR	ATC	TC	MC	Profit
0	235	-	-	-	200	-	-200
1	220	220	220	300	300	100	-80
2	205	410	190	198	396	96	+14
3	190	570	160	165	495	99	+75
4	175	700	130	150	600	105	+100
5	160	800	100	143	715	115	+85
6	145	870	70	141	846	131	+24
7	130	910	40	142	972	148	-62
8	115	920	10	145	1160	166	-240
9	100	900	-20	150	1350	190	-450
10	85	850	-50	157	1570	220	-720

Therefore, the gross income acquires its maximum value at the point where the marginal income is zero:

$$MR = 0 \qquad TR - max.$$

Analyzing the elasticity of demand (Chapter 4), we concluded that with elastic demand, a decrease in price will increase the seller's gross revenue. If the demand is inelastic, the gross income of the seller will have the same direction of changes as the price. It will reach its maximum at unit elasticity of demand ($TR_1 - max$). Combining these conclusions with the previous ones, we get the dependencies presented in Fig. 8.3. Their analysis makes it possible to determine the limits within which the manufacturer will choose the "price-product" ratio. If he chooses a price that corresponds to the inelastic part of the demand curve (P_2), it is easy to see that the gross income he/she receives (TR_2) can also bring the sale of much smaller volumes of products ($Q_3<Q_2$). Therefore, it is clear that a producer trying to maximize profit will always try to avoid the inelastic part of the demand curve in favor of a certain price-product combination on the elastic part.

What specific combination of price and quantity of the product sold will the monopolist choose? It depends not only on demand, but also on its production costs. Let's turn to the analysis of the monopolist's costs shown in Table 8.1. As explained in the previous chapter, the producer will produce each additional unit of the product until the revenue from its sale exceeds the additional costs of producing it. Thus, to increase

production from two to three units of production, the manufacturer spent an additional UAH 99, and received an additional income of 160 UAH from the increase in sales volume. If we consider the transition from five to six units of production, then the marginal revenue and marginal costs will be UAH 131 and UAH 70, respectively, which confirms the impracticality of such a transition. Thus, the monopolist will be able to maximize its profit at such a ratio of price and volume of sales that equalizes marginal revenue and marginal costs. For the example given in the table, it will be UAH 175 and 4 units of production.

A similar conclusion can be reached by analyzing the ratio of total revenue and total costs. The manufacturer receives the maximum profit as an excess of total revenue over total costs (100 UAH) when producing four units of products.

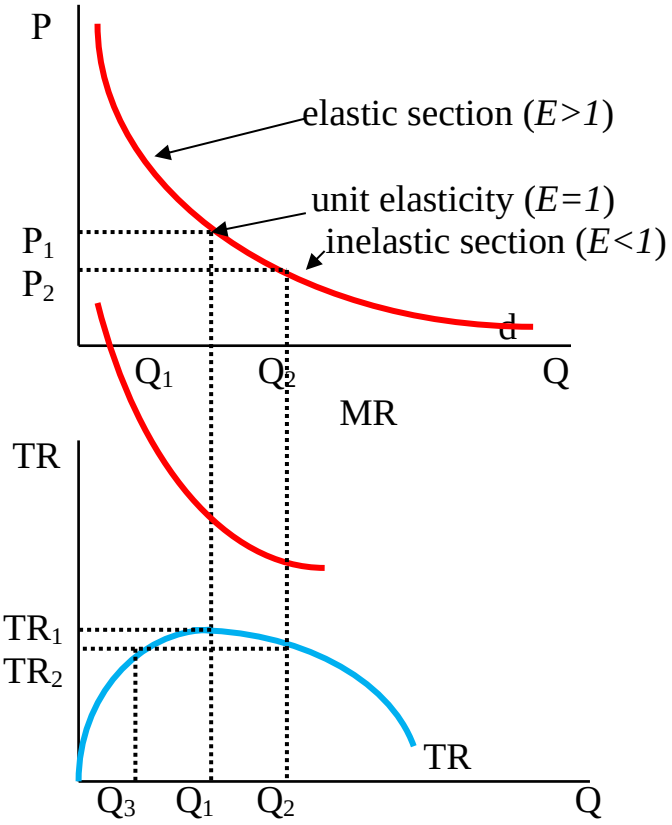


Fig. 8.3. The monopolist's choice of a section of the demand curve

In fig. 8.4 gives a geometric interpretation of the model of the monopolist's choice of price and sales volume ratio, which maximizes his/her profit. In the long run for a competitive firm, equilibrium is established when price reaches minimum average cost. Otherwise, the dish looks like a monopolist. Since the monopolist's marginal revenue curve does not coincide with the price curve (demand curve), the point of profit maximization will always be to the left of the point of intersection of the demand and

marginal revenue curves. That is, the monopolist maximizes profit with production volumes smaller than it could be in a competitive market ($Q_1 < Q_2$). At the same time, he/she sells products at prices (P_1) that exceed the average costs for the proposed sales volume (ATC_1), and receives an economic profit. In Fig. 8.4, the size of the monopolist's economic profit will correspond to the area of the shaded figure.

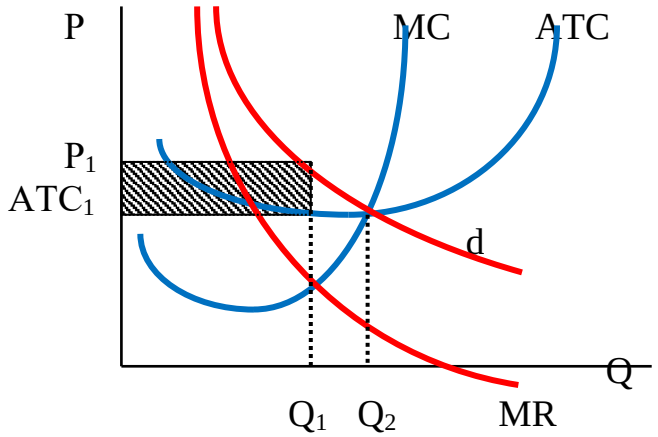


Fig. 8.4. Maximization of economic profit by a monopolist

Since entry into the industry dominated by a monopolist is blocked, there is no threat to it from competitors who, by increasing supply and accordingly shifting its curve to the right, would lower the equilibrium price and eliminate economic profit. Unlike a competitive firm, *a monopolist can earn economic profit both in the short run and in the long run*.

Sometimes, at the everyday level of understanding economic problems, a false impression is formed about the price policy of a monopolist. The most ***common errors*** are:

1. *The monopolist tries to set the highest price*. This mistake is based on not realizing the fact that an increase in price for a monopolist translates into a decrease in sales. In fact, the monopolist does not set himself the goal of maximizing the price, but seeks such a price level that would provide him with maximum profit.

2. *The greater the difference between the selling price of products and the average cost of producing a unit of production, the greater the profit the monopolist receives.* This statement is true only in relation to the yield per unit of production. A monopolist **aims to maximize total profit**. Its maximization does not always coincide with the maximization of the profit from a unit of production. Compare that it is more expedient for a monopolist to sell at UAH 10 40 units of products at production costs of a unit of production of UAH 5, or UAH 9 each 100 units of products at a cost of

UAH 6. per unit? In the first case, the monopolist will receive 100% profit from each unit of production, and in the second - only 50%. However, the total profit of the monopolist in the second case will be UAH 300 against UAH 200 in the first case.

Therefore, for a monopolist, the option that maximizes its total profit, will be more attractive, although it may not achieve the maximum profit per unit of production.

3. *A monopoly position on the market always guarantees a break-even operation*. For a monopolist, there will be a break-even option when the demand curve crosses the average cost curve. This happens most often, since, as a rule, the demand curve for the monopolist's products has a fairly elastic section with a large angle of inclination. However, it is not difficult to imagine a situation when the demand curve passes below the average cost curve without having any points in common with it (Fig. 8.5).

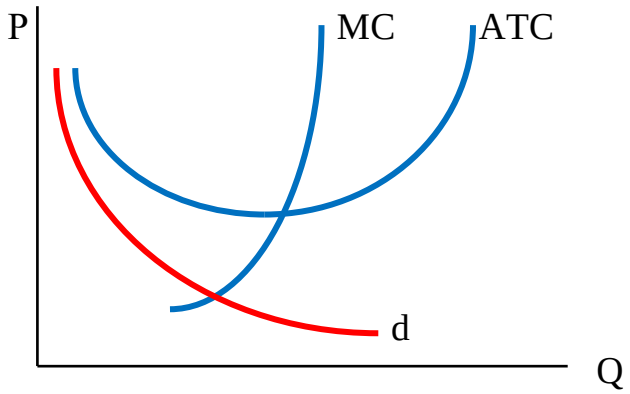


Fig. 8.5. Variant of unprofitability of a pure monopolist

Such a situation occurs when a monopolist continues to produce products for which demand has fallen sharply. Even if an enterprise were today an absolute monopoly on the production of calculators or clamps, this would not provide it with guarantees of unprofitable work.

8.3. Economic consequences of monopoly

The logical conclusion of the study of the monopoly market should be an assessment of the influence of monopoly on economic processes in general. The most significant among the economic consequences of a pure monopoly are the following:

1. *A monopolist considers it more expedient to sell a smaller volume of products and set higher prices than a competitive manufacturer would do* (Fig. 8.4). Therefore, on the one hand, society overspends a certain amount of resources, since the equilibrium volume of production does not coincide with the minimum level of average

costs. A reallocation of resources in favor of a non-monopolized industry would reduce average costs, which would indicate an increase in the efficiency of resource allocation. On the other hand, consumers are forced to pay a sort of monopoly tax, as product prices are set higher than average production costs. This "tax" constitutes the ***monopolist's economic profit***. Since the entry into the industry of new producers is blocked, the mechanism of liquidation of economic profit in the long run, characteristic of a competitive market, does not work here.

2. *The average costs of a monopolist, as a rule, do not coincide with the average costs of a competitive firm*. Until now, there was no discussion about the possibility of such a mismatch. In fact, the average costs of a monopolist (*ATCm*) can be both lower and higher than those of a competing firm (*ATCk*).

Since a monopolist is, as a rule, a large enterprise, the size of average costs may be affected by the effect of scale (Fig. 8.6). Sometimes lower average costs, even taking into account the economic profit that the monopolist puts into the price, can be transformed into lower market prices for the monopolist's products compared to a competing firm. However, such a situation is quite rare.

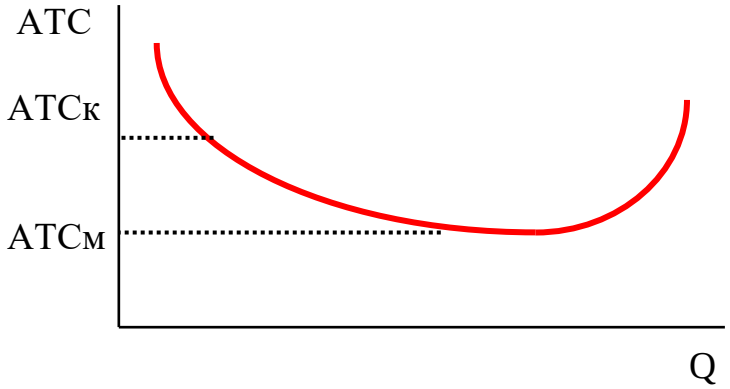


Fig. 8.6. The influence of the effect of scale on the average costs of a monopolist and a competitive firm

All the average cost curves we used earlier are based on the assumption that the producer is using the resources involved with maximum efficiency. However, in relation to a pure monopolist, this assumption quite often becomes unfounded. The fact is that the monopolist's actual costs of the firm for any volume of production are, as a rule, greater than the minimum possible. This phenomenon was called "**X-inefficiency".** It is explained by the following reasons:

a) *the goals of the monopolist's managers do not coincide with the goal of cost minimization*. They can realize the task of growth of the firm, regardless of costs; avoid excessive risk by accepting higher costs; hire incompetent friends and relatives, reducing the overall efficiency of management, etc.;

b) *the monopolist, not feeling the "breath on the back" of the competitor, becomes sluggish, does not focus on the search for technologies that minimize costs*;

c) *the monopoly is forced to bear additional costs to maintain its monopoly position.* These can be both official (legal) payments for the purchase of patents and licenses, and unofficial (illegal) expenses for bribing officials, pressure on resource suppliers, etc.

3. *Monopoly has a contradictory effect on scientific and technological progress*. On the one hand, the scale of the monopoly allows it to allocate significant funds for conducting scientific research and developing new technologies. This, as a rule, is beyond the power of small manufacturers in a competitive market. Most modern discoveries are indeed made with the participation of monopolies. However, on the other hand, a pure monopolist has no automatic incentives for scientific and technological progress. Therefore, he/she can afford to be ineffective.

4. *A pure monopolist has the ability to conduct price discrimination*. It occurs when a certain product is sold at more than one price and these differences are not related to differences in costs. A monopolistic seller can use price discrimination provided that it is able to distinguish different groups of buyers and if the original buyer cannot resell the product or service. There are many examples of such discrimination, especially when it comes to natural monopoly. Thus, electricity supply to the population and enterprises in Ukraine is carried out according to different tariffs, lower tariffs for passenger transportation are covered by Ukrzaliznytsia at the expense of increased tariffs for cargo transportation, etc.

Thus, monopoly has contradictory economic consequences. However, one thing is indisputable: from undermines competition as the basis of market self-regulation. Therefore, one of the functions of the state in modern conditions is considered to be the restriction of monopoly, support of a competitive environment.

The main terms and concepts

Pure monopoly
Barriers to entry into the industry
Patents
Licenses
Unfair competition
Objectives of monopolistic pricing
X-inefficiency
Costs of maintaining a monopoly
Price discrimination

Chapter 9.
MARKET OF MONOPOLISTIC COMPETITION

Monopolistic competition is almost the most common model of the modern market. This especially applies to consumer goods. Therefore, each of us, as a buyer, most often meets a manufacturer or seller who is oriented in his/her behavior towards monopolistic competition. Learning the model of this behavior is the main goal of the chapter. Its achievement will make it possible not only to acquire certain professional knowledge, but also to better understand one's counterparty in the market in everyday life.

9.1. Main features of a monopolistic competition market

Monopolistic competition should not be confused with a monopoly market. Although these terms are quite similar, they reflect completely different situations on the market. We considered the features of the monopoly market in the previous chapter. Let us now pay attention to the characteristics features of monopolistic competition.

1. ***There are quite a large number of sellers on the market***. What does the phrase "quite large" mean? For monopolistic competition to exist, the number of sellers must meet the following criteria:

- it should not be too large, so that demand does not turn into absolutely elastic, which is typical for pure competition;
- it should not be too small, so that each firm owns a relatively small share of the market and has limited control over the price (but still small);
- it must be significant enough to exclude the possibility of secret agreements, concerted actions of individual firms with the aim of limiting production volumes and artificially raising prices;
- it should be sufficient so that firms in the industry do not feel mutual dependence among themselves, each of them determines its policy without looking back at the possible reaction of competitors.

Therefore, if for pure competition in the market it is necessary to have hundreds or even thousands of firms, then for monopolistic competition 30, 50 or 70 firms are enough.

2. The products offered on the market, although they belong to the same product group, are sufficiently differentiated. This differentiation can be based on both real and pretend differences (Fig. 9.1).

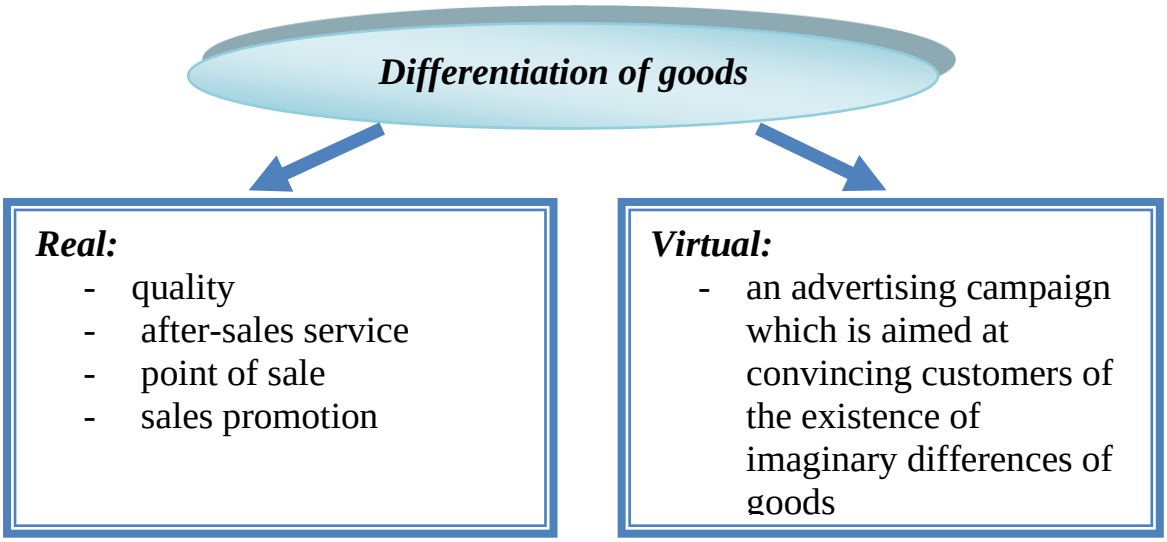


Fig. 9.1. Differentiation of goods

Real differences are achieved due to:

a) *product quality*. Products may differ in certain functional features, materials from which they are made, design, quality of work, etc. The commodity markets of Ukraine are full of goods with the same trademark, but manufactured in different countries: Poland or Italy, Japan or Malaysia, Korea or Bulgaria. At the same time, their quality can have quite significant differences;

b) *deepening of after-sales service*. Firms try to distinguish their product from other similar ones by extending the warranty service period, delivering the product to the buyer free of charge, assembling and installing furniture in the buyer's apartment, etc.;

c) *places of sale of goods*. This especially applies to goods, the need for which arises in a certain place and which is best met there. For example, a cafe located in a crowded place on the bank of the Dnieper-river with a wonderful view, or a gas station on a highway with active traffic will be more attractive to customers, other things being equal;

d) *sales promotion*. In order to distinguish its product from others, the company can stimulate sales by setting prizes for buyers. For example, when purchasing 0.5 kg of candy, the Trostyanets confectionery factory "Korona" gives each customer a special package with its logo, and the "Pivden" gas station gives the driver a free bottle of mineral water when purchasing 30 liters of gasoline.

At the same time, product differentiation is sometimes based on a virtual differences. Most often, the company's active advertising policy is directed at them ("Our toothpaste is the only reliable protection against caries" or "Our washing powder

cleans everything except your pockets"). The same applies to the use of well-known trademarks.

3. ***Limited ability to influence prices***. It would be a mistake to believe that in case of monopolistic competition, the firm cannot influence the price of the product it sells. A good location, bright packaging, and an effective advertising campaign give the company certain advantages over others, which makes it possible to sell its products at a slightly higher price. But this possibility is limited by the fact that there are many close substitute goods in the market of monopolistic competition, and therefore the buyer has the opportunity to purchase the goods from another seller if his/her price turns out to be more attractive.

4. ***Easy entry into the industry***. Since there are quite a large number of competing firms on the market, it is practically impossible to create any barriers for new manufacturers to enter the industry. However, there is an exception to this general rule. For example, the number of places most convenient for installing kiosks is limited, and therefore barriers appear for additional competitors. This is especially important for understanding the model of firm behavior in a market with monopolistic competition in the long term.

The market of monopolistic competition occupies some intermediate place between the monopoly market and the market of pure competition. Therefore, the mechanism for determining the price and production volume in monopolistic competition is an interweaving of the models considered in the two previous chapters.

9.2. Determination of price and production volumes under monopolistic competition

Let's assume that some firm, oriented towards monopolistic competition, produces and supplies to the market a certain type of product that differs from other goods of this group. What form will a demand curve (sales curve) have for this product?

On the one hand, we can say with confidence that if the demand curve is absolutely elastic, then only within certain limits, since the fate of the firm is not so small that its increase in sales volumes does not affect prices at all. Most often, it has sloping character because: a) a firm in conditions of monopolistic competition has fewer competitors than in a competitive market; b) products of these competitors are close but not perfect substitutes.

On the other hand, the demand curve will have greater elasticity than in a monopoly market. Here there is an opportunity due to the positive differentiation of the

product to achieve a substitution effect, when the demand from other products of this group switches to the product of this company.

In general, we can say that the elasticity of the demand curve will depend on the number of competitors the firm faces and the degree of product differentiation in the industry. The larger group of competitors and the weaker product differentiation, the more elastic the demand curve will be for each of them. In this case, monopolistic competition will approach perfect. If the number of competitors is limited, and the depth of product differentiation is significant, the demand curve will have a less elastic form, which will bring the firm's position in the monopoly market closer to a pure monopoly.

Taking into account the introductory remarks, we will now consider the mechanism for choosing production volumes and prices in the short run and long run.

Since the demand curve, characterizing the possible "price-product" relationships for the market of monopolistic competition, will have a decreasing character (albeit with an insignificant angle of inclination), then, like the monopoly market, the marginal revenue curve will always be below it. Applying a general rule, we can say that *a firm in a monopolistic competitive market in the short run will maximize its profits or minimize its losses by producing such a volume of output that corresponds to the coordinates of the point of intersection of the marginal cost and marginal revenue curves*.

Since the firm produces a product that has no absolute substitute, a decrease in its supply in the market will lead to some increase in prices. Due to this, in the short run, a firm in a monopolistic market can receive an economic profit, the size of which corresponds to the area of the shaded figure in Fig. 9.2.

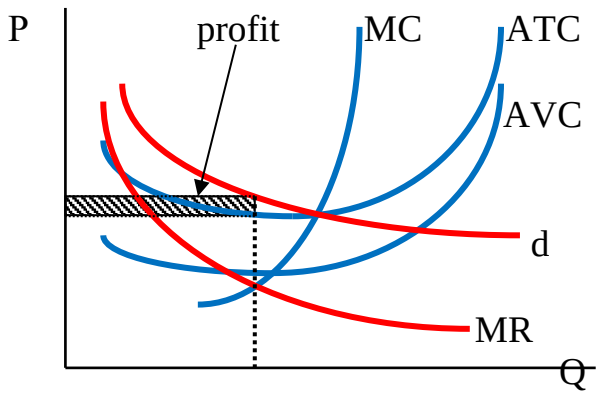


Fig. 9.2. Maximizing the company's profit in the market of monopolistic competition

However, the company is not insured against losses. The condition for obtaining economic profit is the nature of demand for the firm's product, in which the demand curve crosses the average cost curve. If it is located below the curve of average costs,

but crosses the curve of average variable costs, the firm will solve the problem of minimizing losses (Fig. 9.3).

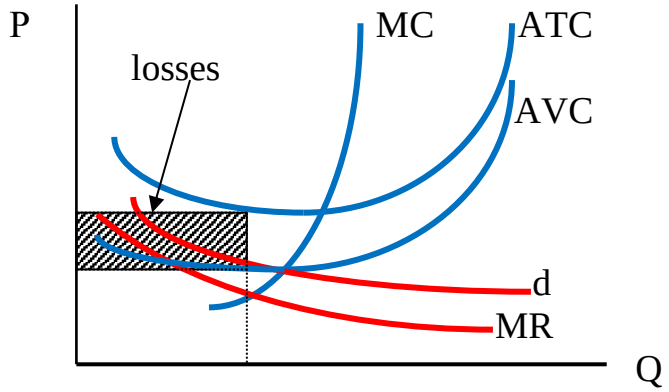


Fig. 9.3. Minimization of the company's losses in the market of monopolistic competition

If the demand curve passes below the curve of average variable costs, the firm will be forced to make a decision to stop production, because at any volume the losses will exceed fixed costs.

Thus, in the short run, a firm under monopolistic competition can make an economic profit, suffer losses, or face the problem of closure. What will happen in the long run?

It is impossible to answer this question unequivocally. We can only talk about the general trend. It can be considered as striving for the company to obtain a normal profit, break-even, i.e. setting the price at the level of average costs.

The economic profit earned by a typical firm under conditions of monopolistic competition attracts new firms to enter the industry. The number of competitors is increasing and the number of products that can effectively replace the product of a typical firm is increasing. This leads to the fact that the demand curve becomes more elastic, bringing the conditions of monopolistic competition closer to the conditions of a competitive market. The distance between the demand and average cost curves decreases, eliminating economic profit.

Conversely, if a typical firm suffers losses, there is an outflow from the industry of producers, the number of competitors decreases, product differentiation deepens, and the demand curve becomes steeper (less elastic). As a result, it can cross the average cost curve, thus eliminating the firm's losses.

Equilibrium will be established when the demand and average cost curves will have only one common point - the point of contact, i.e. when the price will be set at the

level of average costs for a certain volume of production, and the firm will not receive economic profit and will not incur losses (Fig. 9.4):

$$P = ATC; \quad MC = MR.$$

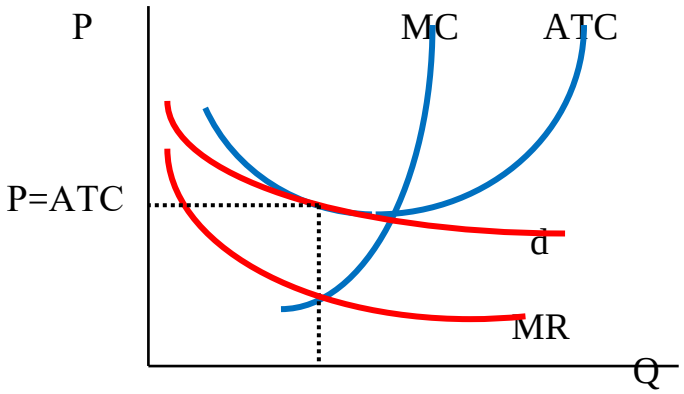


Fig. 9.4. Equilibrium of the firm in the long-term period

At the same time, it is necessary to realize that for the market of monopolistic competition, setting the price at the level of average costs is only a tendency. There are factors that make it difficult to predict the results of monopolistic competition in the long run. The following circumstances can be attributed to them:

1. *There are certain barriers to entry into the industry with monopolistic competition*. Thus, to carry out commercial and commission operations on the stock market of Ukraine, it is necessary to obtain permission from the National Securities and Stock Market Commission (license). This procedure takes a lot of time and is not cheap for the company. Therefore, if a securities trader managed to provide his services with properties that attract customers, he/she can be protected from the appearance of new competitors for a long time and receive economic profit.

2. *Differentiation of a product or service may be based on such circumstances, which are important, or may even be impossible, to reproduce by competitors*. For example, an advertising firm managed to attract a talented artist to the cooperation, which had a positive effect on its products and allowed its product to stand out among the products of similar companies. The deepening of product differentiation, which occurred in this case, cannot be eliminated by new competitors, and therefore the firm will receive economic profit for a long run.

A lot of similar examples can be given, which gives grounds to assess the achievement of price parity with average costs in the market of monopolistic competition only as a fairly probable result in the long run.

9.3. Monopolistic competition and efficiency

During the analysis of the competitive market, we found out that the highest efficiency of resource use and production efficiency are ensured when the equilibrium of the producer is reached with the equality of price, marginal costs and minimum average costs:

$$P = MC = ATC\ min.$$

In other words, efficiency guarantees that consumers receive the largest volume of products at the lowest prices, which are generally possible with the existing technology and production costs. Let's try to evaluate the effectiveness of monopolistic competition using this criterion.

As can be seen from the analysis carried out during the presentation of the previous question in this chapter, with monopolistic competition, the producer's equilibrium can never be achieved when the price is equal to the marginal costs. After all, equilibrium occurs at the point of intersection of the marginal cost curve with the marginal revenue curve, i.e. when $MC = MR$. Since the price is always greater than marginal revenue, it will also be greater than marginal cost at the equilibrium point. For the firm's equilibrium under conditions of monopolistic competition, the following inequality holds true:

$$P > MC.$$

This means that the element of monopoly, which is inherent in monopolistic competition, always causes some underutilization of resources for the production of goods. If the price of a good exceeds the marginal cost of obtaining it, this indicates that society values additional units of this good more than alternative goods that could be produced at the same costs. Therefore, it can be assumed that monopolistic competition does not ensure optimal distribution and use of resources. On the contrary, observations give a lot of examples of underutilization of production capacities by firms focused on monopolistic competition. For example, many ordinary citizens are surprised when a new one opens near one gas station, even though the first one is not overloaded with customers. Just exceeding the price above the marginal cost allows both producers to earn an economic profit under the condition of capacity underutilization.

Monopolistic competition is not able to ensure the highest production efficiency, i.e. price equality at minimum average costs. After all, the intersection of the marginal and average cost curves occurs at the point of the minimum of the latter. In order to achieve maximum production efficiency, it is necessary that the demand and marginal revenue curves pass through this same point at the same time. Since they do not coincide, achieving the highest efficiency for monopolistic competition is fundamentally impossible. On the contrary, both in the short run and long run, the price is higher than the minimum average costs:

$$P > ATC\ min.$$

Therefore, consumers are always forced to pay a higher price per unit of production in the market of monopolistic competition than it could be in a competitive market.

Thus, underutilized capacities of enterprises and inflated prices are society's price for monopolistic competition. However, even this rather critical remark does not provide sufficient grounds for an unambiguously negative assessment of monopolistic competition. The fact is that the focus on monopolistic competition constantly aims the company to find options for distinguishing its product among similar products in the industry, taking into account the diversity of consumer needs. Therefore, the analysis of the market of monopolistic competition will not be complete without consideration of non-price competition, which prompts the firm to search for new options for meeting the needs of consumers.

9.4. Non-price competition

Until now, we have followed the assumption that a firm supplies a certain product to the market without changing anything in it. However, in reality, having received an economic profit, the firm does not wait for competitors to make a similar product and liquidate its excess profit. In order to increase the demand for its product, the company is constantly looking for ways to improve it. This pushes it to non-price competition. It should be noted that non-price competition is the most widespread form for the analyzed market model.

In a generalized form, the methods of non-price competition can be divided into two groups: a) related to product improvement; b) focused on advertising and promotion activities.

Improvement of the product can be carried out without fundamentally changing its consumer qualities. This applies to product packaging, its design, sales methods,

etc. However, in the long run, companies focus on the development of new models of goods, which would embody new achievements of science and technology. Therefore, unlike a pure monopoly, monopolistic competition creates a direct interest of firms in the implementation of scientific and technical innovations. Many companies plan the moral aging of products, even provoke it to create more favorable conditions for the introduction of new products.

Achieving temporary advantages over competitors is possible not only on the basis of real differences of your product, but also due to active advertising. ***The purpose of advertising*** is to increase market share and strengthen consumer loyalty to the company's products. In relation to the graphical representation of the firm's position in the market, the success of advertising will mean a shift of the demand curve to the right and a decrease in its elasticity.

Fig. 9.5 shows a general diagram of the advertising process. It includes the development of the advertising message, the selection of the medium through which the advertising message will be sent to potential buyers, the actual advertising and the evaluation of the effectiveness of the advertising activity.

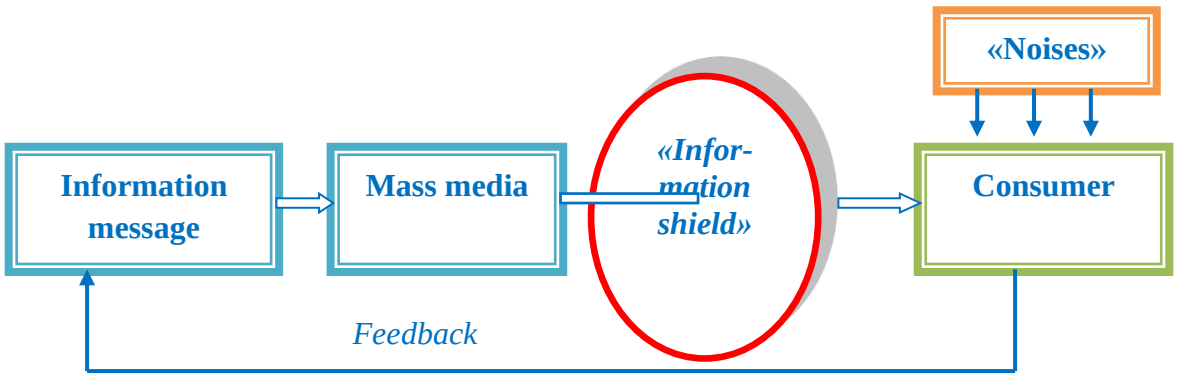


Fig. 9.5. General diagram of the advertising process

Firms pay quite a lot of attention to the development of an advertising message. A successful leading advertising idea, the form of presentation of the material, its volume - all this determines the final effectiveness of the entire advertising process.

The choice of media for linking an advertising message depends on its content, potential consumers, type of advertising (informative, persuasive or reminder), etc.

Choosing the time and place of your own advertising should take into account several circumstances. First of all, every potential consumer, tired of the advertising surrounding him/her everywhere, tries to protect himself from it with a so-called "information shield". And only that advertising can count on success, which can break through this shield: whether it is an unusual form, or content, or place of delivery.

Second, advertising information never exists on its own. The consumer is always surrounded by a whole field of information. The information that goes in parallel with the advertising is called noise in the diagram. These noises can be so strong that they will completely drown out advertising information. Football matches are quite an attractive time for television advertising. However, if the football players of one of the teams conducted a successful attack and scored a goal, then it is safe to say that the advertising message, which will be broadcast by the director, will not be noticed by anyone.

In economic science, the role of advertising is considered contradictory. There are quite strong arguments in favor of advertising. Among them, the following should be highlighted:

1. Advertising provides information that helps consumers make informed choices. After all, completeness of information has always been considered one of the most important prerequisites for an informed choice.

2. Funds for placing advertisements are perhaps the most important source of income for mass media. Neither television, nor radio, nor newspapers could exist if they did not provide paid advertising services. This external effect for viewers and readers from a social point of view justifies certain inconveniences associated with the oversaturation of mass media advertising.

3. Advertising stimulates product improvement by the advertiser. An advertising campaign will be doomed to failure if the product does not have at least some of the properties that are discussed in the advertising message.

4. Advertising stimulates a high level of consumer spending, which creates positive conditions for economic growth, increased employment and, ultimately, an increase in the general well-being of the nation. A famous saying goes: "If advertising does its job effectively, many people keep theirs."

At the same time, it is advisable to listen to the arguments against advertising:

1. The main purpose of advertising is to persuade, not to inform. Remember at least the content of the main advertising messages that you see on television every day. Most of them are built on contrasting the company's product with another product and aim to convince that buying the company's product is the only correct decision.

2. Advertising expenditure is relatively unproductive, adding little or nothing to the prosperity of society. Although the advertising activity itself creates additional jobs (advertising agencies, media, etc.), however, with alternative use of advertising funds, they could bring a greater social effect.

3. Advertising sometimes causes negative external effects, such as increased consumption of tobacco products, alcohol, etc.

4. The effectiveness of advertising is low, since most of it tends to self-neutralize. For example, an active advertising campaign of "Sanino" and "Colgate" toothpastes leads to the fact that the consumer does not know what choice to make, and therefore is guided by other criteria when determining the purchase.

Try to find additional arguments for and against advertising and discuss them with your friends.

Thus, a firm trying to maximize profits in monopolistic competition achieves this by manipulating the price-product ratio, improving the product itself, and conducting an advertising campaign.

The main terms and concepts

Monopolistic competition
Product differentiation
Real and virtual product differences
Equilibrium conditions in the long run
Underutilization of resources
Non-price competition
Advertising
Arguments "for" advertising
Arguments "against" advertising

Chapter 9.
OLIGOPOLISTIC MARKET

The most difficult to predict is the behavior of the producer in the oligopolistic market. The introduction of new variables into the model, primarily the reactions of competitors to certain actions of the manufacturer and their corresponding correction, increase the probability of irrationality in the actions of economic subjects. Therefore, the conclusions that will be obtained during the analysis of the oligopolistic market require additional restrictions for practical use.

10.1. Signs of an oligopolistic market

Using general criteria for classifying market models depending on the dominant type of competition, we will characterize the main features of an oligopolistic market.

1. ***Oligopoly, literally translated from the Greek language, means "the rule of a few", so the main feature of an oligopolistic market is the dominance of a few firms.*** They can be from three to twenty, since oligopoly occupies the entire interval between pure monopoly and monopolistic competition.

An oligopolistic market is formed under the condition of achieving a high degree of concentration of production.

To measure it, a whole system of indicators is used, among which are the following:

— the share of several largest manufacturers (as a rule, four or eight) in the total volume of industry sales. In order to maintain a competitive environment in many countries, the limit of industry concentration of production is established. So, in the United States of America, it is believed that for the normal development of the industry, there should be at least 10 competing firms. At the same time, the largest of them should not account for more than 31% of all industry sales, two companies - no more than 44, three - no more than 54, four - no more than 64%;

— the Herfindahl-Hirschman index (*IXX*), whose calculation is also based on the share of individual manufacturers in the sectoral sales market. It is calculated according to the formula:

$$IXX = \Sigma d^2,$$

where d — the share of each individual firm in the branch market of sales, %.

This index reaches its maximum value when the industry is represented by one pure monopoly (100^2 = 10,000). Therefore, the smaller the Herfindahl-Hirschman index, the more competitive the market can be considered. The value of the index from 1200 to 5000 is most typical for an oligopolistic market.

However, the use of these indicators does not always reflect the degree of competition in reality, since all indicators are usually calculated for the national market. In reality, each market has its own limited geographic scope. Moreover, some goods do not form a single national market at all, but are always formed only in certain territories. For example, it can be a market for bricks or cement mortar, household services or certain food products.

A significant drawback of the calculation of production concentration indicators is also the uncertainty of the concept of "industry". Is the enterprise that is the only one in the Dnipropetrovsk region producing clay-sand wall blocks (the so-called double brick) a pure regional monopolist? What should be included in the denominator to calculate its market share: only similar bricks, bricks in general, wall materials, including cinder blocks and concrete blocks? It is easy to see that depending on the answer to the question, the results of the calculations will differ significantly. Unfortunately, economic science has not yet given a satisfactory justification for how to correctly determine the denominator.

An external factor — foreign manufacturers — is quite significant in the formation of a competitive environment for open economies. Therefore, when determining the market model that has developed in one or another industry, it is necessary to take into account the availability of manufacturers of similar products from other countries.

2. ***The product produced by an oligopoly can be both standard and differentiated***. Typical oligopolistic markets are steel and automobile markets. If in the first case a standard product is produced, then in the second it is quite differentiated. However, the type of product (standard or differentiated) does not significantly affect the functioning of the oligopolistic market, so we will not pay attention to it in the future.

3. ***Since the share of any manufacturer in the general market of the corresponding product is quite significant, each of them can conduct an independent price policy***. Either a price reduction by an individual manufacturer and an increase in sales volumes, or an increase in prices due to a supply limitation in a certain way affect the overall dynamics of prices in the industry. However, it should be taken into account that the results of this influence will largely depend on the reaction of other producers to the actions of one market participant.

4. Entry into the industry of new manufacturers is somewhat limited. It is not as blocked as it is for a pure monopoly market, but the barriers to entry that we discussed in Topic 8 can also be applied to characterize an oligopolistic market.

The oligopolistic market model is almost as common as the monopolistically competitive market. This is caused, in particular, by the following circumstances:

— with a relatively small number of producers in most industries, it is possible to achieve the effect of scale. In this case, the transition to large firms will necessarily be accompanied by the absorption of competitors and the transition to an oligopoly;

— in the economy, there is an objective desire of firms to merge, since the merger of several firms can significantly increase their share and enable the new structure to achieve higher results, including due to the effect of scale. A merger can give greater economic power, greater opportunities for price control, as well as a gain in resource purchase prices as a result of becoming a significant buyer.

Concluding the general characteristics of oligopolistic competition, one should pay attention to the fundamental difference of this market model from others, namely: a small number of producers gives everyone the opportunity to conduct their own price policy, but mutual dependence reaches such a significance that no firm dares to take any actions, without trying to calculate the likely corresponding reaction of your competitors.

10.2. Pricing and output in the oligopolistic market

In the previous three chapters, we considered models of price and output choices under conditions of pure competition, pure monopoly, and monopolistic competition. With their help, it is possible to predict the corresponding behavior of the manufacturer with considerable probability. This cannot be said about the oligopolistic market. An accurate forecast on such a market is impossible, primarily due to the many variants of oligopoly. There can be 2-5 dominant firms (hard oligopoly) or 10-20 (soft oligopoly) in the industry. Mechanisms of interaction of firms under such conditions will be different. In addition, general interdependence makes it difficult to predict the appropriate response of a competitor and makes it impossible to calculate demand and marginal revenue for an oligopolist.

However, this does not mean that the oligopolistic market cannot be studied at all. Its analysis, carried out in microeconomics, makes it possible to distinguish at least two general patterns:

1. Oligopolistic prices tend to be inflexible, or "rigid."

2. If oligopolistic prices do change, it is most likely that all firms do so at the same time. Oligopolistic pricing behavior implies the presence of incentives for collusion or collusion in price setting.

The discovery of these regularities is the result of research into the price policy of the oligopolist. There can be four options for the behavior of an oligopolist in the field of pricing: a broken demand curve; pricing determined by collusion; leadership in prices; pricing according to the "cost plus" principle (Fig. 10.1). Let's consider each of them in more detail.

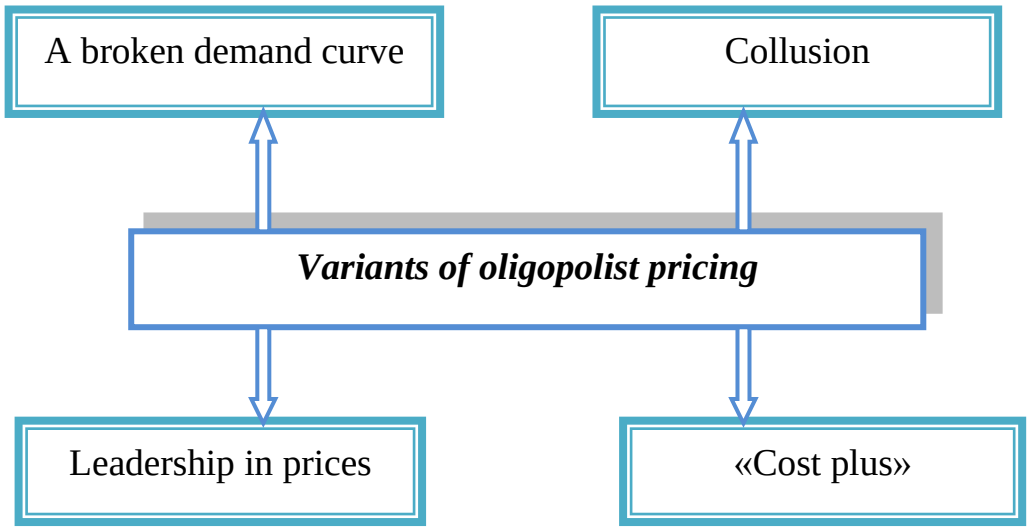


Fig. 10.1. Variants of behavior of an oligopolist in the field of pricing

Suppose that the industry is represented by three equal firms (*A*, *B*, and *C)*, each of which has the same market share, and they do not agree on their prices through direct or secret collusion. What will happen in the market and how will the position of the demand curve for firm *A* change if it decides to change prices? Everything will depend on the reaction of competitors. They can either follow the example of firm *A*, i.e. equalize prices, or ignore it.

If firm *A* lowers the price from P_1 to P_2, trying to sell more of its products, and competing firms repeat this maneuver, then the real increase in sales may be quite insignificant (mainly at the expense of other industries, since the product of this industry has become relatively cheaper). Therefore, it can be ignored. The fact is that the corresponding actions of competitors will shift the demand curve for the firm's product down, leaving the previous volume of sales at lower prices (Fig. 10.2).

If one of the oligopolists raises prices, and his example is followed by others, then this will mean the actual transformation of the industry into a purely monopolistic one and will lead to a decrease in both the total volume of sales and a corresponding

decrease in sales by each firm. Therefore, with unidirectional actions of oligopolists of the entire industry, the demand curve for each of them will have the same form as the industry demand curve, i.e. it will be quite inelastic.

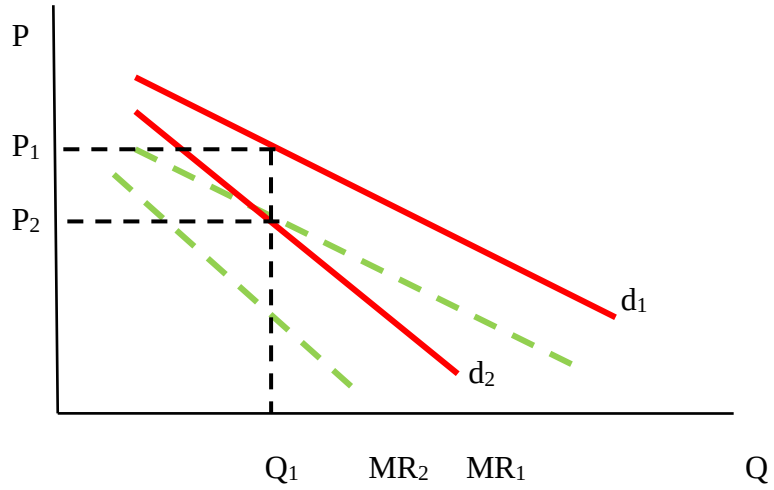


Fig. 10.2. Price equalization by oligopolists when it is reduced

However, competing firms may not repeat what one firm does. Then, by lowering the prices of the industry's products, the initiator will be able to increase sales volumes at the expense of competitors, and when prices are raised, on the contrary, competitors will increase their sales volumes at his expense. At the same time, the demand curve for the firm's product will be quite elastic, which will bring the oligopolistic market closer to the market of monopolistic competition.

Which of these two variants of competitors' behavior is the most likely?

If the initiator firm in the oligopolistic market decides to lower prices, expecting to increase the volume of its own sales, then the competitors will do the same, because in the opposite case, they will get rid of part of the conquered market. On the contrary, if the firm tries to raise its prices, then the competitors, ignoring such behavior, will try to take over part of the market in order to free themselves from the first firm. Thus, price reductions will be leveled out, as competitors will follow the initiator's example. A similar price increase will not occur, as competitors will try to expand their market share. Therefore, the demand curve for an oligopolist will have the form of a broken curve (Fig. 10.3).

The demand curve will be highly elastic in the area above the market price R_e, and weakly elastic (when the product is differentiated) or inelastic at all (if oligopolists sell standard products) in the area below the market price. Due to such a significant difference in the elasticity of demand, the marginal revenue curve will have a gap.

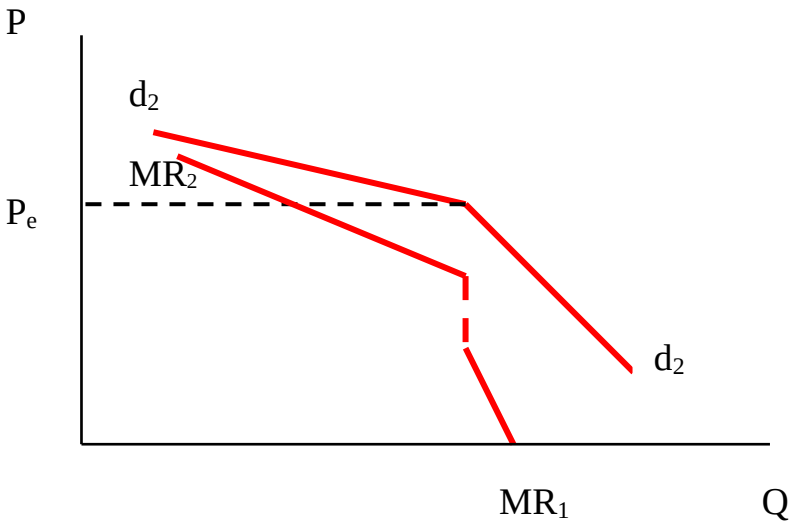


Fig. 10.3. A broken demand curve for an oligopolist

Taking these circumstances into account explains why in an oligopolistic market prices have a tendency to become rigid, because neither lowering the price nor increasing it gives the initiator a profit. In addition, a broken marginal revenue curve means that, within certain limits, significant changes in marginal costs will not affect output and price. As shown in fig. 10.4, the intersection points of the MC_1 and MC_2 curves with the marginal cost curve will correspond to the same production volume and price.

However, based only on the broken demand curve, it is impossible to explain why the market price is set exactly at *Re*. In addition, the conclusion that oligopolists are not interested in price changes does not always coincide with reality: the prices of the oligopolistic market have a steady upward trend. Therefore, the study of the model of the producer's behavior in the oligopolistic market should be complemented by the analysis of the possibilities of collusion by several sellers. This collusion must be secret, since concerted actions by manufacturers in the sphere of pricing are prohibited by law in most countries. It occurs when firms reach an express or tacit agreement to fix prices, allocate markets, or otherwise limit competition among themselves.

If several firms in an industry with an oligopolistic market are approximately the same in terms of size and level of average costs, then for them the level of price and volume of production will coincide, maximizing economic profit. The joint price policy they implement will actually turn the market of oligopolistic competition into a market of pure monopoly. At the same time, the nature of the demand and marginal revenue curves for each firm will coincide with the industry curves, and the market

price will correspond to the one that maximizes the economic profit of each firm. All of this prompts oligopolists to enter into the cartel agreements discussed in Chapter 8.

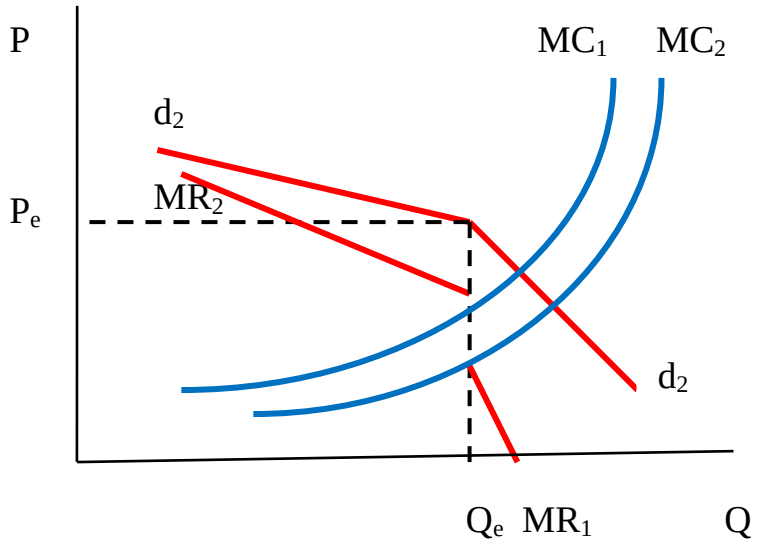


Fig. 10.4. The relative independence of price and production volumes from marginal costs

At the same time, there are many factors in the economy that oppose the conclusion of new cartel agreements and destroy old ones. In particular, they include:

— differences in costs and sales volumes of oligopolistic firms. Under such conditions, the prices that maximize the economic profit of each firm will not coincide;

— with a "soft" oligopoly, the number of firms in the industry is too large to achieve concerted actions;

— economic fluctuations, primarily downturns in business activity, push companies to break deals and try to overcome difficulties on their own;

— economic profit in the industry may attract new producers who are not participants in the agreement;

— there may be fraud among the participants of the agreement, i.e. secret reduction of prices to obtain additional orders;

— state regulation of the economy through price restrictions, bringing to administrative, material and criminal responsibility the participants of price collusion.

For an oligopolistic market, in which companies of different sizes are represented, coordination of actions through the mechanism of the so-called "leadership in prices" is characteristic. The most influential firm in the industry, with the tacit consent of others, is recognized as the leader in pricing, and all other firms follow its example. Since the revision of prices is associated with a certain risk for the initiator, which is explained by the broken nature of the demand curve, even the leader does not change

them so often. As a rule, he/she warns in advance about the next changes in order, on the one hand, to give the partners an opportunity to prepare for the next maneuver, and on the other hand, to study their possible reaction. In addition, the leader does not try to set prices that maximize profit in order to maintain barriers to entry in the industry, which are associated with the inability of the new firm to ensure the minimum level of costs and obtain an economic profit.

To simplify the mechanism of price calculation, industry leaders quite often resort to the technique called "cost plus". In this case, certain typical costs are taken as a basis for determining the price, to which economic profit is added in the form of a surcharge. The advantages of this method are its simplicity. It does not require a deep study of demand curves, income and marginal costs. One can only imagine what amount of analytical work is necessary to construct these curves for several hundred product names produced by an oligopolistic firm!

The "cost plus" price calculation method is well combined with the secret collusion of oligopolists. If they have at least approximately the same costs, then it is enough to agree on a percentage markup for them (5 or 10%) in order to actually implement an agreed pricing policy for all of your products.

Thus, oligopolists actually do not use price competition: it can be quite dangerous both for the initiator and for all market participants. An attempt at price competition threatens to turn into a price war. Therefore, non-price competition prevails in the oligopolistic market. It is unlikely to get out of control. At the same time, a successful solution to advertising, after-sales service or sales promotion may be repeated or neutralized by a competitor not so quickly, which will give the initiator company market advantages for a certain time.

10.3. Evaluation of the economic efficiency of the oligopolistic market

Since the nature of an oligopoly is quite close to a pure monopoly and sometimes turns into it, their economic efficiency estimates are also quite close.

First of all, researchers pay attention to the fact that since the demand curve for the oligopolist's products is always downward-sloping, its price and marginal revenue never coincide. Therefore, the coordinates of the point of intersection of the marginal revenue and marginal costs curves will always lie to the left of the minimum level of average costs. We can confidently say that the oligopolist always chooses such a "price-volume" ratio, which contains a smaller volume and a higher price than in a competitive market. This is especially true for collusion and cost-plus pricing.

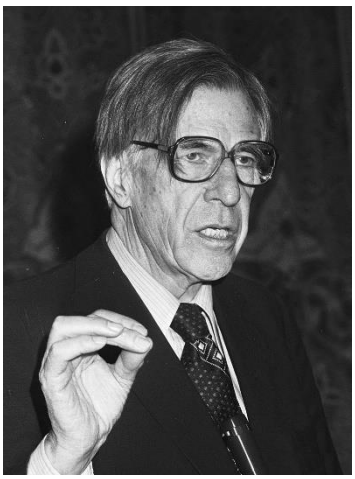
The oligopolist receives economic profit not only in the short run, but also in the long run. This is due to the existence of fairly significant barriers to entry into the

industry, albeit not as difficult to overcome as in the case of a pure monopoly, but which still limit the entry of new competitors into the industry. Therefore, society, having agreed to the existence of an oligopolistic market, is forced to both limit its consumption and pay a higher price for the products of the oligopolistic industry.

According to some economists, oligopoly is an even more undesirable market model than pure monopoly. A pure monopoly is obvious and under constant state control. An oligopoly can disguise itself as monopolistic competition, carry out a hidden policy of price coordination, circumvent antimonopoly legislation, but in fact implement the same principles of market behavior as a pure monopoly. Therefore, it is recommended to improve antimonopoly legislation in an appropriate manner in order to more accurately recognize oligopoly and take effective measures to limit it.

This also applies to the economic legislation of Ukraine. Our state is taking only the first steps in solving the issue of limiting monopoly in general and oligopoly in particular. The first legislative act in this field is the Law of Ukraine "On Limitation of Monopoly and Prevention of Unfair Competition in Entrepreneurship", adopted in 1992. It, in particular, introduced the concept of "monopoly position" of the producer: this is recognized as the position of the economic entity, in which its share in the market of a certain product will be more than 35%. It is possible to imagine a hypothetical situation where there are only three enterprises in the industry with the same market share — 33.3%. In this case, the legislation does not recognize the monopoly position of any of them, and therefore antimonopoly measures cannot be applied to these producers. However, such a situation contradicts common sense!

Joseph Schumpeter
(1983-1950)



John Kenneth Galbraith
(1908-2006)

There is another point of view on the role of oligopoly in the economic system, which was substantiated at one time by economists J. Schumpeter and J. Galbraith. Recognizing certain losses of society from the dominance of oligopolistic competition

in certain branches of production, they believed that these losses are many times covered by gains from the influence of oligopolies on scientific and technological progress. The followers of J. Schumpeter and J. Galbraith recognize the existence of significant oligopolistic forms of management, which have real market power, as a necessary condition for achieving rapid rates of improvement in science and technology. This is due to the fact that modern scientific research requires significant funds, which only large oligopolies are able to allocate. In addition, it is the stability of the oligopoly's market position, the economic profit it receives, that makes it possible to make decisions about financing strategic research with a distant return period.

The given arguments against oligopoly and in favor of it can become the object of discussion at seminar classes on microeconomics.

Thus, in part 3, we found out the peculiarities of the behavior of producers in different markets of goods: competitive, monopoly, oligopolistic and monopolistic competition. However, the manufacturer is not only a seller of the product, but also a buyer of resources. The next section analyzes the producer's behavior on the resource market.

The main terms and concepts

Oligopoly
Degree of concentration
Interindustry competition
Competition from imports
General interdependence
A broken demand curve
Collusive pricing
Leadership in prices
Pricing according to the principle of "cost plus"
Economic consequences of oligopoly

Part 4.
MARKET OF RESOURCES

Chapter 11.
FORMATION OF DERIVATIVE DEMAND

Recall the general scheme of the circulation of goods and money, given in Chapter 1 (see Fig. 1.1). Enterprises (producers) and households as counterparties of market relations meet twice: on the goods market, producers are sellers, and households are buyers; on the resource market, on the contrary. These two markets are closely related. First, resource prices determine households' monetary incomes, which affects their consumer choices. Secondly, the ratio of prices for different types of resources forms the structure of incomes and, accordingly, the structure of demand for final goods. Thirdly, for the firm, the level of prices for resources determines the size of their costs and the choice of the volume of production of final goods. The task of this chapter is to find out the factors that determine the demand for economic resources.

11.1. Theory of marginal productivity and demand for resources

In the market of resources, producers (as buyers) can meet with different models. Let's analyze the situation when a manufacturer buys resources and sells a product on a competitive market.

Resources satisfy the producer's needs not directly, but indirectly: it makes no sense for the producer to buy labor or capital if they cannot be used productively. Therefore, the demand for any resource depends on: a) the demand and price of the manufacturer's goods on the market of final products; b) productivity of the resource when creating the product. If a resource is highly productive in the production of a product that is in wide demand on the market and has a fairly high price, then the demand for such a resource will be significant. At the same time, if the resource has even phenomenal productivity, and the product produced with its help does not have the necessary sales, then it is unlikely that any manufacturer will want to purchase this resource. The uniqueness and high productivity of a resource is not a guarantee of demand and a high price for it. Ultimately, everything depends on the demand and the price of the final product. One of the supporters of the theory of marginal utility

emphasizes: "Tokai wines are not expensive because Tokai vineyards are expensive, but on the contrary, Tokai vineyards are expensive because Tokai wine is expensive."

Thus, the demand for resources is a derived demand, i.e. one that depends on the demand for goods produced with their help.

As we found out in the previous chapters, only one factor changes in the short run, while the others remain unchanged. Under these conditions, the law of decreasing marginal productivity of the variable factor applies, i.e., starting from a certain moment, each new additional unit of the variable factor leads to a smaller increase in product than the previous one. According to this table 11.1 it is possible to calculate the marginal product of the variable factor in monetary terms (***MRR***).

The marginal product in monetary terms is the increase in total income due to the use of each additional unit of the variable factor of production. In the table 11.1 gives data on the marginal product in monetary terms for labor, while capital remains unchanged. Similarly, it would be possible to calculate the marginal product for capital under the condition of constant labor.

Table 11.1

The marginal product of a variable factor in monetary terms in a competitive market (labor is a variable factor, capital is a constant)

L, persons	TP, units	MP, units	P, UAH	TR, UAH	MRR, UAH
0	0	-	40	0	-
1	10	10	40	400	400
2	19	9	40	760	360
3	27	8	40	1080	320
4	34	7	40	1360	280
5	40	6	40	1600	240
6	45	5	40	1800	200
7	49	4	40	1960	160
8	52	3	40	2080	120
9	54	2	40	2160	80
10	55	1	40	2200	40

To resolve the issue of the scale of labor involvement in the production process, the manufacturer, if he/she is guided by the rule of profit maximization, must compare the additional effect of involving a new portion of the factor with the additional costs associated with such involvement. The amount by which total costs increase with an increase in the resources involved per unit is called the ***marginal cost of resources*** (*MRC*). To maximize profit, the firm must use additional units of any type of resource

until each subsequent unit gives an increase in the firm's total revenue greater than the increase in its total costs. The limit of the feasibility of attracting additional resources will be the point at which the marginal product in monetary terms and the marginal cost of the resource are balanced:

$$MRR = MRC.$$

Since we assume that the producer buys resources in a competitive market, their prices will remain unchanged and will not depend on the amount of resources involved. In other words, with respect to the labor resource, the marginal cost of the resource will be equal to the wage (W). Then equation takes the following form:

$$MRR = W.$$

If, say, the salary is UAH 200, then for the situation shown in the table. 11.1, it is advisable to stop at the involvement of six workers, since the seventh will cost the manufacturer UAH 200, and the increase in total revenue will be only UAH 160.

In the model of a competitive resource market the demand curve for a certain resource will coincide with the marginal product curve in monetary terms (Fig. 11.1). Research makes it possible to determine several factors that affect the volume of involvement of the factor in production activities. This is, first of all, the wage level that has developed in the labor market. Changing it will move the W_1 line up or down, which will change the point of its intersection with the *MRR* curve. Secondly, the *MRR* curve itself can move on the graph under the influence of changes in product prices and under the influence of labor productivity growth.

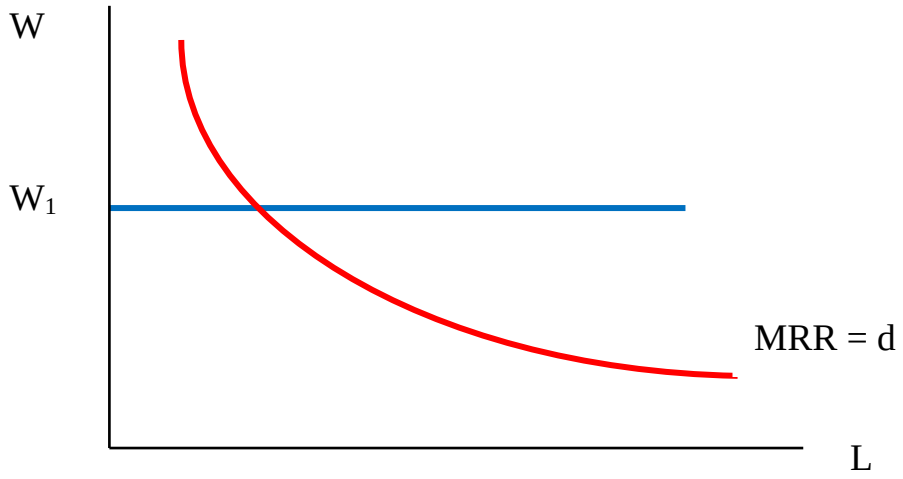


Fig. 11.1. The graph of the firm's demand for labor resources

The situation is somewhat different when the firm sells its products in the market of imperfect competition. In this case, in order to increase the volume of sales, it is forced to reduce the price, and to increase the price, it is forced to give up part of the volume of sold products. Therefore, the marginal product in monetary form will decrease not only under the influence of the law of diminishing marginal productivity, as it was in conditions of perfect competition, but also under the influence of a decrease in the price of products (Table 11.2).

Table 11.2

The marginal product of a variable factor in monetary terms in an imperfect competitive market (labor is a variable factor, capital is a constant)

L, persons	TP, units	MP, units	P, UAH	TR, UAH	MRR, UAH
0	0	-	50	0	-
1	10	10	48	480	480
2	19	9	46	874	394
3	27	8	44	1188	314
4	34	7	42	1428	240
5	40	6	40	1600	172
6	45	5	38	1710	110
7	49	4	36	1764	54
8	52	3	34	1768	04
9	54	2	32	1728	-40
10	55	1	30	1650	-78

The curve of the marginal product in monetary form, as in the previous example, is the demand curve for the labor resource. However, for models of imperfect competition, it will have a lower elasticity than in a competitive market. Therefore, in case of imperfect competition, the manufacturer reacts less to changes in wages when hiring labor resources than the manufacturer in conditions of perfect competition. This can be demonstrated by calculating the number of workers involved in production with the same changes in wages under conditions of perfect and imperfect competition (based on the data in Tables 11.1 and 11.2). As we can see from the Table 11.3, the volumes of resources involved in perfect competition respond more actively to changes in wages.

As we found out in part 3, other things being equal, the manufacturer produces less in imperfect competition than it could in a competitive market. Naturally, for the production of a smaller volume of products, the manufacturer will attract a smaller number of resources, therefore the demand for resources in imperfectly competitive markets is always lower than in competitive markets.

Table 11.3

Elasticity of demand for resources in markets of perfect and imperfect competition

Wage, UAH.	Number of employees involved in production, persons	
	Perfect competition	Imperfert competition
350	2	2
250	4	3
200	5	4
100	8	6

Of course, the marginal product curves in monetary terms (demand curves for the relevant resources) for each firm will have its own slope and position on the graph. Differences will be caused by different levels of labor productivity and marginal product. In order to determine the market demand for a particular resource, it is necessary to sum up the individual demands for it of individual firms.

11.2. Changes in demand for the resource. Elasticity of demand

We have already mentioned that the demand curve for a resource can move on the graph to the right, which will mean an increase in demand, or to the left, which will correspond to its decrease. Let us consider in more detail the factors that can cause such changes.

1. *The changes in product demand*. Other things being equal, changes in the demand for a firm's product, which it produces with the help of certain resources, will lead to a shift in the demand curve for these resources in the same direction. For example, the financial crisis in Ukraine and other countries led to the bankruptcy of banks and a decrease in demand for their services. This, in turn, caused an increase in unemployment among bank employees.

2. *The changes in productivity of resource*. An increase in resource productivity shifts the demand curve for it to the right, a decrease in productivity shifts it to the left. Factors of changes in resource productivity can primarily be changes in its own quality characteristics (qualification of workers, reliability of machines, etc.). In addition, fixed resources can provide greater performance by changing the quality of other resources with which they are used. Thus, the improvement of the employee's qualification level leads to an increase in the productivity of both labor and fixed capital.

3. *The price changes for other resources*. As you know, resources are characterized by substitutability and complementarity. The changes in the prices of substitute resources and complementary resources affect demand differently.

Thus, when the prices of substitute resources are changed, two opposite effects are triggered at the same time: ***the substitution effect and the volume effect***. If, for example, wages decreased, then labor became cheaper relative to capital. It will be more expedient for the manufacturer to increase the amount of labor involvement and reduce capital (*substitution effect*). Therefore, the demand for capital will decrease. On the other hand, the cheapening of labor will lead to a decrease in producer costs in general and an increase in production volumes, which should be accompanied by an increase in demand for resources in general (*volume effect*). The actual change in demand for the resource will depend on the ratio of forces with which these effects operate. *If the effect of substitution exceeds the effect of volume of production, then changes in prices and demand will have the same direction; if the effect of the volume acts with greater force, then it is the opposite*.

If the prices of complementary resources change, then only the effect of the volume of production will work. At the same time, price changes for some resources and demand for others have different directions.

Therefore, it can be concluded that the demand curve for the resource will shift to the right (increase in demand) under the influence of the following factors:

a) increase in demand for the product produced using this resource;

b) increasing resource productivity;

c) a decrease in the price of substitute resources, when the effect of the volume of production is stronger than the effect of substitution;

d) an increase in prices for substitute resources, when the substitution effect is stronger than the effect of production volumes;

e) reduction of prices for complementary resources.

The sensitivity of demand for resources to changes in its price and non-price factors is determined by elasticity indicators. The price elasticity of demand for resources depends, in particular, on the following factors:

1. ***The rate of decline of the marginal product***. If the marginal product of labor decreases gradually with an increase in the amount of labor added to the constant capital, then the demand curve for the resource will have a smaller slope and a tendency towards greater elasticity. On the contrary, with a rapid fall in the marginal product, the demand curve will be weakly elastic.

2. ***Ease of resource substitution***. Here the dependence is direct: the more close substitute resources there are, the higher the elasticity of demand for a certain product.

3. ***Elasticity of demand for the manufacturer's product***. Since the marginal product curve in monetary terms depends on the price of the product, the elasticity of demand for resources will directly depend on the elasticity of demand for the product.

4. ***Share of resource costs in total costs***. The greater the total cost of a resource, the lower the elasticity of demand for it.

11.3. Optimal ratio of resources

Until now, it was mainly about the short run. We considered the situation when one of the factors of production (labor) changes, while the others remain unchanged (capital). It is time to consider the long run, when all factors of production are variable.

In the long run, two main questions may arise before the manufacturer: what ratio of resources provides minimum total costs to produce the given quantity of the goods; what ratio of resources will ensure the maximum profit? The answers are given ***by the costs minimization rule and the profit maximization rule.***

The rule of cost minimization emphasizes that costs are minimized at such a ratio of resources, when marginal products per unit cost of each resource are the same. Let's imagine that 1 man-hour of labor (R_L) and 1 machine-hour of capital (R_k) have a cost of UAH 150. If with an increase in labor per unit, the increase in production is 5 units. (marginal product of labor — MP_L), and capital — 7 units. (marginal product of capital — MP_K), then it is expedient for the producer to redistribute the funds he/she spends on the acquisition of resources in such a way as to increase the use of capital and reduce the use of labor. Release UAH 150 due to a decrease in labor consumption by 1 man-hour will lead to a shortage of 5 units of production, while the attraction of one more unit of capital at the expense of these funds will give an additional 7 units of production. The producer's gain is obvious: in order to maintain the previous volume of production, he/she can release more funds from reducing the consumption of one resource than spending additionally on the acquisition of another. Therefore, the total costs for the production of a given volume of products will decrease.

If the ratio "marginal product / price" for each of the resources changes in favor of labor, then the producer will reduce his/her costs, redistributing funds in favor of labor. It is obvious that the possibilities of reducing the total costs for the production of a certain amount of products due to the redistribution of funds between different types of resources will be exhausted *when their marginal products per unit price are equal*:

$$MP_L/P_L=MP_K/P_K.$$

However, minimum production costs do not always ensure maximum profit. The cost-minimizing production volume and the profit-maximizing production volume will coincide only for a competitive market, where demand is perfectly elastic, and the price of the product will remain unchanged when the firm's supply changes. The situation is different under conditions of imperfect competition. Therefore, it is more appropriate to use a more general approach, which was applied in the previous section: the maximum profit is achieved under the condition of balancing the marginal product and marginal costs. As for the costs of purchasing individual resources, the profit will grow until the marginal product in monetary terms of the variable factor of production exceeds the costs of purchasing an additional unit of this resource. If the price becomes higher than the marginal product in monetary terms, then the profit will decrease. It acquires its maximum value when the following equality holds:

$$MRR_L/P_L = MRR_K/P_K = 1.$$

Thus, in the case of purchasing resources on a competitive market, the firm achieves a ratio of resources that maximizes its profit if each new unit of production factors has a price equal to the marginal product in monetary terms for each type of resource. However, resource markets are not always competitive. Most often, the competition here is limited and imperfect. The specifics of individual resource markets are analyzed in the next chapter.

The main terms and concepts

Derived demand
Marginal product in monetary terms
Marginal costs of a resource
The MRR=MRC rule
Substitution effect
Effect of production volume
Cost minimization rule
The rule of profit maximization

Chapter 12.
PRICING ON THE RESOURCES MARKET

A common feature of the demand for any resource is its derivative nature. However, depending on the features of the resource itself, the type of market, the degree of state intervention in self-regulation mechanisms, the process of pricing on the markets of various resources has its own specifics. Let's consider in more detail how wages, economic rent, loan interest and business income are formed..

12.1. Wage forming

Wage is a fee for engaging in the production of labor services. It can take a variety of forms: direct salary, bonus, participation in the company's profits, commissions, year-end rewards, etc. However, in its essence, it is a payment that the owner of the labor resource receives from the producer for the labor services provided to him/her. With a certain convention, the remuneration of the owner of the labor resource can be measured by the amount of money he/she received, and the amount of labor services by the time during which the producer received labor services. Therefore, in the future, the term "wage" ($P_L = W$) will be used to denote ***the remuneration of the owner of labor resources for a unit of time for the provision of labor services***.

There is considerable variation in wage levels for different countries. If in developed countries the average wage is several thousand dollars per month, then in countries with a weak economy it is several tens of dollars. Therefore, the general level of wages is a mirror image of the level of development of the country in general and the level of labor productivity, in particular. The economist must understand that the real income of the owners of labor resources grows at approximately the same rate as labor productivity.

Since the wage is the price of labor services, the mechanism of its formation, as it was clarified in the previous section, depends on the market model. Let's consider several options for labor markets, depending on the state of competition in them.

If the labor market is competitive, then it is characterized, on the one hand, by a significant number of firms competing with each other in purchasing labor services, and on the other hand, by a large group of workers who have the same qualifications and independently of each other offer a certain type of labor services. Under these conditions, neither firms nor workers can control market wage rates. In other words, the firm agrees with the price of labor services that has developed on the market. It can

purchase an infinite (from the standpoint of an individual firm) amount of labor services at this price. Therefore, the supply of labor for an individual firm in a competitive market will have the form of a straight line, which will correspond to the market price of labor services and the marginal costs of this resource.

The demand for labor resources for an individual firm will be determined by the curve of the marginal product in monetary terms, and therefore, on the basis of the law of diminishing marginal productivity of the resource, will have the form of a descending curve. As long as marginal product in monetary terms exceeds marginal cost, the firm will hire more workers. It maximizes its profit (shaded figure in Fig. 12.1) when *MRR* equals *MRC*.

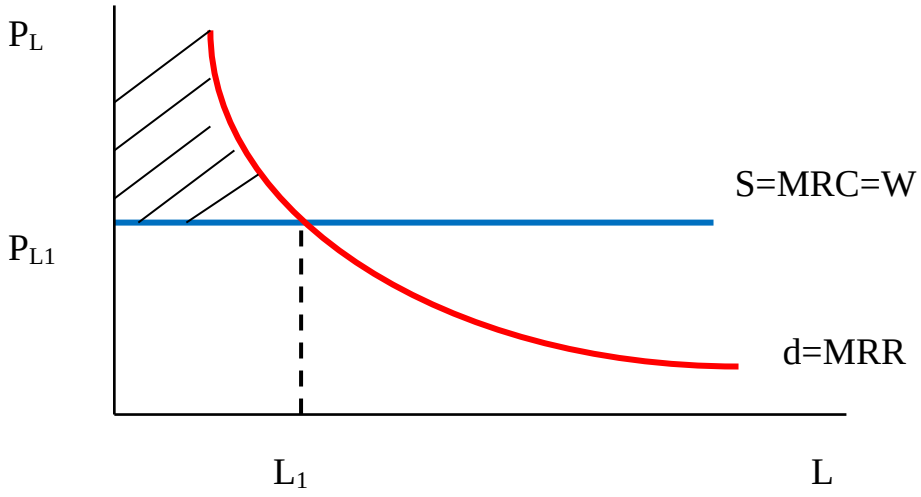


Fig. 12.1. Supply and demand for labor for an individual firm in a competitive market

In the labor market, a situation can often arise when a buyer of labor services occupies a monopoly position. Such a market is called ***monopsony.*** It is characteristic of small cities, in which the number of employees in a certain company constitutes the main part of all employees. Characteristic examples can be the cities of Marganets and Pokrov in the Dnipropetrovsk region, where the majority of workers are employed in the mining and processing industry. Since labor services in this case are immobile, i.e. they cannot quickly change their place of residence or qualification, the firm dictates wages, determining the number of employees.

If there is one buyer of labor services in the monopsony market, then for him/her the offer will coincide with the industry one, i.e. its curve will have an increasing character, due to the increase in the alternative cost of the resource. In order to increase the attraction of labor resources, the company will have to pay higher wages. However, in order to relieve social tension, higher wages should be paid not only to additional

workers, but also to those who were hired earlier. Therefore, for a monopsony, the marginal cost of a resource will not coincide with the wage, but will always be higher than it. Accordingly, the *MRC* curve will pass higher than the *S* curve, and the firm's profit maximization point (*MRR = MRC*) will correspond to a lower wage rate (W_M) and a lower number of employees (L_M) than in a competitive market (Fig. 12.2).

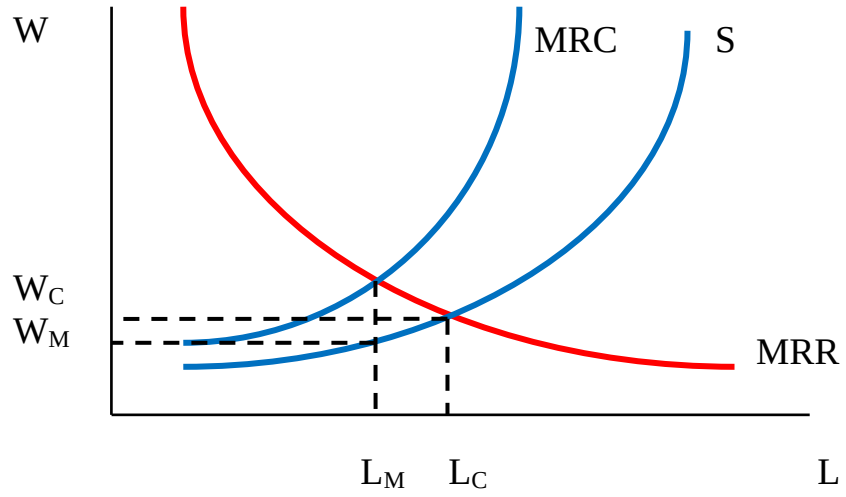


Fig. 12.2. Wage formation in the monopsony market

However, monopolization of the labor market is possible not only on the part of the buyer, but also on the part of the seller. Trade unions play an important role in this. They can influence the level of wages by increasing the demand for labor: by their activity, they can contribute to the growth of demand for final products, increase labor productivity or prices for resource substitutes. This needs further explanation. Why, say, professional associations of highly qualified workers support the struggle for raising the minimum wage, although this will not directly affect the wages of their members? Here, not only solidarity works, but also a clear economic calculation: the increase in the cost of unskilled labor increases the demand for skilled labor, shifts the demand curve to the right and raises the equilibrium level of wages.

Professional associations try to influence the supply of labor resources. Depending on the specifics of labor services, tactics of closed (or shop) or open trade unionism may be used. ***Closed trade unionism*** is used when formal or informal professional associations can directly affect the number of labor services of a certain qualification group. At the same time, entry into this group is also controlled by its members. Let's say, how can you control the offer of services of doctors of economic sciences? Since the scientific degree of doctor of sciences can be obtained only by defending a thesis in front of those who already have this scientific degree, then,

simplifying or complicating the defense procedure, the informal association of doctors of sciences will regulate its salary (Fig. 12.3, a) .

Trade unions resort ***to open trade unionism*** when it is not possible to strictly regulate the influx of new workers of this qualification group. Then, through the conclusion of sectoral tariff agreements or in some other way, a certain minimum wage level is established, which cuts off the part of the supply curve of labor services that lies below this level. The supply curve acquires a broken character (Fig. 12.3, b).

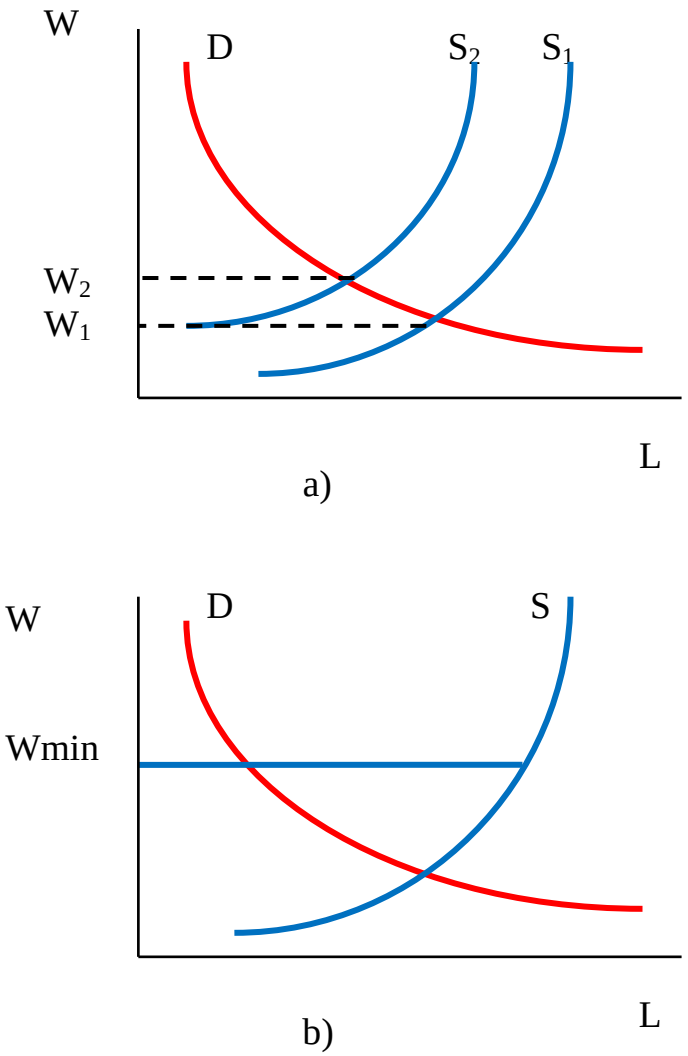


Fig. 12.3. The influence of trade unions on the wage formation mechanism: a — closed trade unionism; b — open trade unionism

The labor market gives us examples when both the seller and the buyer occupy a monopoly position (the so-called ***bilateral monopoly***). In this case, the graphics in fig. 12.2, a and 12.3, b seem to overlap each other: the trade union demands a wage not lower than the minimum level, and the firm insists on a much lower wage. The actual price on such a market will depend on the balance of power. However, there is every

reason to believe that in the conditions of a bilateral monopoly, the actual wages will be closer to the level of the competitive market than in the case of a unilateral monopoly on either side.

The considered models explain the general mechanism of setting wages, but do not provide an answer to the question of the reasons for the differentiation of payment for labor services of certain groups of workers. It is related to differences in the ratio of supply and demand in various segments of the labor market. Since employees are heterogeneous in terms of qualifications, abilities, willingness to work in certain conditions, this leads to differentiation of their individual labor productivity and leads to differences in wages. In addition, there are significant differences in the attractiveness of labor itself: producers are forced to pay higher wages for unattractive labor. Differences in wages are also explained by the fact that there is, as a rule, imperfect competition among sellers of labor services. It is primarily related to the geographical limitation of the mobility of labor resources, institutional limitations (availability of a higher education or scientific degree to occupy a position, etc.), sociological limitations of mobility.

Wage differentiation is largely explained by differences in investments made earlier in human capital. ***Investments in human capital*** are any actions that increase the qualifications and abilities of an employee. These include spending on education, health care, and increasing social mobility. Successful investments are returned to the employee in the form of increased wages. This is very important for modern students to understand.

12.2. Economic rent

The term "rent" is used quite widely in everyday life, and it can have a wide variety of meanings. To eliminate further misunderstandings, it should be noted that for an economist, ***rent is the price paid for the use of land and other natural resources, the quantity of which is strictly limited***. It is the strict limitation of resources that distinguishes rent from all other types of income.

Let's make some assumptions:

1) assume that all land has the same quality;

2) all land is used for the production of only one product;

3) land is leased on a competitive market.

Under these conditions, the land supply curve will be completely inelastic (vertical straight line). Demand for land becomes the only effective factor in determining rent. In turn, it will depend on the price of products grown on the land, the productivity of the land, and the prices of the resources used with the land. So, if the

prices of products grown on land rise, the demand curve for land will shift to the right and increase rent (R_2 *vs.* R_1). Conversely, an increase in the price of fertilizers, the use of which provides the desired level of land productivity, will reduce the demand for land, and therefore the rent, to the level of R_3. The negative impact of demand factors may be so significant that the demand curve (d_4) and the supply curve will not intersect at all. Under these conditions, the land will not be able to bring its owners any income in the form of rent (Fig. 12.4).

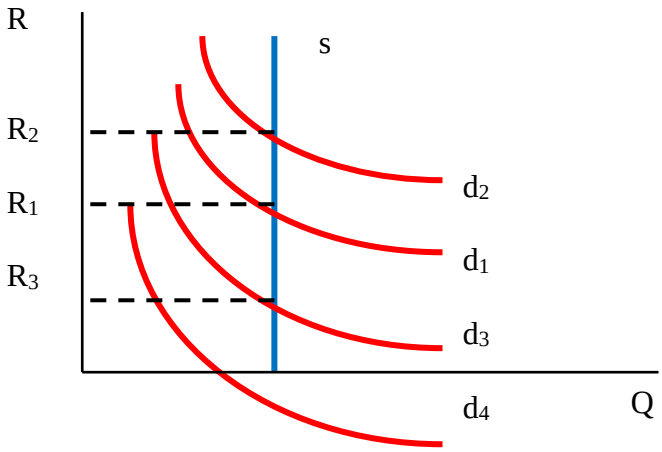


Fig. 12.4. Mechanism of rent formation

As you can see, the change in rent does not affect the amount of land offered for use. If in relation to non-land resources, the price performs an incentive function, i.e. pushes the resource owners to increase their supply on the market, then in relation to land, rent does not perform such a function. Therefore, economists consider rent to be a surplus, i.e. a fee that is not required to ensure the availability of land.

Until now, we have assumed that the soil has the same fertility. However, in reality, the quality of different land plots can differ quite significantly: take, for example, the sandy loams of Chernihiv Oblast and the chernozem of Cherkasy Oblast. Therefore, the same labor or capital in combination with different fertile lands brings different results. For more fertile lands, the average cost curve will lie lower than for less fertile lands. Therefore, users of fertile land, other things being equal, will receive additional economic profit, which is associated with persistent differences in soil quality. This additional profit is called ***differential rent***. Since the amount of land is limited and someone already uses the fertile land, the differential rent cannot be eliminated by capital flows, and therefore the owners of better land can receive a higher rent even in the long run.

However, the fertility of the land can change as a result of human economic activity. The use of modern technologies for the cultivation of agricultural products,

additional investments in land can give significantly better results compared to the exploitation of lands used traditionally. This is how differences in the economic fertility of the land arise, which can also bring differential rent. They are less stable and may be eliminated if competitors switch to a similar land use option.

Economic rent can be received not only by the owners of land used for agricultural purposes, but also by the owners of other natural resources, which are characterized by absolute limitation. These can be mineral deposits, territories attractive for tourism, forces of nature (waterfalls, rivers, etc.). The mechanism of rent formation in these cases will coincide with the one discussed above.

12.3. The loan interest

Money, by its very nature, does not belong to economic resources. However, they are a means of acquiring all other factors of production. In addition, the producer who spends his/her funds on the acquisition of capital refuses alternative options for their use, in particular, from granting a loan. Therefore, *the profit that the manufacturer could have received if he/she had lent his funds is the alternative cost of capital*. Elucidating the mechanism of formation of the loan price will also mean elucidating the process of formation of the alternative value of capital.

The loan interest can be considered as the price of the loan. Loan interest is the price paid for the use of money. Most often, it is not considered in an absolute sense (as the amount of money), but in a relative sense — as a percentage of the amount of borrowed money. For convenience, the loan interest rate is usually given in annual terms. Let's say, if for receiving UAH 10,000 the borrower needs to return UAH 14,000 for the loan after a year, which means that he/she received money at 40% per annum.

Since the provision of credit and the return of money are disconnected in time, the problem arises of money losing its purchasing power due to inflation. Then part of the payment for the use of money will go to cover the loss of its purchasing power, and part will really be a reward for the owner. A distinction should be made between nominal and real interest rates. ***The nominal rate*** (r_N) is an interest rate expressed in monetary units at the current exchange rate. ***The real rate*** (r_R) is the interest rate expressed in constant money or adjusted for inflation. So, if in the previous example the prices for the year increased by 1.25 times (I_p = 1.25), then according to its purchasing power UAH 1 at the beginning of the year it will be UAH 1.25. at the end of the year. If you calculate all the money returned at the end of the year in comparison with the money given at the beginning of the year, then 14,000 UAH. will correspond to UAH 11,200 (14,000 : 1.25 = 11,200). So, the real interest rate will be only 12%. The relationship between nominal and real rates is shown by the following formula:

$$r_R=(100 + r_N)/I_p.$$

The loan interest rate is formed depending on the ratio of demand for money and its supply. However, there is no single interest rate for all cases. The provision of credit may differ depending on the conditions of return, state regulation of this process, characteristics of the borrower, etc. Therefore, it is appropriate to consider the factors that affect interest rates.

Granting a loan is a risk on the part of the creditor, as the borrower may not return the money received under certain conditions. Therefore, the first factor that will determine the specific level of interest on a specific position is the degree of risk — the probability of the lender losing money. Here the dependence is direct: the greater the probability of not returning the money, the higher the percentage will be. At the same time, the threat of losing money can reach such a level that it is not at all compensated by an increase in interest. Under these conditions, the loan is not granted.

The size of the loan has a certain influence on the interest rate. All other things being equal, the creditor prefers larger loans, as this reduces his/her costs for studying the borrower's economic situation, servicing the loan, etc. Therefore, the creditor agrees to provide larger amounts at lower interest rates.

The term of the loan has a different effect on the interest rate. Since the probability of unforeseen events is greater in the long-term period, the interest on loans will also be higher to insure losses from them.

Interest rates are also influenced by state taxation policy. If the received interest from the loan is not taxed or is taxed on preferential terms, then the cost of obtaining the loan will be lower. Thus, while discounts on domestic state loan bonds were not taxed in Ukraine, their yield was lower, i.e. it was cheaper for the state to obtain funds. After the introduction of taxation, the cost of attracting funds increased.

12.4. Entrepreneurial revenue and economic profit

Entrepreneurial revenue (or profit) is the income brought by the realization of entrepreneurial abilities. It consists of normal and economic profit. ***Normal profit*** is the minimum income necessary to sustain an entrepreneur in a certain industry. As already mentioned, by its nature, normal profit belongs to internal (hidden) costs. ***Economic profit*** is the remainder of total income after deducting all expenses. Under conditions of a competitive market model with a static economy, economic profit is always zero.

A static economy is an economic system that does not undergo changes, where all cost indicators and data on the supply of resources, on the one hand, and data on demand and income, on the other hand, are constant. Under these conditions, the future can be predicted quite clearly. If at some stage an economic profit arises, then due to the well-known mechanism of capital flow, it is eliminated.

Economic profit can exist under conditions of dynamic changes in the economy with their inherent uncertainty. In ***a dynamic economy***, all the conditions for the formation of supply and demand are uncertain, so the entrepreneur takes on the risk associated with costs and the lack of guarantees to receive not only profit, but also spent funds. Economic profit is considered by economists as a *reward for accepting risk*.

It is necessary to distinguish between two types of risk: ***an insurable risk and one that cannot be insured against***. Each of us is constantly taking risks: whether it is leaving the house in icy conditions, or getting behind the wheel of a car for a trip in difficult city conditions, or even traveling in an airplane, etc. However, the risk associated with fire, theft, and accidents is an insurable risk. Insurance companies calculate the probability of this or that insurance event and offer clients appropriate insurance conditions.

Non-insurable risks are risks associated with uncontrollable and unpredictable changes in demand (revenues) and supply (costs) faced by the firm. Economic profits and losses can be associated with risks that arise due to cyclical and structural shifts in the economy.

Another condition for obtaining economic profit can be monopoly power. It is related to the ability of the monopolist to limit the production of products and influence the price of the product in its favor. This was discussed in the previous sections when considering the markets of pure monopoly, monopolistic competition and oligopoly.

Economic profit received as a reward for making a risky decision and additional income as a result of a monopoly position are significantly different from each other. Taking risks in a dynamic and uncertain economic environment is a socially necessary function of entrepreneurship. Therefore, obtaining this type of economic profit is socially justified.

The social necessity of monopoly profit is very questionable. Since its receipt is accompanied, as a rule, by a reduction in production volumes and an increase in prices above the minimum possible for this technology, society considers this profit as a kind of tax that the monopoly imposes on its buyers.

Obtaining profit is the ultimate goal of entrepreneurial activity. It is the expectation of profit that prompts an entrepreneur to search for the best options for using resources. The main function of profit is to stimulate innovations, search for ways

to improve technology. At the same time, profit performs the function of distributing resources between the branches of production. The appearance of economic profit in one or another industry indicates an insufficient level of resource attraction and encourages entrepreneurs to direct resources to increase supply in these industries. On the contrary, the unprofitability of the industry indicates oversaturation of resources and stimulates their outflow from it. However, the implementation of these profit functions can be restrained in conditions of imperfect competition.

The main terms and concepts

Competitive labor market
Monopsony
Closed trade unionism
Open trade unionism
Bilateral monopoly
Differentiation of wages
Investments in human capital
Economic rent
Incentive function
Nominal interest rate
Real interest rate
Normal profit
Economic profit
Static economy
Risks that are not insured

Part 5.
GENERAL EQUILIBRIUM

Chapter 13.
ANALYSIS OF GENERAL EQUILIBRIUM AND EFFICIENCY

So far, we have considered how individual economic entities (equilibrium of the consumer and equilibrium of the firm) or individual sectors of the market (market of goods, market of resources) achieve equilibrium. For a holistic view of the functioning of the microsystem, it is necessary to consider how a change in the situation in one market is transformed into changes in other markets. The mechanism of redistribution of resources between individual parts of the general market and the achievement of the highest overall efficiency of the functioning of the economic system requires additional analysis.

13.1. Analysis of partial and general equilibrium

The analysis of partial equilibrium, which we dealt with in the previous chapters, means the study of equilibrium prices and equilibrium volumes of production in many specific markets, which are components of the general market system. However, the economy is a tight tangle of the most diverse connections between business entities: the economic impulse from one of them is necessarily transmitted to others through the market system. Therefore, a general equilibrium analysis is necessary, i.e. a comprehensive consideration of the relationships between all markets and prices that make up the market system as a whole.

General equilibrium analysis can be used to examine the long run feedback effects of price changes in markets. The feedback effect is a further change in prices and volumes of goods and services in a certain market in response to changes in prices in related markets caused by events in it. Let's consider this using the example of the situation in Ukraine. Due to the breakdown of traditional economic ties after gaining independence, the supply of oil to the markets of Ukraine decreased. Its supply curve shifted to the left, which led to an increase in prices (Fig. 13.1a). This had a negative impact on the markets of those products, in the production of which oil is used, in particular gasoline. The gasoline supply curve also shifted to the left, and its prices increased (Fig. 13.1b). Gasoline, in turn, is a complementary good for cars. The increase in gasoline prices caused a decrease in the demand for cars (Fig. 13.1c), gasoline and, accordingly, for oil. In addition, the initial increase in the price of oil led

to the effect of replacing it with coal and increasing the demand for it (Fig. 13.1d). As a result of all these iterations, the demand for oil will decrease, which will lead to lower oil prices. The economic flywheel will begin to spin again, but in the opposite direction: an increase in the supply of gasoline, a decrease in its price, an increase in the demand for cars, an increase in the demand for gasoline, an increase in the demand for oil, an increase in the price of oil. However, each subsequent pulse will have less force than the previous one. Therefore, after several generations, the potential of the primary impulse will be exhausted and the economy will settle down overall balance.

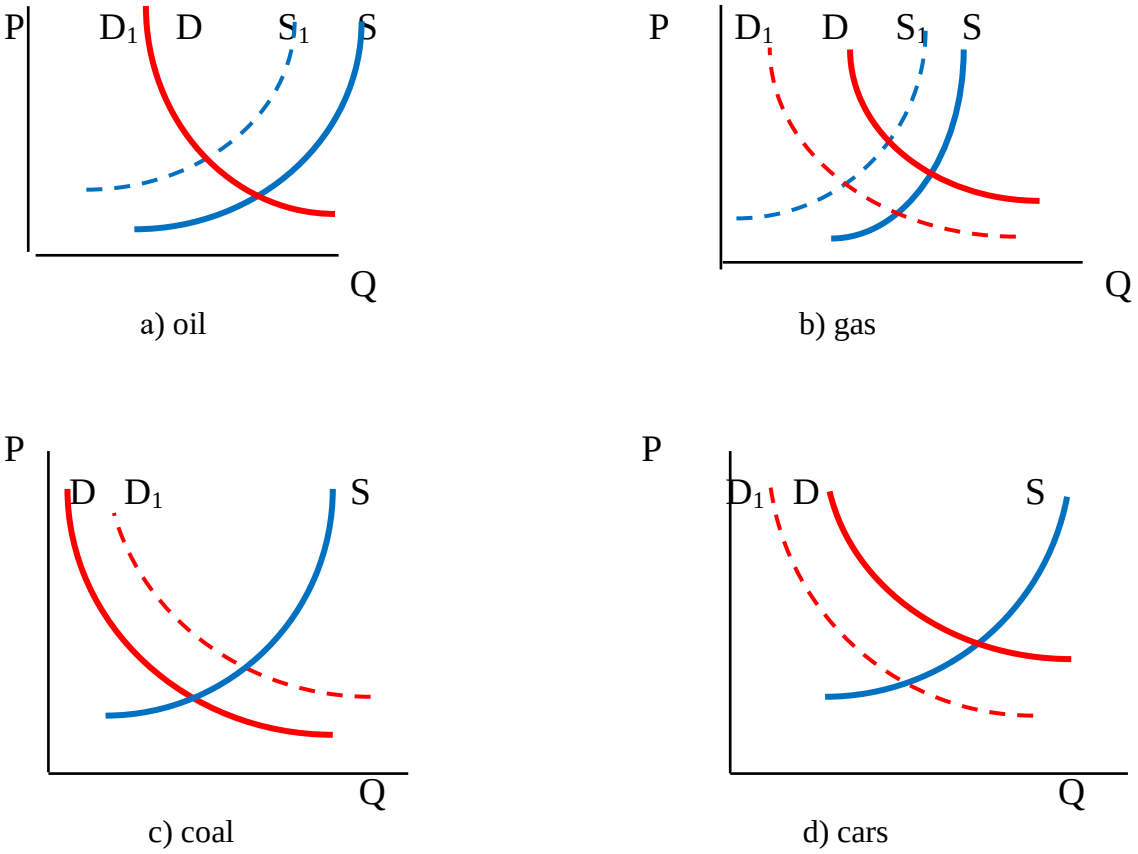


Fig. 13.1. Feedback effect

General equilibrium will occur when prices have responded to an initial change in demand or supply in such a way that the volume of demand equals the volume of supply in all markets. Under these conditions, there is no tendency for further changes in demand or supply in any market.

13.2. Edgeworth diagram

In the above example, we have demonstrated the relationship between four markets. In reality, the situation is even more complicated. However, a two-

dimensional analysis will suffice to understand the main principles of achieving general equilibrium.

Suppose that only two factors of production (labor and capital) are used in the economic system. In one day, 40,000 man-hours of labor and 20,000 machine-hours of capital can be used for production purposes. The aggregate volume of services of production factors, available for a certain period of time, is called the resource limitation of the economy. After all this amount of resources is included in the production process, supply will be perfectly inelastic.

If production is limited to only two products (*X* and *Y*), then it can be argued that the more one of them is produced, the smaller the society's ability to produce the other. Here we are dealing with ***resource constraints***, which for the two-product model will have the following form:

$$L = L_X + L_Y.$$
$$K = K_X + K_Y.$$

A convenient tool for analyzing production and distribution of resources in an economy with a fixed supply of labor and capital is the ***Edgeworth diagram***. It is a rectangle, the sides of which represent the amount of resources that society has at its disposal for the production of two goods. Each point on the Edgeworth diagram corresponds to a certain variant of the distribution of the available amount of resources for the production of goods *X* and *Y* (Fig. 13.2).

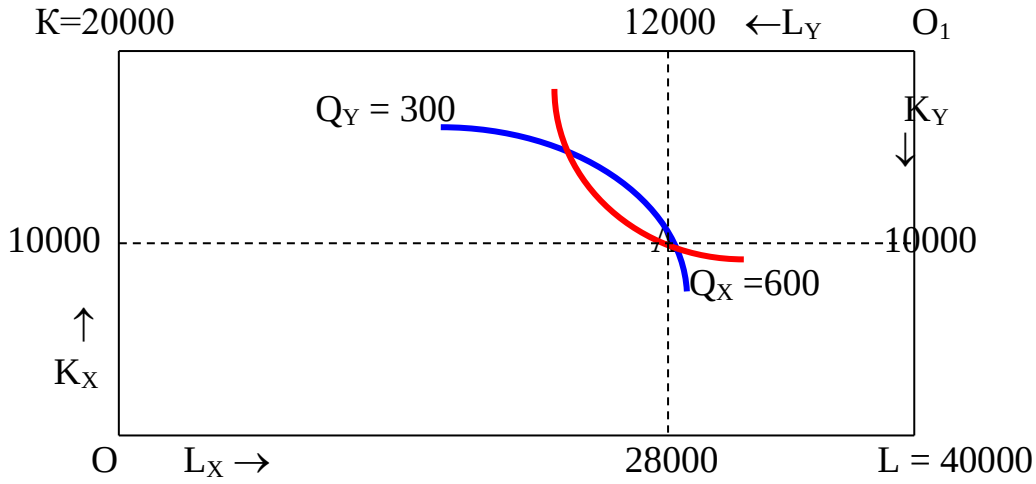


Fig. 13.2. Edgeworth diagram

On the diagram, labor and capital costs for the production of product *X* are deferred from point *O* to the relevant parties, and from point O_1 - for the production of

product *Y*. For example, at point *A*, the following costs will be incurred for the production of product *X*: $L_X = 28000$, $K_X = 10000$, and for the production of goods *Y*, respectively, $L_Y = 12000$, $K_Y = 10000$.

In order to determine the volumes of production of goods X and Y with this distribution of resources, it is necessary to draw the corresponding isoquants through point A. For our example, the production volume of product *X* will be 600 units, and product *Y* - 300 units.

Thus, each point on the Edgeworth diagram corresponds to a specific value of six variables: L_X, L_Y, K_X, K_Y, Q_X, Q_Y..

13.3. Production efficiency

Can the production of goods *X* and *Y* at point *A* be considered efficient? The answer to this question can be obtained by analyzing the Edgeworth diagram.

Production efficiency is achieved when it is impossible to rearrange the use of available resources in such a way as to increase the output of one of the goods without reducing the output of any other. From this point of view, the use of resources at point A is inefficient. After all, staying on the Q_X isoquant and moving to the left, we move to other points that correspond to larger volumes of production of product *Y*.

It is not difficult to come to the conclusion that only those combinations of resources that correspond to the points of contact of two families of isoquants are effective options for their distribution (Fig. 13.3).

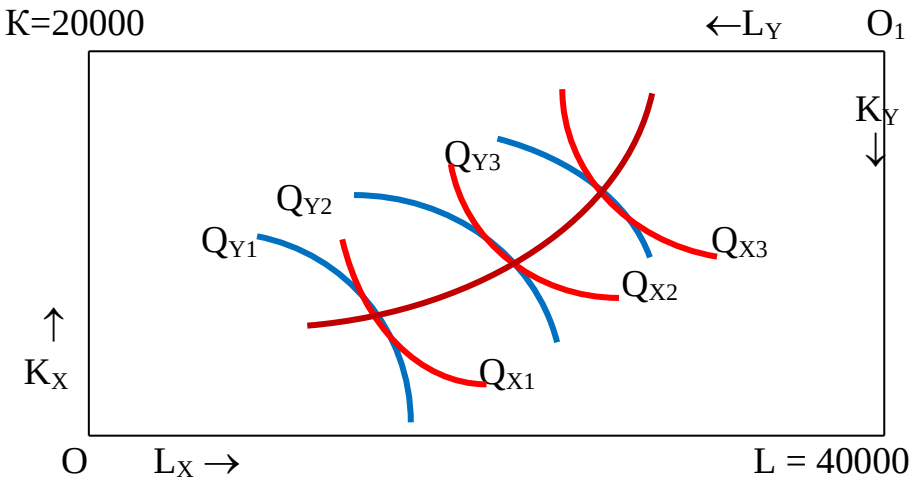


Fig. 13.3. Production efficiency curve

At the points of contact, the angles of inclination of the isoquants coincide. Then it can be argued that efficiency will be achieved if the marginal rates of technological substitution of resources are equal in the production of both goods:

$$MRTS_{LK}^{X} = MRTS_{LK}^{Y}.$$

Through all points of contact of the isoquants, a curve can be drawn, which is called ***the curve of the efficiency of the use of resources*** in the economic system. It shows all those combinations of resources in which they are used effectively.

It is easy to move from the production efficiency curve to the production possibilities curve. It shows the maximum volume of a certain product that can be produced with given volumes of output of other goods, resource limitations and existing technology. After all, each point of the efficiency curve shows not only the ratio of resources, but also the maximum possible volume of production of one product at given volumes of another, which is the main essence of ***the production possibilities curve*** (Fig. 13.4).

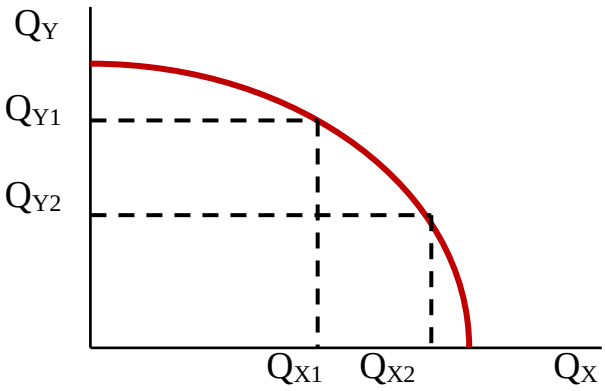


Fig.13.4 The production possibilities curve

Using the production possibilities curve, it is possible to determine the marginal rate of transformation of one product into another, which shows how much product *Y* must be discarded to obtain an additional unit of product *X*:

$$MRT_{XY} = -\Delta Q_Y / \Delta Q_X .$$

The marginal rate of transformation is equal to the slope of the production possibilities curve multiplied by –1. It can also be expressed through the marginal costs of producing the corresponding goods:

$$MRT_{XY} = MC_X / MC_Y .$$

13.4. Exchange and efficiency of distribution

The distribution of products is efficient when a given volume of products, which is produced in a certain period of time, is distributed among consumers in such a way that it becomes impossible to improve the position of anyone without causing harm to someone else. An Edgeworth diagram can be constructed for the distribution of products. Let one of the points on the production possibilities curve correspond to the following volumes of product production: Q_X = 400; Q_Y = 300. These products are distributed between consumers *A* and *B* in the proportion corresponding to point *C* in fig. 13.5.

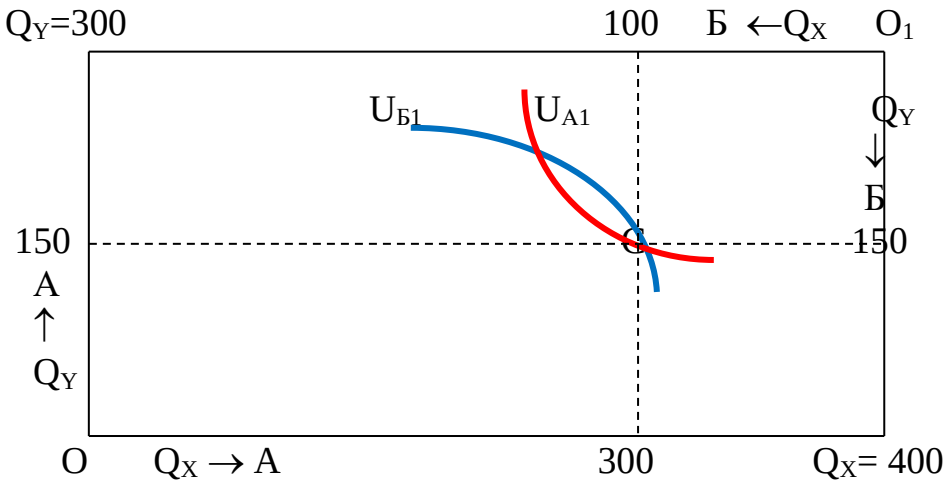


Fig. 13.5. Edgeworth distribution analysis

To determine the degree of satisfaction of needs by consumers *A* and *B*, we draw the corresponding indifference curves U_{A1} and $U_{Б1}$ through point *C*. Analyzing the situation that has developed, it is possible to conclude that the distribution is inefficient at point *C*. Moving along the indifference curve U_{A1}, it is possible to improve the position of consumer B, without worsening the position of consumer *A*.

The distribution of a given volume of production between two consumers will be efficient when it corresponds to the points of contact of the indifference curves of these consumers (Fig. 13.6).

Since the slopes of the curves are equal at the points of contact, the rates of product substitution are also equal:

$$MRS_{XY}^{A} = MRS_{XY}^{Б}.$$

The *AB* line connecting all possible points of contact of the indifference curves belonging to two maps of these curves specific to each individual consumer is called a ***contract line***. It shows all possible efficient options for the distribution of two goods between two consumers.

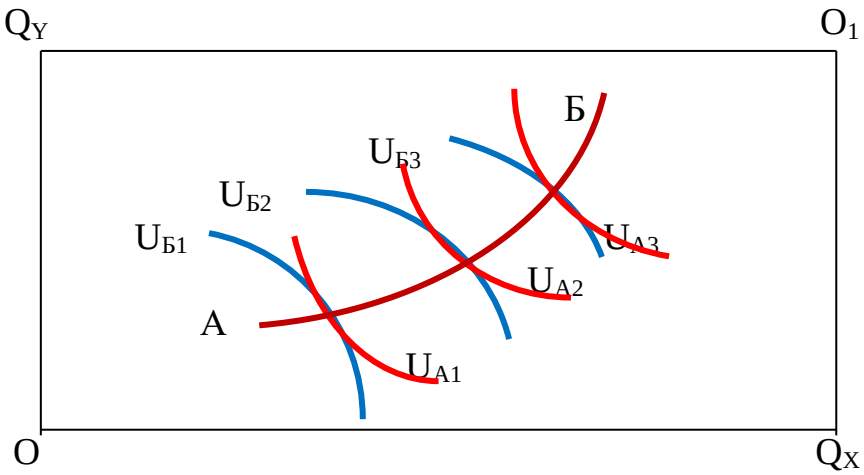


Figure 13.6. Distribution efficiency

When both resources and output are distributed in such a way that it is impossible to improve the position of one person without harming the other, the ***Pareto optimal allocation of resources*** is achieved. In order to achieve such efficiency, it is necessary to not have the possibility of obtaining additional profit by redistributing resources or exchanging products between consumers. Therefore, the condition necessary to achieve the Pareto optimal allocation of resources can be expressed in the form of equality:

$$MRS_{XY}^{A} = MRS_{XY}^{Б} = MRT_{XY}.$$

For an economic system, there is a set of efficiency points for which the specified equality holds. These points form ***the curve of consumer possibilities***. It shows how the utility received by consumers changes with all possible options for the distribution of resources and manufactured products (Fig. 13.7).

Each point on the curve of consumer possibilities corresponds to an efficient variant of product and resource distribution. Along it, it is impossible to improve the position of one person without harming another.

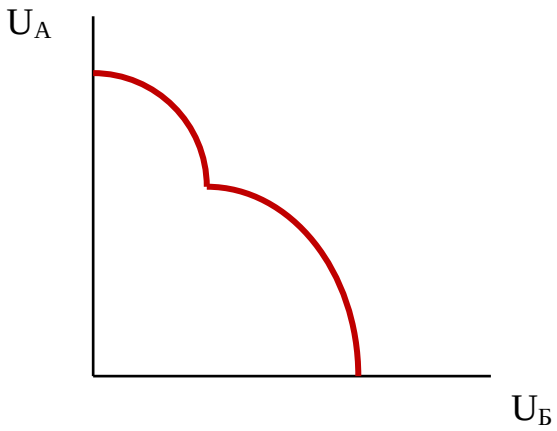


Fig. 13.7. The curve of consumer possibilities

Does the economic system provide an actual distribution of product and resources that would correspond to an efficient one? As was explained in the previous section, only a competitive market can provide such efficiency. All other models modify the distribution mechanism, which leads to a certain underutilization of resources and overpricing of products against a competitive market. However, this does not give grounds for unequivocally evaluating pure competition as a model, and all other models as those that should be eliminated. Each of them has certain positive consequences of its functioning, complements each other, and all of them together form a real functioning mechanism of the microsystem.

The main terms and concepts

Analysis of partial equilibrium
Analysis of general equilibrium
Feedback effect
Resource constraints
Edgeworth diagram
Production efficiency
Production possibilities curve
The limit rate of transformation
Distribution efficiency
Contractual curve
Pareto optimal allocation of resources
Curve of consumer possibilities

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