MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

SIMON KUZNETS KHARKIV NATIONAL UNIVERSITY OF ECONOMICS

MACRO- AND MICROECONOMICS

Textbook

Under the general editorship of PhD in Economics,
Associate Professor T. Cherkashyna

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The course of macro- and microeconomics is presented that considers economic relations between economic entities (households, enterprises, the state, the foreign economic sector) which are formed at the micro and macro levels.

For students, postgraduate students, lecturers as well as managers who are interested in actual economic problems.

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Contents

Introduction

The academic discipline "Macro- and Microeconomics" belongs to the cycle of natural science and general economic disciplines and is a basic theoretical discipline for the professional training of economists and managers. "Macro- and Microeconomics" is a complex combination of the two fundamental academic disciplines which are macroeconomics and microeconomics. The structural and logical scheme of studying "Macro- and Microeconomics" is needed for the preliminary mastering of the academic discipline "Economic Theory" or disciplines of secondary school containing theoretical and applied foundations of economics. Successful study of this academic discipline is possible only under the conditions of possession of theoretical knowledge of the conceptual and categorical apparatus of economic theory, the essence of economic phenomena and processes, understanding of the laws and main trends in the economic development of society. The combination of macroeconomics and microeconomics makes it possible to reveal the mechanism of functioning of national economic system based on the complex of macro- and microeconomic theories and economic modeling proved by Ukrainian and world science and tested by economic practice.

The purpose of learning the academic discipline is to develop students' basic knowledge of the theory and practice according to the functioning of national economy; thorough mastery of the essence of economic phenomena and processes; provision of the fundamental theoretical training necessary for further study of the cycle of economic disciplines; a deep understanding of the laws and the main trends of the economic development of society; disclosure of tools and mechanisms of economic development based on its most famous world models and strategies.

The objectives of the course are:

● determination of the essence of main macroeconomics problems and macroeconomics indicators and their relationship;

● analysis of main macroeconomic indicators, their correlation and measurement as well as the problems relating to them;

● investigation of theoretical and methodological problems of modern labor market;

● characteristics of households' income and consumption during modern economic cycle;

● determination of the functional role of investments in the modern economy;

● determination of equilibrium GDP in the conditions of different levels of employment;

● optimization of economic decisions of business entities taking into account the limitations imposed on their possibilities;

● analysis of the impact of restrictions that are imposed on the capabilities of business entities and explain the quality of decision-making.

The issues considered in the textbook are important for the future economist as they allow them to master the following competencies:

● the ability to demonstrate skills in searching, collecting and analyzing information, calculate indicators to prove managerial decisions;

● the ability to use management methods to ensure the effectiveness of the organization's activities;

and achieve the following learning outcomes:

● the ability to analyze the results of organization's activities, compare them with factors influencing the external and internal environment.

Knowledge of microeconomics is very important for effective management of enterprises. Understanding how factors such as demand, supply and competition affect prices, costs and profits helps companies make optimal decisions. Microeconomics provides students with the basic concepts and tools of economic analysis at the level of individual economic entities such as enterprises, markets of goods, services, labor and capital. It helps them understand how economic decisions are made and how these decisions affect market processes.

On the other hand, macroeconomics helps policymakers understand the impact of their decisions on households and individuals, analyze different economic strategies such as taxation, regulation and social programs.

Knowledge of macro- and microeconomics is key to many professions in the field of economics such as finance, business consulting, accounting, marketing, management, analytics and many others. Studying this academic discipline helps students prepare for a variety of career opportunities and understand their basic principles.

The textbook is a combination of the main microeconomic theories and contains educational trainings for each of the topics. Each topic of the text-book includes the list of goals and key terms, questions for self-assessment, practice tests of different levels of difficulty, computing tasks with examples of solutions, computing tasks for self-study, essay topics. Practice tests can

be used to check and control knowledge both in seminar classes and during distance learning.

The topics in the textbook are presented in a concise and logical order that brings the material as close as possible to the structured one. Each topic includes examples of practical tasks as well as helpful practical tips that explain theoretical concepts and stimulate students' imaginations.

Visual diagrams, tabular and graphic interpretation of the material are widely used which helps to focus on key points and contributes to the full assimilation of information.

The glossary and bibliography contain a series of pedagogically important references that may be useful for students.

Thus, the textbook contains almost all educational and methodological blocks that are necessary for the successful assimilation of the academic discipline "Macro- and Microeconomics" by students. At the same time, the textbook does not only help students in their studies but also creates a solid foundation for studying other economic disciplines.

Therefore, the study of macro- and microeconomics is an important component of the training of students of economic specialties because it provides them with the knowledge and skills necessary for a future successful career.

Content module 1. The main problems of microeconomics

Topic 1. Utility of economic goods. Economic choice. Analysis of consumer behavior

The purpose of studying the topic is to form the following students' competencies: determination of the subject of research and the features of microeconomics as an integral part of economic theory; the ability to analyze the need to make choice in conditions of limited resources; the ability to build the production possibilities curve, the indifference curve, the budget line and prove their practical significance; the ability to analyze the tools of micro-economic analysis.

Study questions:

1.1. The subject matter of microeconomics. The role of microeconomics.

1.2. The concept of utility. Indifference curves: the essence, the main features of construction.

1.3. Marginal rate of substitution. Consumer equilibrium.

1.4. Consumer reaction on changes in income and in the price of goods.

Recommended literature: [1, p. 64–87; 3, p. 33–55; 5, p. 5–35; 15, p. 2–12, 139–156; 19, p. 25–56].

Keywords: utility, marginal utility, law of diminishing marginal utility, indifference curves, budget constraint, budget line, marginal rate of substitution, Giffen's paradox, Giffen goods, income-consumption line, price-consumption line, Engel's laws, Engel curves, Torquinst curves.

1.1. The subject matter of microeconomics. The role of microeconomics

Microeconomics is a part of general economic theory that was formed in the late nineteenth and early twentieth centuries. However, the process of formation of microeconomic theory began in the works of representatives of the English Classical School as early as the eighteenth century. In particular, A. Smith, an outstanding English economist, proved a positive relationship

between the division of labour, competition, labour productivity and production efficiency thereby forming the foundations of modern functional analysis. In his turn, J.-B. Say, the famous French economist, proposed the theory of the three factors of production, according to which, in a market economy, the main factors of production are labour, land and capital, and, accordingly, the main sources of incomes for the main microeconomic actors are wages, rent and profit. However, the emergence of microeconomics as a separate scientific discipline took place only in the late nineteenth century as a result of the so-called marginal revolution. Marginalism is one of the key directions of world economic thought and representatives of Marginalism studied marginal values as interrelated phenomena at different levels (firm, industry, national economy as a whole) (Table 1.1).

Table 1.1

The main stages of the formation of microeconomics as a science

Stages	Characteristics of stages	Representative(s)	Contribution to the theory of microeconomics
1	2	3	4
First stage (1845 – 1890)	Formulation of the main methodological foundations of microeconomics	H. Gossen	He proposed the laws analyzing consumer behavior from the cardinal utility approach
		A. Dupui	He formulated the concept of price surplus that is a result of the consumer ability to buy each additional unit of good at a constant price
		A. Cournot	He proposed the concept of micro-economic equilibrium, the function of demand and the definition of elasticity of demand
		J. von Thünen	He formulated the laws of marginal analysis
Second stage (1890 – 1933)	Analysis of firm's behavior and its reaction to changes in income and price of goods	F. Edgeworth	He proposed indifference curves as the main methodological tool of the ordinal utility approach

Table 1.1 (the end)

1	2	3	4
		A. Marshall	He formed a synthetic economic theory that combines elements of the labor theory of value and the theory of marginal utility
		H. Giffen	He established a relationship between the dynamics of household incomes and the structure of consumption
		A. Pigou	He proposed a theory of social well-being
Third stage (1933 – 1990)	Analysis of firm's behavior under different types of market structures	E. Chamberlin	They investigated the peculiarities of determination of the price and the optimal volume of production under monopolistic competition
		J. Robinson	
		J. Neumann	He developed non-cooperative game theory as one of the modern tools of microeconomic analysis
		J. Schumpeter	He established the decisive importance of an entrepreneur in a national economic system
Fourth stage (1990 – present)	Investigation of institutional aspects of a market economy	R. Coase	He developed an economic approach to improve business efficiency based on the transaction cost theory
		D. North	He investigated the problem of ownership of property rights of various micro-economic subjects
		O. Hart	He developed the microeconomic theory of contracts
		B. Holmström	He determined the basics of management of a modern firm

Thus, modern microeconomics is a science studying the patterns of consumers' and producers' behaviour and revealing the mechanism of optimal economic decisions-making in conditions of limited resources.

The subject matter of microeconomics is the processes of economic choice made by economic actors in order to achieve their goals in the conditions of limited resources and unlimited human needs. In particular, the subject of microeconomics is the consumers' and producers' behaviour; market (micro-economic) supply and demand for a certain product; determination of optimal volume and price under different market structures (monopoly, oligopoly, monopolistic competition, perfect competition); setting of partial and general microeconomic equilibrium.

The subject matter of microeconomics is characterized by its purpose, objects and subjects.

The purpose of microeconomics is an analysis of the mechanisms for setting, disrupting and restoring microeconomic equilibrium and improving the efficiency of business entities.

The object of microeconomics is microeconomic level at which micro-economic actors interact between each other. The object of microeconomics is also economic categories determining the efficiency of business entities (price, costs, prime cost, profit, profitability, etc.) and how these categories form.

The main subjects of microeconomic processes are individuals, house-holds, enterprises (or firms), and state.

Individuals are consumers creating demand for goods and services and enterprises producing them.

The household (or family) is a microeconomic subject consisting of one or more persons living in a common area and having a common budget. Households is a microeconomic subject that performs two functions. The first function is economic that means distribution and consumption of goods, the accumulation of savings and their transformation into investment, determination of the most efficient options for investing money, production and reproduction of human capital, and inheritance of property. The second function is social that means giving birth and raising children who will be labor force in the future.

An enterprise (or firm) is a microeconomic subject that carries out the process of production of goods and services to make a profit. In the course of its economic activity, an enterprise is both a producer and a consumer: a producer of economic goods and a consumer of inputs (capital, labour, land, innovation, information, finance, etc.).

A state is a microeconomic subject that is represented by a government and local authorities so it is the main coordinator and regulator of economic processes in the country.

Households, individuals and enterprises form the private sector, and the state forms the public sector. All microeconomic subjects interact with each other, creating "flows" of expenditures and income (Fig. 1.1).

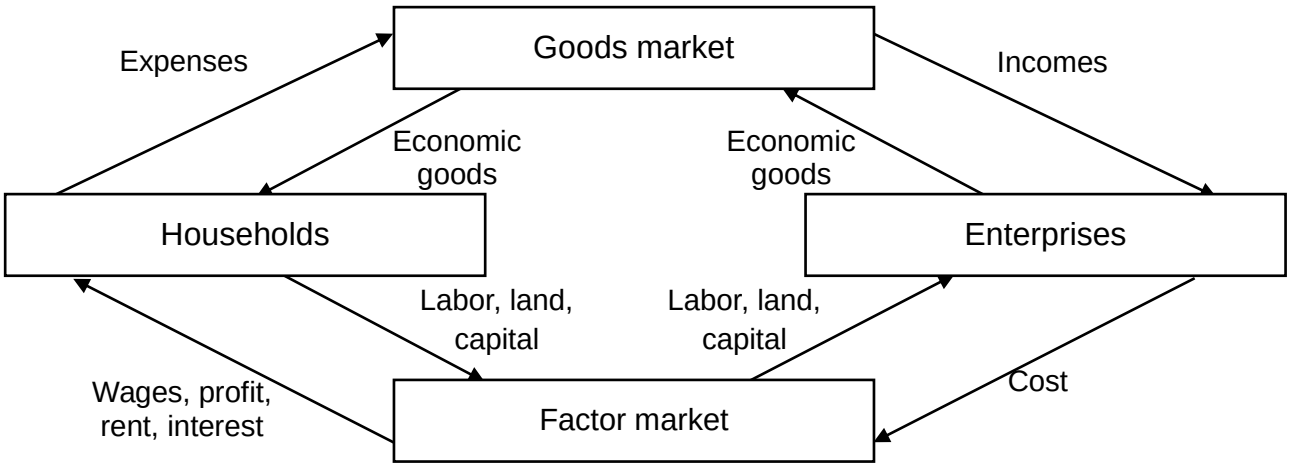


Fig. 1.1. **The model of circular flows**

As we can see, households and enterprises play a dual role in the economic cycle. In particular, households are buyers of final goods and services but, at the same time, they supply economic resources, primarily labor and financial resources, for production purposes so they are also owners of resources. For example, individuals' deposits on the commercial bank accounts are a source of credit and investment for the business sector, so households turn into sellers of inputs on the resource market. In turn, enterprises produce goods and services that society needs so they are sellers at goods market. However, on the market of production factors enterprises are buyers of inputs (e.g., when they hire labour force).

The functions of microeconomics are the following:

1) the theoretical and cognitive functions mean microeconomics studies and explain theoretical economic processes and phenomena;

2) the methodological function means microeconomics is the basis for the study of other economic disciplines such as economics of enterprise, financial economics, regional economics, global economics, etc.;

3) the practical function means microeconomics ensures the formation and implementation of economic policy at microlevel;

4) the prognostic function means microeconomics studies trends and develops models for predicting the economic agents' behaviour;

5) the ideological function means microeconomics forms a system of modern economic thinking, understanding and solving actual economic problems.

There are two types of microeconomic analysis. Positive microeconomic analysis explains the essence of economic phenomena, determines relationship between them, forms scientific ideas about the principles of economic agents' behaviour and answers the question "How is it?". On the contrary, normative microeconomic analysis provides evaluative judgements about the state of an economic object or entity according to certain criteria and concepts, helps to develop strategies for achieving normative goals and answers the question "How should it be?".

Taking into account all the above, it can be noted that the task of microeconomics is to ensure a stable state of equilibrium of the microsystem and search for the principles of optimal behaviour of economic entities, and the goal is to increase the efficiency of their activities.

Human needs are unlimited, while economic resources (capital, labour, land, innovation, information, finance, etc.) are limited. For that reason, the problem of resource scarcity is actual for all economic actors (individuals, households, enterprises, government). However, the problem of resource scarcity is relative rather than absolute. This is due to the fact that, firstly, the amount of available resources in the economy can change, and, secondly, any amount of resources is not enough to satisfy unlimited needs of society. In view of this, all microeconomic subjects make rational economic choices in the conditions of limited inputs. However, having chosen a certain option of using economic resources, they must refuse from other alternative options. The solution to the problem of rational choice under conditions of limited economic resources can be presented graphically in the form of a production possibility curve (frontier) or transformation curve (Fig. 1.2).

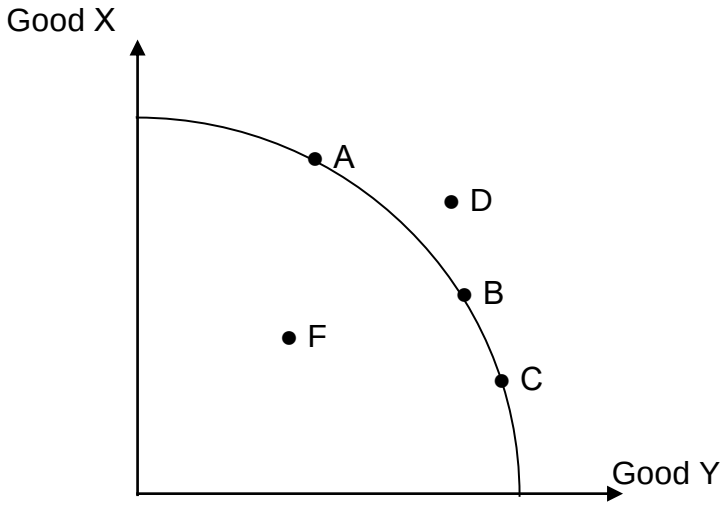
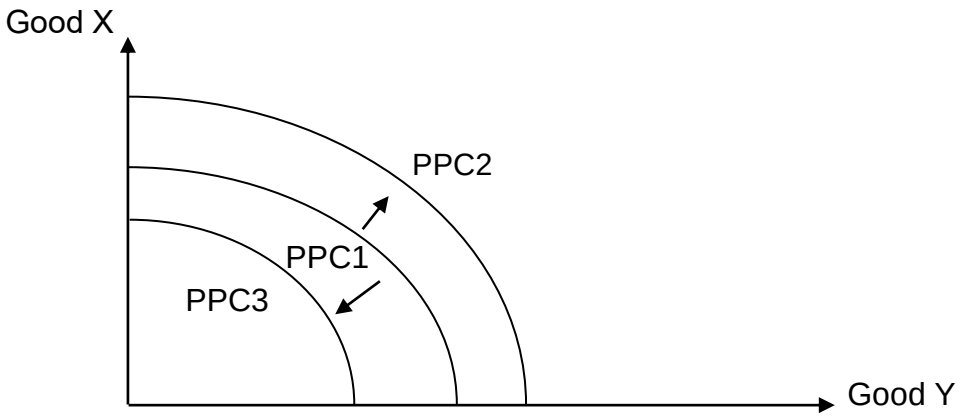


Fig. 1.2. **The production possibilities curve**

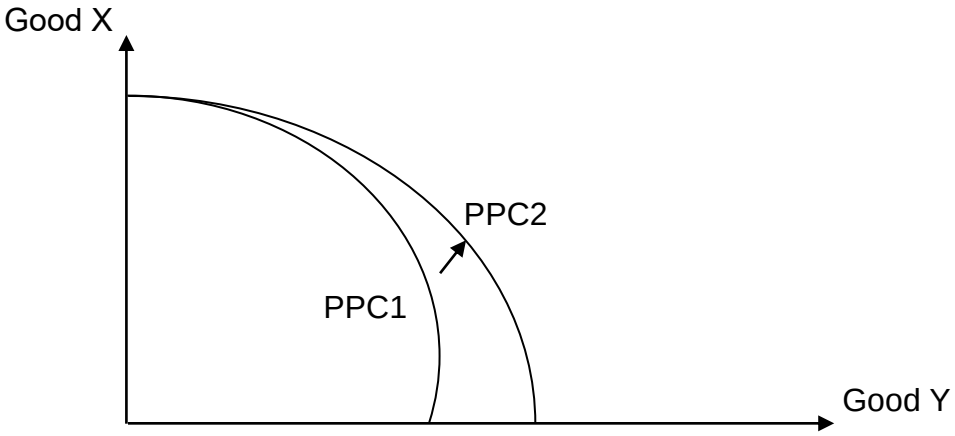
The production possibilities curve (PPC) (or transformation curve) is a geometric place of points showing the set of options for maximising the production of two economic goods under full use of available resources. In other words, the production possibilities curve shows the relationship between the cost of production (a set of inputs) and the result of production (volume of production). The main assumptions made to construct the production possibility curve (PPC) are the following:

- the curve describes the production of two goods or groups of goods (e.g., consumer and investment goods);
- the amount of inputs and the level of technology are fixed;
- all available economic resources are fully utilised.

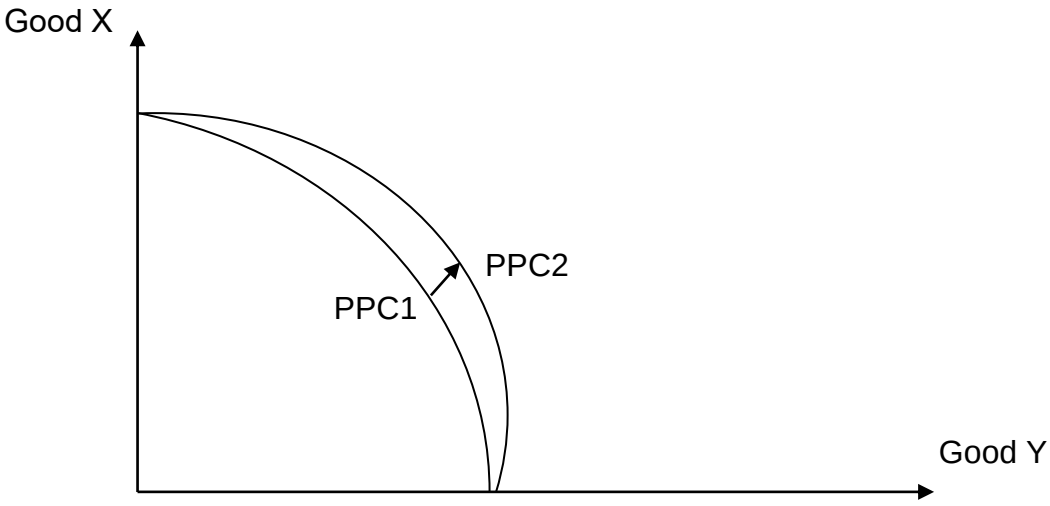
There are some features of the production possibilities curve (PPC). The first feature is a downward convex shape to the origin that is explained by imperfect interchangeability of inputs and increase in the opportunity cost of production. The second feature is the existing two types of production: efficient and inefficient production. Efficient production is observed when the maximum possible quantity of both goods is produced with full use of inputs (points A, B, C in Fig. 1.2). Inefficient production takes place if either inputs are not fully used (point F in Fig. 1.2) or inputs are insufficient (point D in Fig. 1.2). The last one is the movement of the production possibilities curve in consequence of both qualitative and quantitative changes. For example, due to qualitative changes (improvement of the educational and qualification level of employees, increase in labour productivity, implementation of the technical advance) or quantitative (increase in capital equipment, hiring additional employees, increase in land), the production possibilities curve will move upwards to the right (from PPC_1 to PPC_2, see Fig. 1.3a). On the other hand, negative trends in the development of a country or an enterprise (decrease in population, decline in labour productivity, use of outdated equipment, exhaustion of mineral resources, natural disasters, epidemics, etc.) lead to a downward movement of the production possibilities curve (from PPC_1 to PPC_3, see Fig. 1.3a). However, quite often there are changes in the quantity or quality of inputs to the production of only one of the two goods. In this case, the production possibilities curve will not move, but only its slope will change (Fig. 1.3b, 1.3c).



a) the impact of qualitative and quantitative changes in inputs for production of two goods



b) the impact of qualitative and quantitative changes in inputs for production of good X



c) the impact of qualitative and quantitative changes in inputs for production of good Y

Fig. 1.3. **The impact of factors on shifting of the production possibilities curve**

It should be added that the analysis of the production possibilities curve allows you not only to determine the efficiency of the choice of business entities under conditions of limited resources but also study trends in the change of the opportunity cost.

Opportunity cost is a cost of production of economic goods estimated taking into account the lost opportunities of the use of them for the production of other (alternative) goods.

The opportunity cost of production is the amount of one good (good X) that must be sacrificed in order to increase the production of another good (good Y) by one unit. It is calculated using the following formula:

$$\text{Opportunity cost of good X (AB)} = \frac{Y(A) - Y(B)}{X(B) - X(A)}, \qquad (1.1)$$

where X(A) is the volume of good X at the combination A;
X(B) is the volume of good X at the combination B;
Y(A) is the volume of good Y at the combination A;
Y(B) is the volume of good X at the combination B.

For example, according to formula (1.1) the opportunity cost of production of consumer goods moving from combination A to combination B equals −1 ($\text{Opportunity cost of good (AB)} \ \frac{1-0}{14-15} = -1.$)

Thus, in economics, the opportunity cost of production is the value of lost opportunities or the amount of one good that must be sacrificed to increase the production of another good. In finance, the opportunity cost of production takes into account the loss of real money spent on the chosen alternative as well as the greatest possible monetary benefits that would be lost if the next most important alternative was sacrificed.

1.2. The concept of utility. Indifference curves: the essence, the main features of construction

One of the key concepts of modern microeconomics is the concept of utility. The notion of utility was proposed by J. Bentham who defined it as measure of satisfaction that an individual gets consuming a good. That economic category was gradually proved and complemented by the representatives of

Marginalism. According to the Marginalist economic theory, the value of goods is determined by the utility of the last unit of a good, and the utility of the good, in turn, depends on its rarity. In other words, utility is an ability of an economic good to satisfy human needs which can be measured quantitatively.

In modern microeconomics, there is a difference between total and marginal utility. The term "marginal utility" was introduced into scientific circulation by F. von Wieser, the famous German marginal economist, in 1883. According to Wieser, utility is a subjective value, so the utility of any good may be different for different consumers but it changes as the consumption of the good increases. For example, the maximum utility of the consumption of good X is achieved at point C that corresponds to 8 units of good X (Fig. 1.4). This means that the amount (8 units) fully satisfies the consumer's needs for this good and if consumption increases to 10 units, then the utility will gradually decrease and may even become negative.

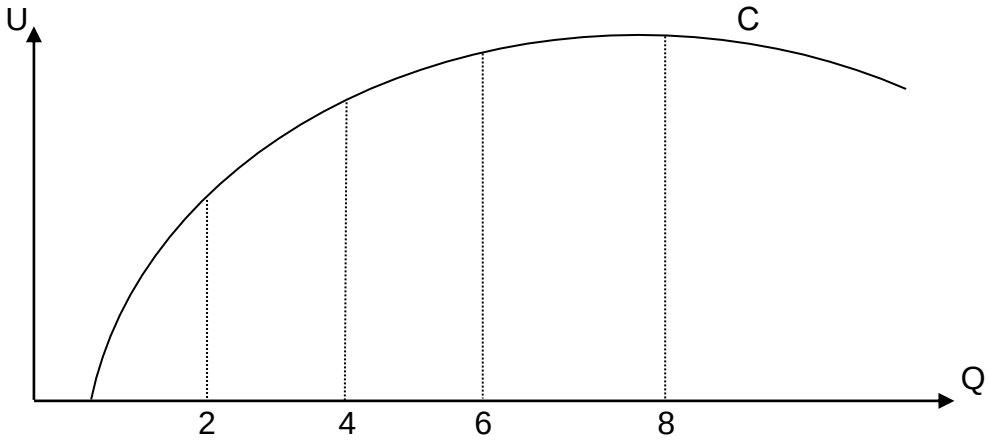


Fig. 1.4. **The utility curve**

Based on Wieser's economic doctrine, W. Jevons, the famous British economist, defined the concept of marginal utility and proved that marginal utility, not total utility, closely relates to the process of setting the market price for a product.

Let's distinguish between "total utility" and "marginal utility". Total utility is a satisfaction or happiness that an individual gets from consumption of all units of good. The total utility function can be defined by assigning a numerical value to each consumer basket. This is how it becomes possible to provide a quantitative ranking of individual consumer baskets: a rational consumer will always choose the basket with the highest amount of utility. In a generalised

form, total utility can be represented as a utility function that determines positive relationship between the quantity of a good and the level of utility derived by the consumer:

$$TU = f(Q_X, Q_Y \dots Q_Z), \quad (1.2)$$

where TU is total utility;

Q_X, Q_Y, Q_Z are quantities of goods consumed (goods X, Y, Z accordingly).

If an individual consumes only two goods (X and Y), then the total utility function will be simplified:

$$TU = f(Q_X, Q_Y). \quad (1.3)$$

On the other hand, total utility is a sum of marginal utilities so it can be calculated as:

$$TU = U_1 + U_2 + \dots U_N, \quad (1.4)$$

where U_1 is the utility of the first unit of good;

U_2 is the utility of the second unit of good;

U_N is the utility of the *n*-th unit of good.

It should be noted that utility functions differ for different groups of goods:

for substitute goods:

$$TU = A_X + B_Y, \quad (1.5)$$

where A_X is consumer preferences of the set of goods X;

B_Y is consumer preferences of the set of goods Y;

for complementary goods:

$$TU = \min\{A_X; B_Y\}; \quad (1.6)$$

for two absolutely independent (neutral) goods:

$$TU = A_{X0} + B_{Y0}; \quad (1.7)$$

for goods if good X is neutral:

$$TU = B_Y; \quad (1.8)$$

for two anti-goods:

$$TU = -A_X - By; \quad (1.9)$$

for goods if good X is an anti-good:

$$TU = -A_X + B_Y; \quad (1.10)$$

for two quasilinear goods:

$$TU = f(x) + B_Y. \quad (1.11)$$

The entire set of economic goods that an individual will buy on limited budget is a consumer basket. The total utility of the consumer basket can be determined by adding the values of the marginal utility of each unit of a good. But in real life, a consumer, as a rule, is not able to quantify the difference between utilities of goods. That is why the cardinal approach to the analysis of consumer behavior is somewhat limited. It is most expedient for a consumer to determine how much one set of goods is more attractive than another. Subsequently, it was this approach to the analysis of consumer behavior that was applied in the ordinal utility model.

Marginal utility is a satisfaction that an individual gets from consumption one additional unit of good. It is calculated using the following formula:

$$MU = \frac{\Delta TU}{\Delta Q}, \quad (1.12)$$

where MU is marginal utility;

ΔTU is the increase in marginal utility;

ΔQ is the increase in the quantity of goods.

Marginal utility of goods can also be calculated as a derivative of the total utility function. In that case the formula for the calculation of marginal utility will be the following:

$$MU = \frac{\delta TU}{\delta Q}. \tag{1.13}$$

The dynamics of total utility of consumption of bananas is given in Table 1.2.

Table 1.2

The dynamics of total utility

Quantity of bananas, number of pieces	Total utility of bananas, utils	Marginal utility of bananas, utils
1	50	50
2	85	35
3	110	25
4	120	10
5	125	5

Calculate marginal utility of bananas using the formula (1.12):

$$MU_2 = \frac{85\,\text{utils} - 50\,\text{utils}}{2\,\text{pieces} - 1\,\text{pieces}} = 35;$$

$$MU_3 = \frac{110\,\text{utils} - 85\,\text{utils}}{3\,\text{pieces} - 2\,\text{pieces}} = 25;$$

$$MU_4 = \frac{120\,\text{utils} - 110\,\text{utils}}{4\,\text{pieces} - 3\,\text{pieces}} = 10;$$

$$MU_5 = \frac{125\,\text{utils} - 120\,\text{utils}}{5\,\text{pieces} - 4\,\text{pieces}} = 5.$$

In modern microeconomics, there are two approaches to the analysis of consumer behavior. These are cardinal (or quantitative) and ordinal (Table 1.3).

Table 1.3

Comparative analysis of microeconomic approaches to the analysis of consumer behavior

Criteria	Cardinal approach	Ordinal approach
Representatives	F. von Wieser, G. Gossen, W. Jevons, A. Marshall, D. Robertson	R. Allan, J. Hicks, R. Giffen, F. Edgeworth, V. Pareto, E. Slutsky
Key statements	1. Utility can be quantified. 2. The unit of measurement of the utility of a good is util	1. Consumer's ability to rank goods in accordance with his wants. 2. Availability of multiple choices (alternatives) of consumption
Main principle of rational consumer behavior	A consumer maximizes utility by choosing the good with the highest total utility	A consumer maximizes utility by preferring one set of goods compared to another set (a set of goods X comparing to a set of goods Y)
Analysis tools	Determination of the total and marginal utility of a good as well as the marginal utility of money	Building of budget lines and indifference curves
Consumer equilibrium	Mathematical (algebraic) determination of consumer equilibrium (optimum) according to the second Gossen's law	1. Mathematical (algebraic) determination of the consumer's equilibrium (optimum) by formation of a system of equations, one of which is a mathematical interpretation of the second Gossen's law and the second equation is the consumer's budget constraint. 2. Graphical interpretation of the consumer equilibrium (optimum) by building a budget line and an indifference curve on the same graph

According to the cardinal approach to the analysis of consumer behavior, the tendency of the marginal utility to change is usually diminishing (Fig. 1.5): it decreases as each additional unit of a good is consumed. This is the essence of the first Gossen's law (or the law of diminishing marginal utility). At the same time, the total utility tends to increase and reaches its maximum when the marginal utility of a good equals 0. It should be added that the first

Gossen's law corresponds to the basic psychophysical law proposed by M. Weber and G. Fechner. Weber – Fechner's law determines a positive relationship between the degree of a motivating stimulus and the intensity of sensations. These researchers proved that stimuli of the same intensity repeated over a certain period of time, as a rule, lead to a decrease in the intensity of sensations.

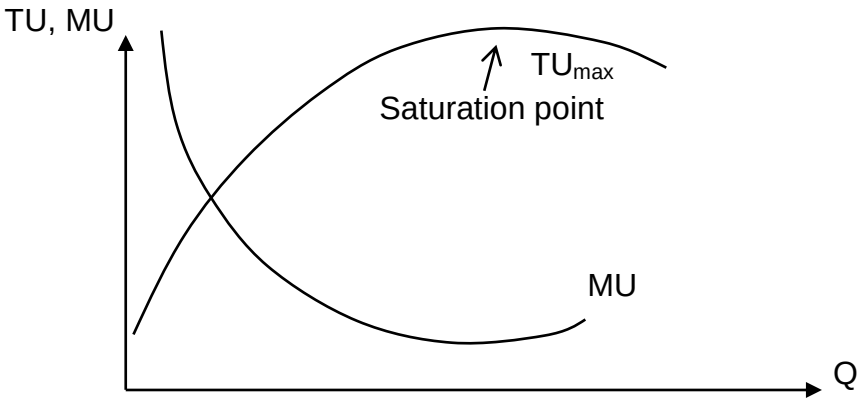


Fig. 1.5. **The relationship between total and marginal utility**

For example, to build the graph of total and marginal utility, it is needed to transfer data from Table 1.2 to Fig. 1.6. The quantity of bananas is on the horizontal axis and utility is on the vertical axis.

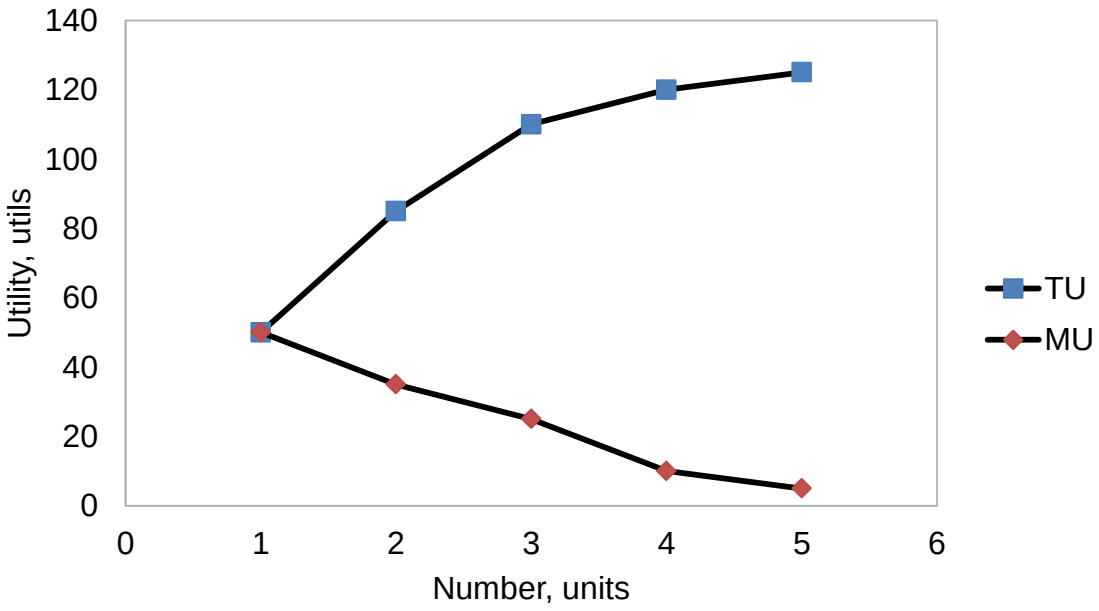


Fig. 1.6. **The total utility and marginal utility curves**

The effect of the law of diminishing marginal utility leads to the formation of consumer surplus that is the difference between the total utility and the market price of a product. From the point of view of the cardinal theory, the economic essence of consumer surplus is that the consumer receives a surplus of utility from the consumption of all units of a good, except for the latter, since all previous units of the good, except for the last one, are valued by the consumer higher. Also, in modern microeconomics, there is a concept of producer surplus that is the difference between the actual total revenue and the minimum total revenue for which an entrepreneur is willing to sell this amount of goods.

However, there are also exceptions to the first Gossen's law. Such exceptions include economic goods, the saturation limit from the consumption of which does not exist. On the contrary, as the consumption of these goods increases, marginal utility also increases. For example, these can be goods bought by collectors, shoppers or gamblers.

With the cardinal approach to utility, an individual is in an equilibrium and gets the maximum utility if the second Gossen's law (or the rule of utility maximization) is fulfilled. That law states that the ratio between marginal utilities and prices (MU / P) must be equal for all goods or services. It is mathematically described as:

$$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y} = \frac{MU_X}{MU_Y} = \frac{P_X}{P_Y}, \qquad (1.14)$$

where MU_X is the marginal utility of good X;

P_X is the price of good X;

MU_Y is the marginal utility of good Y;

P_Y is the price of good Y.

For example, if marginal utility of good A equals 75 utils, marginal utility of good B equals 30 utils, price of good A is 5 euros, price of good A is 2 euros, then an individual will be in the equilibrium:

$$\frac{75 \text{ utils}}{5 \text{ euros}} = \frac{30 \text{ utils}}{2 \text{ euros}} = 15.$$

At the same time, if marginal utility per 1 euro is not equal for different goods, then in order to achieve market equilibrium, a consumer must change the structure of the consumer basket. It means that the consumer must spend more money on goods with higher utility and less money on goods with lower

utility. For example, if the marginal utility of good A equals 75 utils, the marginal utility of good B equals 50 utils, the price of good A equals 5 euros, the price of good B equals 10 euros, then a consumer must increase the consumption of good A ($(MU_A / P_A) > (MU_B / P_B)$):

$$\frac{75}{5} > \frac{50}{10}, \quad \text{or } 15 > 5. \tag{1.15}$$

Another important thing for analysis of consumer behavior with the cardinal utility approach is determination of marginal utility of money. It is calculated using the following formula:

$$\lambda = \frac{MU}{P}, \tag{1.16}$$

where λ is marginal utility of money.

As we see, a rational consumer can maximize the utility of good X if he stops consuming it. Then the marginal utility of the last consumed unit will be zero, that is, it will not be able to add any more satisfaction.

The representatives of the ordinal utility approach (R. Allan, F. Edgeworth, V. Pareto, J. Hicks) analyzed consumer behavior in another way. From their perspective, utility of a good cannot be measured. For instance, F. Edgeworth proposed to determine the utility of a good comparing a set (combinations) of some goods with others and thus identifying which combination of goods the consumer prefers. The methodological tools of the ordinal theory of consumer behavior are indifference curves and budget lines.

An *indifference curve* (or *an isoutility curve*) is a set of combinations of goods and services providing the consumer with the same level of satisfaction of needs. In other words, the consumer is indifferent to all sets of goods because they provide the same utility for him. For example, according to the data given in Table 1.4, the consumer is indifferent to both combination A and combination B. It means that for the consumer it makes no difference whether to buy 2 kg of grapes and 8 kg of sausages or 5 kg of grapes and 3 kg of sausages. Therefore, indifference curves allow us to identify the consumer's preferences and the possibilities of changing one good for another good but they do not show which set of goods is the most profitable for consumer.

Table 1.4

Data for building the indifference curve

Combination	Grapes, kg	Sausages, kg
A	2	8
B	4	5
C	5	3
D	7	1

To construct the indifference curve, it is necessary to transfer the data from Table 1.4 to the graph by matching one good (grapes) on the horizontal axis and another good (sausages) on the vertical axis and connecting all the points (Fig. 1.7).

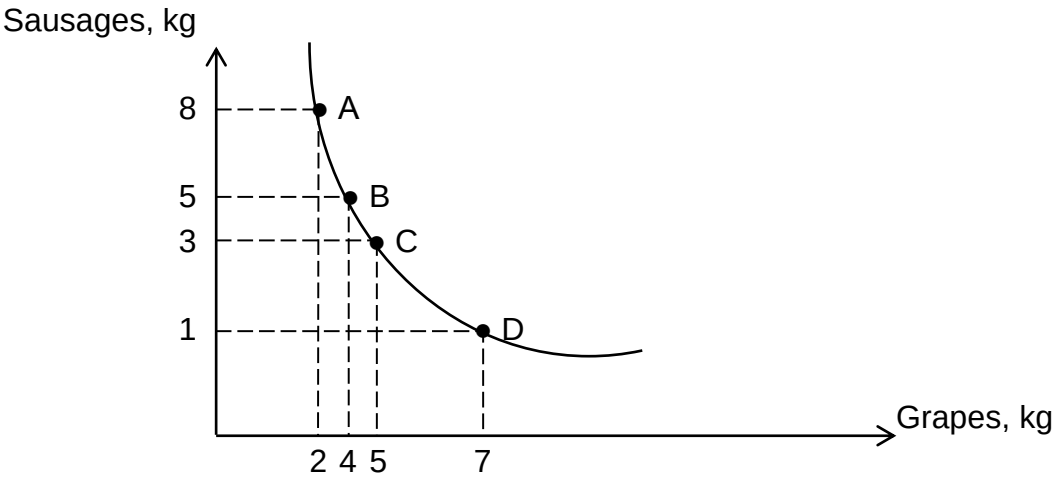


Fig. 1.7. **The indifference curve**

As we see, the indifference curve looks like a monotonically descending curve convex to the origin of the coordinate system. This type of indifference curves indicates that an increase in the consumption of one good necessarily leads to a decrease in the consumption of another good. However, in practice, the graphical interpretation of the indifference curves for different groups of goods can differ significantly. In particular, for substitute goods indifference curves can be presented in the form of a descending line (Fig. 1.8a), for complementary goods – in the form of a right angle (Fig. 1.8b), for neutral goods – in the form of a vertical line (Fig. 1.8c), for quasi-linear goods – in the

form of a clearly monotonic curve (Fig. 1.8d), for anti-goods – as a curve with a positive slope (Fig. 1.8e).

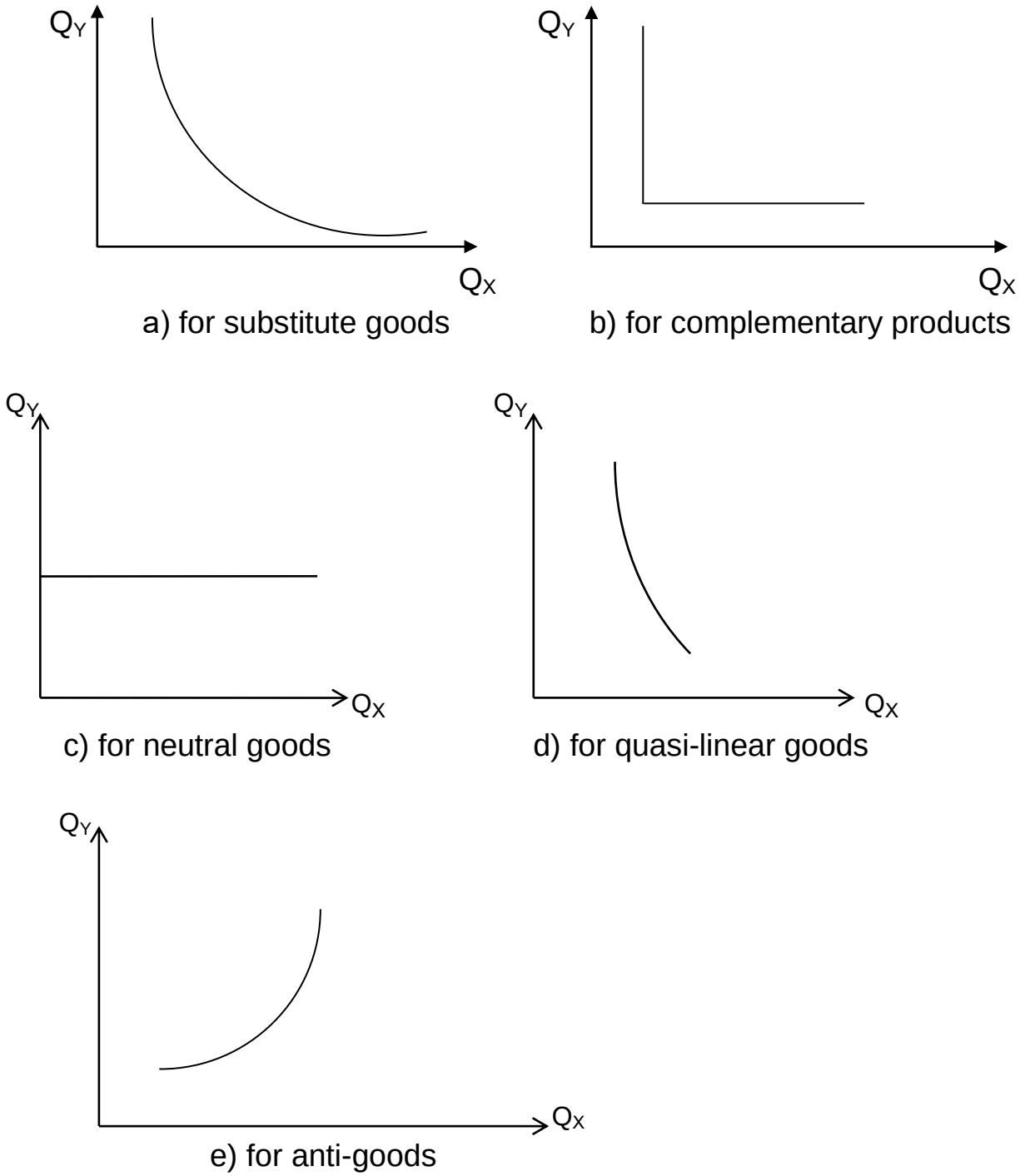


Fig. 1.8. **Indifference curves for different product groups**

The set of indifference curves each of which characterizes a different level of utility for the consumer is the indifference map (Fig. 1.9), and the farther from the origin the indifference curve is situated, the higher is utility for the consumer.

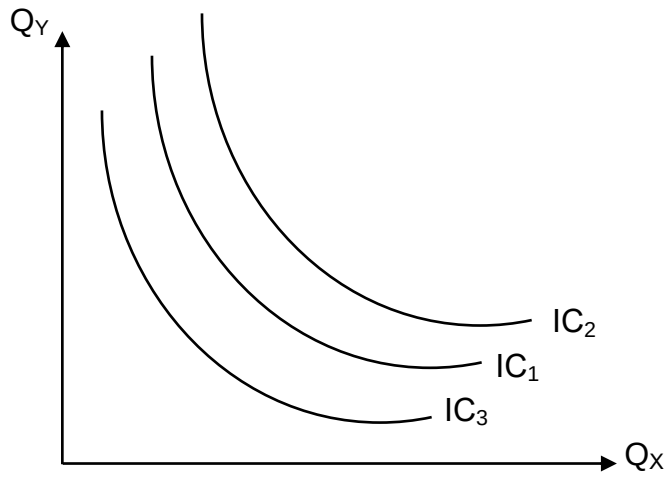


Fig. 1.9. **The indifference map**

So the indifference curve IC_1 has higher utility (TU = 50 utils) than the indifference curve IC_2 (TU = 20 utils) but lower utility than the indifference curve IC_3 (TU = 80 utils) that is shown in Fig. 1.9.

1.3. Marginal rate of substitution. Consumer equilibrium

The consumer behavior depends on the price of a product and incomes such as wages, salaries, entrepreneurial income (profit), rent, dividends, transfers and other payments. Because all incomes are fixed, a consumer budget is limited, that means the consumer can purchase a limited number of goods or services with his income. The budget constraint of a consumer can be mathematically described as:

$$I = P_X \cdot Q_X + P_Y \cdot Q_Y, \qquad (1.17)$$

where I is consumer income;

P_X is the price of good X;

Q_X is the quantity of good X;

P_Y is the price of good Y;

Q_Y is the quantity of good Y.

To determine the sets of goods available to the consumer, representatives of the ordinal theory use the following concepts: marginal rate of substitution and budget lines (price lines or cost lines).

The marginal rate of substitution shows an amount of one good the consumer is willing to refuse from in order to increase the consumption of

another good by one unit. Marginal rate of substitution is calculated using the following formula:

$$MRS_{XY} = \frac{-MU_X}{MU_Y} = \frac{-P_X}{P_Y} = \frac{-\Delta Q_Y}{\Delta Q_X}, \qquad (1.18)$$

where MRS_{XY} is marginal rate of substitution of good X for good Y.

The indifference curve becomes flatter as you move down along it, at the same time, the meaning of the marginal rate of substitution gradually decreases, as the amount of good Y, which the consumer is ready to refuse from in order to increase the consumption of good X, decreases. That statement is proved by Fig. 1.10. For example, when moving from point A to point B marginal rate of substitution of fish for meat equals −0.5 ($MRS = \frac{10\text{ kg} - 16\text{ kg}}{2\text{ kg} - 1\text{ kg}} = -6$), when moving from point B to point C it equals −4 ($MRS = \frac{6\text{ kg} - 10\text{ kg}}{3\text{ kg} - 2\text{ kg}} = -4$).

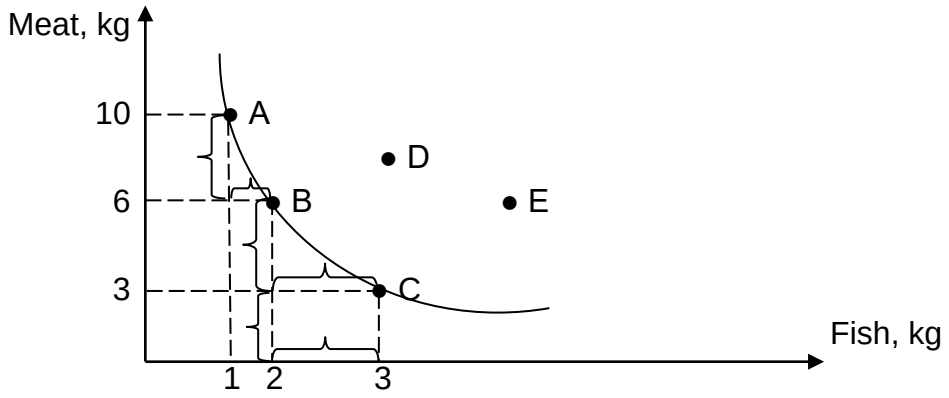


Fig. 1.10. **Marginal rate of substitution**

The zones of the indifference curve on which the substitution of one good for another is possible (points A, B, C in Fig. 1.10) are the *substitution zones*. Outside this zone, the substitution of goods is impossible (points D and E in Fig. 1.10) so the indifference curve becomes parallel to the coordinate axes.

A *budget line* is a line that shows what amount of the two goods a consumer can purchase with a certain income and a given price level. Suppose a consumer income equals 12 euros, price of bananas equals 1 euro/kg and price of oranges equals 1.5 euro/kg. To construct the budget

line (Fig. 1.11), it is necessary to find two extreme points showing the maximum quantity of bananas and oranges available to the consumer:

$$Q_{ban} = \frac{I}{P_{ban}} = 12\ \text{kg};\ Q_{orange} = \frac{I}{P_{orange}} = 8\ \text{kg}.$$

Any point (point A, B or C) on the budget line (see Fig. 1.11) is available to the consumer. If the point is below (inside) the consumer's budget line (point E), then the consumer's income is not fully spent. If the point is above (outside) the budget line (point D), then the combination of goods is unaffordable for the consumer because he or she does not have enough money.

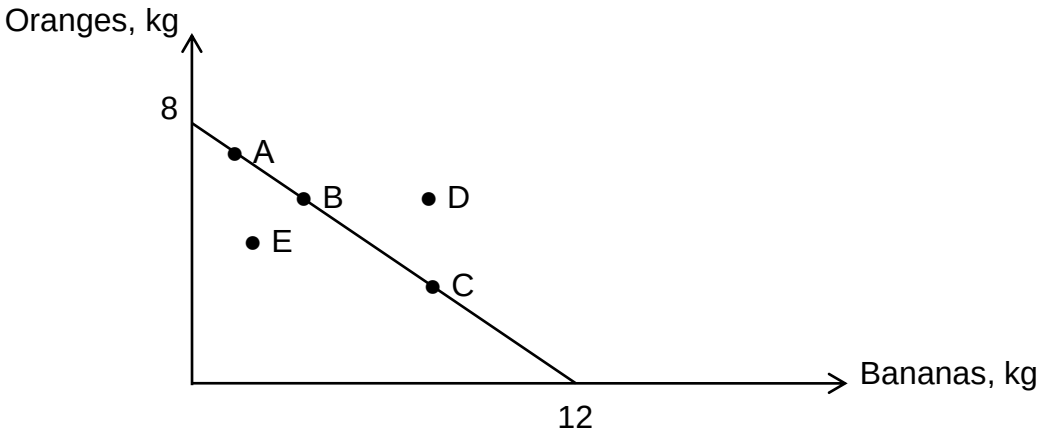


Fig. 1.11. **The budget line**

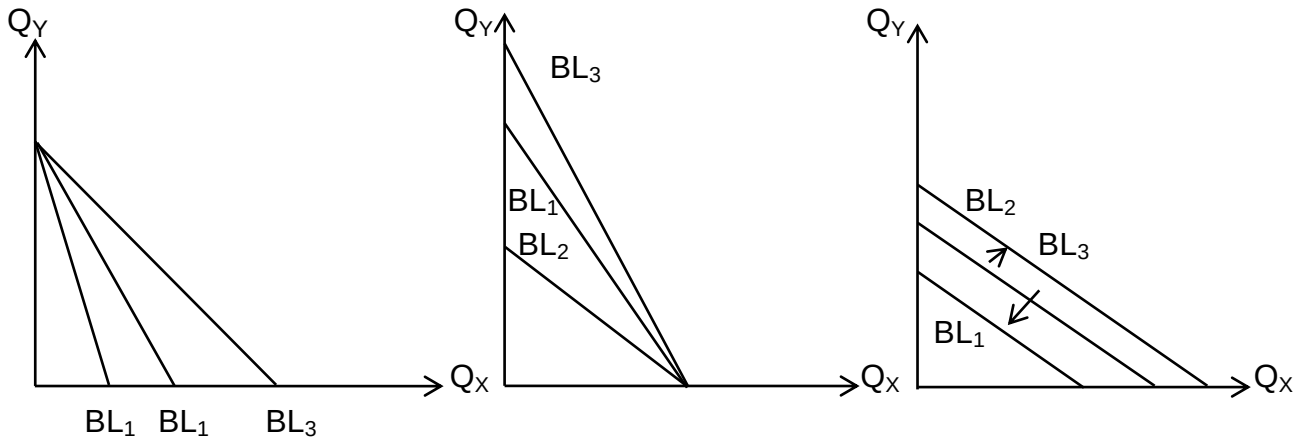
The characteristics of budget lines are the following*:*

1) they slope negatively because in order to increase consumption of one good the consumer must refuse from a certain amount of another good;

2) changes in the price of one product lead to a change in the angle of inclination of budget lines (Fig. 1.12a, 1.12b);

3) changes in consumer income lead to shifting of budget lines either to the left (if income increases) or to the right (if income decreases) (Fig. 1.12c);

4) the further they are from the origin, the more goods a consumer can buy, and, on the contrary, the closer they are to the origin, the fewer goods a consumer can buy.



a) the impact of changes in the price of good X

b) the impact of changes in the price of good Y

c) the impact of changes in income

Fig. 1.12. **The impact of changes in prices and consumer income on the position of the budget line**

If the budget line and the indifference curve are represented in the same coordinate system, there will always be a point where they touch each other. It is the point characterising the consumer's equilibrium in the market (point E in Fig. 1.13).

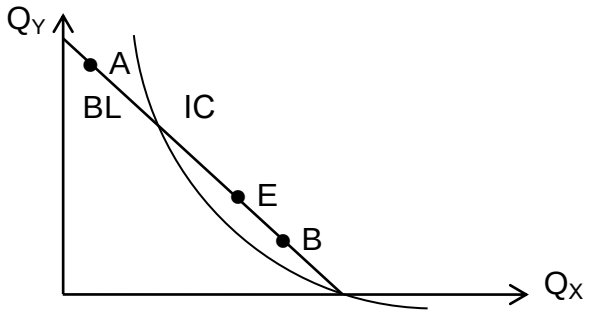


Fig. 1.13. **Consumer equilibrium**

The zone above the budget line is unattainable for the consumer, and below the budget line it is undesirable for him. The points on the budget line (points A, B) correspond to the consumer's budget but provide with lower utility than the set of goods X and Y corresponding to point E.

The consumer's equilibrium (optimum) means that the consumer satisfied all needs for both goods, spent all income, and the marginal utilities of the goods are proportional to their prices. That can be mathematically represented as

a system of equations in which the first equation is the utility maximizing rule (or the second Gossen's law) and another equation is a budget constraint:

$$\begin{cases} \dfrac{MU_X}{P_X} = \dfrac{MU_Y}{P_Y}, \\ I = P_X \cdot Q_X + P_Y \cdot Q_Y . \end{cases} \qquad (1.19)$$

1.4. Consumer reaction to changes in income and changes in the price of good

Changes in budget (income) and changes in prices for goods impact significantly the consumer behavior. Let's analyze these situations in more detail.

First, let's analyze the consumer's reaction to changes in income. Suppose the consumer is in an equilibrium that corresponds to point E_1 (Fig. 1.14). Change in consumer's income results in shifting of budget line from BL_1 to BL_2, BL_3, BL_4 that leads to the formation of other indifference curves (IC_2, IC_3, IC_4) and setting of new points of the consumer's equilibrium (E_2, E_3). Connect all the points of consumer equilibrium (E_1, E_2, E_3) and obtain the "income – consumption" curve showing different optimal sets of goods for the consumer if income changes ($I_3 > I_4 > I_2 > I_1 > I$) but prices are stable (P_X = const, P_Y = = const).

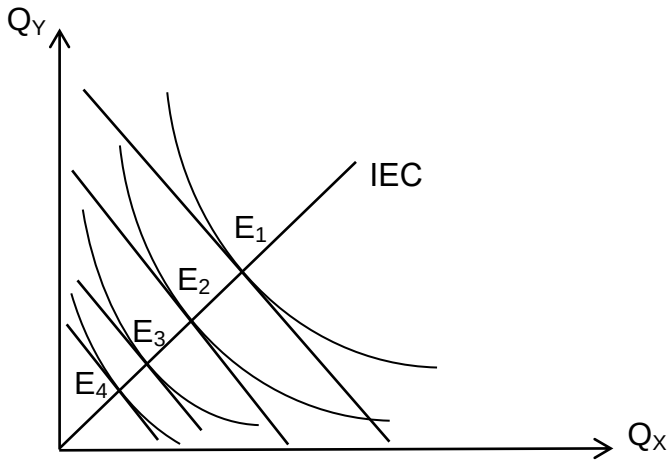
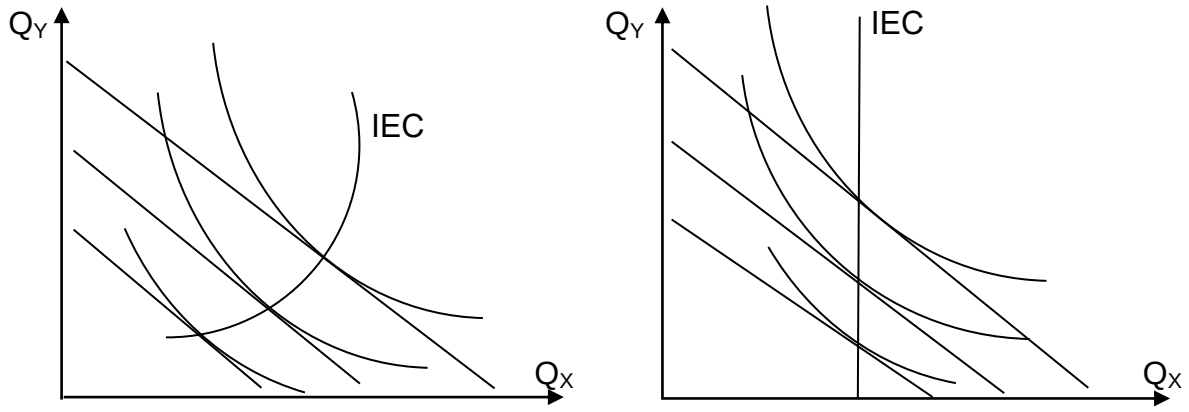


Fig. 1.14. **The "income – consumption" curve for normal goods**

As shown in Fig. 1.14, the "income – consumption" curve for normal (or superior) goods monotonically increases and slopes positively, that indicates a positive relationship between change in income and quantity of both consumed goods. However, the form of the "income – consumption" curve may differ for other groups of goods. For example, if a consumer income increases, then the quantity of a normal consumed product decreases because the consumer begins to evaluate that product as a product of low quality (an inferior good) so the "income – consumption" curve will slope negatively (point E_4 in Fig. 1.15a). At the same time, the "income – consumption" curve for neutral goods (salt, sugar, cereals, medicines, hygiene products, etc.) is vertical because the quantity of consumption of these goods does not depend on the dynamics of the consumer's income (Fig. 1.15b).

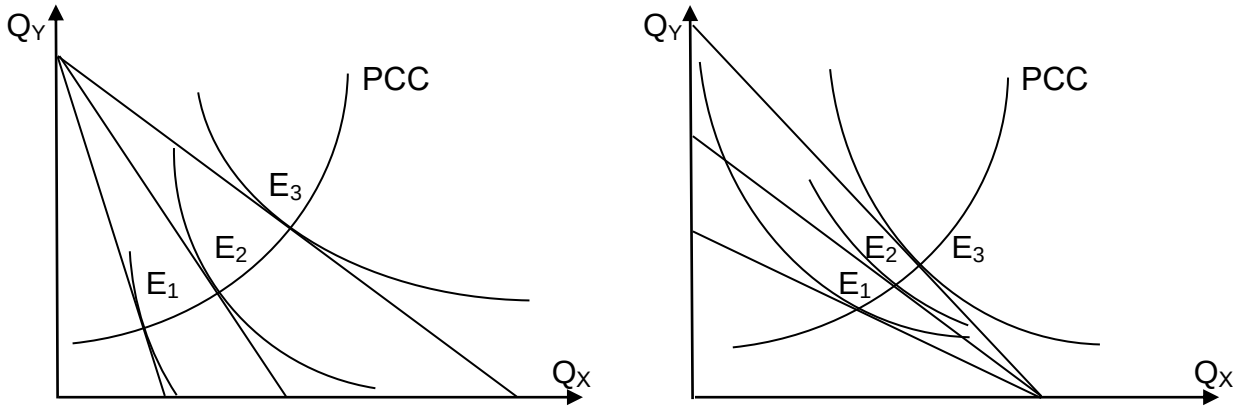


a) for low quality products b) for neutral products

Fig. 1.15. **The "income – consumption" curve for different groups of goods**

Now let's analyze the consumer's reaction to a change in the price of one of the two goods. Suppose that a consumer is in initial equilibrium (point E_1 in Fig. 1.16a). Changes in the price of product X result in shifting of the budget line from BL_1 to BL_2, BL_3, BL_4 that leads to the formation of other indifference curves (IC_2, IC_3, IC_4) and setting of new points of the consumer's equilibrium (E_2, E_3). Connect all the points of consumer equilibrium (E_1, E_2, E_3) and obtain the "price – consumption" curve showing different optimal sets of goods for the consumer in case of changes in the price of one product ($PX_1 < PX_2 < PX_3$), stable prices for another product (P_Y = const) and fixed income (P = const).

As we see from Fig. 1.16, the "price – consumption" curve (PCC) slopes positively: if the price of one product decreases, the quantity of both consumed goods increases, and, on the contrary, if the price of one product increases, the quantity of both consumed goods declines.

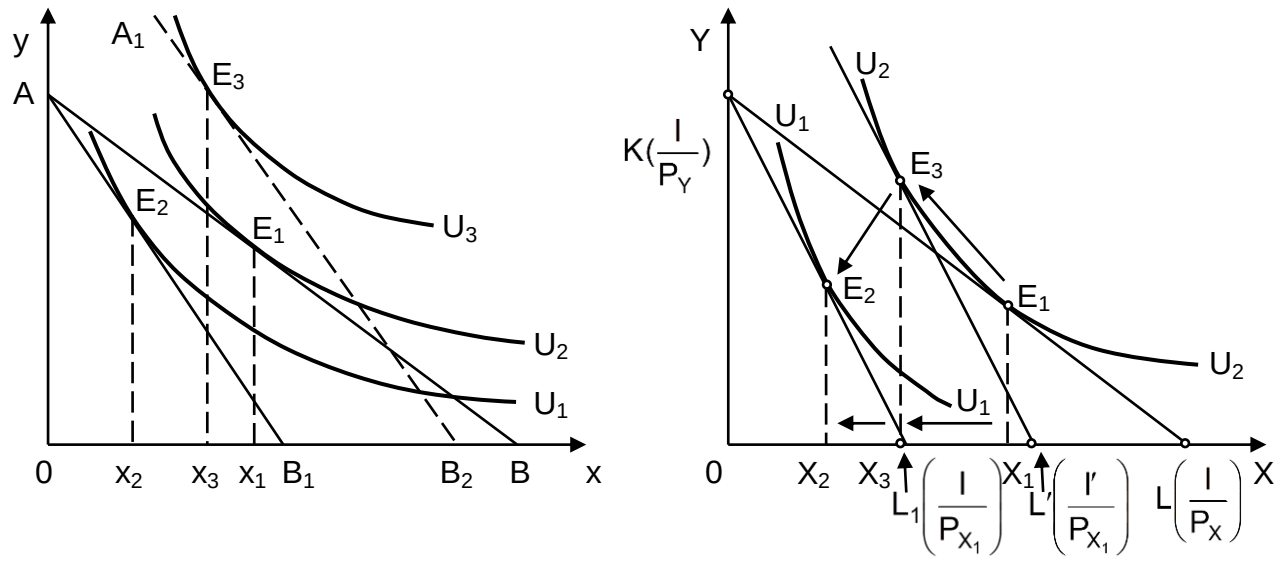


a) in case of a change in the price of product X

b) in case of a change in the price of product Y

Fig. 1.16. **The "price – consumption" curve**

The consumer's reaction to a change in price differs. On the one hand, a decrease in the price of a certain product makes the consumer richer that is explained by new consumer's opportunity to spend the saved part of budget to purchase other goods. It is an *income effect*. On the other hand, a change in the price of a certain product leads to a change in the structure of consumer consumption: the share of consumption of normal goods increases and the share of consumption of inferior (cheap) goods declines. It is a *substitution effect*. This was first noticed by E. Slutsky, the famous Ukrainian economist, in 1915, and later by J. Hicks, an outstanding British scientist, in the mid-30s of the twentieth century. To explain the action of these effects, both economists used a *compensatory budget line* that is an additional line showing a change in the structure of the consumer's set of goods in the case of a change in the relative prices for both goods (Fig. 1.17).



a) according to Slutsky b) according to Hicks

Fig. 1.17. **Interaction of substitution and income effects**

However, E. Slutsky proposed to build the budget line A_1B_2 through the initial point of the consumer's equilibrium E_1 and parallel to the budget line AB_1 (Fig. 1.15a). As a result, according to Slutsky, a new point of the consumer's equilibrium (point E_3) shows a new ratio of prices for both goods as a result of the impact of an increase in the price of product X. At the same time, J. Hicks built the compensatory budget line as tangent to the initial indifference curve U_2 (Fig. 1.15b) and indicated that increase in the price of goods X results in changes in the consumer set of goods by increasing the quantity of good X but remaining at the same level of utility. As movement from E_1 to E_2 shows only the impact of price changes, the increase in the quantity of goods (from X_1 to X_2) acts through the substitution effect. At the same time, the substitution effect encourages the consumer to increase demand for product X and reduce the consumption of product Y which is represented as a movement along the indifference curve.

As we see, the interaction of income and substitution effects results in an increase in the quantity demanded if the price of a product decreases and in a decrease in the quantity demanded if the price of a product increases. However, this pattern is not typical for all groups of goods (Table 1.5). Thus, if the price of low-quality goods increases, then consumption of these goods usually increases because their share in the consumer budget is considerable. These goods are Giffen's goods in honor of the British economist R. Giffen

who studied the structure of households' consumption in Ireland at the end of the nineteenth century and concluded that the law of demand for cheap goods is not fulfilled.

Table 1.5

Interaction of substitution and income effects for different groups of goods

Types of goods	Changes in prices	Action of the income effect	Action of the substitution effect
Normal	Price increases	Quantity demanded decreases	Quantity demanded decreases
	Price decreases	Quantity demanded increases	Quantity demanded increases
Low quality	Price increases	Quantity demanded increases	Quantity demanded decreases
	Price decreases	Quantity demanded decreases	Quantity demanded increases

The income effect is calculated using the following formula:

$$\Delta Xn_1 = X'_1(P'_1, I') - X_1(P_1, I), \quad (1.20)$$

where ΔXn_1 is change in the quantity of goods X_1 due to the income effect;

$X'_1(P'_1, I')$ is consumption of product X_1 at the new price P'_1 and a new level of income I;

$X_1(P_1, I)$ is consumption of goods X_1 at the initial price P_1 and the new level of income I.

The substitution effect is calculated using the following formula:

$$\Delta XS_1 = X'_1(P'_1, I') - X_1(P_1, I), \quad (1.21)$$

where ΔXS_1 is change in the quantity of goods X_1 due to the substitution effect;

$X'_1(P'_1, I')$ is consumption of good X_1 at the new price P'_1 and a new level of income I;

$X_1(P_1, I)$ is consumption of goods X_1 at the initial price P_1 and the initial level of income I.

*The total effect of price change (*known as *the Slutsky equation)* is calculated using the following formula:

$$\Delta X_1 = \Delta XS_1 + \Delta Xn_1. \quad (1.22)$$

So, we have analyzed how budget and prices impact consumer behavior.

Glossary

Budget line is a line that shows what amount of the two goods a consumer can purchase at a certain income and a given price level.

Indifference curve (or **isoutility curve)** is a set of combinations of goods and services providing the consumer with the same level of satisfaction of needs.

Marginal rate of substitution shows an amount of one good the consumer is willing to refuse from in order to increase the consumption of another good by one unit.

Marginal utility is a satisfaction that an individual gets from consumption of one additional unit of a good.

Microeconomics is a science studying the patterns of behaviour of consumers and producers. It reveals the mechanism of making optimal economic decisions in conditions of limited resources.

Opportunity cost is a cost of production of economic goods estimated taking into account the lost opportunities of the use of them for the production of other (alternative) goods.

Production possibilities curve is a geometric place of points showing the set of options for maximising the production of two economic goods with full use of available resources.

Questions for self-assessment

1. Determine the basic microeconomic categories. What is the practical significance of these categories for making economic decisions?
2. Characterize the subjects and objects of microeconomics.
3. What are the methods for analyzing microeconomic processes?
4. Explain the relationship between microeconomics and other economic sciences.

5. List the representatives of the cardinal theory of utility and determine their contribution to the development of modern microeconomics.

6. What does the "Smith's paradox" mean and how did the representatives of the cardinal theory of utility propose to solve it?

7. Explain the reasons for the diminishing marginal utility of economic goods.

8. Write the total utility function for two goods. Will the total utility function change for two substitute goods?

9. What types of economic goods do you know? What are anti-goods and what benefits do they have for a consumer? Give, at least, three examples.

10. What does the first Gossen's law state? Are there exceptions to the first Gossen's law? Give, at least, two examples.

Practice tests

1. Microeconomics as a science arose:

a) at the beginning of the seventeenth century;

b) at the end of the eighteenth century;

c) in the 1870s;

d) in the 1990s.

2. Utility as a measure of personal satisfaction was proposed by the representatives of:

a) English classical economics;

b) Marxian economics;

c) Marginalist economics;

d) Keynesian economics.

3. The representative of the theory of cardinal utility is:

a) F. Edguort;

b) G. Gossen;

c) V. Pareto;

d) P. Samuelson.

4. This curve usually slopes downward because each successive unit adds less to total utility than the previous unit:

a) marginal utility curve;

b) total utility curve;

c) maximum utility curve;

d) average utility curve.

5. The additional utility generated by consuming one more unit of the good or service is:

a) marginal utility;

b) total utility;

c) maximum utility;

d) the right answer is not given.

6. Marginal utility is calculated as:

a) TU / Q;

b) $TU \cdot \Delta Q$;

c) $\Delta TU / \Delta Q$;

d) $\Delta TU \cdot \Delta Q$.

7. The principle of diminishing marginal utility (or first Gossen's law) illustrates the general point:

a) to minimize marginal utility, consumers must focus on total utility;

b) $\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y} = \frac{MU_X}{MU_Y} = \frac{P_X}{P_Y}$;

c) to maximize marginal utility, consumers must focus on total utility;

d) to maximize total utility, consumers must focus on marginal utility.

8. Which of the following demonstrates the principle of diminishing marginal utility:

a) 24, 28, 34, 35;

b) 22, 10, 12, 18;

c) 30, 40, 50, 80;

d) 20, 15, 10, 5.

9. The optimal consumption rule states that total utility is maximized when all income is spent and:

a) MU is equal for all goods;

b) P / MU is equal for all goods;

c) MU / P is equal for all goods;

d) MU is as high as possible for all goods.

10. A consumer spends all of her income and receives 100 utils from the last unit of good A and 80 utils from the last unit of good B. If the price of good A is $2 and the price of good B is $1, to maximize total utility the consumer should buy:

a) more of good A;
b) more of good B;
c) less of good B;
d) more of both goods.

Computing tasks with examples of solutions

Task 1. The function of total utility of consuming pizza is described as: $TU = 100 + 85 \cdot Q - 5 \cdot Q^2$, utils. Calculate total utility of consuming from 1 to 5 items of pizza and build total utility and marginal utility curves. Prove that the first Gossen's law works.

Guidelines

1. Calculate total utility of consuming from 1 to 5 items of pizza:

$TU_1 = 100 + 85 \cdot Q - 5 \cdot 1^2 = 180$ utils.
$TU_2 = 100 + 85 \cdot 2 - 5 \cdot 2^2 = 250$ utils.
$TU_3 = 100 + 85 \cdot 3 - 5 \cdot 3^2 = 310$ utils.
$TU_4 = 100 + 85 \cdot 4 - 5 \cdot 4^2 = 360$ utils.
$TU_5 = 100 + 85 \cdot 5 - 5 \cdot 5^2 = 400$ utils.

2. Calculate marginal utility of pizza:

$$MU = \frac{\Delta TU}{\Delta Q},$$

$$MU_2 = \frac{250 \text{ utils} - 180 \text{ utils}}{2 \text{ items} - 1 \text{ items}} = 70.$$

$$MU_3 = \frac{310 \text{ utils} - 250 \text{ utils}}{3 \text{ items} - 2 \text{ items}} = 60.$$

$$MU_4 = \frac{360 \text{ utils} - 310 \text{ utils}}{4 \text{ items} - 3 \text{ items}} = 50.$$

$$MU_5 = \frac{400 \text{ utils} - 360 \text{ utils}}{5 \text{ items} - 4 \text{ items}} = 40.$$

Using the data from Table 1.6, build total utility and marginal utility curves (Fig. 1.18).

Table 1.6

The dynamics of utility of pizza

Q	TU, utils	MU, utils
1	180	180
2	250	70
3	310	60
4	360	50
5	400	40

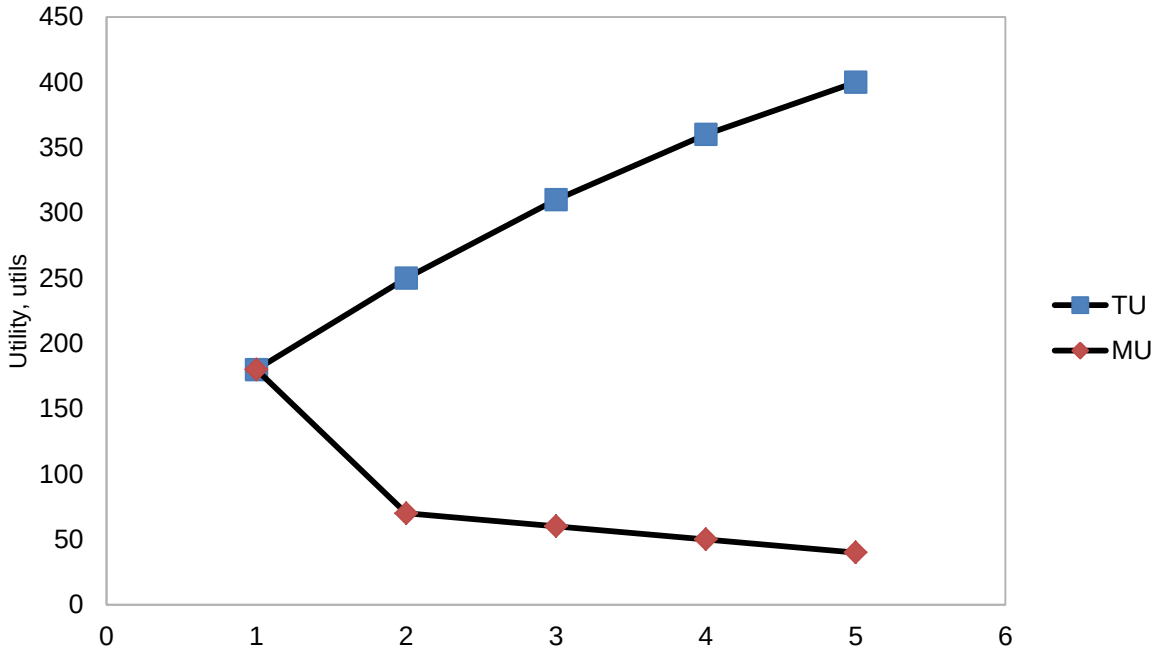


Fig. 1.18. **Total utility and marginal utility curves**

As we see, the dynamics of the marginal utility curve is downsloping, so it proves that the first Gossen's law works.

Task 2. Study Table 1.7 containing some data.

Table 1.7

Input data for determining consumer equilibrium

Combination	Cheese, kg	Sweets, kg
A	20	3
B	12	5
C	5	15
D	3	30

Do the following: 1) build an indifference curve; 2) build a budget line if the price of mutton is 10 euro, the price of fish products is 5 euro and consumer's income is 120 euro; 3) define graphically the point of consumer equilibrium.

Guidelines

1. Build an indifference curve, using data in Table 1.7 (Fig. 1.19).

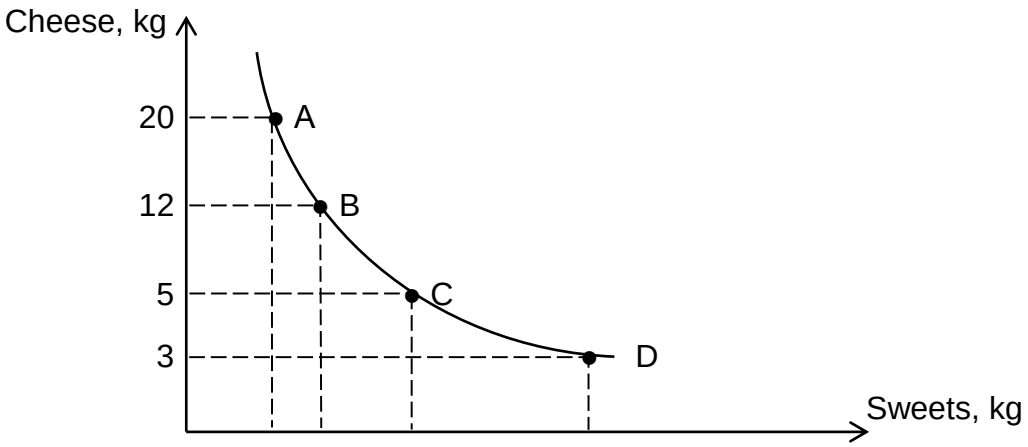


Fig. 1.19. **The indifference curve**

2. Build a budget line (Fig. 1.20).

$$Q_C = \frac{I}{P_C},$$

$$Q_S = \frac{I}{P_S}.$$

Hence Q_C = 12 kg, Q_S = 24 kg.

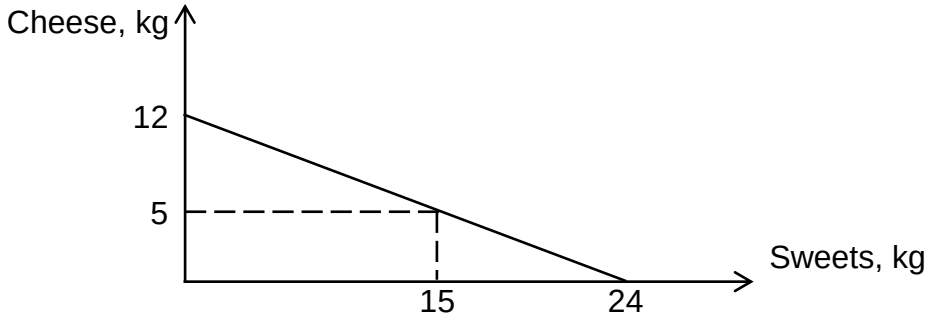


Fig. 1.20. **The budget line**

3. Define graphically the point of consumer equilibrium (Fig. 1.21).

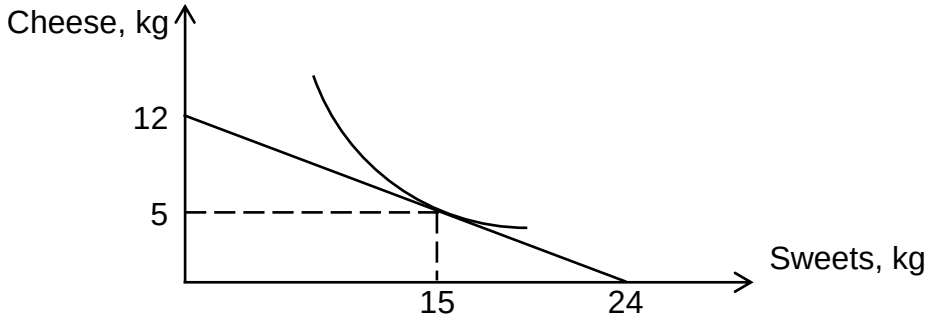


Fig. 1.21. **The consumer equilibrium**

Therefore, the optimal consumer basket includes 5 kg cheese and 15 kg sweets.

Task 3. Marginal utility of bananas is described as $MU_B = 4 \cdot X + 6$, while marginal utility of tangerines is described as $MU_T = 32 - 2 \cdot Y$. The price of bananas is 2 euro and price of tangerines is 4 euro. Determine consumer optimum using the mathematical approach if consumer's income is 40 euro.

Guidelines

In order to solve this task, it is necessary to form a system of equations in which the first equation is the utility maximizing rule (or the second Gossen's law) and another equation is a budget constraint:

$$\begin{cases} \dfrac{MU_B}{P_B} = \dfrac{MU_T}{P_T}, \\ I = P_B \cdot Q_B + P_T \cdot Q_T. \end{cases}$$

$$\begin{cases} \frac{4X+6}{2} = \frac{32-2Y}{4}, \\ 40 = 2 \cdot X + 4 \cdot Y. \end{cases}$$

$2X + 4Y = 40;$

$X + 2Y = 20;$

$x = 20 - 2Y;$

$4 \cdot (4X + 6) = 2 \cdot (32 - 2Y);$

$16X + 24 = 64 - 4Y;$

$16 \cdot (20 - 2X) + 24 = 64 - 4X;$

$320 - 32 + 24 = 64 - 4X;$

$-32Y + 4Y = 64 - 320 - 24;$

$Y = 10.$

Hence $X = 20 - 2Y = 20 - 2 \cdot 10 = 0.$

Therefore, consumer optimum includes 0 bananas and 10 tangerines.

Computing tasks for self-study

Task 1.1. Three confectionery factories produce two types of products: cakes and sweets. Information about production possibilities of each enterprise is given in Table 1.8:

Table 1.8

Production possibilities of confectionery factories

Producers	Cakes, t	Sweets, t	Opportunity cost of cakes	Opportunity cost of sweets
Factory "Laska"	10		2	
Factory "Zefirka"	30			2
Factory "Yunist"		5		2

1. Fill in Table 1.8.

2. Build a production possibilities curve for each confectionery factory.

3. Calculate the opportunity cost of increase in production of cakes from 20 to 25 tons.

4. Show graphically the opportunity cost of production of the first 15 tons of sweets.

Task 1.2. Study the data given in Table 1.9.

Table 1.9

The dynamics of total utility of cucumbers

Cucumbers consumed, kg	Total utility, utils
1	100
2	170
3	220
4	240
5	250

Do the following: 1) calculate the marginal utility of cucumbers at each level of consumption; 2) build total utility and marginal utility curves; 3) prove that the first Gossen's law works.

Task 1.3. Marginal utility of good X is described as $MU_A = 60 - 5X$, and marginal utility of good Y is described as 48 – 12Y. The price of good X is $50, the price of good Y is $40, the consumer income is $380. What amount of each goods will the consumer purchase to maximize total utility?

Task 1.4. Suppose a student consumes three goods: apples, potatoes, and marshmallows. The price of apples is 25 UAH/kg, the price of potatoes is 10 UAH/kg, the price of marshmallows is 50 UAH/kg. The marginal utility of each good is given in Table 1.10.

Table 1.10

The dynamics of utility indicators

Q	MU_{apples}	$MU_{potatoes}$	$MU_{marshmallows}$
1	75	20	50
2	50	14	46
3	45	12	42
4	25	12	40
5	20	10	39

Determine: 1) whether the student gets the maximum utility if he consumes 2 kg of apples, 5 kg of potatoes and 3 kg of marshmallows; 2) a set of goods that ensures consumer equilibrium if student's income is 200 UAH.

Task 1.5. Student's income is 10 euros and he wants to spend money on buying two goods: potatoes and tomatoes. The dynamics of marginal utility of each of the two goods for the student is given in Table 1.11.

Table 1.11

The input data for determining consumer equilibrium

Quantity of good, kg	MU_p, utils	MU_t, utils
1	10	24
2	8	20
3	7	18
4	6	16
5	5	12

Determine the optimal set of goods for a student at this level of income if the price on potatoes is 1 euro/kg and the price on tomatoes is 2 euros/kg.

Essays

1. Goals and features of microeconomic analysis.
2. Evolution of scientific views on the verification of the hypothesis about rationality of consumer economic behavior.
3. The problem of measuring utility in economic theory.
4. Comparative analysis of the first Gossen's law (the law of diminishing marginal utility) and the basic psychophysical Weber – Fechner's law.

Topic 2. The laws of supply and demand in a market economy

The purpose of studying the topic is to develop the following competencies: the ability to analyze the laws of supply and demand in the economy; the ability to independently perform graphical construction of supply and demand curves and justify the practical significance of market equilibrium; the ability to analyze

the main factors influencing supply and demand; the ability to calculate elasticity coefficients, determine the effects of price changes on producer revenue at different price elasticities of demand.

Study questions:
2.1. Market demand.
2.2. Supply and main factors that influence dynamics of supply.
2.3. Market equilibrium.
2.4. The elasticity of demand.

Keywords: demand, quantity of demand, law of demand, supply, quantity of supply, law of supply, change in the quantity of demand (supply), change in demand (supply), market equilibrium, equilibrium price, elastic demand (supply), elasticity.

Recommended literature: [1; 2; 7 – 10; 14].

2.1. Market demand

In market theory, supply and demand play a crucial role. First, the concept of supply and demand is based on the assumption of a perfectly competitive market. This assumption simplifies the understanding of complex economic categories and the interactions between microeconomic agents.

Market pricing is a system of interconnected economic laws and elements that shape the organization of a market economy as a self-regulating system.

The market mechanism represents the interaction between buyers and sellers, ensuring a balance between supply and demand for goods and services while addressing the interests of market participants.

The primary functions of the market mechanism include informational, regulatory, stimulative, and integrative roles. These functions prioritize consumer interests in the "seller – buyer" relationship. Microeconomic entities interact within the market framework, which is characterized by three key components: supply, demand, and price.

The concept of demand was first introduced into economic theory by the American scholar J. Stewart in 1767. Later, this concept was further developed by prominent economists such as A. Smith, D. Ricardo, A. Marshall, L. Walras, and J. Hicks.

The behavior of consumers in the market is described by the concept of demand, while the behavior of producers (sellers) is reflected in the concept of supply. Market price results from the interaction between buyers and sellers. On the one hand, price is a function of supply and demand; on the other hand, it influences the quantity demanded and supplied. These variables are interconnected and influence each other, forming the self-regulating market mechanism.

Economic agents in the market make decisions based on both their desires and financial capabilities. Therefore, the quantity of goods and services that a consumer is willing and able to purchase is referred to as demand.

There are two main types of demand: individual demand, which refers to the demand of a specific market participant under certain conditions and at a given time, and market demand, which is the aggregate of individual demands across all consumers in the market. To determine market demand, the sum of all individual demands at each price level must be calculated.

In general, demand represents consumers' willingness and ability to purchase goods and services at various price levels under given conditions over a certain period. A change in price leads to a change in the quantity demanded. When the price of a product rises, consumers tend to buy less of it.

Fig. 2.1 illustrates the inverse (negative) relationship between price and quantity demanded. As the price of a product decreases, consumers can afford to buy more of it. A lower price makes the product relatively cheaper compared to alternatives, leading consumers to substitute it for other goods. This inverse relationship between price (P) and quantity demanded (Q) forms the essence of the law of demand.

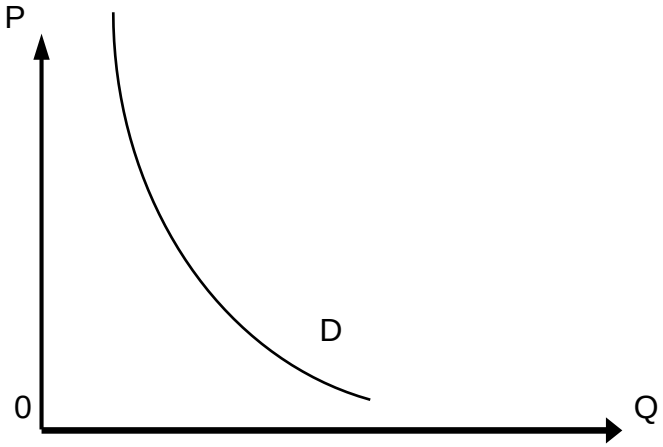


Fig. 2.1. **The demand curve**

It is important to note that there are exceptions to the law of demand, where a direct (positive) relationship exists between price and quantity demanded. This applies to two specific categories of goods: Veblen goods and Giffen goods.

Veblen goods are luxury and prestigious items for which demand decreases when prices drop. Consumers purchase these goods primarily for their status and exclusivity. Examples include expensive cars, luxury jewelry, and renowned works of art.

Giffen goods are low-quality, inexpensive products. Under crisis conditions, an increase in their price can lead to higher demand. This occurs because these goods constitute a significant portion of a consumer's budget, making more expensive alternatives even less affordable.

Common economic crises that may influence demand for Giffen goods include:

global or regional military conflicts;

large-scale natural disasters;

pandemics;

political instability;

sharp depreciation of the national currency due to economic downturns.

Demand can be presented in table, graphical, and analytical forms. The tabular form is represented by a demand schedule, which shows different price levels and corresponding quantities demanded (Table 2.1).

Table 2.1

Demand scale for buckwheat in a supermarket

Indicators	Combinations						
	A	B	C	D	E	F	G
Price (€/kg)	2.1	1.8	1.5	1.2	0.9	0.6	0.3
Quantity demanded (thousand kg)	10	20	30	40	50	60	70

The graphical representation of market demand is illustrated in Fig. 2.2.

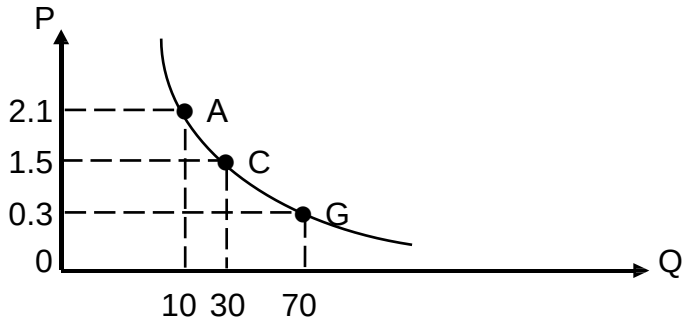


Fig. 2.2. **Graphical representation of market demand for buckwheat**

The relationship between demand and price can be expressed mathematically as follows:

$$Q_X = f(P_X), \quad (2.1)$$

where Q_X is demand for good X;

P_X is price of good X.

However, aside from price, non-price factors also influence market demand, shifting the demand curve to the right or left (Fig. 2.3).

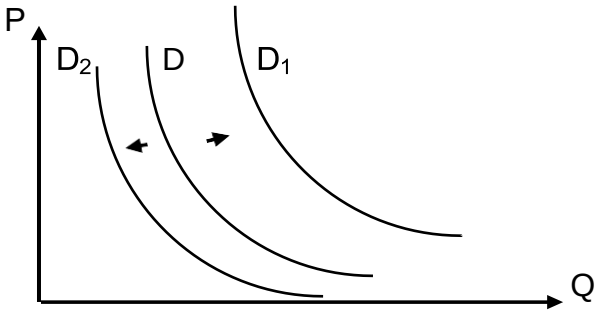


Fig. 2.3. **The impact of non-price factors of demand**

Key non-price factors influencing demand:

1. Consumer income: an increase in income raises demand for normal goods and decreases demand for inferior goods, and vice versa.

2. Number of consumers: more buyers in the market lead to higher demand (rightward shift of the demand curve), while fewer buyers decrease demand (leftward shift).

3. Price expectations: in inflationary conditions, expected future price increases lead to higher current demand, shifting the demand curve to the right. Conversely, expectations of price reductions lower current demand.

4. Consumer preferences: cultural habits, fashion trends, and education influence demand positively or negatively at constant price levels.

5. Prices of related goods: demand for a product can be affected by changes in the prices of complementary or substitute goods.

In reality, non-price factors do not operate in isolation but interact dynamically, forming a complex and sometimes contradictory system.

2.2. Supply and main factors that influence dynamics of supply

Supply refers to the quantity of goods or services that producers are willing and able to offer at various price levels. Similar to demand, supply depends on both the willingness and capability of sellers.

An individual producer's supply is called individual supply, while the total supply of a good offered by all producers in the market is known as market supply. Thus, supply represents the quantity of goods producers are prepared to offer at a given price over a specific period.

Market supply is the sum of individual supplies from all sellers of a particular product. Generally, higher prices lead to increased supply, as producers are incentivized to sell more at higher profit margins. This direct relationship between price and supply is known as the law of supply: an increase in the price of a good increases its supply, while a decrease in the price causes a decrease in the quantity of the good that the seller is willing to provide for sale on the market.

The mathematical function representing supply is as follows:

$$Q_S = f(P_X), \tag{2.2}$$

where Q_S is supply of X;

P_X is price of X.

The relationship between price, as the primary factor influencing supply, and the actual quantity supplied in the market is graphically represented by the market supply curve (Fig. 2.4).

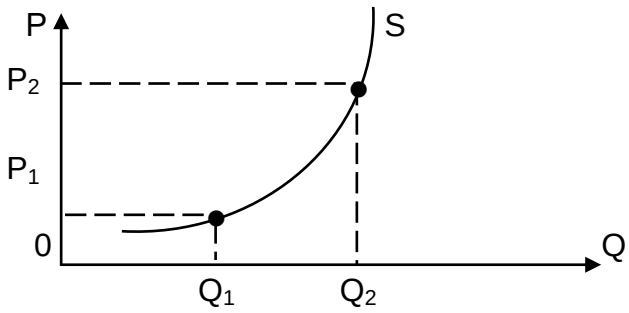


Fig. 2.4. **The supply curve**

The change in supply volume is influenced by both price (inversely proportional), which causes the movement of a point along the supply curve (Fig. 2.4), and non-price factors. Under the influence of non-price supply factors, the change in volume is shown by a shift in the supply curve itself at a constant price (Fig. 2.5).

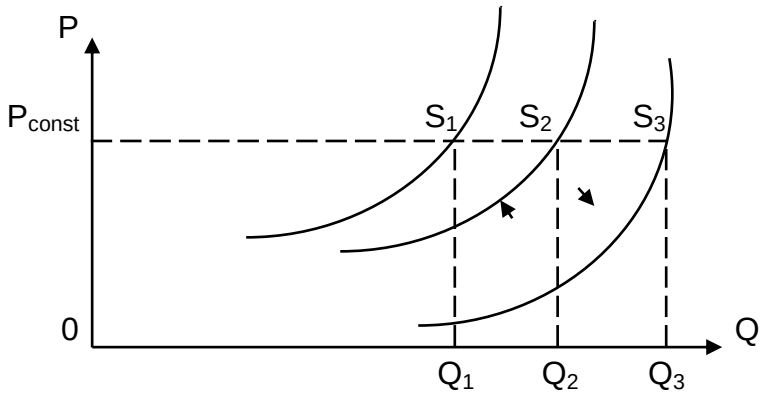


Fig. 2.5. **The influence of non-price factors on the change in supply**

When supply increases, you can see a shift in the supply curve to the right, and when it decreases, to the left. So, the following non-price factors affect the change in supply:

production technology: improvement of technology and organization of production contributes to more efficient use of resources and an increase in production volumes; this leads to a shift of the supply curve to the right;

the number of sellers directly affects the market supply. The more sellers there are, the greater the supply, and vice versa;

taxes and subsidies: an increase in taxes leads to higher costs, meaning the market supply decreases. On the other hand, subsidies help cover part of the producer's costs, which leads to an increase in supply;

changes in prices of other goods: changes in the prices of other goods produced by a manufacturer affect the structure of their supply. For instance, if one of the goods produced by the manufacturer becomes more expensive, the production volumes of that good will increase. In other words, the manufacturer will reallocate resources to the more expensive product, and the supply of the analyzed good will decrease;

price expectations of sellers have opposite effects compared to consumers. In the case of expected price increases, the existing market supply will decrease in anticipation of a more favorable situation in the future.

2.3. Market equilibrium

In the interaction of supply and demand, the market price is formed, which satisfies both the seller and the buyer.

The demand and supply curves intersect and form the market equilibrium point (E) (from Latin *equilibrium*) (Fig. 2.6).

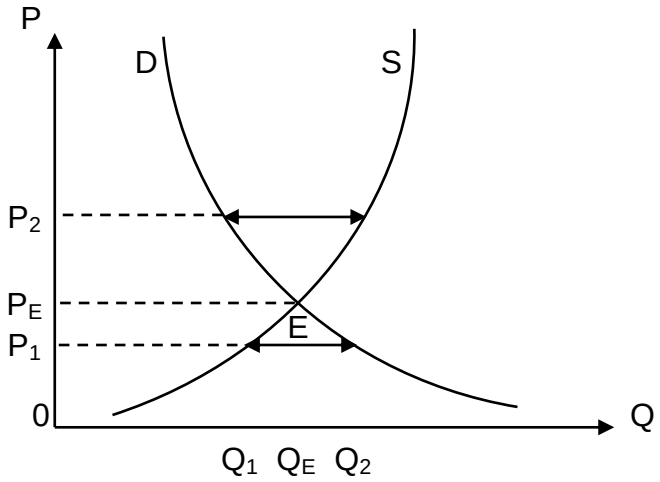


Fig. 2.6. **Market equilibrium**

Market equilibrium is the state of the market when the volumes of demand and supply are balanced and form an equilibrium price. The equilibrium price is the market price at which the volume of demand equals the volume of supply; it satisfies both sellers and buyers, and at this price, their interests coincide.

At the equilibrium point:

$$P_E = P_D = P_S; \quad (2.3)$$

$$Q_E = Q_D = Q_S, \quad (2.4)$$

where P_E is the equilibrium price;

P_D is the demand price;

P_S is the supply price;

Q_E is the equilibrium quantity;

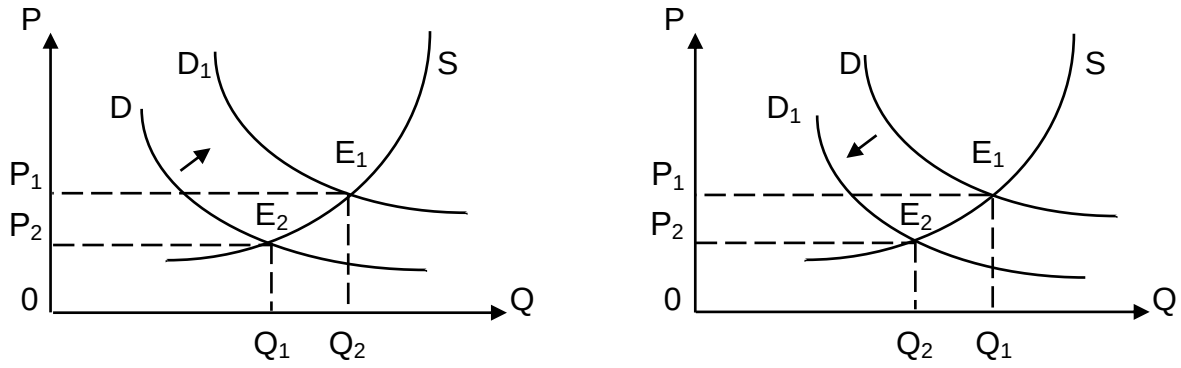
Q_D is demand quantity;

Q_S is supply quantity.

However, in real economic practice, the price usually deviates from the equilibrium price, disrupting the state of market equilibrium. In cases where the price is set higher than the equilibrium price ($P_2 \geq P_E$), producers are interested in increasing production volumes, while consumers, on the contrary, purchase less. As a result, a surplus of goods arises in the market. Competition between producers leads to a reduction in price, and consumers' desire to buy more increases, while this situation is less favorable for producers, prompting them to supply less product to the market. In this way, equilibrium is restored in the market.

In cases where the price is set lower than the equilibrium price ($P_1 \leq P_E$), the demand volume exceeds the supply volume, creating a product shortage.

When consumer incomes rise, demand for goods also increases, so the demand curve shifts to the right (from D to D_1) (Fig. 2.7a).



a) in case of an increase in demand b) in case of a decrease in demand

Fig. 2.7. **Disruption of market equilibrium under the influence of a change in demand**

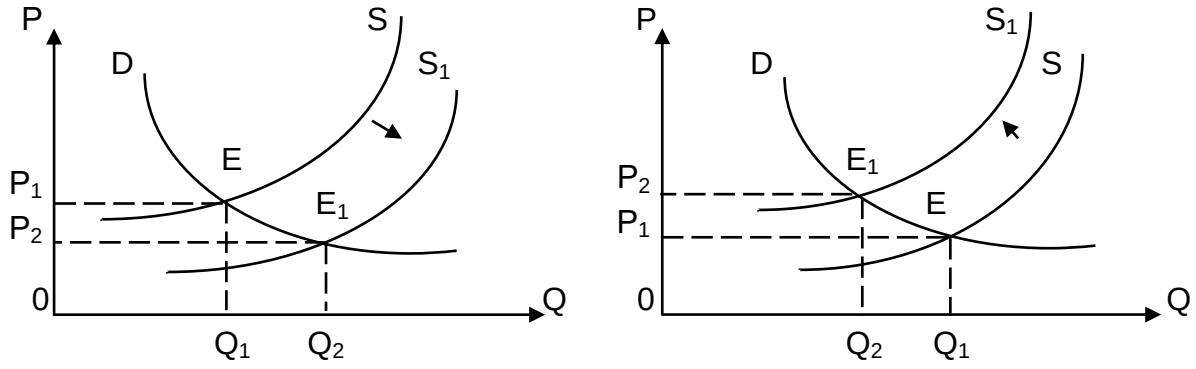
With unchanged prices and supply volume, a product shortage will occur on the market (from Q_2 to Q_1). Excess demand will lead to an increase in production volume and a rise in the price of the product. The new equilibrium

point will be point E_2. This will correspond to a price level of P_1 and a production volume of Q_1. Thus, a disruption in market equilibrium due to an increase in demand leads to a higher equilibrium price and an increase in the equilibrium production volume.

Market equilibrium can also be disrupted due to non-price determinants of supply and demand. If we assume that the initial market equilibrium E_1 was disrupted by a decrease in consumer incomes, this will lead to a reduction in demand (from D to D_1) (Fig. 2.7b). With unchanged prices and supply volume, a surplus of goods (from Q_1 to Q_2) will occur on the market, and the stock of goods will increase.

This will lead to intensified competition between producers, and as a result, the price will decrease to level P_2, prompting producers to reduce the production of their goods. In this case, the equilibrium point will be point E_2, corresponding to the price level P_2 and the production volume Q_1. Therefore, a disruption in market equilibrium due to a decrease in demand leads to the decline in the equilibrium price and a reduction in the equilibrium production volume.

Market equilibrium can also change under the influence of an increase or decrease in supply (Fig. 2.8). Suppose that market equilibrium E was disrupted due to an increase in the land tax. This will result in a decrease in supply (from S to S_1) (Fig. 2.8a). With prices and production volume remaining unchanged, a shortage of goods will emerge in the market (from Q_1 to Q_2). This will intensify competition among consumers, and the price will start rising to the level P_1.



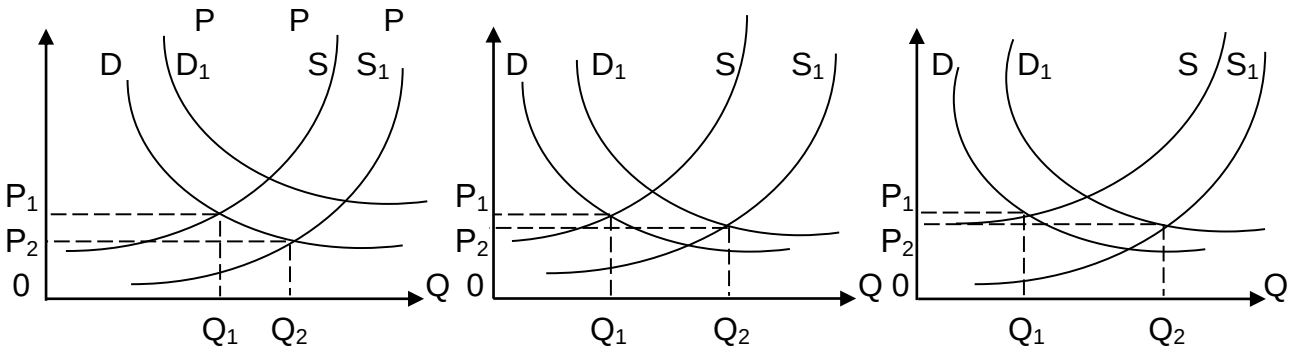
a) in case of a decrease in supply b) in case of an increase in supply

Fig. 2.8. **Disruption of market equilibrium under the influence of a change in supply**

As a result, entrepreneurs will increase production. Consumers will buy the good at a higher price, but over time, this will lead to a reduction in their demand for the good. The result will be the market reaching a new equilibrium state E_1. Therefore, the disruption of market equilibrium due to a decrease in supply leads to an increase in the equilibrium price and a decrease in the equilibrium quantity of production.

At the same time, with a reduction in the land tax, the supply of goods will increase, and the supply curve will shift to the right (from S to S_1). With prices and production volume remaining unchanged, an excess of products will emerge (from Q_1 to Q_2), but the surplus supply will promote a decrease in price and an increase in production (E_1). Therefore, the disruption of market equilibrium due to an increase in supply leads to a decrease in the equilibrium price and an increase in the equilibrium quantity of production.

In a situation where both demand and supply decrease simultaneously, the equilibrium quantity of production will tend to decrease (Fig. 2.9). It should be noted that the equilibrium price can change in different ways. It will decrease if the rate of growth in demand for the good exceeds the rate of growth in supply (Fig. 2.9a). Conversely, the equilibrium price will increase if the rate of growth in supply exceeds the rate of growth in demand (Fig. 2.9b). The equilibrium price will remain unchanged if the rate of growth in demand for the good equals the rate of growth in supply (Fig. 2.9c).



a) if the rate of growth in demand exceeds the rate of growth in supply

b) if the rate of growth in supply exceeds the rate of growth in demand

c) if demand and supply change proportionally

Fig. 2.9. **Disruption of market equilibrium due to the simultaneous decrease in demand and supply**

If there is excess demand in the market (QD > QS), producers set a price favorable to them to control the quantity of products. In this case, a producer surplus is formed – the difference between the equilibrium price at which they sold their goods and the price at which they were willing to sell them.

On the contrary, when there is excess supply in the market (QD < QS), producers are forced to lower the price, creating favorable economic conditions for consumers. This leads to a consumer surplus – the difference between the demand price, which is the maximum price consumers are willing to pay for a certain quantity of goods, and the equilibrium price at which they actually purchased their goods.

Thus, the market represents a self-regulating system, where equilibrium can be achieved automatically, without external influence. However, according to microeconomic practice, regulation of market pricing is one of the key functions of the government. Specifically, the government uses tools such as "price floors", "price ceilings", taxes, and subsidies.

Setting a "price floor", or the minimum price for a good ($P_{Equilibrium} < P$), can be aimed at either supporting consumers or supporting producers. For example, a government may set minimum prices for certain goods. However, setting a price higher than the equilibrium price can lead to negative consequences, such as a surplus of goods (triangle KMO in Fig. 2.10).

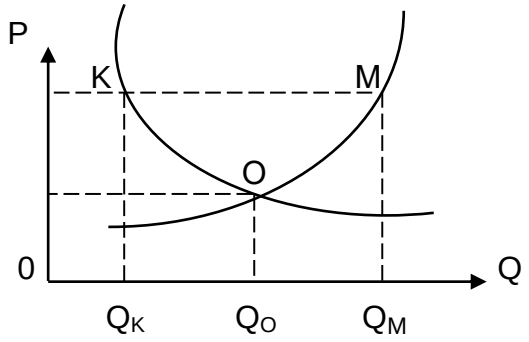


Fig. 2.10. **Disruption of market equilibrium due to the establishment of a price floor**

Setting a "price ceiling", or the maximum price for a good ($P_{Equilibrium} > P$), is aimed solely at supporting consumers. For example, in order to combat poverty, the government may establish a maximum price for cheaper types of bread. This can also have negative consequences, such as a shortage of goods sold at prices lower than the equilibrium price (Fig. 2.11).

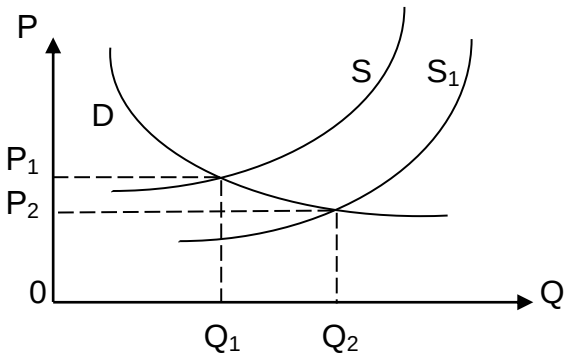


Fig. 2.11. **Disruption of market equilibrium due to the establishment of a price ceiling**

2.4. The elasticity of demand

Various determinants influence supply and demand. The degree of their sensitivity to these changes is shown by the elasticity coefficient.

Demand elasticity refers to the ability of demand to adapt to changing market conditions; it is the degree of sensitivity of demand to changes in other determinants. It is calculated as the ratio of the change in the dependent variable to the independent variable.

In microeconomics, different measures of elasticity are used depending on the factors causing the change in supply or demand.

The following types of demand elasticity are distinguished:

1. Price elasticity of demand.
2. Cross elasticity of demand.
3. Income elasticity of demand.

Price elasticity of demand is calculated as the percentage change in the volume of demand caused by a one percent change in the price of a good:

$$E_D = \frac{\%\Delta Q}{\%\Delta P} = \frac{\Delta Q}{\Delta P} = \frac{\Delta Q}{\Delta P} \cdot \frac{P_1}{Q_1}. \qquad (2.5)$$

where ΔQ is a change in demand;

ΔP is a change in price;

P_1 is the price of demand;

Q_1 is the volume of demand. The indicator usually has a negative sign, which is often ignored.

To calculate the elasticity indicator, two methods are used. The linear elasticity indicator is defined as the percentage change in the volume of demand. This indicator is calculated for a linear demand curve, which is given by the equation $Q_D = a - b \cdot P$, or for a small price change for a nonlinear demand curve, using the formulas:

$$E_D = \frac{Q_2 - Q_1}{Q_1} : \frac{P_2 - P_1}{P_1}, \text{ or } E_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P_1}{Q_1}. \quad (2.6)$$

Since b is the slope coefficient of the demand curve with respect to the x-axis, then $-b = \Delta Q / \Delta P$, from which:

$$E_D = -b \cdot \frac{P}{Q}. \quad (2.7)$$

This formula is usually applied to determine elasticity at the market equilibrium point.

The arc elasticity indicator is used when there are significant price fluctuations (more than 5 %) and it is calculated using the formula:

$$E_{DP} = \frac{\Delta Q}{\Delta P} = \frac{Q_2 - Q_1}{Q_1} / \frac{P_2 - P_1}{P_1}. \quad (2.8)$$

The following types of price elasticity with respect to price are distinguished (Table 2.2).

Table 2.2

Types of price elasticity of demand

Meaning of elasticity	Type of elasticity	Characteristics of elasticity
$E_D > 1$	Elastic demand	Demand increases or decreases faster than the price changes
$E_D < 1$	Inelastic demand	Demand increases (or decreases) slower than price changes
$E_D = 1$	Unitary elasticity	The percentage change in price is equal to the percentage change in demand
$E_D = 0$	Zero elasticity	A change in price does not cause any change in demand
$E_D = \infty$	Perfect elasticity	Demand is infinitely responsive to price changes

Cross-elasticity of demand is a percentage change in the volume of demand for one product when the price of another product changes by 1 %:

$$E_{XY} = \frac{\%\Delta Q_X}{\%\Delta Q_Y} = \frac{\Delta Q_X}{\Delta P_Y} \cdot \frac{P_Y}{Q_X}, \quad (2.9)$$

where $E_{XY} > 0$ for substitute goods;

$E_{XY} < 0$ for complementary goods.

The income elasticity of demand is the percentage change in the volume of demand for one product when income changes by 1 %:

$$E_I = \frac{\%\Delta Q}{\%\Delta I} = \frac{\Delta Q}{\Delta I} \cdot \frac{I}{Q}, \quad (2.10)$$

where $E_I > 0$ for normal goods (with many substitutes);

$E_I < 0$ for inferior goods (with few/no substitutes);

$E_I = 0$ for neutral goods;

$0 < E_I < 0$ for essential goods.

Thus, the elasticity of demand, besides price, is influenced by the following factors:

1) availability of substitute goods: the more substitute goods available, the more elastic the demand for the given product is;

2) the share of the good in the consumer's budget;

3) the quality characteristics of the product: for luxury goods, demand is always elastic; for most goods, demand is inelastic;

4) stock levels of the good.

Supply elasticity refers to the sensitivity of sellers to price changes of a product. Price elasticity of supply represents the percentage change in the quantity supplied of a good when the price of that good changes by 1 %:

$$E_S = \frac{\%\Delta Q_S}{\%\Delta P} = \frac{\Delta Q_S}{\Delta P} \cdot \frac{P}{Q} \text{ or } E_S = d\,P\,Q, \quad (2.11)$$

where d is the slope coefficient that defines the slope of the supply curve.

The price elasticity coefficients of supply are calculated using the same formulas as the price elasticity coefficients of demand, but instead of the demand quantity, the supply quantity is used.

Types of supply elasticity:

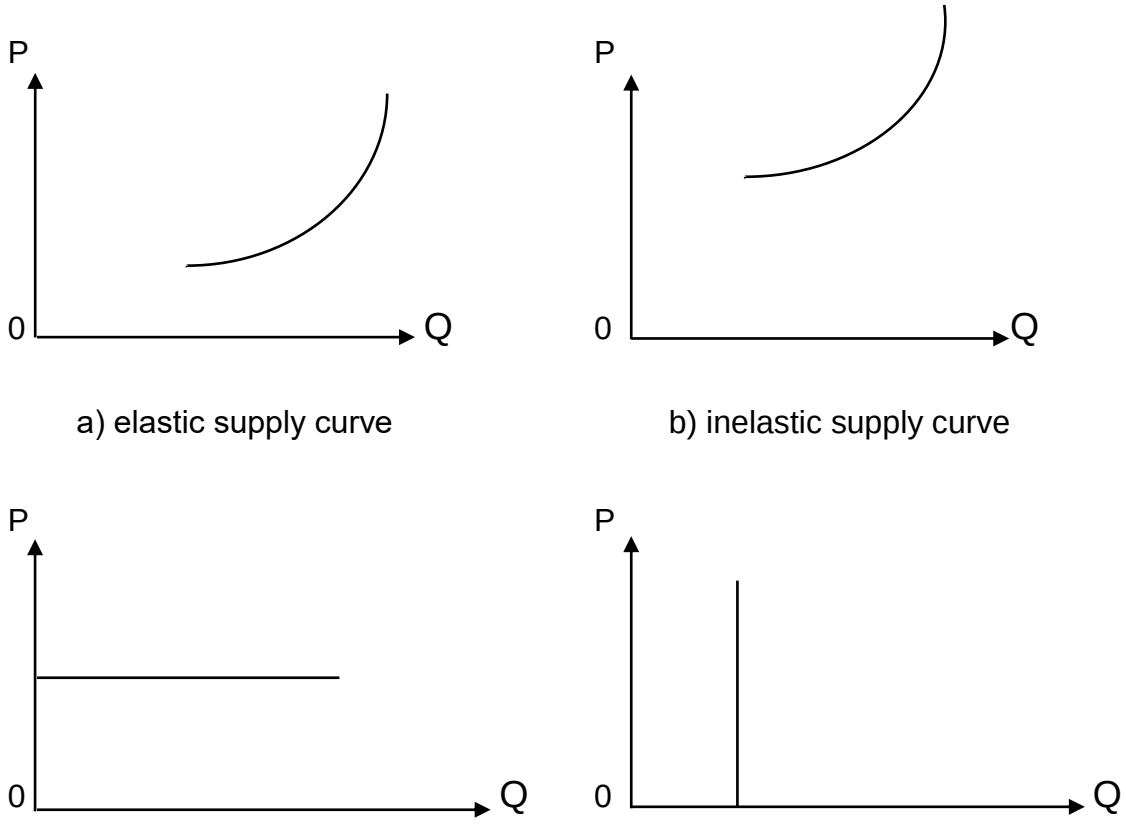
1) elastic supply: a 1 % increase in price leads to a greater than 1 % increase in the quantity supplied ($E_S > 1$);

2) inelastic supply: a 1 % increase in price causes a less than 1 % change in the quantity supplied ($E_S < 1$);

3) perfectly elastic supply: a price change causes a dramatic reduction in the quantity supplied. For goods with perfectly elastic supply, there is always a price at which producers will supply any quantity of the good;

4) perfectly inelastic supply: any price change does not affect the quantity supplied because production of such goods cannot be increased.

The interpretation of these types of supply elasticity can be shown graphically (Fig. 2.12).



a) elastic supply curve

b) inelastic supply curve

c) perfectly elastic supply curve

d) perfectly inelastic supply curve

Fig. 2.12. **Graphical interpretation of supply elasticity**

Glossary

Complementary goods are goods that are produced to enable the use of other goods.

Demand is the quantity of a good that a consumer wants to buy at a certain price level over a certain period of time.

Elasticity is a measure of the sensitivity of a quantity to the influence of a variable factor.

Market equilibrium is a situation in the market when demand equals supply.

Substitute goods are goods that can be used to replace another product. For the consumer, these goods are equivalent and equally useful.

Supply is the quantity of goods that a producer is willing to produce and supply to the market at a certain price level over a certain period of time.

Surplus is a situation in the market when supply exceeds demand.

Shortage is a situation in the market when demand exceeds supply.

The law of demand is an inverse relationship between the amount of demand and the price. As the price increases, demand decreases and vice versa.

The law of supply is a direct relationship between supply and price. As the price increases, the supply increases and vice versa.

Questions for self-assessment

1. Define the concept of market equilibrium. Justify its conditions.
2. What information does the demand curve carry? Explain the downward sloping nature of the demand curve.
3. How is the supply curve constructed? What does it show?
4. What is meant by upward and downward movement on the demand curve? What does a shift in the demand curve mean?
5. What factors affect the elasticity of supply and demand?
6. What is supply? What is the difference between individual supply and market supply?
7. What is the price elasticity of demand?
8. What is the market equilibrium? Show graphically how in these conditions the equilibrium price and the optimal volume of goods are determined.

Practice tests

1. Consumer demand is influenced by the following factors:

a) prices;

b) prices and supply;

c) only prices and consumer income;

d) price and non-price determinants.

2. Which of the following changes is not characterized by a decrease in the value of demand for a product:

a) improvement of the technology of production of goods;

b) a decrease in the price of raw materials used for the production of goods;

c) increase in the income of consumers who buy the product;

d) increase in the volume of purchases of the goods?

3. Movement along the demand curve from left to right is the result of:

a) a decrease in the quantity demanded;

b) a reduction in demand;

c) a shift in demand;

d) an increase in supply.

4. What are the goods for which demand increases with increasing consumer income:

a) normal;

b) neutral;

c) low-quality;

d) normal and neutral?

5. The market demand curve shows:

a) an increase in consumption of a good with an increase in its price;

b) reduction in consumption of goods with a decrease in consumer income;

c) reduction in consumption of a good with an increase in its price;

d) an increase in consumption of goods with a decrease in consumer income.

6. An increase in supply can lead to:

a) an increase in equilibrium prices and quantity of a good;

b) a decrease in equilibrium prices and quantity;
c) an increase in prices and a decrease in quantity;
d) a decrease in prices and an increase in quantity.

7. The income elasticity of demand is zero for:
a) substitute goods;
b) goods that have no substitutes;
c) complementary goods;
d) luxury goods.

8. The cross elasticity of demand is characterized by the response of:
a) the price of one product to a change in the price of another;
b) demand for one product to changes in the price of another;
c) changes in the price of one product to changes in the supply of another;
d) changes in demand for one product to changes in demand for another.

9. The curve of perfectly inelastic demand is:
a) a horizontal line;
b) a curved line with a negative slope;
c) a vertical line;
d) a curved line with a positive slope.

10. If the government sets the lower price limit for a good at a level above the equilibrium price, then:
a) the equilibrium price will increase to this level;
b) there will be a shortage of this good;
c) the supply of this good will decrease;
d) there will be a surplus of the good.

Computing tasks with examples of solutions

Task 1. The demand function for pencils is as follows: QD = 46 − 8P, and the supply function is: QS = −32 + 18P, where Q is the quantity of pencils, thousand units; P is the price, UAH. Calculate: a) the equilibrium price and equilibrium quantity; b) the shortage (or surplus) if the price is set at 4 UAH per unit; c) the shortage (or surplus) if the price is set at 2 UAH per pencil.

Guidelines

1. Calculate the equilibrium price by comparing the supply and demand functions:

$46 - 8P = -32 + 18P$;

$-8P - 18P = -32 - 46$;

$-26P = -78$;

$P = 3$ (UAH).

Equilibrium quantity of pencils at the equilibrium price (P = 20 UAH):

$QD = 46 - 8P = 46 - 8 \cdot 3 = 22$ (thousand units);

$QS = -32 + 18 \cdot 3 = 22$ (thousand units).

Thus, the equilibrium price is 3 UAH, and the equilibrium quantity of pencils is 22 thousand units.

2. Next, let's calculate the shortage (or surplus) at a price of 4 UAH:

$QD = 46 - 8P = 46 - 8 \cdot 4 = 14$ (thousand units);

$QS = -32 + 18P = -32 + 18 \cdot 4 = 40$ (thousand units).

Task 2. The supply and demand for lunches in the student cafeteria are described by the following equations:

$Qd = 2\,400 - 100P$;

$Qs = 1\,000 + 250P$.

1. Calculate the equilibrium price and the number of lunches sold at this price.

2. Out of concern for the students, the administration has set the price at 3 UAH per lunch. Describe the consequences of this decision.

Guidelines

1. Find the equilibrium price, given that the value of demand is equal to the value of supply:

$Qd(P) = Qs(P)$,

$2\,400 - 100P = 1\,000 + 250P$,

$1\,400 = 350P$,

$P = 4$ UAH.

Find the equilibrium quantity of dinners by substituting the equilibrium price into any of these functions:

Qd = 2 400 − 100P,

Qd = 2 400 − 100 · 4,

Q = 2 000 (meals per day).

2. If the price is set at 3 UAH per lunch, i.e. below the equilibrium price, then demand will exceed supply, resulting in a shortage of lunches.

Let's find the number of lunches that the canteen can offer at this price:

Qs(3) = 1 000 + 250 · 3, Qd(3) = 2 400 − 100 · 3,

Qs = 1 750 (meals per day). Qd = 2 100 (meals per day).

Therefore, the cafeteria will sell 250 fewer meals than at the free price. The deficit will be (2 100 − 1 750 = 350) 350 meals per day. This proves once again that any external interference in the market pricing mechanism can lead to negative consequences in the form of creating a shortage or surplus of goods on the market.

Computing tasks for self-study

Task 2.1. The demand for a good is given by QD = 100 − P, and the supply is given by QS = −80 + 2 P. Determine the equilibrium quantity sold. The answer should be confirmed graphically. What will the situation on the market be if the government sets the price for this product at 50 UAH per 1 unit? Will producers sell this product at 70 UAH per 1 unit?

Task 2.2. The demand function is QD = −9 000 P + 10 500, and the supply function is QS = 1500 P. Analyze the situation on the market of this product. Determine the market equilibrium if the supply of carrier services changes due to a 50 % increase in the price of fuel. Describe the market situation if the government sets the price of transportation at 10 UAH.

Task 2.3. If the price of shoes increases from 1 500 UAH to 3 000 UAH per pair, the demand for shoes decreases from 50 to 40 pairs. Will the demand be elastic at the price of shoes 1 500 UAH per pair? Justify your answer.

Task 2.4. The demand function for a good is given by the equation QD = 500 − P, the supply function is QS = 2 P − 100. Find (graphically and

analytically) the equilibrium point; determine what will happen in the market if the state provides producers with a subsidy of 1 500 UAH per unit of goods; calculate the distribution of benefits between consumers and producers from the provision of such a subsidy. Illustrate your answer graphically.

Essays

1. Features of individual consumer demand.
2. The economic content of factors affecting market equilibrium.
3. Features of the laws of supply and demand in real life.

Topic 3. The theory of marginal products and microeconomic model of an enterprise. Costs of production and profit

The purpose of studying the topic is to form the following students' competencies: the ability to analyze the relationships between production functions and costs in the short and long term; to understand the principle of inevitable growth of marginal costs; to calculate production costs; to make an economic justification for choosing the optimal volume of production and the minimum efficient size of the enterprise.

Study questions:

3.1. An enterprise as a subject of market relations, motivation behavior, economic organization and basic types of choice.

3.2. The production function. The law of diminishing variable factor of production.

3.3. The concept and types of costs.

3.4. The essence and types of profit.

Recommended literature: [1; 5; 4; 8; 10; 14; 15].

Keywords: factors of production, production function, law of diminishing returns, isoquant, isocost, production costs, profit, normal profit, scale effect, producer equilibrium.

3.1. An enterprise as a subject of market relations, motivation behavior, economic organization and basic types of choice

Economic science considers an enterprise (firm) as a subject of microeconomics, as one of the most important basic types of microsystems, as a complex economic and property object that converts resources into finished products (goods, services).

Different economic schools offer alternative views on the nature and behavior of enterprises:

Neoclassical theory of the firm considers a firm as a rational agent that maximizes profit given limited resources.

Transaction cost theory (R. Coase) says that existence of firms is explained by the fact that they reduce the costs of concluding contracts and coordinating in market conditions.

Agency theory studies the relationship between owners and managers of enterprises, in particular the problems of delegation of authority and conflicts of interest.

Evolutionary theory of the firm views enterprises as dynamic structures that adapt to changes in the environment.

An enterprise (or firm) is considered an economic agent that carries out production activities in order to maximize profit or achieve other economic goals. A firm is the basic unit of production in a market economy that organizes the processes of producing goods and services using available resources that are labor, capital, land and entrepreneurial abilities.

Each of these factors plays a key role in the production process and has certain features in management. Labor is the physical and intellectual effort that people put into the process of producing goods and services. It is one of the most important factors of production, since without human activity, the creation of products is impossible. Most often, we are talking about physical labor (associated with the use of physical strength, for example, factory workers, construction workers) and mental labor (includes analysis, planning, management, for example, analysts, managers, engineers).

Any enterprise uses labor by hiring workers in the labor market, concluding labor contracts; optimizing costs for salaries and other compensation, using mechanisms to increase labor productivity (training, motivational programs), automating routine processes to reduce labor costs.

Wages are determined by supply and demand in the labor market and depend on: the level of qualification, demand for certain professions; labor productivity, economic situation (for example, unemployment rate) and other factors.

Capital in microeconomics is all resources used in production to create goods and services. It is divided into the following types: physical capital (buildings, equipment, tools, transport), financial capital (money, shares, loans, investments), human capital (knowledge, skills, experience of employees). The enterprise uses capital by: purchasing equipment, modernizing production facilities, investing in the development of technologies; managing finances (borrowing, issuing shares, reinvesting profits); using capital to scale production.

When determining the cost of capital, it should be taken into account that the enterprise has an opportunity cost (costs associated with choosing one option for investing capital instead of another), depreciation (gradual depreciation of fixed assets), interest costs (fees for raising capital, for example, interest on loans).

Land is all the natural resources that the enterprise uses in production. It includes not only land plots, but also minerals, water, forests, solar and wind energy.

The main types of natural resources include: non-renewable resources – oil, gas, metals (have a limited supply); renewable resources – forests, water, air (can self-renew under appropriate conditions); land plots that are used for the construction of factories, warehouses, stores.

The enterprise uses land in the following ways: rents or buys land for production needs; uses natural resources as raw materials (for example, metallurgical companies); optimizes logistics costs by locating production closer to markets.

The cost of land depends on location, access to infrastructure, resource costs, and includes maintenance costs, taxes, environmental requirements.

Entrepreneurial abilities are a special factor of production, which includes the ability to organize the production process, manage risks, make strategic decisions. The role of an entrepreneur in the economy is no less important than other factors. He identifies market opportunities and creates a business model; organizes production processes, combining labor, capital and land; bears risks associated with market uncertainty; generates innovations, finds new ways of doing business.

The enterprise uses entrepreneurial abilities in the following ways: introduces new products and technologies; builds a business strategy to increase profits; optimizes production processes, reducing costs; manages finances and attracts investments.

The enterprise combines all these resources, creating a production process. For example, a fertilizer factory hires engineers and workers (labor), uses machines and factory premises (capital), purchases saltpeter, plastic, copper (land/resources); owners and managers develop a business strategy (entrepreneurship).

A firm performs several key functions in a market economy:

the production function – organization of the process of creating goods and services by transforming resources into a final product;

the allocation function – efficient allocation of limited resources to obtain the maximum possible result;

the pricing function – determination of the optimal price level for its goods and services, taking into account demand, competition and costs;

the innovation function – introduction of new technologies, processes and management methods to increase production efficiency and competitiveness;

the financial function – management of income, expenses and investments in order to achieve financial stability and profitability.

In the management process (in the production process in particular), enterprises have certain opportunities to change the volume of use of resources involved in production, and therefore the activities of the enterprise as a micro-system should be studied in certain periods of time.

Firstly, the instantaneous period is the period of production during which none of the factors of production can be changed (a "snapshot" of the state of the enterprise at a certain time).

Secondly, the short-term period is the period in the production and economic activity of the enterprise during which at least one of the factors of production (for example, labor) can be changed, the rest are considered constant (fixed).

Thirdly, the long-term period is the period in the activities of the enterprise, the duration of which is sufficient to change the volume of use of all, without exception, factors of production necessary for the production of finished products.

In the short term, only the intensity of the use of available resources can be changed.

It should be noted that the division into instantaneous, short-term and long-term periods is not based on the criteria of time as such but on the possible change in the amount of resources used in the production process of products. And this possibility, in turn, is due to the influence of a number of factors, in particular, the size of production, field of activity, technology, etc. In other words, for some companies the short-term period can last several weeks, for others – several months or even years. Today there are many ratings of companies based on various criteria. According to the number of product names produced by the company, they are divided into mono-product companies and companies with several products. In microeconomics, it is customary to assume that each company produces only one (certain) type of product (service), that is, all the companies considered are mono-product enterprises. Modern economics is based on the hypothesis of rational behavior of market entities, and companies in particular, this means that the company seeks to make decisions that maximize profit in conditions of limited resources, that is, the main goal of the enterprise is to maximize profit.

The company has sovereignty in making economic decisions regarding its activities. The assumption of a single goal for any enterprise is a significant simplification of reality. A firm may pursue the following goals:

profit maximization, that is obtaining the highest possible income after covering all costs;

market share growth – striving to expand its presence in the market;

cost optimization, that is reducing production costs to increase profitability;

social responsibility, that is taking into account environmental, ethical and social aspects of activities.

But in the long term, the leading goal of activity should be profit maximization, otherwise the enterprise will not be able to engage in economic and financial activities for a long time and, therefore, will not remain in business and will not achieve other goals. It should be understood that production relations at certain enterprises are, first of all, technological relations. Technology in its most general form is a set of knowledge about the technical means of implementing the production process, about how to combine individual factors of production (qualitatively and quantitatively different) to ensure the production of a certain volume of goods and services.

3.2. Production function. The law of the diminishing variable factor of production

A production function is a mathematical model that describes how a firm uses resources to create production. Understanding of this point helps companies make decisions about:

optimal combination of resources;

introduction of new technologies;

increase or decrease in production;

choice of business growth strategies.

The production function reflects the amount of output that a company can produce if it uses different combinations of resources in the production process.

There are many types of production functions: multiplicative and additive, two-, three- and multifactor. It is expressed by the formula:

$$Q = f(L, K, N, E), \quad (3.1)$$

where Q is the volume of output;

f() is a function describing the relationship between the factors of production;

L is labor costs;

K is capital costs;

N is the use of land and natural resources;

E is entrepreneurial abilities.

For simplicity, microeconomics assumes that the enterprise uses only two factors in its production process: labor (L) and capital (K). Thus, in general, the production function has the following form:

$$Q = f(L, K), \quad (3.2)$$

where only labor and capital determine the volume of production.

The main properties of the production function are as follows:

The law of diminishing marginal productivity (when one factor of production increases (while others remain unchanged), its marginal contribution to production decreases). For example, if the number of workers on fixed equipment is increased, then over time the increase in production will decrease.

Interchangeability of production factors (some factors can partially replace each other). For example, automation reduces the need for labor.

Scale effect (shows how output changes with a proportional change in all production factors).

One of the most famous production functions is the Cobb-Douglas function (developed in 1923), which describes the dependence of production volume on labor and capital:

$$Q = A \cdot K^{\alpha} \cdot L^{\beta}, \quad (3.3)$$

where A is the proportionality coefficient (scale factor);

α and β are elasticity coefficients that show the impact of a 1 % change in labor (β) and capital (α) on total output.

Later, another factor was introduced into this function – technological progress:

$$Q = A \cdot K^{\alpha} \cdot L^{\beta} \cdot I^{t}, \quad (3.4)$$

where I^{t} is the impact of technological progress and other qualitative changes on total output.

In microeconomics, the production process is usually considered in a functional perspective, according to which production is defined as the process of transforming production resources (costs of production factors) into final products. This process is carried out on the basis of a certain production technology, which specifies possible ways of combining factors. The formalized representation of the production process is implemented through a production function, the analysis of which is key in the study of resource efficiency.

Let us consider a situation when an enterprise, operating within a given technology, maintains fixed volumes of all production factors, except for one variable. In this case, the concept of a single-factor production function is applied. As noted in paragraph 3.1, this approach corresponds to a short-term production function, which is characterized by a partial change in the volumes of use of individual factors.

The analysis of the short-term production function is carried out on the basis of the dynamics of three key indicators.

Total product (TP) is the total volume of output for a certain amount of a variable factor.

Average product (AP) is the output per unit of a variable factor, defined as the ratio of total product to the quantity of the variable factor.

Marginal product (MP) is the increase in output caused by the use of an additional unit of a variable factor, with all other resources held constant.

The relationship between total, average, and marginal products in the context of the use of a variable factor (e.g., labor) is shown in the graph (Fig. 3.1). This relationship is important for determining optimal production volumes and efficient allocation of resources in the short run.

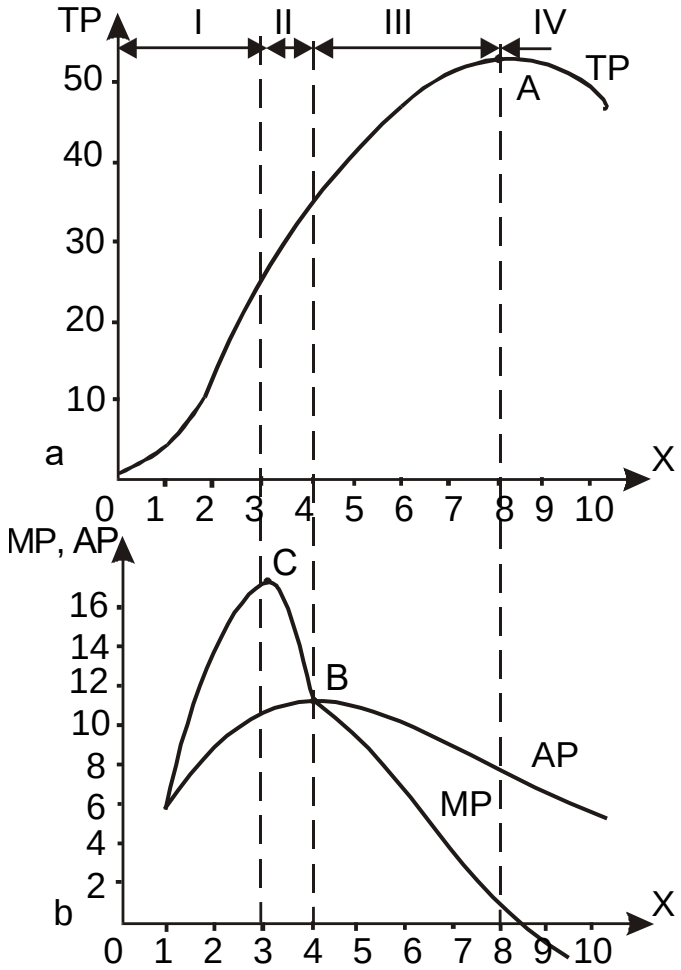


Fig. 3.1. **Total, average and marginal products of a variable factor of production and their relationships**

Let us analyze the case when a firm, with a certain technology, uses fixed volumes of all factors of production, except for one, that is, a single-factor production function. It is also called a production function of the short run (under conditions of partial variation of the factors of production involved). The main indicators used for analysis are the dynamics of three indicators,

namely: total product (TP), average product (AP) and marginal product (MP) of a variable factor of production.

The total product (TP) of the firm increases with the increase in the use of a variable factor X (for example, labor) and reaches the largest value (maximum) at point A, then the process of increasing the total product stops. The average product (AP) of the firm increases, reaches the maximum value at point B. In the future, AP decreases. The marginal product (MP) of the firm increases, reaching its highest value at point C, then begins to decrease.

The nature of the change in these indicators means that, starting from a certain point (in Fig. 3.1, it is point C), each additional unit of the variable factor (labor) involved in production gives less and less results (other factors are fixed). Moreover, additional expenses of this factor (labor) can negatively affect the output of finished products (in Fig. 3.1, b MP < 0 at X > 8). Therefore, under these conditions, the optimal combination of the involved production factors is violated (non-compliance with the production technology), and this leads to a decrease in the marginal product (marginal productivity) of the variable factor.

The pattern observed in similar situations is known in theoretical economics (in particular, in microeconomics) as the law of diminishing returns of the variable factor of production. In accordance with this law, the involvement of an increasing additional quantity of a certain (variable) factor in the production process, with the remaining (fixed) volumes of other factors, ultimately leads to the fact that the return (productivity) of each subsequent unit of a variable resource (for example, labor) involved in production will be less than the return of the previous unit of this resource. We have the result – the marginal productivity of the variable resource falls.

More complex, but closer to practice is the situation when the volumes of use of two factors of production are variable in the production process. Such a production function is called a two-factor production function. Graphically, the utility of using certain combinations of resources to produce certain volumes of a product can be studied using isoquants.

So, an isoquant is a line, each point of which reflects such combinations of production resources (labor and capital), the use of which makes it possible to produce the same volume of output. The larger the volume of resources used in production, the larger the volume of output that the company can provide (Fig. 3.2). The larger the volume of output that the company provides, the further from the source the corresponding isoquant is located. A set of

isoquants with one production function, each of which corresponds to a certain output volume, is called an isoquant map (Fig. 3.3).

Different combinations of production factors (within the isoquant) ensure the production of a certain amount of output, which means that these factors are in a sense interchangeable. The interchangeability of production resources at each point of the isoquant has different values.

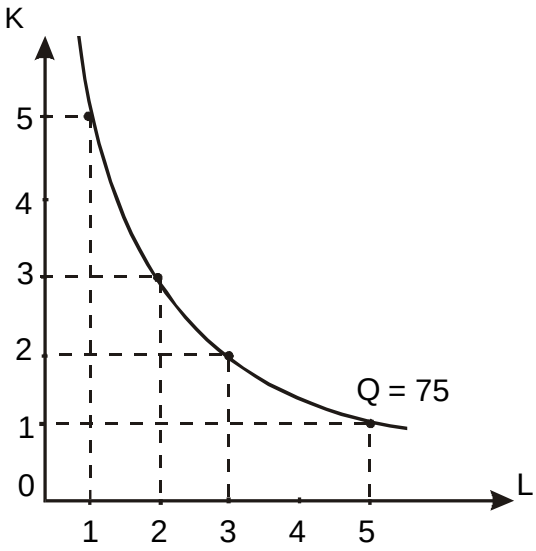


Fig. 3.2. **An isoquant**

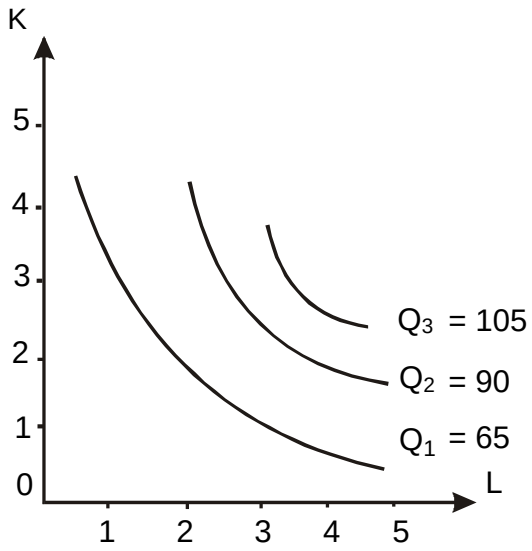


Fig. 3.3. **An isoquant map**

In order to determine the level of interchangeability of factors of production (production resources), the concept of the marginal rate of technological substitution (MRTS) is used. The MRTS coefficient shows how many units a manufacturing firm must reduce the use of one resource in production in exchange for an increase in the use of another production resource by one unit, provided that the volume of production remains unchanged. For example, the marginal rate of technological substitution MRTS of labor by capital is determined by the formula:

$$MRTS_{LK} = \frac{\Delta L}{\Delta K}\Big| Q = const . \qquad (3.5)$$

To determine the optimal combination of resources, a rational producer needs to know the prices of resources in order to minimize costs. When developing an economically efficient production plan, the firm takes into account the costs of purchasing resources.

So, in a simplified way, assuming that the firm uses only two resources (labor (L) and capital (K)) and knowing the wage rate (ω) and the amount of payment for the use of physical capital (r), the total costs of the firm (TC) can be expressed as:

$$TC = rK + \omega L, \qquad (3.6)$$

where rK is the total cost of capital;

ωL is the total cost of labor.

Formula (3.5) is a mathematical expression of the budget constraint. The budget constraint of a firm is graphically depicted as a budget line – an isocost.

An isocost is a line, each point of which reflects the same amount of costs for different combinations of two resources in the production process. Or, an isocost is a line that shows all possible (available) combinations of production resources (labor and capital) at a constant level of total costs.

Each level of costs has its own isocost. The set of isocosts that reflect different levels of total costs is called an isocost map.

By comparing the isoquant map and the isocost map, one can obtain the optimal combination of resources that, at minimal cost, will provide a certain volume of output. This situation is called the producer's optimum (Fig. 3.4).

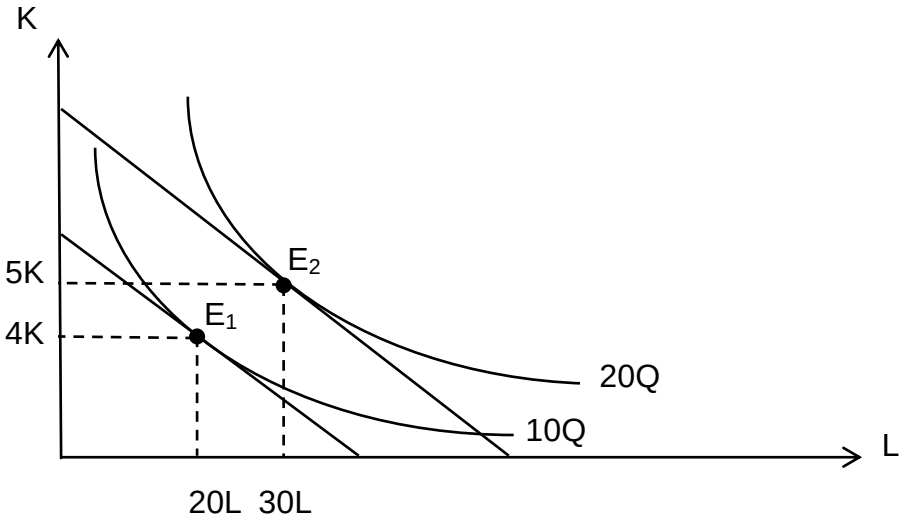


Fig. 3.4. **Producer's optimum**

The optimum is reached at the point where the slope of the isoquant is equal to the slope of the isocost, which corresponds to the equality of the marginal rate of technological substitution and the ratio of resource prices.

The producer's optimum is the combination of resources and production volumes that maximizes profit or minimizes costs at a given level of output. In microeconomic analysis, the producer's optimum is determined by the relationship between the costs of production factors, technological capabilities, and the level of product prices.

In the production process, the enterprise seeks to achieve the optimal ratio between the resources involved. This means that the marginal rate of technical substitution (MRTS) is equal to the ratio of the prices of the factors of production:

$$MRTS = \frac{MP_L}{MP_K} = \frac{w}{r}, \quad (3.7)$$

where MP_L, MP_K, are the marginal products of labor and capital, respectively,

w, r are the costs of labor and capital, respectively.

This equality means that the enterprise cannot improve its results by changing the ratio between the factors of production, and it is at the most efficient level of resource use.

3.3. The concept and types of costs

The production of any good or service relates with costs. *Production costs* are the costs of an enterprise (or an entrepreneur) for the production of goods or services.

There are different theories of production costs (Table 3.1).

Table 3.1

Theories of production costs

Theories	Authors	The essence of production costs
1	2	3
Theory of absolute cost advantage	A. Smith	Absolute costs are labor costs for the production of a unit of production. Each enterprise must adhere to the principle of least absolute advantages and should specialize in the production of a good with lowest absolute costs

Table 3.1 (the end)

1	2	3
Theory of comparative cost advantage	D. Ricardo	Each enterprise must adhere to the principle of least comparative advantages and should specialize in the production of a good with a lower opportunity cost comparing with other enterprises in the industry
Marxist theory	K. Marx, F. Engels	Production costs equal the cost of advanced capital that is calculated as follows: AC = c + v, where AC is advanced capital; c is fixed capital; v is variable capital
Theory of marginal costs	K. Menger, A. Marshall	Production costs are determined by the value of marginal costs that arise during the production of each additional unit of a good
Theory of opportunity costs	F. Wieser	Production costs equal the greatest total utility of goods that an entrepreneur could receive in a case of another (alternative) option for investing capital
Institutional theory of human costs	J. Clark J. Hobson	Human costs are a type of production costs which are determined by the level of knowledge and abilities of people involved in the production process
Theory of transaction costs	R. Coase, D. North, K. Arrow	Transaction costs are costs relating with solving the problem of selling products and the analysis of market needs
Neoclassical theory	C. R. McConnell, S. L. Brew, E. J. Dolan	Production costs are the sum of fixed and variable costs for the purchase of factors of production

Production costs can be classified according to different criteria (Fig. 3.5).

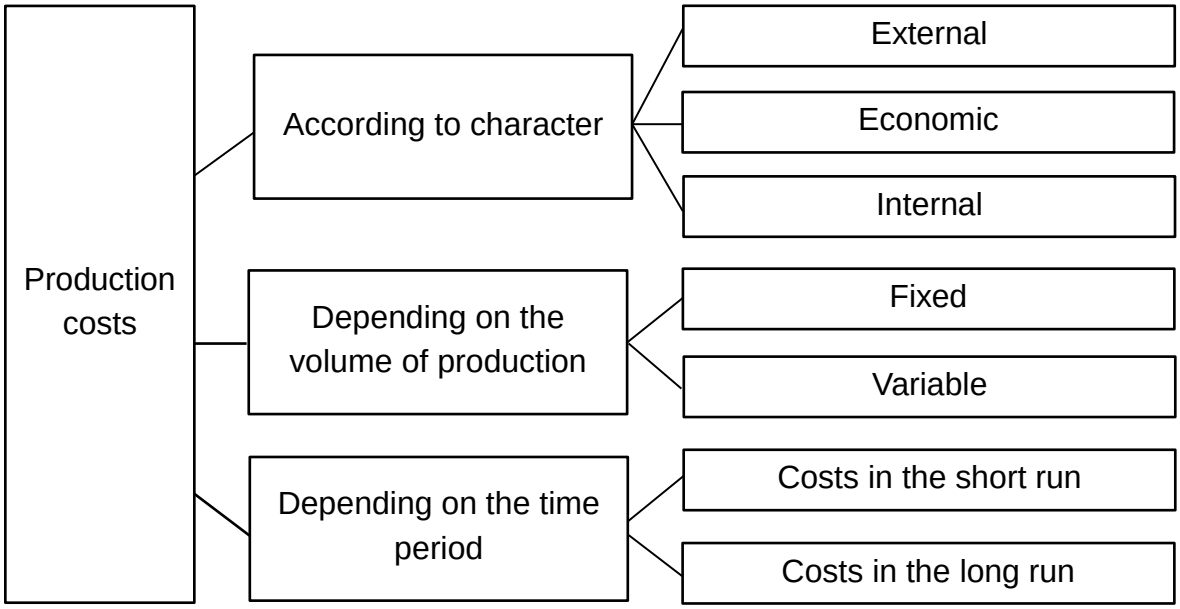


Fig. 3.5. **Classification of production costs**

External costs (ES) are the costs of an enterprise (or an entrepreneur) relating with the acquisition of production resources from other enterprises (or entrepreneurs). External costs mainly include costs for the acquisition of financial resources (in the form of payment of interest for the use of a loan or the purchase of a franchise that is the right to use a trade brand of another manufacturer), capital resources (in the form of purchase or lease of premises and equipment), labor resources (in the form of remuneration hiring employees), energy resources (in the form of payment for electricity, gas, heat, water, etc.).

Internal costs (IS) are the costs of an enterprise (or an entrepreneur) relating with the use of their own production resources. The examples of internal costs are the cost of own premises and/or own equipment, own financial funds that were withdrawn from the deposit account and invested in production as well as the value of the normal (or zero) profit of the owner of the enterprise. The emergence of internal costs is caused by the fact that the if an entrepreneur uses his own resources, then he must refuses from other (alternative) options for investing capital and obtaining income from the use of them.

Fixed costs (FC) are the costs of an enterprise (or an entrepreneur) that do not depend on the volume of production, for example, the costs of renting and guarding premises, advertising, licensing, labeling and certification of products, payment of salaries of employees with hourly wages (managers, accountants, lawyers, economists), payment of insurance premiums. Graphically, fixed costs are depicted in the form of a horizontal line.

Variable costs (VC) are the costs of an enterprise (or an entrepreneur) that depend on the volume of production, for example, the cost of purchasing raw materials, electricity, gas, payment of wages and bonuses to employees with piecework wages as well as the payment of certain types of taxes, in particular income tax. As a rule, a curve of variable costs positively slopes.

The sum of fixed and variable costs is *total costs* that are calculated as follows:

$$TC = FC + VC, \tag{3.8}$$

where TC is total costs.

A graphical representation of fixed, variable and total costs is given in Fig. 3.6.

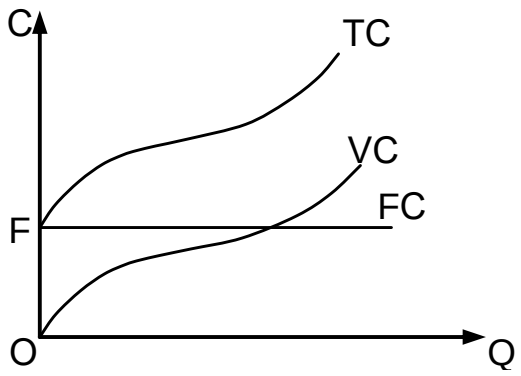


Fig. 3.6. **Curves of fixed, variable and total costs**

Let's give a conditional example of calculating fixed, variable and total costs (Table 3.2).

Table 3.2

Annual production costs of the sewing enterprise "New style"

Types of costs	Costs, UAH
1	2
Fixed costs	644 200
Including	
Rent of premises	144 000
Security of the premises	48 000
Payment of interest for the use of the loan	187 000
Payments on employees' social contribution	27 000
Costs for labeling and certification of goods	5 400
Renumeration of employees with hourly wage (accountants, fashion designer, lawyer)	232 800
Variable costs	
Including	
Purchase of materials (fabrics, threads, buttons, rhinestones, zippers, etc.)	745 000
Depreciation of equipment (sewing machines)	12 000
Renumeration of employees with piece-rate pay (seamstresses, cutters)	480 000
Utility bills	29 400

Table 3.2 (the end)

1	2
Electronic and mobile communication services	3 600
Tax on profit	8 700
Total costs	1 278 700

Uneven changes in total costs lead to the fact that with the increase of production average costs also increase. In view of this, there is a need to determine *average costs* that are costs for the production of a unit of production. Average costs are divided into average fixed costs, average variable costs and average total costs.

Average fixed cost is the fixed cost per unit of output. It is calculated using the following formula:

$$AFC = \frac{FC}{Q}, \tag{3.9}$$

where AFC is average fixed cost;

FC is total fixed cost;

Q is the number of units of output produced.

Average variable cost is the variable cost per unit of output. It is calculated using the following formula:

$$AVC = \frac{VC}{Q}, \tag{3.10}$$

where AVC is average variable cost.

Average total cost is the total cost per unit of output. It is calculated using the following formula:

$$ATC = \frac{TC}{Q}, \tag{3.11}$$

where ATC is average total cost.

A graphical representation of average fixed, average variable and average total costs is given in Fig. 3.7.

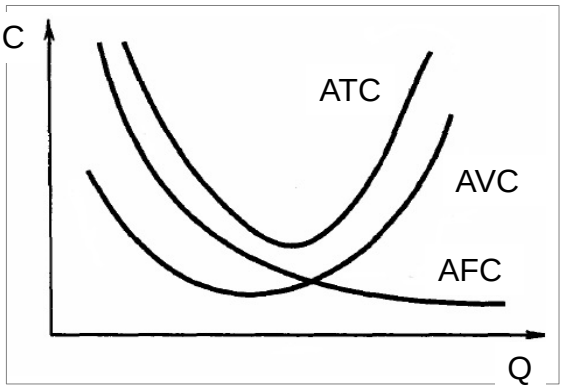


Fig. 3.7. **Curves of average costs**

Production costs in the short run are the costs of an enterprise (or an entrepreneur) for the acquisition of production resources (labor, financial, natural, energy, etc.), and the volume of resources can be easily and promptly changed.

Production costs in the long run are the costs of the enterprise (or an entrepreneur) relating with changes in the production capacity of the enterprise, for example, with the renewal of production infrastructure or purchase of new equipment.

In modern microeconomics, opportunity, marginal and transactional costs also exist. *Marginal costs* are the costs of an enterprise (or an entrepreneur) that arise during the production of each additional unit of production. It is calculated using the following formula:

$$MC = \frac{\Delta TC}{\Delta Q}, \tag{3.12}$$

$$\text{or } \Delta TC = TC_n - TC_{n-1}, \tag{3.13}$$

where MC is marginal cost;

ΔTC is a change in total costs;

ΔQ is a change in quantity;

TC_n is total cost of producing n units;

TC_{n-1} is total cost of producing n-1 units.

Transaction costs are the costs of an enterprise (or an entrepreneur) relating with the sale of goods and services rather than production. For example, in order to sell products, an entrepreneur needs to have information about the tastes and age of potential consumers and competitors' prices for similar products. Obtaining this information relates with an increase in costs of labor, first of all, of employees of marketing and logistics departments. Like production costs, transaction costs are divided into fixed and variable. Fixed transaction costs do not depend on the number of transactions but relate with the formation and development of an effective organizational structure of the enterprise. These costs, as a rule, include the company's spending on creating new departments and/or registering subsidiaries abroad. At the same time, variable transaction costs depend on the number of transactions and relate with the costs of preparing a contract, negotiating with partners and providing guarantees for the fulfillment of obligations by the enterprise.

Opportunity costs are the costs of the enterprise that are a result of "missed opportunities". Let's consider the essence of this type of cost using the following example. Suppose you decided to produce furniture and therefore refused the position of chief economist of Bank *Pivdenny* with a salary of 150 000 UAH per year. In this case, the opportunity cost will equal 150 000 UAH and included in the structure of your internal costs. The mechanism of formation of opportunity costs is also illustrated by another example. Suppose you run your own business and produce men's shoes and choose what material to make them of: genuine or artificial leather. If you decide to produce shoes of artificial leather, then you must abandon the production of shoes made of genuine leather. In other words, the choice of one production option always implies the rejection of another (alternative) option which also has a certain utility for the enterprise (or the entrepreneur).

Production costs are an important component of the formation of the price of goods, so enterprises and entrepreneurs are interested in minimization of them. There are three main ways how to minimize production costs:

1) the use of advanced, more productive equipment;

2) saving on the wages of employees with hourly payment through outsourcing (transfer by the enterprise of the performance of certain "non-core" functions to specialized companies or agencies (e.g. marketing, accounting, legal, cleaning) and/or outstaffing (hiring employees who are formally employed in a specialized agency, which is their official employer but physically work at the enterprise and perform certain "auxiliary" tasks));

3) implementation of resource- and energy-saving technologies, wider use of renewable resources (solar and wind energy) in the production process.

3.4. The essence and types of profit

Profit occupies an important place in the system of value instruments of a market economy. In market conditions, profit influences the entrepreneur's decisions: what, how, and in what quantities to produce.

Modern neoclassical theories consider profit as:

the theory of productive capital;

the theory of profit as income from entrepreneurial activity in all its forms;

the theory of retention, where profit is a reward to the entrepreneur for underconsumption of own capital, for the risk of invested funds;

the theory of profit as a result of the existence of monopolies.

The presence of many concepts of profit indicates its complexity and multidimensionality. Profit is the main source of funds for the development of the enterprise. The development of the enterprise, its expansion is the main goal of entrepreneurs, because it brings greater cash income. However, the expansion of activity requires significant cash investments, the main source of which is profit.

Profit maximization is the goal of the firm. Profit is the main financial source of production accumulation, technology improvement, and the development of the enterprise team. Profit for a certain period is calculated as the difference between revenue from product sales and total revenue.

Profit is the main financial result of an enterprise, reflecting the difference between total revenue from the sale of goods and services and total costs of their production and sale. In microeconomics, profit is the key motive for the activities of firms and the main indicator of their efficiency.

The main functions of profit include:

1. The stimulating function which

- motivates entrepreneurs to use resources efficiently, increase productivity and introduce innovations;
- encourages investment – high profit makes the enterprise attractive for investment;
- promotes competition – firms strive to maximize profit, which leads to an increase in the quality of goods and services.

2. The evaluation function which

• reflects the efficiency of the enterprise – if profit is growing, the business is operating successfully;

• signals the state of the market – high profits may indicate a favorable situation, and a decrease – problems in the industry;

• helps compare alternatives – allows you to evaluate different areas of activity according to their profitability.

3. The distribution function which

• forms the income of owners and employees – part of the profit can be distributed in the form of dividends or bonuses;

• provides financing for further development – to expand production, purchase of new technologies, marketing;

• is a source of tax revenues – taxable profit is an important item of state budget revenues.

4. Resource-providing function that

• allows the accumulation of financial resources for the development of the enterprise;

• promotes the renewal of fixed assets – profit is used to modernize production;

• allows the creation of reserves to cover possible risks and unforeseen expenses.

5. Social function that

• increases the level of well-being – part of the profit can be directed to raising salaries and improving working conditions;

• promotes the development of society – enterprises invest in charity, educational and environmental initiatives;

• ensures business stability – enterprises with high profits are less likely to go bankrupt, which is important for the labor market.

Profit is not only a financial indicator, but a multifunctional tool that stimulates the development of business, the market and society as a whole. Its functions contribute to economic growth, ensuring competitiveness and social well-being.

Accounting profit is calculated as the difference between total revenue and external (explicit) costs.

Economic profit is calculated as the difference between total revenue and the sum of explicit and implicit costs:

$$EP = TR - TC, \quad (3.14)$$

where EP is economic profit;

TR is total revenue;

TC is total costs (sum of explicit and implicit costs).

Normal profit is profit equal to the necessary costs invested in production by the owner of the firm. It is necessary in order to attract and retain the entrepreneur's own resources within the framework of a given type of activity.

Economists view economic profit as a reward for entrepreneurial initiative and technical innovation or as a reward for risk and uncertainty.

The firm seeks to maximize profit. Profit maximization is a crucial condition for the successful competition of the enterprise, its viability and consolidation in the market.

The rule of cost minimization states that a firm should allocate its resources in such a way that it produces a given level of output at the lowest possible cost. This principle is fundamental in microeconomic production theory and applies to both short-run and long-run decision-making.

A firm minimizes its production costs when the ratio of marginal products to input prices is equal for all inputs:

$$\frac{MP_L}{P_L} = \frac{MP_K}{P_K}, \tag{3.15}$$

where P_L and P_K are the prices of labor and capital, respectively.

This condition ensures that the firm is using its resources efficiently – each additional dollar spent on labor or capital yields the same additional output.

The profit maximization rule states that a firm should produce at a level where marginal revenue (MR) equals marginal cost (MC) to achieve the highest possible profit. This principle applies to firms operating under all market structures, including perfect competition, monopoly, oligopoly, and monopolistic competition.

A firm maximizes profit when

$$MR = MC, \tag{3.16}$$

where MR is marginal revenue;

MC is marginal cost.

Marginal revenue is the additional revenue generated by selling one more unit of output.

Marginal cost is the additional cost incurred by producing one more unit of output.

In economics, total revenue (TR), average revenue (AR), and marginal revenue (MR) are key concepts used to analyze a firm's revenue.

Total revenue is the total income a firm receives from selling its goods or services. It is calculated as:

$$TR = P \cdot Q, \tag{3.17}$$

where P is the price at which the firm sells each unit of the good;

Q is the quantity sold.

Average revenue is the revenue per unit of output sold. It is essentially the price of the good in a perfectly competitive market. The formula for average revenue is:

$$AR = TR / Q, \tag{3.18}$$

where AR is average revenue.

Since total revenue is the price multiplied by the quantity, the average revenue (AR) equals the price in a perfectly competitive market. In perfect competition, the average revenue is the same as the price of the good.

Marginal revenue is the additional revenue a firm receives from selling one more unit of output. It is the change in total revenue when the quantity sold increases by one unit. The formula for marginal revenue is:

$$MR = \Delta Q / \Delta TR, \tag{3.19}$$

where ΔQ is the change in quantity (usually 1 unit);

ΔTR is the change in total revenue.

These concepts help firms and economists understand how changes in output levels and prices affect a firm's revenue.

Glossary

Factors of production are resources that are used to create goods and services. The main factors of production include land, labor, capital and entrepreneurial abilities.

Isocost is a line that shows all possible combinations of production factors that can be purchased at fixed costs. Isocost is used to determine the most effective combination of production factors that corresponds to the company's budget.

Isoquant is a curve that displays all possible combinations of two factors of production that make it possible to produce the same amount of production. In fact, the isoquant shows how it is possible to replace one factor of production with another, while maintaining a constant level of output.

Production function is an economic model that describes the relationship between the number of production factors (resources) and the number of products produced. It shows how a change in one or more factors affects the volume of output.

The law of diminishing returns states that when one of the factors of production (for example, labor) increases, with other factors unchanged, the increase in production output will initially increase, but after a certain point it will begin to decrease.

Normal profit is the minimum level of profit that is necessary for the company to remain on the market. Normal profit is considered a part of production costs and is equal to the income that is necessary to compensate all factors of production, including entrepreneurial efforts.

Producer equilibrium is a state in which the firm achieves maximum profit by optimizing the use of all production factors and achieving such a combination of resources that its marginal costs are equal to marginal revenue.

Production costs are costs incurred for the acquisition and use of production factors necessary for the creation of production. They include both variable and fixed costs.

Profit is the difference between the revenue from the sale of the product and all costs for the production of this product. Profit is the main incentive for entrepreneurial activity and evaluation of the firm's efficiency.

Producer equilibrium is a state in which the firm achieves maximum profit by optimizing the use of all production factors and achieving such a combination of resources that its marginal costs are equal to marginal revenue.

Scale effect is a change in the firm's productivity when the scale of production changes. The effect of scale can be both increasing (an increase in production volume leads to a decrease in costs per unit of production) and decreasing (with an increase in production volume, costs begin to increase).

Questions for self-assessment

1. List and explain the main factors of production. What role does each of them play in the process of creating a product or service?
2. How do possible combinations of resources change depending on the economic period (short-term, medium-term, long-term)? Give examples for each phase.
3. What economic and non-economic factors can influence the motivation of the company's behavior in the market? How can the motivation of the company change depending on the external and internal situation?
4. How does the production function reflect the relationship between the number of used production factors and the volume of output?
5. Explain the law of diminishing returns to factors of production and how it manifests itself in the context of a two-factor production function.
6. How does constructing an isoquant map help to analyze production processes?
7. How does profit contribute to business sustainability and ego development?
8. What theories of profit exist and how do they explain its formation and distribution in market conditions?
9. What are the rules for cost minimization at a given production volume and profit maximization?
10. How do these rules help companies optimize their activities and increase profitability?

Practice tests

1. What is the marginal product:

a) the total amount of output produced by all factors of production;

b) increase in production when one additional resource is added;

c) output produced by all employees of the company;

d) profit received from the sale of products?

2. What is the name of the effect in which an increase in one of the factors of production, with other factors unchanged, leads to an increase in output, but over time, the rate of increase in production decrease:

a) the law of diminishing returns;

b) the law of increasing marginal product;

c) scale effect;

d) the law of growth of profitability?

3. Which of the following refers to fixed costs:

a) salaries of employees;

b) cost of raw materials;

c) equipment depreciation;

d) electricity costs?

4. Which of the following characteristics refers to variable costs:

a) these costs do not change depending on the volume of production;

b) these costs increase with the increase in production volume;

c) these costs are always fixed;

d) these costs do not depend on the amount of production?

5. What are total costs:

a) the sum of fixed and variable costs;

b) costs associated with the purchase of raw materials;

c) costs related to the payment of labor;

d) the amount of only variable costs?

6. Which of the following situations corresponds to a firm in a state of equilibrium:

a) the firm cannot increase profits by increasing production;

b) the firm produces as much as its resources allow, without changing costs;

c) the firm receives zero profit;

d) the firm strives for the maximum amount of output?

7. Which of these is terms means "a profit that is sufficient for the firm to continue its activities in the market, but does not receive additional economic benefits":

a) normal profit;

b) economic profit;

c) marginal profit;
d) absolute profit?

8. What is marginal cost:
a) the total amount of production costs for all production units;
b) additional costs for the production of one additional unit of production;
c) cost of all variable costs;
d) the amount of fixed costs per unit of production?

9. Which of these concepts characterizes the difference between income and all costs, including normal profit:
a) economic profit;
b) loss;
c) normal profit;
d) conditional profit?

10. Which of the statements about the theory of marginal products is true:
a) marginal product always increases with an increase in the number of factors of production;
b) with an increase in the amount of one factor of production, with fixed other factors, the marginal product will first increase, and then decrease;
c) the marginal product always remains constant, regardless of changes in the use of production factors;
d) the marginal product depends only on the level of capital rather than on labor?

Computing tasks with examples of solutions

Task 1. Suppose a firm operates in the short run with fixed equipment. It is known that as the number of workers in the production process increases from 1 to 7, the quantity of output changes as follows: 10, 17, 22, 25, 26, 25, 23.

1. Calculate the marginal and average productivity of labor for this production function.

2. Does this production function exhibit diminishing returns to scale? Explain why?

3. Using your intuition, explain what might cause the marginal productivity of labor to be negative?

Guidelines

1. Average labor productivity (APL) is Q / L. Marginal labor productivity (MPL) is ΔQ / ΔL. The corresponding calculations are given in Table 3.3.

2. This production process exhibits decreasing labor productivity, which is characteristic of all production functions with one fixed resource. Each additional unit of labor produces a smaller increase in output than the previous one.

Table 3.3

Average and marginal labor productivity

L	Q	APL	MPL
1	10	10	10
2	17	8 ½	7
3	22	7 1/3	5
4	25	6 ¼	3
5	26	5 1/5	1
6	25	4 1/6	−1
7	23	3 2/7	−2

3. Negative marginal productivity of labor can arise from a manufacturing firm being over-staffed. If an increasing number of workers use the same fixed amount of capital, they begin to interfere with each other, thereby reducing output.

Task 2. The total curve of the firm is described as TC = 4 000 + 500Q − − $40Q^2 + Q^3$. Calculate: 1) fixed costs; 2) variable costs if 2 items are produced; 3) average fixed costs if 500 items are produced; 4) average variable costs if 3 items are produced; 5) marginal costs if 5 items are produced.

Guidelines

1. Because fixed costs do not depend on the volume of production, it is the following: FC = 4000.

2. Because variable costs depend on the volume of production, it is the following: VC = $500Q - 40Q^2 + Q^3$.

If Q = 2, then VC = 500 · 2 − 40 · 2^2 + 2^3 = 848.

3. Calculate average fixed costs:

$$AFC = FC / Q = 4000 / Q.$$

If Q = 500, then AFC = 4000 / 500 = 8.

4. Calculate average variable costs:

$$AVC = VC / Q.$$

AVC = (500Q − 40Q^2 + Q^3) / Q.

If Q = 3, then AVC = 500 − 40 · 3 + 3^2 = 389.

5. Calculate marginal costs as a derivative from TC or VC.

MC = (500Q − 40Q^2 + Q^3)' = 500 − 80Q + 3Q^2.

If Q = 5, then MC = 500 − 80 · 5 + 3 · 5^2 = 175.

Computing tasks for self-study

1. Using the data in Table 3.4 calculate the average (AP) and marginal (MP) products of the firm.

Table 3.4

Data for calculating the average and marginal products of the firm

QL	TP	AP	MP
1	200		
2	500		
3	900		
4	1100		
5	1200		

Analyze the data obtained and determine with what number of workers the law of diminishing returns begins working.

2. To produce 48,000 units of output, the enterprise uses 120 units of labor and 80 units of capital. What is the marginal productivity of capital if the marginal productivity of labor is 200 (the effect of scale is constant).

Essays

1. The rule of the least cost: theory and practice of use.
2. Technologically efficient production: microeconomic research tools.

Topic 4. The theory of market structures

The purpose of studying the topic is to form the following students' competencies: the ability to understand the rules of enterprise behavior (choosing optimal production volumes) under conditions of changing market situations; the ability to determine the volumes of production that maximize profits or minimize losses or ensure break-even operation; the ability to justify the behavior of a company under conditions of poorly predicted market conditions.

Study questions:
4.1. Market of perfect competition.
4.2. Monopoly market.
4.3. Market of monopolistic competition.
4.4. Oligopolistic market structure.

Recommended literature: [2; 5; 4; 9; 14; 15; 21].

Keywords: perfect competition, equilibrium of a competitive firm, monopoly, monopsony, monopoly power, price discrimination, antitrust policy, monopolistic competition, oligopoly.

4.1. Market of perfect competition

The model of perfect competition represents an idealized framework in microeconomic theory, which assumes a highly competitive environment where no single buyer or seller has the ability to influence the overall market conditions. This model is widely used as a reference point for analyzing efficiency and resource allocation in real markets, although in practice, perfect competition rarely occurs in its pure form.

In a perfectly competitive market, there exists a very large number of independent buyers and sellers. Each of them operates at such a small scale relative to the total market that their individual actions cannot affect the prevailing market price. This leads to the notion of all participants being price takers, meaning they accept the market price as given and cannot influence it through their own supply or demand decisions.

Another defining feature of perfect competition is the homogeneity of the product. All firms offer identical goods or services that are perfect substitutes for one another. This absence of product differentiation means that consumers are indifferent to the source of the good, focusing purely on price rather than brand or perceived quality.

The model also assumes complete freedom of entry and exit from the market. New firms can enter the industry whenever they perceive an opportunity for profit, and existing firms can exit if they incur persistent losses. This dynamics ensures that, in the long run, economic profits tend to be zero, as any short-term gains attract new competitors, increasing supply and driving prices down.

Perfect information is another essential assumption of perfect competition. All market participants are presumed to have full and immediate knowledge of all relevant factors, including prices, production technologies, and the quality of goods. This transparency enables rational decision-making and ensures that resources are allocated efficiently.

In such a market, firms are guided by the goal of profit maximization. They determine their level of output by equating marginal cost with marginal revenue. Under conditions of perfect competition, marginal revenue is equal to price, so firms expand production up to the point where the cost of producing an additional unit equals the market price.

Additionally, perfect competition assumes the absence of government intervention. There are no subsidies, taxes, price controls, or regulatory barriers that distort market outcomes. The only forces at play are supply and demand, which determine the equilibrium price and quantity in the market.

This theoretical model leads to highly desirable outcomes in terms of economic efficiency. In the short run, firms may experience profits or losses, but in the long run, the forces of competition push all firms toward a state of zero economic profit, where price equals both average and marginal costs. At this point, the allocation of resources achieves both allocative and productive efficiency, ensuring that society's resources are used in the most effective way possible.

Under conditions of perfect competition, the market behavior (formation of the offer) of a company is based on two basic principles:

first, the output of an individual firm is insignificant compared to the total industry output of goods, and, as a result, no change in individual output can have any effect on the market prices of goods;

secondly, the industry in which the company operates is almost free from "entry" and "exit", that is, any producer (who is not currently even subject to economic relations in this market) can begin production of a certain product ("enter the industry"), and any participant in the market exchange can stop production or consumption ("exit the industry").

The combined companies of this industry do not influence these decisions.

The formation of market demand for the products of a company operating in conditions of perfect competition is determined by the following circumstances:

• the impossibility of concluding any form of collusion between manufacturers, who are unable (due to the large number of market participants and the insignificance of their market shares) to influence the terms of sale of goods and services;

• the standard nature of the products offered for sale and the insignificance of the differences between products of different manufacture, the choice of which is not associated with any profit for consumers;

• the lack of opportunities for non-price competition, the source of which is a certain differentiation of the product.

In addition, a feature of the formation of market demand for the products of a competitive firm (a firm operating in a perfectly competitive market) is the perfectly elastic nature of the demand curve.

Fig. 4.1 and 4.2 show a graphic illustration of the process of formation of demand and price in a competitive market. A single firm (see Fig. 4.1) accepts the market equilibrium price (P_0), and its demand schedule is perfectly elastic. The consequences of implementing such a behavioral model are a situation where the company's efforts to lower or somehow increase the price relative to P_0 will lead to a loss of customers and the disappearance of demand for its products.

Fig. 4.1. **Perfectly elastic demand of a competitive firm**

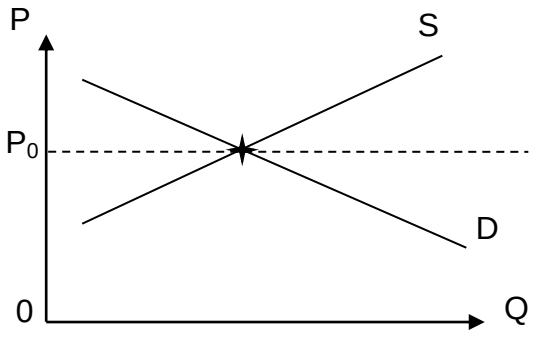


Fig. 4.2. **Industry as a whole**

Perfect competition arises under a specific set of theoretical conditions that create an ideal environment for maximum efficiency and fairness in the allocation of resources. These conditions, although rarely found in real-world markets in their entirety, serve as a foundational benchmark for analyzing deviations in other market structures.

The first fundamental condition is the existence of a large number of buyers and sellers. In such a market, each participant operates on a small scale relative to the overall market size. As a result, no single buyer or seller has the ability to influence the market price through their individual actions. Every firm is a price taker, meaning it must accept the prevailing market price as determined by the intersection of aggregate supply and demand.

Another important condition is the homogeneity of products. In a perfectly competitive environment, all firms offer an identical product that is completely indistinguishable from the same product provided by other firms. This lack of differentiation eliminates consumer preference for one seller over another, and the only factor influencing a buyer's choice is price. Quality, branding, and advertising play no role, as all products are perceived as perfectly substitutable.

Equally essential is the presence of perfect information. All market participants are assumed to have full and immediate access to relevant data, including prices, product characteristics, and production techniques. This transparency ensures rational decision-making and prevents any single firm from gaining a competitive advantage through exclusive knowledge or hidden strategies.

The condition of free entry and exit into the market also plays a crucial role. In the long run, firms can enter the market without restrictions if they identify a profit opportunity. Conversely, they can exit easily if they are unable to sustain operations profitably. This fluid movement of firms maintains long-term equilibrium, where abnormal profits are eliminated through competitive pressures.

A further condition involves the absence of government intervention. The market operates without taxes, subsidies, price controls, or other regulatory measures that could distort natural supply and demand dynamics. The interaction of buyers and sellers alone determines equilibrium outcomes.

Lastly, it is assumed that all resources used in production are perfectly mobile. Factors such as labor and capital can be reallocated instantly and without cost across industries, responding efficiently to changes in market conditions. This mobility ensures that resources are always employed where they are most valued, contributing to optimal economic performance.

Together, these conditions construct the theoretical framework of perfect competition. While purely hypothetical, this model remains a critical analytical tool for comparing real markets and understanding the principles behind efficient pricing and production.

A perfectly competitive market, while primarily theoretical, presents a set of clear advantages and disadvantages that are important for understanding how real-world markets function and deviate from ideal conditions.

A perfectly competitive market offers both benefits and drawbacks. One major advantage is efficiency. Firms produce at the point where price equals marginal cost, ensuring optimal resource allocation. Prices are low due to intense competition, and firms must minimize costs to survive, leading to productive efficiency. Consumers benefit from fair pricing and a market that reflects their preferences, with no need for advertising or artificial product differentiation.

Another strength is transparency. With perfect information, consumers make informed decisions, and firms quickly adapt to demand. In the long run, only the most efficient producers remain, reinforcing competitiveness.

However, the model also has weaknesses. The lack of innovation incentives is significant. Since products are identical and profits are minimal, firms are discouraged from investing in research or improving products. Any innovation can be quickly copied by competitors, erasing the advantage.

Also, economies of scale are harder to achieve. Small firms dominate, preventing cost savings from large-scale operations. Furthermore, the model ignores real-world complexities like externalities, public goods, and imperfect information, limiting its applicability to real economies.

While idealized, the model helps economists understand market behavior and identify areas where real markets fall short.

The characteristic features of the formation of market demand for products offered for sale by a competitive firm are revealed through the dynamics of changes in indicators that reflect the relationship between, on the one hand, the income received in the course of market transactions and, on the other hand, the volume of sales of the corresponding goods. The following should be included in the indicators that reflect the described relationship: gross (total) revenue (TR), average revenue (AR), marginal revenue (MR). A graphical representation of the dependence of the dynamics of the relationship of these indicators on production volumes is shown in Fig. 4.3.

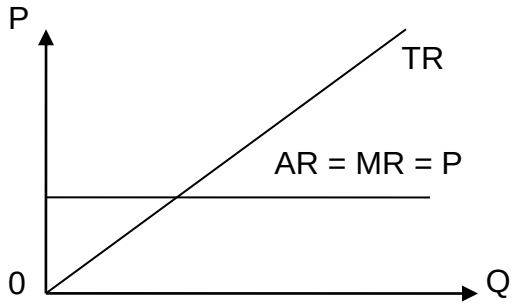


Fig. 4.3. **Gross, average, and marginal revenues of a competitive firm**

Under conditions of perfect competition, the gross revenue of a competing company grows in direct proportion to the increase in sales.

Marginal revenue (MR), which is defined as the amount of money received by the enterprise for selling an additional unit of output, will be equal to the corresponding market price, and, conversely, if under conditions of perfect competition the price is equal to marginal revenue, then for a firm that has maximized its profit, the price should be equal to marginal costs.

The inability of a competing firm to have any influence on the selling price of its products causes the demand, average revenue and marginal revenue curves of the firm to coincide (unite) at a level corresponding to the market price (horizontal line in Fig. 4.3).

The decision to determine the company's production volume in any market situation is always based on the requirements of the so-called golden rule of profit maximization, according to which economic profit will reach its maximum value only at those production volumes for which the firm's marginal revenue must equal marginal costs:

$$MR = MC. \quad (4.1)$$

For a perfectly competitive market, the formulation of the golden rule also takes into account additional conditions – marginal revenue will be equal not only to marginal cost, but also to price:

$$MR = MC = P. \quad (4.2)$$

Therefore, the absolute amount of profit of a competitive firm directly depends only on the volume of production, that is, on the market supply of the firm.

The choice of the optimal volume of production will also be based on the study of the relationship between marginal revenue, average and marginal costs.

In the graphical interpretation (Fig. 4.4), the optimal volume of output (Q_0) will be the intersection point of the firm's marginal cost curve (MC) with the marginal revenue line (MR). At the same time, it should be taken into account that maximizing profit at the optimal volume of production is not at all a guarantee of ensuring a positive financial result (economic profit). Obtaining a positive profit additionally implies the need to exceed the level of the market price of the product in the short-term period by more than the average total costs (ATC) of its production (P_0 > ATC).

For other options for the ratio between the market price of the product and average costs, the company can maintain equilibrium and self-sufficient production (provided that the market price is equal to average costs), or suffer losses (market prices will be lower than average costs).

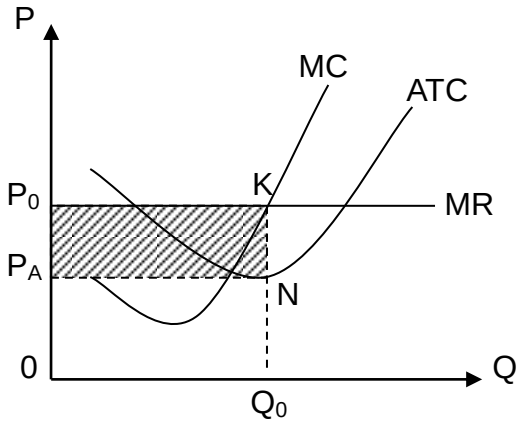


Fig. 4.4. **Obtaining economic profit by a competitive firm**

In the first case (P_0 = ATC) the company will not make a profit (profit will be zero), in the second (P_0 < AVC), financial results will be negative. A further decrease in prices relative to the level of average variable costs should be considered as a necessary condition for making a decision on the need to implement anti-crisis measures, reduce production or even bankruptcy of the company.

A change in the ratio between prices and costs in the short term is an important factor affecting fluctuations in the company's activity volumes: a production increase will be accompanied by a predominant excess of prices over costs, and a decrease will be a sign of an increase in costs relative to prices. The graphical interpretation of this model is a partial coincidence of

the supply curve of a perfectly competitive company in the short run with the part of the marginal cost curve (MC) that exceeds the average variable cost (AVC) curve.

At the industry level, that is, for the entire group of companies producing homogeneous products, in a situation of perfect market competition in the short run, the supply curve reflects changes in the output of products offered for sale by all companies, with fluctuations in market prices. The achievement of an equilibrium state (equilibrium price level) will occur when the total supply of the industry is equal to the corresponding total demand for the product. In this case, for each individual company operating within the industry, the absolute value of the profit will be determined on the basis of the regularities, the graphical interpretation of which is given in Fig. 4.4.

The long-term nature of trends that exceed the market price of the product by the long-term average cost of production determines the positive nature of the economic benefits that the company will receive.

Profitability is a favorable prerequisite for attracting new member firms to a competitive industry, and, conversely, declining profits and accumulated losses force producers to reduce production and leave the industry. As a result of such long-term processes, the market price of the product will be determined at the level of minimum average costs (LATC) of a typical company (Fig. 4.5).

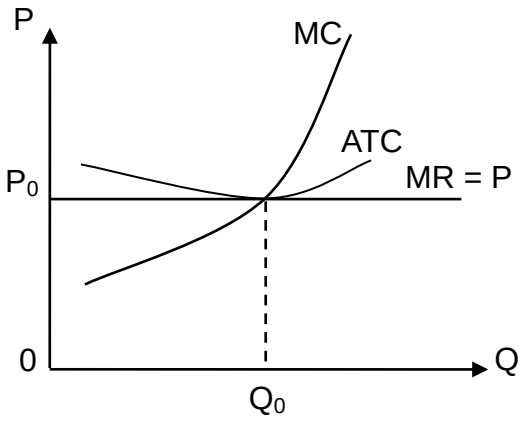


Fig. 4.5. **Long-run equilibrium of a firm under conditions of perfect competition**

Under such conditions, the total economic profit received by all firms in the industry will tend to zero, each firm will be guided by the choice of such a volume of production, under which the following condition will be fulfilled:

$$P = VR = LATC = LMC, \quad (4.3)$$

where P is profit;

VR is variable revenue;

LATC is long-run average total cost;

LMC is long-run marginal cost.

These equations are a condition for achieving a balance between a competitive company, an industry and a market in the long run. The need to comply with this equation encourages companies to continuously improve their activities, that is, it is a source of a wide range of advantages in a perfectly competitive market.

In this market, when adapting to changing market conditions, the ability of a company is limited only by its ability to make significant changes in production. The efficiency of the enterprise (provided that the composition and number of production factors do not change) will be determined by the productivity of the use of variable resources. Therefore, the firm will strive to produce such a quantity of products as to maintain the equality of the ratio of marginal costs and the level of prices for the product at any volume of production (provided that prices exceed the level of average variable costs).

For producers in a perfectly competitive market, there is a wide range of incentives to improve and increase the efficiency of economic activity. The positive impact of such incentives determines the advantages of a perfectly competitive market structure, the most important of which are the following:

1. High efficiency and rational allocation of resources between industries and individual producers.

2. Minimization of costs for manufacturing high-quality products at the lowest prices, which for a perfectly competitive company is equal to the minimum average production costs per unit of output (P = ATC). In this case, the consumer in a perfectly competitive market will receive goods at the lowest price.

3. Maximization of labor productivity of producers with limited economic resources, the prerequisite for which is the need to minimize the costs of enterprises per unit of output.

4. Priority orientation of producers to meet consumer needs, changes in the volume and nature of demand, which must be guaranteed by appropriate changes in distribution, and the use of economic resources limited by companies.

5. The possibility of restoring production efficiency in the use of resources. After establishing long-term equilibrium in a perfectly competitive market, average

long-term costs will remain at the same level for all companies remaining in this market.

Under such conditions, the ability to determine the optimal number of enterprises in the industry as part of the distribution of demand by production will have a positive impact on the realization of the opportunities for minimizing the average costs of each producer.

6. In a perfectly competitive market, there are no transaction costs.

4.2. Monopoly market

A *pure monopoly* is a market structure where a single firm is the sole producer and seller of a unique product with no close substitutes. This firm has significant market power, allowing it to set prices without competition. Entry into the market is blocked by high barriers such as legal restrictions, ownership of key resources, or technological advantages. The monopolist maximizes profit by adjusting output where marginal revenue equals marginal cost. Unlike competitive markets, monopolies may lead to higher prices and reduced output. However, they may also promote innovation due to secure profits and control over the market environment.

Imperfect competition is characterized by the presence of many sellers, but each with some degree of market power due to product differentiation. Unlike perfect competition, firms in such markets can influence prices. Key features include limited competition, differentiated products, non-price competition (such as advertising), and barriers to entry that prevent new firms from easily joining the market. Buyers may not have complete information, and firms often use branding to build customer loyalty. Examples of imperfect competition include monopolistic competition and oligopoly, where strategic behavior among firms plays a significant role in determining prices and market outcomes.

A *monopoly* is a market structure in which a single firm is the exclusive producer and seller of a particular product or service that has no close substitutes. This firm has significant control over the market, including the ability to set prices and influence supply. Monopolies often arise due to high barriers to entry, such as government regulations, control of essential resources, or significant economies of scale. As a result, the monopolist can maintain dominance and limit competition, which may lead to reduced consumer choice and higher prices compared to more competitive market structures.

Monopoly markets are often protected by various barriers that prevent new firms from entering. Natural barriers arise when a single firm can produce at lower costs due to economies of scale, making competition inefficient. Economic barriers include high initial investment costs or exclusive access to vital resources. Administrative barriers may involve complex licensing procedures or regulatory restrictions that favor existing firms. Legal barriers are established through patents, copyrights, or government-granted monopolies, giving one firm exclusive rights to produce or sell a good or service. Together, these barriers maintain the monopolist's dominant position and limit market access for potential competitors.

Monopolies can be categorized into several types based on their origin and structure. An open monopoly occurs when a single firm dominates the market without government restrictions, usually due to innovation or efficiency. A closed monopoly exists when legal protections, such as patents or licenses, prevent other firms from entering the market. Natural monopolies arise in industries where high infrastructure costs make competition impractical, such as utilities.

A bilateral monopoly is a unique situation where a single seller interacts with a single buyer, requiring negotiation to determine price and quantity. A *monopsony*, on the other hand, occurs when there is only one buyer in the market, giving that buyer substantial control over pricing and supply decisions.

Diversification of production refers to the strategic expansion of a firm's activities by introducing new products, services, or entering new markets to reduce risks and increase profitability. It allows businesses to spread their operations across various sectors, minimizing dependence on a single source of income. This strategy helps firms respond more effectively to changes in consumer demand, market fluctuations, or competitive pressures.

There are different forms of diversification. These are related and unrelated. *Related diversification* involves expanding into industries that have a connection with the company's core business, while *unrelated diversification* means entering entirely new areas. Both approaches aim to enhance stability and long-term growth.

Monopoly power is the ability of a single firm to influence or control the market price and output of a particular good or service without facing significant competition. This power arises when a company becomes the sole provider in a market, either due to legal protection, high entry barriers, or control over key resources. As a result, the monopolist can set prices above

competitive levels, often leading to reduced consumer choice and potential inefficiencies in resource allocation.

Unlike firms in competitive markets, a monopolist is a price maker, not a price taker. This means they can adjust supply to maximize profit, typically producing less and charging more than would occur under perfect competition.

Sources of monopoly power stem from various structural, legal, and strategic factors that limit competition and allow a single firm to dominate a market. One key source is control over essential resources – when a firm owns or regulates a critical input needed for production, it can block others from entering the market. Legal barriers, such as patents, licenses, and government regulations, also grant temporary or long-term exclusive rights, protecting firms from competitors.

Another significant source is economies of scale. Large firms often produce at a lower average cost, making it difficult for new, smaller firms to compete. Additionally, brand loyalty and strong customer preferences can solidify a firm's market position, discouraging rivals. Technological superiority or early market entry can also give firms a substantial head start, further strengthening their monopoly power.

A *monopoly price* is the price set by a firm that holds exclusive control over the supply of a particular product or service in the market. Unlike in competitive markets, where prices are determined by supply and demand dynamics, a monopolist has the power to influence or directly set the price to maximize its own profit. Since the monopolist is the sole producer, it faces the entire market demand curve and typically chooses a price higher than marginal cost, resulting in limited output and higher prices for consumers.

This price-setting behavior often leads to allocative inefficiency, where the quantity of goods produced is less than what would be socially optimal. The monopoly price is not necessarily fixed but depends on the demand elasticity of the product and the cost structure of the firm. It reflects the monopolist's strategic decision to balance revenue and sales volume in pursuit of the highest possible profit.

The choice of the option for setting the price by the monopolist depends on his subjective goals and ideas about the economic feasibility of certain business decisions.

The monopolist makes the choice of the combination of price and production volume in the short term based on the use of tools similar to those

used to justify such decisions in a perfect market, that is, by comparing total revenue with total costs, as well as marginal revenue with marginal costs.

Fig. 4.6 shows the model of the monopolist's choice of the ratio of price and sales volume of products.

A monopoly will maximize profits by producing the quantity of output (Q*) at which marginal revenue equals marginal cost (the profit maximization rule). For a monopoly market, this rule takes the form:

$$MC = MR < P, \qquad (4.4)$$

where MC is marginal cost;

MR is marginal revenue;

P is price.

The price set by the monopolist (P_0) is determined by the height of the demand curve at the point of output that maximizes profit. This price will always exceed marginal cost. At the same time, the monopolist firm will sell its products at a price that exceeds average total cost for the proposed sales volume (ATC), and will receive economic profit. Its size corresponds to the area of the shaded figure (see Fig. 4.6).

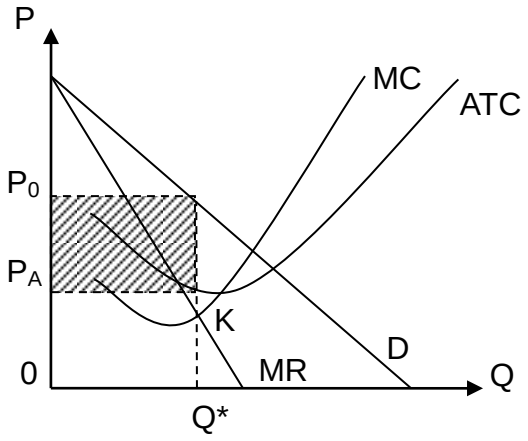


Fig. 4.6. **Profit maximization by a monopolist in the short run**

Since a monopoly firm can freely manipulate output and product prices, there is no clear supply curve for this firm.

Until now, it was assumed that the monopolist sets a single price for its products for all consumers (a simple monopoly situation).

However, in an attempt to gain additional income, it resorts to price discrimination (price diversification), i.e. selling products at different prices to different buyers. At the same time, the price differences are not due to differences in the costs of production and delivery of the product, its quality, or other objective reasons.

The basis of such a pricing strategy is the manufacturer's attempt to capture consumer surplus, i.e. sell the product to each consumer at the price that he is willing to pay.

To implement price discrimination, the following conditions must be met:

- the consumer does not have the opportunity to resell the product at a higher price (therefore, price discrimination is widely used in the service sector);
- the seller must be able to divide consumers into appropriate groups and offer them the product at different prices. Moreover, buyers with low elasticity of demand are usually offered a high price, and, conversely, elastic demand contributes to a decrease in price.

The logical conclusion of the study of the market of pure monopoly should be an assessment of its efficiency and impact on economic processes in general.

1. Compared with a perfectly competitive market, a monopoly that maximizes profit tries to produce a smaller volume of products and set a higher price for it.

2. The exceptional position in the market allows the monopoly to almost constantly make a profit and thereby redistribute the income of society in its favor.

3. The real costs of the company for the monopolist for any volume of production are usually greater than the minimum possible. This phenomenon is called X-inefficiency.

4. Monopoly has a contradictory effect on scientific and technological progress.

5. In addition, the monopoly spends money on measures to maintain its monopoly position in the market, which is also reflected in the level of their costs.

6. Monopoly tends to discriminate in price under certain conditions.

7. These consequences of monopoly action force society to neutralize the negative consequences.

Therefore, monopoly has contradictory economic consequences. It cannot be denied that this undermines competition as the basis of market self-

regulation. Therefore, one of the functions of the state in modern conditions is to limit monopoly and maintain a competitive environment. To neutralize the negative consequences caused by the activities of monopolies, the state is forced to apply antitrust policy aimed at preventing commercial practices that undermine the effectiveness of competition and abuse of market dominance.

The purpose of antitrust regulation is to limit market power (increase production and reduce prices) and maintain competition.

The methods of antitrust regulation are legislative and economic.

Antitrust instruments can be divided into three groups, according to their functions:

• restrictions (fees, taxes, prohibition of mergers and joint activities);

• incentive (licenses, loans, fees, investments, interest, benefits, financing, subsidies, infrastructure creation, intergovernmental transfers, targeted programs, scientific and technical programs, subsidies, grants, exceptions to antitrust legislation);

• prohibition (prohibition of mergers and joint ventures; establishment of maximum/minimum prices, monitoring).

In Ukraine, antitrust regulation is carried out by the Antimonopoly Committee, which regulates the activities of natural monopolies and applies antitrust legislation to unnatural monopolies. According to the Law of Ukraine "On Restriction of Monopoly and Prevention of Unfair Activities" of 1992, a monopoly is a state in which a company controls more than 35 % of the market for a certain product (sometimes even less).

Antitrust regulation in Ukraine is carried out in the following areas:

• regulation of the activities of leading companies;

• control over vertical and horizontal location;

• regulation of natural monopolies.

4.3. Market of monopolistic competition

Monopolistic competition is a market model that combines elements of monopoly and perfect competition. Key characteristics: a large number of sellers, differentiated products, free entry and exit from the market, and significant advertising costs. Each firm has a certain market power due to the unique properties of its product. Prices are set independently, but with consideration for competition. In the long term, economic profit tends to zero,

as new entrants squeeze out excess profits. This market is often found in the service and mass-market industries, such as cafes, clothing, and cosmetics.

Monopolistic competition occurs under specific market conditions. Firstly, there are many sellers, each holding a small market share. Secondly, products are differentiated, meaning each firm offers a slightly unique version of a similar good or service. Thirdly, there is free entry and exit in the market, allowing new businesses to join easily. Additionally, firms have some control over pricing due to product differentiation. Non-price competition, such as advertising and branding, plays a significant role. Finally, consumers have access to information, but it may not be perfect. These conditions create a dynamic and highly competitive market environment.

Monopolistic competition has several key signs. One major sign is *product differentiation* that is a situation when each company offers a product that is similar but not identical to others. Another sign is the presence of many small firms, none of which can dominate the market. Firms have some price-setting power due to brand loyalty and perceived differences. Advertising and marketing are actively used to attract customers. There is also relatively easy entry and exit from the market. In the long run, firms earn normal profit as new competitors enter, reducing excess profit. This market type is common in retail, restaurants, and consumer goods industries.

The mechanism of monopolistic competition operates through a mix of competition and limited market power. Firms offer differentiated products, allowing them to set prices above marginal cost. They compete not only through price but also through branding, quality, and marketing. In the short run, firms can earn economic profits due to product uniqueness. However, in the long run, new firms enter the market attracted by profits, increasing competition and reducing individual market share. This entry continues until only normal profits remain. The balance between differentiation and competition defines the dynamic nature of monopolistic competition in industries like food, fashion, and services.

Under monopolistic competition, pricing and production decisions differ between the short-term and long-term periods due to the dynamics of market entry and product differentiation.

In the short term, firms face downward-sloping demand curves because of product differentiation. Each firm has some control over price and can set it above marginal cost to maximize profit. They determine the optimal production volume where marginal revenue equals marginal cost (MR = MC). As a result,

firms may earn economic profits or incur losses, depending on demand and costs.

In the long term, the situation changes as new firms enter the market attracted by profits or leave due to losses. Entry of new firms increases competition and shifts the demand curve for each existing firm to the left, making it more elastic. Over time, economic profits shrink to zero, and firms only earn normal profits. In this equilibrium, the price equals average total cost (P = ATC), but still exceeds marginal cost (P > MC), indicating some inefficiency compared to perfect competition.

Production volume in the long run is lower than the socially optimal level, leading to excess capacity. Despite this, consumers benefit from a wide variety of products, and firms continue to compete through innovation and marketing rather than price alone.

In monopolistic competition, price determination is influenced by product differentiation and market demand. Each firm faces a downward-sloping demand curve, meaning it can set its own price rather than taking a market price. Firms choose the price that maximizes profit, where marginal revenue equals marginal cost (MR = MC). Because products are not identical, consumers may be willing to pay more for preferred brands or features. This gives firms some pricing power. However, competition limits how high prices can go. In the long run, new entrants reduce profits, and prices adjust until firms earn only normal profit.

Advertising plays a crucial role in price determination under monopolistic competition. It helps firms create product differentiation by shaping consumer perceptions and building brand loyalty. Effective advertising can increase demand for a product, making the demand curve less elastic and allowing firms to charge higher prices. By highlighting unique features or emotional appeal, firms can justify a premium price. Advertising also increases consumer awareness, potentially expanding market share. However, it adds to production costs, which may influence pricing decisions. Overall, advertising strengthens a firm's pricing power by making its product appear distinct in the eyes of consumers.

Deepening product differentiation involves enhancing the uniqueness of a product through features, quality, design, or branding. This strategy has both positive and negative consequences.

On the positive side, it allows firms to build strong brand identity and customer loyalty, which can lead to greater pricing power and higher profit

margins. It encourages innovation and gives consumers a wider variety of choices tailored to specific preferences. Differentiation can also reduce direct price competition, as products are no longer seen as perfect substitutes.

However, there are negative consequences as well. Increased focus on differentiation often leads to higher production and marketing costs, which may be passed on to consumers through higher prices. It can also result in market inefficiency, as resources are spent on non-essential features or excessive branding. In some cases, consumers may face confusion due to too many similar options. Thus, while differentiation adds value, it must be balanced to avoid diminishing returns.

Advertising significantly impacts both production volumes and costs in monopolistic competition. On the one hand, effective advertising can increase consumer awareness and demand, leading to higher sales volumes. As demand rises, firms may increase production to meet the market's needs, benefiting from economies of scale and reducing average production costs in the long run.

On the other hand, advertising itself is a major cost. Firms must invest heavily in marketing campaigns, branding, and promotional activities. These expenses add to overall production costs, especially in the short term. If advertising is not successful, the added costs may not be covered by increased sales, reducing profitability.

Moreover, frequent advertising may shift focus from product improvement to image building, which might not always align with long-term efficiency. In summary, while advertising can stimulate production growth and enhance market presence, it also raises operational costs and must be managed carefully to maintain a balance between expansion and profitability.

Non-price competition refers to strategies used by firms to attract customers without changing the price of their products. Its essence lies in creating value through product quality, design, branding, customer service, and advertising rather than relying solely on lower prices. This type of competition is especially common in monopolistic competition, where products are differentiated.

Several prerequisites drive the development of non-price competition. First, product differentiation must be possible, allowing firms to offer unique features that appeal to specific consumer preferences. Second, consumer demand must be responsive to quality, style, or brand image, not just price. Third, markets must allow for advertising and innovation as competitive tools.

Finally, firms must have the financial ability to invest in marketing, research, and product development.

Non-price competition helps firms build customer loyalty, reduce price sensitivity, and maintain market share even in highly competitive environments. It emphasizes long-term value and brand strength over short-term pricing tactics.

4.4. Oligopolistic market structure

An oligopoly is a market structure characterized by a small number of large firms that dominate the industry. These firms hold significant market power and are interdependent, meaning each firm's decisions on pricing, production, and strategy directly affects the others. Oligopolists can influence prices, but they must consider rivals' responses to avoid price wars. Products may be differentiated or standardized. Common features of oligopoly include barriers to entry, economies of scale, and potential for collusion. Examples of oligopolistic industries include telecommunications, automotive, and airline sectors, where a few firms control the majority of the market share.

In oligopoly, pricing and production volumes are heavily influenced by the interdependence between firms. Unlike in perfect competition, where firms are price takers, oligopolists have some control over pricing but must consider competitors' responses when making decisions. Pricing strategies often involve either price leadership, where one dominant firm sets the price, or tacit collusion, where firms avoid aggressive price competition to maintain higher profits.

Production volumes are also influenced by the actions of rival firms. If one firm increases production, others may follow suit to avoid losing market share, potentially leading to an oversupply. Alternatively, firms may restrict production to maintain higher prices, but this can result in lower overall output compared to more competitive market structures.

In both short-term and long-term decisions, oligopolists are likely to engage in strategic planning, considering both market demand and competitors' possible responses. The result is often higher prices and limited production compared to perfectly competitive markets, potentially leading to inefficiencies.

Oligopoly is a market structure dominated by a small number of large firms, each holding significant market power. These firms are interdependent, meaning their pricing, output, and strategic decisions influence one another.

Key features of oligopoly include limited competition, barriers to entry, and the potential for both price and non-price competition. Products may be differentiated or homogeneous, and firms may engage in tacit collusion or formal cartels to set prices or output. Oligopolistic markets often lead to higher prices and reduced consumer choice compared to more competitive structures, with examples found in industries like telecommunications and automobiles.

Indicators of market concentration measure the degree to which a small number of firms dominate a market. The most common indicators include the concentration ratio (CR), which calculates the combined market share of the largest firms (e.g., CR4 for the top four firms), and the Herfindahl – Hirschman index (HHI), which sums the squares of the market shares of all firms. Higher concentration indicates less competition and greater market power for leading firms. These indicators help assess the competitiveness of a market, with higher values suggesting a more concentrated, less competitive one.

The causes of oligopoly arise from various market conditions that limit competition. One major cause is barriers to entry, such as high capital requirements, economies of scale, and strong brand loyalty, which prevent new firms from entering the market. Mergers and acquisitions also contribute to oligopolies by consolidating market share among a few large firms. Additionally, product differentiation allows dominant firms to maintain control over pricing and consumer preference. Finally, government regulations or patents can create artificial barriers, favoring a small number of firms. These factors combine to create a market dominated by a few powerful competitors.

Oligopolistic structures vary widely, ranging from collusive oligopolies, where firms cooperate to set prices, to non-collusive oligopolies, where firms compete aggressively. The general interdependence in oligopolies means that each firm's actions whether in pricing, production, or advertising directly affect competitors, making strategic decisions complex. This interdependence leads to uncertainty, as firms must anticipate rivals' reactions. Analyzing firm behavior in such a market is challenging because of the potential for tacit collusion, price wars, and strategic behavior like product differentiation. The resulting dynamics make predicting outcomes in oligopolistic markets more complicated than in competitive or monopoly markets.

A duopoly is a market structure dominated by two firms that control most of the market share. The Cournot and Bertrand models are two classic economic frameworks used to analyze competition in duopolies.

In the Cournot model, firms compete by setting quantities of output rather than prices. Each firm chooses its production level, assuming that the other firm's output is fixed. The firms then simultaneously decide how much to produce, with the goal of maximizing their profits based on the quantity produced by the competitor. In this model, the market price is determined by the total quantity produced. Cournot competition leads to a stable equilibrium, where each firm's output is optimal given the other firm's output.

In contrast, the Bertrand model assumes that firms compete by setting prices rather than quantities. Here, each firm assumes that its competitor's price is fixed and chooses its own price to maximize profits. The Bertrand model leads to a different outcome: if the products are identical and firms have the same costs, they will compete down to the point where price equals marginal cost, resulting in no economic profit.

Both models illustrate different strategies and outcomes in duopolistic competition, with Cournot emphasizing quantity and Bertrand focusing on price competition.

The prisoner's dilemma is a fundamental concept in game theory, illustrating the conflict between individual rationality and collective benefit. In the classic scenario, two individuals are arrested and accused of a crime. If both remain silent, they receive a moderate punishment. If one betrays the other (defects), the betrayer goes free while the other receives a harsh sentence. If both betray each other, they both receive a severe sentence. Despite the better collective outcome if both cooperate (remain silent), the dominant strategy for each individual is to betray, leading to a suboptimal result for both.

Oligopolistic pricing refers to the strategies used by firms in an oligopoly to set prices, considering the interdependence of their competitors. In an oligopolistic market, a small number of firms dominate, and each firm's pricing decisions impact the others. As a result, pricing behavior is often more complex compared to perfectly competitive or monopolistic markets.

One common approach is price leadership, where one dominant firm sets the price, and the others follow. This reduces the risk of price wars and helps maintain stability in the market. Another approach is price collusion, either explicit or tacit, where firms agree to set prices or limit output to maximize collective profits, though this is illegal in many jurisdictions.

In some cases, firms may engage in non-price competition, focusing on product differentiation, advertising, and branding rather than directly changing prices. Price rigidity is also common in oligopolies, where firms avoid frequent

price changes to prevent unpredictable responses from competitors, leading to stable pricing over time.

Overall, oligopolistic pricing is shaped by strategic interaction, with firms carefully considering how their pricing decisions will affect competitors and the overall market equilibrium.

Glossary

Antitrust policy is government regulations and laws aimed at promoting competition and preventing monopolies or anti-competitive practices, such as price-fixing, mergers that reduce competition, and abuse of monopoly power.

Equilibrium of a competitive firm is the point at which a perfectly competitive firm maximizes its profit, where marginal cost (MC) equals marginal revenue (MR), and price (P) equals both MC and average total cost (ATC) in the long run, leading to zero economic profit.

Oligopoly is a market structure dominated by a small number of large firms, each with significant market power. Firms in an oligopoly are interdependent, meaning their pricing and output decisions are influenced by the actions of their competitors.

Monopoly is a market structure in which a single firm is the sole producer of a unique product with no close substitutes, giving it significant pricing power. Monopolies often arise due to barriers to entry that prevent competition.

Monopolistic competition is a market structure in which many firms sell differentiated products, allowing them to have some pricing power. There are low barriers to entry, and firms compete through product differentiation, advertising, and customer service.

Monopoly power is the ability of a monopoly to set prices above competitive levels, resulting in higher profits and potentially inefficient outcomes, as it can limit consumer choice and reduce overall welfare.

Monopsony is a market situation in which there is only one buyer for a product or service, giving the buyer significant power to set prices and influence the supply of goods or services.

Perfect competition is a market structure where many firms sell identical products, there is easy entry and exit, and no single firm can influence the market price. All firms are price takers, and consumers have perfect information.

Price discrimination is the practice of charging different prices to different consumers for the same good or service, based on factors such as willingness to pay, age, location, or quantity purchased. It is typically used by monopolies or firms with some market power.

Questions for self-assessment

1. What are the characteristics of marginal and average revenue formation for a competitive firm?
2. Under what conditions will a competitive firm continue operating even if it incurs losses?
3. How efficiently do markets function under perfect competition?
4. Who benefits from the establishment of a monopoly?
5. Why can't a monopolist set any price or produce any quantity of goods it desires?
6. Is there a connection between a monopolist's behavior and the price elasticity of demand for its product?
7. How is profit-maximizing production for a monopoly characterized in the long run?
8. Why is price competition ineffective in markets with product differentiation?
9. Can it be argued that high advertising costs hinder production development?
10. How can the efficiency of monopolistic competition and oligopoly be evaluated?

Practice tests

1. Which of the following is a condition only for perfect competition:
a) the firm has no market power;
b) the firm maximizes profit;
c) the firm earns economic profit in the long run;
d) the demand curve is the same as the firm's average revenue curve?

2. Under perfect competition, price equals minimum average cost:
a) in the short run;
b) in the long run;

c) always;
d) never.

3. A monopolist, unlike a competitive firm:
a) can set any price for its product;
b) maximizes profit if marginal revenue equals marginal cost;
c) can produce any quantity and sell it at any price;
d) can choose a combination of price and output along the market demand curve.

4. The characteristic features of monopolistic competition are:
a) no dependence of profits on the decisions of one firm's management;
b) product differentiation;
c) the demand curve is less elastic than that of a competitive firm's product;
d) all answers are correct.

5. Monopolistic competition is characterized by:
a) firms cannot freely enter and exit the market;
b) a small number of firms operate in the market;
c) firms produce differentiated products;
d) firms do not have complete information about market conditions.

6. Price discrimination is:
a) selling the same product at different prices to different buyers;
b) differences in wage payment based on nationality or gender;
c) increasing the price for a higher-quality product;
d) all answers are incorrect.

7. In a monopolistic competition market:
a) a single buyer can influence the price of the product;
b) advertising does not play an important role;
c) products differ in terms of conditions and features;
d) producers have the same access to information.

8. If marginal costs exceed average costs at the production level that maximizes profit, the competitive firm:
a) will not stop production;

b) produces at a level corresponding to the point to the right of the minimum of the average cost curve;

c) earns a positive profit;

d) all of the above answers are correct.

9. Unlike a competitive firm, a monopolist:

a) faces a perfectly elastic demand curve;

b) maximizes profit where marginal revenue equals marginal cost;

c) can produce any quantity and sell it at any price;

d) can choose a combination of price and output along the market demand curve that maximizes profit.

10. Suppose a monopolist can sell 1,000 units of a product at a price of 100 UAH per unit, but selling 1,001 units reduces the price to 99.5 UAH. The marginal revenue when increasing the sales from 1,000 to 1,001 units will be:

a) 100 UAH;

b) 99.5 UAH;

c) 94.5 UAH;

d) 94.0 UAH.

Computing tasks with examples of solutions

Task 1. The company "Rukh" is a monopolist in the market for a certain product. What price will it choose if its total costs TC = 50Q, where Q is the output volume, thousand units, and the price elasticity of demand for the product is 2?

Guidelines

1. The price chosen by the monopolist can be calculated using the following formula:

$$P = MC \times \frac{E_d}{E_{d-1}}.$$

2. This equation constitutes a universal pricing rule for any firm with monopoly power, given that E_d is the elasticity of demand for the firm, not market demand. MC in the equation is marginal cost, which is equal to:

$$MC = dTC / dQ = 50.$$

3. Calculate monopoly price:

$P = 50 \cdot (2 / (2 - 1)) = 100$ UAH.

Therefore, the monopolist firm will choose a price of 100 UAH.

Task 2. The firm "Rukh" operates in a monopolistically competitive market and has marginal revenue (MR) described by the formula MR = 110 − − 2Q, and its marginal cost (MC) in the long run (on the growing segment) is given by the formula MC = 2Q − 10. If the minimum value of long-run average cost (AC) is 90, what will the excess production capacity of this firm be?

Guidelines

1. The output of the firm "Rukh", which operates in a monopolistic competition market, can be given by the condition MR = MC, which determines the rule of profit maximization for any firm.

2. Then, substituting the values of MR and MC, we obtain 110 − 2Qm = = 2Qm − 10. Hence, the output of the firm "Rukh", which produces products under monopolistic competition, will be equal to Qm = 30.

3. If this firm operated under conditions of perfect competition, then its output would be given by the condition: ACmin = MC. Then 2Qc − 10c = 90.

4. Therefore, the volume of production under perfect competition would be equal to Qc = 40.

5. The amount of excess (underutilization) of production capacities is the difference between the production volumes of the firm "Rukh", operating in the market of monopolistic competition, and the competitive firm, i.e.: Qm − − Qc = 30 − 40 = −10.

Therefore, the underutilization of capacities of the firm "Rukh" is 10,000 units of annual output, which fully corresponds to the imperfectly competitive conditions of its operation.

Computing tasks for self-study

Task 4.1. The long-run average cost of a perfectly competitive firm is described by the following formula: $LATC = 2Q^2 - 10Q + 100$.

Determine:

a) what price for the product will be set in the long run;

b) what the output of the typical firm is;

c) what maximum economic profit that the innovator firm can earn is if its average cost per output is 50 % less than that of the typical firm;

d) at what output this firm will earn maximum profit.

Task 4.2. Firms operating in a duopoly have identical marginal costs (MC), which are equal to zero. The demand for the products of the duopoly industry is described by the following equation: $P = 1\,000 - 4Q$.

Determine:

a) the volume of production under the condition that the industry is competitive;

b) the volume of production under the condition that the firms unite in a cartel.

Essays

1. Advantages and disadvantages of the market competition mechanism.
2. Basic principles of antitrust policy in Ukraine.
3. Factors of development of non-price competition.

Content module 2. Main problems of macroeconomics

Topic 5. Macroeconomic indicators in the system of national accounts

The purpose of studying the topic is to form such students' professional competencies as: the ability to analyze indicators of measuring the results of the functioning of the national economy; the ability to use modern methods of calculating macroeconomic indicators.

Study questions:

5.1. The subject of macroeconomics. The role of macroeconomics.

5.2. Gross domestic product (GDP) and methods for calculation of GDP. Gross national income (GNI).

5.3. Main macroeconomic indicators of income. National wealth.

5.4. Cyclicality and economic growth.

Recommended literature: [5, p. 24–40; 7, p. 39–56; 8, p. 25–44; 11, p. 112, 115–142; 17].

Keywords: macroeconomics, macroeconomic methods, macroeconomic regulation, state regulation of the economy, gross domestic product, gross national income, national wealth, economic cycle, economic growth.

5.1. The subject of macroeconomics. The role of macroeconomics

The division of economic theory into macroeconomics and microeconomics became generally accepted in the 1930s after the publication of "The General Theory of Employment, Interest and Money" by J. M. Keynes, who is considered the founder of macroeconomics.

Macroeconomics studies economic processes and phenomena. It has the following features:

firstly, macroeconomic theory studies indicators in an aggregated state, which characterizes the development of the economy at the national level, namely socio-economic indicators that characterize the efficiency of the economy (gross domestic product, gross national income, general price level, total

employment and investment volumes, economic growth rates, etc.). The main subjects of macroeconomics are producers and consumers, who are considered as aggregated quantities;

secondly, economic entities are considered through a system of interdependent markets;

thirdly, entities at the macro level include the aggregate producer, the aggregate consumer, the state and the foreign sector.

At the macro level, the issues of finding a balance between savings and investments, income and expenses of the state budget, aggregate demand and aggregate supply are resolved, but the specific task of macroeconomics is to systematize, generalize and explain the processes determined by the mechanism of functioning of the national economy.

In the modern sense, national economy is understood as the national economy of a certain country. This is a set of all subjects united into a single organism by multilateral economic ties and interests. The socio-economic processes that occur in the macroeconomic system cover material, labor, financial, natural and other resources that are involved in economic turnover, and in their combined interaction constitute a single reproduction process, which can be reduced to four main types of activity: production, exchange, distribution, consumption.

To carry out the production process, the state does not only need to have certain production resources. Production technology in the economic sense is a way of combining material and personal factors of production in a single process, with the aim of producing the necessary goods of life. Technological means of production distinguish the stages of development of the national economic system according to the following indicators:

the level of development of productive forces, i.e. the level of means and objects of labor, labor force, technologies;

the level of development of organizational and economic relations, i.e. the depth of division and specialization of labor, the scale of its cooperation and combination, the development of organizational structures;

forms of ownership of the means of production;

changes in the economic mechanism of regulation.

In the real practice of national economy, all reproduction processes develop in unity and interrelation, according to objective economic laws; do not tolerate voluntarism, i.e. volitional intervention in their content and development; are

under the influence of factors and conditions that should be taken into account when economic decisions are made.

At the macro level, each subject, whether it is a household, a firm, a region or a state, being included in the economic space, has its own interest. The coordination of interests is determined by objective economic laws and is reflected in the national economic interest. Interests are formed through economic relations between social subjects who participate in production, distribution and exchange. The main subjects of economic interests that are formed in the process of economic relations are people, enterprises, the state, society. In the conditions of economic independence of producers, scientific organizations, territories, new carriers of interests arise: territorial-industry, inter-industry, production and scientific-production associations.

For the development of the macroeconomic system as a whole, the realization of the interests of all subjects is an important condition. The realization of the general public interest can be ensured by the realization of group and individual interest. The main condition at the same time is to ensure the commonality of interests at all levels. The content of each type of interest is of great importance for the creation of a certain system of incentives in the sphere of production and services. Thus, the economic interests of the state manifest themselves as the need to ensure social welfare for society, and at the same time they set the goal of developing the national economy.

Effective macroeconomics strives for stability and justice by ensuring the following goals:

1. Stable growth of national production.
2. High and stable employment levels.
3. Stable price levels.
4. Maintaining an equilibrium external balance.

Thus, the subject of macroeconomics is the mechanism of the functioning of the national economy, as well as the factors that determine changes in this mechanism in the short, medium and long term, and the impact on economic processes by the state at the national economic level.

The object of macroeconomic analysis is the economic system and parameters in the aggregate state. The modern economic system is constantly developing, therefore, new tasks and problems arise that require justification and solution.

The economic system is the relationship between productive forces and production relations, subject to certain laws of economics.

The subjects of macroanalysis are:

1) the consumer sector, namely households, which form the supply of labor and the demand for goods, consume part of the income received, and retain the other part;

2) the producer sector, namely the business sector – all enterprises of the country that constitute the demand for factors of production, create the supply of goods and invest;

3) the government sector, which creates such specific goods as security, science, infrastructure services. As a macroeconomic entity, the state purchases goods, collects taxes, pays transfers, forms the money supply, etc.;

4) the foreign sector, which is a set of economic entities located outside the country.

The foreign sector is studied mainly to determine foreign economic policy (trade policy, exchange rate regulation, etc.).

The main and defining goal of macroeconomics is the development of the national economy and economic growth.

From this general goal of macroeconomic analysis, problems arise that determine *specific tasks:*

economic efficiency – an indicator of the growth of economic efficiency of production is the increase in real national income per capita;

economic freedom – it is determined by the main issues (what, how and for whom to produce);

fair distribution of income of the country's population;

economic security in the country;

stable price level (without high inflation rates and deflation processes);

high level of employment;

increased free time for harmonious development of the individual;

maintaining a balance of interaction with the environment;

maintaining a foreign trade balance.

Macroeconomic targets determine the economic policy of the state, which is based on identifying optimal development priorities and overcoming relevant problems.

Economic regulation is the state's activity regarding the legal, economic, and social prerequisites necessary for the effective functioning of the market mechanism and minimizing its negative consequences in the country.

The state performs a number of *functions* in regulating the economy:

1) developing a policy of socio-economic development of the country, which determines the main goals and means of economic development;

2) forming the legal basis for the functioning and development of the economy;

3) protecting competition through the state's antitrust policy;

4) redistributing income and resources in the country;

5) stabilizing the economy through fiscal and monetary policy.

The main instruments of state regulation are:

tax and budgetary (fiscal) policy, which means manipulating state taxes and expenditures;

monetary policy, which is carried out through the country's monetary, credit and banking systems;

income policy – the state's desire to curb inflation (or influence deflation) either by direct control over wages and prices, or by voluntary planning of wage and price increases;

foreign economic policy and trade policy, aimed at increasing the efficiency of foreign trade;

social policy of the state as an activity to ensure the social living conditions of the country's population.

Methods of macroeconomics are a specific toolkit of scientific research. Macroeconomics uses both general and specific research methods.

General methods of economics are methods that are inherent in any economic science:

dialectical method – the study of economic phenomena in connection with other phenomena in their development, as well as sequential study from lower to higher and from simple to complex;

boundary value analysis – the method of additional values;

methods of induction (movement from the particular to the general) and deduction (analysis is carried out by studying from the general to the particular);

method of analysis and synthesis – division of a separate element into its constituent parts with the gradual study and combination of already studied parts.

Specific methods are methods inherent only in macroeconomic theory:

aggregation is the combination of phenomena and processes into a single whole. Macroeconomic aggregation is extended to economic entities (households,

business, state, foreign sector) and markets (goods and services, money, labor, capital, foreign exchange markets, etc.);

macroeconomic modelling is a method of creating simplified models that allow for a description of economic phenomena and processes in order to identify the relationship between them;

the cycle of income and expenditure is a study of commodity and monetary flows in the territory of this country, in particular imports and exports;

the method of stocks and flow accounting. Stock is the state of any indicator at a certain point in time, for example, the unemployment rate, public debt, savings, national wealth. Flow is the magnitude of the change in stock over a specific time period;

the method of withdrawals and injections is a consideration of withdrawals and injections from the flow "income – expenditure";

the equilibrium, or balance, method, on which the system of national accounts is built.

Economic models are widely used in macroeconomic theory, which constitute logical, graphical and algebraic descriptions of various economic phenomena and processes, in order to identify functional relationships between them.

5.2. Gross domestic product (GDP) and methods for calculation of GDP. Gross national income (GNI)

In world practice, the most well-known methods for calculating the main macroeconomic indicators are the former System of National Economy Balance (SNEB) and the modern System of National Accounts (SNA).

In 1993, the UN Statistical Commission adopted a new and so far the latest version of the SNA. According to this version, the SNA is defined as a set of indicators for a consistent and interdependent description of the most important processes and phenomena of the economy: production, income, consumption, capital accumulation, finance.

Because the SNA was created much later than the SNEB, it borrowed the following from the latter: tables that reflect inter-industry relations of the economy; the division of final consumption into collective and individual; the concept of total consumption, etc.

At the same time, there are *also differences between the SNA and the SNEB*. The main of them include, firstly, that the SNEB was based on

a scheme for reproducing the aggregate social product (gross social product), which provided an assessment of the output of material production, but ignored the main share of the service sector; secondly, this scheme contained double counting; thirdly, only one factor of production – labor – participated in the creation of society's income; fourthly, the scheme had an insufficiently developed system of indicators, especially in the field of finance, etc.

A feature of the SNA-93 is that it is not built on *the concept of factor income* (the state's income is received as a result of the redistribution of primary incomes of the four main factors of production – labor, land, capital, entrepreneurial ability), but on the modern *concept of primary incomes*. The starting point of the latter concept is that state administration bodies are actually also a factor of production, therefore *primary incomes* are incomes that economic entities receive in the process of primary distribution of created value. *The form of revenue of state administration bodies* under this concept is taxes on production and imports.

The transition of most countries of the world to the SNA-93 made it possible to carry out a comparative analysis of the efficiency of the functioning of national economies, which is especially relevant in the context of globalization of economic development.

One of the main macroeconomic indicators that assess the results of the economic activity of the national economy is GDP.

GDP (gross domestic product) is defined as the total market value of all finished goods and services produced in the country per year. It takes into account the cost of final products and services and excludes intermediate products.

Final products are intended for final consumption, investment (accumulation) and export.

Intermediate products are used for intermediate consumption.

A distinction is made between nominal and real GDP.

Nominal GDP is calculated in the prices of the current year, while *real GDP* is calculated in comparable prices, i.e. prices of the base period.

The value of nominal GDP changes under the influence of the dynamics of the real volume of production and the dynamics of the price level.

Real GDP is calculated by adjusting nominal GDP for a price index:

$$GDP_R = \frac{GDP_N}{CPI} \times 100, \quad (5.1)$$

where GDP_R is real GDP;

GDP_N is nominal GDP;

CPI is consumer price index.

If the value of the price index is higher than 1, real GDP will be less than nominal, so deflation will be carried out – adjustment of nominal GDP towards its decrease by reducing the price level of the current year to the price level of the base year, that is, artificial deflation.

If the value of the price index is lower than 1, nominal GDP is adjusted towards its increase by inflation (artificial inflation).

Most often, the following aggregate indices are used to analyze nominal and real GDP values:

1) *consumer price index (CPI), or Laspeyres index* that reflects the change in prices of the consumer basket, which characterizes the typical level and structure of annual (monthly) household consumption. It is used to calculate the subsistence minimum;

2) *GDP deflator, or Paasche index* that reflects the change in prices for goods and services produced in the country's economy over a certain period of time. Unlike the Laspeyres index, the Paasche index slightly underestimates the growth of the price level in the economy;

3) *Fisher index* that is used to partially eliminate the shortcomings of the Laspeyres and Paasche indices.

There are *three main methods* of measuring GDP:

by value added (production method);

by expenditure (final use method);

by income (distribution method).

Under the production method, GDP is determined by summing up added values (*Gross value added* is calculated by subtracting intermediate consumption from gross output):

$$GDP = GVA + T - S, \tag{5.2}$$

where GVA is gross value added;

T is taxes;

S is subsidies.

Taxes on products are set in proportion to the value or volume of products produced and sold (VAT, excise duty, sales tax, etc.).

Taxes on production are set in proportion to the factors of production (land tax, fixed capital, payroll, construction).

Subsidies are free financial assistance from the state to individuals and enterprises.

This method of calculating GDP allows you to take into account the contribution of various firms and industries to the creation of GDP.

The method of calculating GDP by expenditure (final use) includes the following items:

a) *household expenditure (C)* which does not include expenditure on the purchase of housing; it consists of consumer expenditure on goods of daily demand, durable goods and expenditure on services;

b) *government procurement of goods and services (G).* These are expenditures on the purchase of products of enterprises and resources for the needs of the state, calculated as the sum of its expenditure on paying salaries to civil servants, expenditure on the construction of roads, hospitals, etc. Government expenditures under this article do not include transfer payments – payments by government agencies that are not related to the movement of goods and services (for example, pensions, scholarships, social assistance, etc.);

c) *gross investment (I),* which consists of investments in fixed assets, housing construction, inventories;

d) *net exports (X_n),* which is equal to the difference between the country's exports and imports.

The method of calculating GDP by income (distribution method) includes the following items:

a) wages of employees;

b) gross profit and gross mixed income, which consist of the profits of firms and corporations; income of unincorporated enterprises that are individually or family-owned, and income of independent workers – artists, writers, lawyers and other workers who do not work for hire; rent, i.e. income received by owners of land, real estate, etc.; interest on borrowed capital; depreciation;

c) indirect taxes on production and imports (value added tax, sales taxes, excise duty, etc.). At the same time, subsidies on production and imports have been removed. In the practice of a market economy, this item is considered as the primary income of government agencies.

GDP, calculated using all three methods, should be equal to the same value.

The difficulties in calculating GDP are mainly related to the presence of a set of economic phenomena that are not recorded by direct observation carried out by statistical, fiscal, customs and other state information collection systems. It can be conditionally divided into: *1) shadow production* (tax evasion and unrecorded employment of labor); *2) illegal production* (prohibited production of goods and services; unlicensed, etc.); *3) production in the informal sector; 4) production of households for their own final use.*

5.3. Main macroeconomic indicators of income. National wealth

The SNA-93 provides for several interdependent flow indicators that complement the GDP indicator.

Gross national income (GNI), which until 1993 was called "gross national product" (GNP):

$$GNI = GNP + DN, \tag{5.3}$$

where GNP is gross national product;

DN is the difference between the income of residents of this country received abroad and the income of non-residents transferred abroad from this country *(net income across the border).*

Net Domestic Product (NDP) = GNP − Depreciation.

Net National Income (NNI) = GNI − Depreciation.

National wealth (NW) is the sum of assets owned by households, firms, and the state, accumulated by society over the entire history of its existence.

The structure of NW is as follows: 1) explored and unexplored natural resources of the country; 2) accumulated products of past labor; 3) financial assets; 4) intangible assets (patents, know-how, etc.); 5) intangible wealth associated with human resources (level of education and health of nations, its economic security, etc.).

The SNA-93 does not include indicators such as national income (NI), personal income (PI), and personal disposable income (PD), which were in the SNA-68 and are still widely used in macroeconomic analysis.

Here are the most common formulas for calculation of these indicators.

$$NI = NNI - T_{NI}, \tag{5.4}$$

$$T_{NI} = T_I - S_B, \quad (5.5)$$

where T_{NI} is net indirect taxes;

T_I is indirect taxes on business;

S_B is business subsidies.

$$PI = NI - SSC - CIT - REC - NID + GT, \quad (5.6)$$

where PI is personal income of the population;

NI is national income;

SSC is social security contributions;

CIT is corporate income taxes;

REC is retained earnings of corporations;

NID is net interest on debt;

GT is government transfers and payments to households.

$$PD = PI - T_{ind}, \quad (5.7)$$

where T_{ind} is individual income taxes of citizens.

5.4. Cyclicality and economic growth

In a market economy, there are tendencies towards economic instability, which are manifested in its cyclical development, unemployment, inflationary price growth. Economic growth occurs unevenly: economic activity experiences periods of recessions and ups or a decrease or increase in production volumes.

Macroeconomic instability is characterized by the loss of mobility, dynamism and flexibility of the economic system, the inability to adapt in a timely and fully manner to changes in the internal conditions of its functioning and the environment.

A general idea of macroeconomic instability is given by the study of economic cycles. The economic cycle is characterized by the rise and fall of business activity in society, which is manifested in the mismatch between supply and demand. Economic cycles cover almost all sectors of the national economy and have a wide variety of distinctive features. They are classified based on duration, scope, forms of deployment and manifestation.

Economic cycle (business cycle, business activity cycle) is a series of ups and downs in the economy that are constantly recurring over a number of years.

At the current stage of economic development, the economic cycle is considered as a temporarily synchronized deviation of the main indicators of business activity from the long-term trend of economic growth (trend).

A trend is the result of the impact of factors that determine the long-term economic growth of business activity indicators (the level of savings, technological changes, the increase in labor resources, etc.).

The presence of cyclical fluctuations in the economy can be observed through analysis of the dynamics of such indicators of business activity as: GDP growth rates; general price level; level of utilization of production capacities, etc.

The most famous economic cycles include the following types:

Short-term economic cycles (J. Kitchin cycles, small cycles, inventory cycles) lasting from 2 to 4 years. The reason for short-term economic cycles is the change in world gold reserves, uneven reproduction of working capital; changes in monetary circulation.

Medium-term economic cycles (cycles of K. Zhuglyar) lasting 7 – 11 years. The reason for the cycles is the need to restore the active part of fixed assets. Cycles of S. Kuznets are economic cycles lasting 15 – 25 years, the third longest after the cycles of J. Kitchin and K. Zhuglyar. The discoverer of these waves of business activity, the American economist of the Ukrainian origin, Nobel laureate S. Kuznets, linked them to the stages of capital construction.

Long-term economic cycles ("big waves") of N. Kondratiev lasting 50 – 100 years. The reasons for the cycle are periodic changes in basic technologies, energy sources; restoration of facilities, infrastructure.

Let us consider in more detail the main phases of the medium-term economic cycle. At the same time, it is worth bearing in mind that the classical cycle of business activity has four phases, and the modern cycle has two phases. Classical economic (business) cycles were characteristic of the economy of the 19th century.

A crisis begins if, as a result of relative overproduction of goods, the mass of unsold products increases. Credit from banks decreases; lending interest increases, which leads to a decrease in the profits of enterprises and banks; share prices decrease, capital depreciation occurs; inventories of finished products increase; unemployment increases, etc.

In *the depression phase*, production no longer decreases, the rapid fall in prices stops, inventories and lending interest decrease.

The phases of recovery and growth have common features. The difference between them is that in the recovery phase, the economy reaches the pre-crisis level, and in the recovery phase, it exceeds it.

In the recovery and growth phases, there is an increase in production, the general price level, the level of income of the population, while the level of unemployment and reserves decreases. Economic growth in the recovery phase continues until the volume of production again exceeds effective demand and a new economic cycle begins (the crisis phase).

Modern economic cycles of the 20th and 21st centuries modified due to changes in the technological method of production and state intervention in the economy.

The decline phase, depending on its duration, is called a *decline* if its duration does not exceed 6 months; a *recession* if its duration is from 6 months to 1 year; a *depression* if its duration is more than 1 year.

The peculiarity of modern economic cycles is that, firstly, in the second half of the twentieth century as a result of the actions of the state and the monopoly sector in the crisis phase, prices did not fall, as in the classical cycle, but, on the contrary, prices rose. This phenomenon was called *stagflation* and was of great importance, because it disrupted the mechanism of self-regulation of the economy and sharply increased the role of the state in implementing anti-crisis and anti-cyclical policies. Secondly, in anti-crisis policies, the central bank's policy on the level of interest rates is changed: it tends to decrease, that is, a policy of "cheap money" is implemented. Thirdly, modern economic cycles differ in duration: there is a reduction in the phase of economic decline and an increase in the duration of the recovery phase, etc. In economic science, there are many theories (over 200) that explain the causes of economic cycles.

All theories in terms of determining the factors of economic cycles can be divided into: *exogenous theories*, according to which the causes of economic cycles lie outside the economic system (population dynamics, the influence of scientific and technological progress, natural and social cataclysms, the discovery of new natural resources, gold, land, etc.); *endogenous theories*, which see the causes of economic cycles in the impact of factors of the economic system itself (consumption, investment).

According to other theories, the main problems of economic cycles lie in the impact of the multiplier-accelerator mechanism. According to this model, the growth of autonomous investments leads to a multiplicative growth of income, which, in turn, to an increase in the rate of demand for consumer goods and an increase in consumer goods production, that is, to an increase in investment. The growth of such induced investments depends on the growth of income. The growth of such investments again leads to a multiplicative effect.

Macroeconomic theory considers economic growth as a component and one of the most important characteristics of the country's economic development.

Economic growth is an increase in the level of development of the productive forces of society from year to year, an increase in the production volumes of real gross domestic product and real national income of the country. Economic growth is positive if the real volumes of GDP in the analyzed period exceed its level in the base year, but can also be negative if the indicators are lower than in the previous year.

Along with the concept of economic growth, the concept of economic development is considered in the economic literature, but these are not identical concepts.

Growth is an integral part of economic development, which includes periods of both growth and decline. Economic growth is a positive component of the dynamics of economic development.

Socio-economic development is a complex contradictory process in which positive and negative factors interact, and periods of progress are replaced by periods of regression.

Sustainable socio-economic development is ensuring such economic growth that will make it possible to harmonize the "man – nature" relationship and preserve the environment for present and future generations.

There are two main *sources of economic growth*:

increase in production factors;

increase in factor productivity based on technological progress.

Factors of economic growth are phenomena and processes that determine the scale of the increase in the real volume of production and the possibility of increasing the efficiency and quality of growth (quantity and quality of the country's natural resources; quantity and quality of capital resources, level of development of production funds, energy systems, transport; quality of the country's labor resources, level of their education and professionalism; scientific and technological progress, etc.).

Depending on which factors economic growth occurs*, two main types of economic growth are distinguished:*

• extensive type of economic growth, achieved through quantitative growth of all elements of productive forces, primarily factors of production, with an unchanged level of the technical basis of production;

• intensive type of economic growth, in which growth is achieved through qualitative improvement of the entire system of productive forces based on the latest achievements of scientific and technological progress.

The choice of sources of economic growth implies the need for quantitative determination of the relationships between the growth of resources and the growth of their productivity, on the one hand, and the growth of national production volumes, on the other. This relationship is revealed in the production function. The production function is the simplest model of economic growth.

The production function can be *two-factor*, calculated by the following formula:

$$Q = f(K, L), \quad (5.8)$$

where Q is the volume of production;

K is capital;

L is labor;

three-factor:

$$Q = Ef(K, L), \quad (5.9)$$

where E is a parameter reflecting the level of technology;

multifactorial, which, in addition to the main sources of economic growth, seeks to take into account the influence of institutional, external factors (cycle phase, political situation).

The general form of the Cobb-Douglas production function is:

$$Q = A \cdot L^{\alpha} \cdot K^{\beta}, \quad (5.10)$$

where A is the technological coefficient;

α is the elasticity coefficient for labor;

β is the elasticity coefficient for capital.

Analysis, and then forecasting of economic growth and its consequences are impossible without creating models. Modern modeling is based on the presence of certain conditions under which it is possible to maintain equilibrium in the development process. All the models considered further are simple, that is, they present only two subjects – households and enterprises.

The neo-Keynesian models of economic growth of R. Harrod and E. Domar have some differences, but are very similar to each other. Their theoretical significance is gradually fading into the background due to the emergence of

more developed models. Recently, for the sake of simplicity of presentation, these two models have been combined into one – the Harrod – Domar model.

In the Harrod – Domar model, under these technical conditions of production, the rate of economic growth is determined by the magnitude of the marginal propensity to save, and the dynamic equilibrium in the market system is inherently unstable and active, and purposeful actions of the state are necessary to maintain it under conditions of full employment.

The R. Solow model is built on the neoclassical premise of the dominance of competition in the markets of factors of production, which ensures full employment of resources and is based on the Cobb – Douglas production function. The main difference between the Solow model and the production function is that output is a function not only of capital, but also of labor, which are substitutes, and the sum of the coefficients of elasticity of output for these factors is equal to one.

The key idea in the R. Solow model is that economic growth should be achieved through increasing capital equipment rather than through scientific and technological progress.

An important role in achieving balanced economic growth is played by *Phelps's golden rule of accumulation*. This is a hypothetical trajectory of balanced economic growth, in which each generation saves for future generations the same part of the national income that the previous generation leaves it. At the same time, the equality of the marginal efficiency of capital and the rate of economic growth is established:

$$MP_k = \delta + n + g, \qquad (5.11)$$

where MP_k is the marginal product of capital;

δ is the depreciation rate;

n is the population growth rate;

g is the rate of technological progress.

In the Solow growth model, the golden rule is the rule for choosing the optimal amount of capital to maximize specific consumption.

Glossary

GDP (gross domestic product) is the value of final products produced by residents of a country over a certain period of time.

GNI (gross national income) is the total primary income received by residents of a country from production activities and property.

Economic growth is a long-term sustainable development of the economy, that is, the process of a gradual increase in the national income and gross domestic product in the long term without imbalances in the short term.

Economic cycle (business cycle, business activity cycle) is a constantly recurring ups and downs in the economy over a number of years.

Macroeconomics is a branch of science that studies the patterns of functioning and trends in the development of the national economy as a whole, as well as the tools and methods for national economy regulation.

National wealth is the sum of assets owned by households, firms and the state, accumulated by society over the entire history of its existence.

Nominal GDP is calculated in the prices of the current year.

Real GDP is GDP in comparable prices, i.e. prices of the base period.

Socio-economic development is a process of continuous change in the material basis of production, as well as the entire set of various relationships between economic entities and social groups of the population.

Transfers are economic transactions through which some institutional units transfer goods, services, assets or property rights to other institutional units free of charge and irrevocably.

Questions for self-assessment

1. How does macroeconomics differ from other economic sciences?
2. What is the difference between the SNA methods "double accounting" and "double recording"?
3. Analyze and explain with examples the distinctive features of the SNA and the SNEB.
4. What is the qualitative and quantitative difference between GDP and GNI?
5. Describe the main methods of calculating GDP.
6. With the help of which macro indicator can you determine the entire income of the country that the national economy can dispose of?
7. What is the "unobserved" economy?
8. What is the difference between intermediate and final goods and services?
9. Describe macro indicators on a net basis.

10. What is the difference between the concepts of factor and primary income?

11. Name the types of economic growth.

12. Describe the models of economic growth and explain their shortcomings.

13. Identify the advantages and disadvantages of the Solow model of economic growth. What is its significance for modern models?

14. What is the essence of the business cycle?

15. What are the causes of economic (business) cycles?

16. What are modern business cycles? How do they differ from classical ones?

Practice tests

1. If the economy is studied as a holistic system, then this analysis is:
a) microeconomic;
b) macroeconomic;
c) positive;
d) normative.

2. The goals of macroeconomics include:
a) achieving full employment;
b) maintaining economic growth;
c) economic security;
d) economic efficiency.

3. The size of the country's real GDP will not grow if they observe:
a) an increase in the number of labor forces;
b) an increase in the volume and technical level of equipment;
c) an increase in inflation;
d) an improvement in production technology.

4. Which of the following is not included in GDP:
a) government purchases of goods and services;
b) deductions for consumption of fixed capital;
c) government transfer payments;
d) there is no correct answer?

5. If the volume of real GNI decreased by 6 %, and the population in the same year decreased by 3 %, then:

a) real GNI per capita decreased;

b) real GNI per capita increased;

c) real GNI increased, and nominal GNI decreased;

d) prices fell by 3 %.

6. The difference between GNI and GDP is equal to:

a) factor income from abroad;

b) transfer payments to the household sector from abroad;

c) the difference between sales revenue and the value of material costs;

d) the difference between receipts from national factors of production from abroad and factor income received by foreign resources in a particular country.

7. If the volume of GDP grows faster than the population, then:

a) the volume of GDP per capita decreases;

b) GDP per capita increases;

c) GDP per capita does not change;

d) GDP per capita and population are not related in any way.

8. Economic growth is:

a) an increase in nominal GDP over a certain period of time;

b) an increase in real GDP in absolute terms over a certain period of time;

c) an increase in real GDP per capita over a certain period of time;

d) the correct answers are a) and c).

9. During a recession, the following decrease the most:

a) consumer spending on medicines;

b) wage levels;

c) corporate profits;

d) government purchases of goods and services.

10. During a boom, the state increases:

a) government spending;

b) money supply;

c) investment;

d) tax rates.

Computing tasks with examples of solutions

Task 1. Calculate the GDP of a country if its economy is characterized by the following data (in billion euro): gross investment is 28, rent is 15, personal consumption expenditure is 70, government expenditure is 21, exports make 5, imports make 7, transfers make 3, depreciation is 5.

Guidelines

According to the conditions of Task 1, the data is sufficient only to calculate GDP by the final use method (based on expenditure) using the following formula:

$$GDP = C + I + G + X. \quad (5.12)$$

$$GDP = 70 + 28 + (21 - 3) + (5 - 7) = 114 \text{ (billion euro).}$$

Since government expenditures consist of government purchases of goods and services and transfers, they must be reduced by the amount of transfers to avoid double counting.

This problem contains redundant data that are not used when calculating GDP based on expenditure, namely rent and depreciation.

Task 2. Determine the growth rate of real GDP in the current year, if it is known that the nominal GDP of the country in the base year is 157 conventional units, and in the current year it is 178 conventional units. The GDP deflator of the current year is 103.2 %.

Guidelines

The growth rate (GR) of real GDP in the current year is calculated using the following formula:

$$GR = ((GDP^1_R - GDP^0_R) / GDP^0_R) \cdot 100\ \%, \quad (5.13)$$

where GDP^1_R is real GDP in the current year;

GDP^0_R is real GDP in the base year.

We calculate the current year's real GDP using the following formula:

$$GDP^1_R = GDP^1_N / D^1, \quad (5.14)$$

where GDP^1_N is nominal GDP in the current year;

D^1 is deflator in the current year.

178 / 1.032 = 172.481 (conventional units).

In the base year, real and nominal values are the same (no inflation), therefore:

$GDP^0_R = GDP^0_N = 157$ (conventional units).

From here we find the growth rate of real GDP in the current year:

GR = (172.481 − 157) / 157 · 100 % = 9.861 %.

Task 3. A hypothetical country produces and consumes two goods. Based on the data in Table 5.1, determine the Laspeyres, Paasche, and Fisher indices (2023 is the base period).

Table 5.1

Notional country data

Good	2023		2024	
	Price of a unit of good	Amount of good	Price of a unit of good	Amount of good
A	18	5	21	6
B	41	14	36	11

Guidelines

The Laspeyres index is calculated for base period prices using the following formula:

$$P_L = \frac{\sum P_i^1 \times Q_i^0}{\sum P_i^0 \times Q_i^0}, \quad (5.15)$$

where P^1_i is price of goods in the current year;

Q^0_i is quantity of goods in the base year;

P^0_i is price of goods in the base year.

$$P_L = (21 \cdot 5 + 36 \cdot 13) / (18 \cdot 5 + 41 \cdot 13) = 573 / 623 = 0.92.$$

The Paasche index is calculated for current period prices using the following formula:

$$P_P = \frac{\sum P_i^1 \times Q_i^1}{\sum P_i^0 \times Q_i^1}, \quad (5.16)$$

$$P_P = (21 \cdot 6 + 36 \cdot 11) / (18 \cdot 6 + 41 \cdot 11) = 522 / 559 = 0.93.$$

Both indices show a decrease in the cost of living in 2024, compared to 2023.

The Fisher index averages the result:

$$P_F = \sqrt{P_L \times P_P} = \sqrt{0.92 \times 0.93} = 0.925. \quad (5.17)$$

Computing tasks for self-study

Task 5.1. Calculate the country's GDP as the sum of expenditures and the sum of revenues if the components of GDP (billion euros) for a given year are: net investment is 18, rent is 6, government purchases of goods and services are 11, depreciation is 8, personal consumption expenditures make 27, profits of joint-stock companies is 20, indirect taxes on business make 3, net exports make (−5), the amount of accrued interest is 2, wages make 12, income of individual owners is 3, transfers make 3.

Task 5.2. Calculate GDP by the production method if the country's economy is characterized by the following data (billion euro): gross output is 415, material costs make 180, product taxes amount to 18, subsidies make 7.

Task 5.3. Calculate the value of the country's net exports, if it is known that the components of GDP are (conventional units): consumer spending is 87, government spending is 35, net investment is 15, transfers are 5, depreciation

is 7. The country's GNI for the same period was 129 conventional units, and net foreign factor income earned abroad was 7 conventional units.

Task 5.4. In the base year, the country's nominal GDP was 287 billion euros, and real GDP was 218 billion euros.

Calculate the value and absolute growth of real GDP in the current year if it is known that the GDP deflator increased by 11 %, and nominal GDP will grow to 315 billion euro.

Task 5.5. In the current year, the country's nominal GDP will be $219 billion, the GDP deflator will be 117 %.

Calculate the growth rate and the growth rate of the current year if it is known that in the base year the nominal GDP was $179 billion, and the GDP deflator was 110 %.

Task 5.6. The economy is described by the following data: C = 0.4Y + + 80, I = 100, where C is consumption, I is volume of investment. Suppose that as a result of government allocations, the volume of investment increased by 10 units (ΔI = 10).

Determine the change in the level of income (Y) as a result of the impact of the accelerator if its value is 2.

Task 5.7. Given the production function $y = x^{1/2}$. The savings rate is 0.4. The depreciation rate is 0.1.

At what value of x, according to the R. Solow model of economic growth, will the economy be in equilibrium?

Essays

1. The evolution of macroeconomics as an independent section of economic theory.

2. Experience in the practical application of macroeconomic theories (mercantilism, neoliberalism, Keynesianism, monetarism, neoclassical synthesis) in the economic policy of the world's leading countries.

3. Comparative analysis of the dynamics of the main macroeconomic indicators (GDP, GNP, net national income (NNI), NI) in Ukraine and other post-socialist countries of Eastern Europe.

Topic 6. Household consumption and private investments. Macroeconomic equilibrium

The purpose of studying this topic is to develop the following competencies of students: the ability to identify problems in creating an investment portfolio; the skill to analyze the mechanism of establishing macroeconomic equilibrium, and the ability to model it.

Study questions:
6.1. Consumption, savings, investments.
6.2. Macroeconomic equilibrium "AD – AS".
6.3. The macroeconomic equilibrium model "expenditure – output".
6.4. The macroeconomic equilibrium model "withdrawals – injections".

Recommended literature: [1; 3; 4; 5; 11; 12; 15; 20].

Keywords: savings, consumption, investments, expenditure, output, withdrawals, injections, multiplier, macroeconomic equilibrium, macroeconomic modeling.

6.1. Consumption, savings, investments

The household sector of the national economy encompasses all households in the country whose activities are focused on satisfying their own needs. A household is an economic unit, an individual, or a group of individuals (e.g., a family). Key characteristics of households include: the joint (full or partial) use of the household budget by its members, continuous shared consumption, and meals. A fundamental difference between a household and a family is that a household can consist of just one person. In the economy, households perform several essential functions, such as: human capital reproduction, ownership of production resources, and offering them in relevant markets; production of goods, formation of consumer demand; consumption, savings, investment, and more.

Household consumption refers to expenditures on consumer goods and services, which depend on their income. The way these incomes are formed is illustrated by a simplified model of economic circulation, which, in the context of a private closed economy, explains the interaction of only two entities

within the economic system: households and firms. This model does not account for government intervention or any connections to the outside world. The interaction between households and firms in this model occurs through the markets for resources and products (Fig. 6.1).

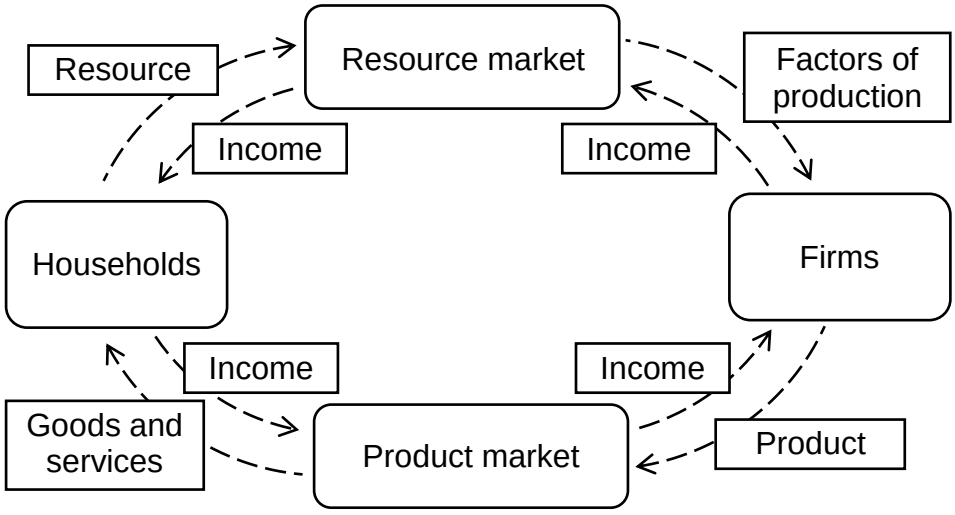


Fig. 6.1. **A simplified model of economic circulation in a private closed economy**

Households do not allocate all of their available income for consumption; a portion of it is saved. The decision to save is influenced by various factors, such as the desire to protect oneself from unexpected events (e.g., illness, accidents, unemployment), or to finance planned future expenses that require significant funds.

Therefore, personal income of households is divided into two parts: consumption and savings. Consumption refers to the portion of income after taxes that is spent on fulfilling needs, while savings is the part of income after taxes that is not spent but saved.

The main factor determining consumption is the current income of households. In other words, consumption is directly related to the amount of income. This relationship is called the consumption curve or consumption function. Algebraically, it can be expressed using the following formula:

$$C = a + c'(Y - T + TR), \quad (6.1)$$

where C is consumption expenditures;

a is autonomous consumption, the amount that does not depend on the current distributable income;

c' is the marginal propensity to consume;

Y is income;
T is tax deductions;
TR is transfers;
(Y − T + TR) is the disposable income (after taxes).

The term (Y − T + TR) is referred to as DI. The graphical interpretation of the consumption function is shown in Fig. 6.2. The consumption curve has a positive slope because there is a positive relationship between income levels and consumption volume. The slope of the consumption line is determined by the marginal propensity to consume (c').

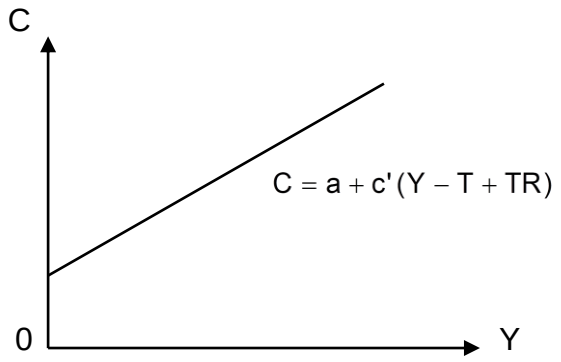


Fig. 6.2. **The consumption function**

Changes in consumption are represented on the vertical axis, while changes in income levels are shown on the horizontal axis. The consumption line does not pass through the origin; its intersection with the vertical axis occurs at the level of autonomous consumption. Autonomous consumption is independent of income.

In a simplified, tax-free economy under consideration, the disposable income of the private economy (DI) equals the income (Y), i.e., DI = Y. It is divided into private consumption and private savings:

$$DI = Y = C + S, \quad (6.2)$$

where C is private consumption;
S is private savings.

To characterize savings, the savings function is used:

$$S = -a + s'(Y - T + TR), \quad (6.3)$$

where S is savings;

s' is the marginal propensity to save.

The graphical interpretation of the savings function is shown in Fig. 6.3.

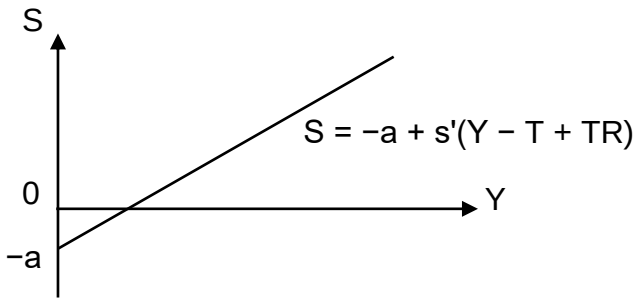


Fig. 6.3. **The savings function**

As we can see, the savings curve has a positive slope because there is a positive relationship between income levels and the amount of savings. The angle of the slope is determined by the marginal propensity to save (s').

Key indicators in macroeconomics are the average and marginal propensities to consume.

The average propensity to consume (APC) is the ratio of consumption to current income or the ratio of consumption expenditure to the income from which it is made (APC = C/Y).

The average propensity to save (APS) is the ratio of savings to current income or the ratio of savings to the income from which they are made (APS = S/Y).

The marginal propensity to consume (MPC) is the ratio of the change in consumption to the change in income that caused the shift in consumption:

$$MPC = c' = \Delta C / \Delta Y, \quad (6.4)$$

where MPC is the marginal propensity to consume;

ΔC is the change in consumption expenditure;

ΔY is the change in disposable income (income after taxes).

The marginal propensity to consume (MPC) reflects the level of current income spent on current consumption.

The marginal propensity to save (MPS) is the inverse of the marginal propensity to consume (MPC). It is the coefficient that shows how much savings change when income changes by one unit:

$$MPS = s' = (1 - c') = \Delta S / \Delta Y. \quad (6.5)$$

As income increases, the portion of income spent on consumption decreases, while the share saved increases. However, the sum of the average propensity to consume and the average propensity to save equals one:

$$APC + APS = 1, \quad (6.6)$$

as they represent two opposite parts of the same income.

Similarly, the sum of the marginal propensity to consume (MPC) and the marginal propensity to save (MPS) also equals one, as they represent the two opposite parts of the change (increase or decrease) in income:

$$MPC + MPS = 1. \quad (6.7)$$

If MPC = 0, then all income is saved, which is typical of a closed economy. If MPC = 0.5, it is an ideal economic situation where consumption equals savings (MPC = MPS), as consumption forms aggregate demand, while savings provide the basis for investment, which in turn stimulates aggregate supply. If MPC = 1, all the increase in income will be spent on consumption.

Savings serve as the only source of funding for investments, i.e., S = I (for a private economy). Investments refer to capital expenditure aimed at the generation of profit. They represent the flow of goods over a certain period, used to maintain or increase capital in the economy. All investments are made by firms. Savings play the role of financial constraints for investments. The equilibrium between savings and investments is achieved through fluctuations in interest rates, influenced by the demand for borrowed funds (investments) and their supply (savings).

In macroeconomics, investments refer to real investments. The demand for investments comes from enterprises. Investment demand consists of the demand for replacing depreciated capital and the demand for increasing capital. Thus, gross investments and net investments are distinguished. Gross investments are the total of investments for replacing depreciated capital and increasing investments for expanding production. Investments to replace physically worn-out or morally outdated capital are called depreciation of fixed capital. Net

investments are gross investments minus the depreciation of fixed capital. In other words, net investments are expenditures directed solely towards the creation of new, additional capital, while gross investments include both the creation of new capital and the replacement of worn-out capital with new capital goods.

Investment demand depends on both subjective factors – the decisions of entrepreneurs to invest – and objective factors, such as the bank interest rate and the expected rate of net profit.

The interest rate is the price of borrowed funds in the money market. The higher the cost of borrowing, the lower the demand for investments, and vice versa. Investments are only profitable as long as the interest rate equals the expected rate of net profit. The net profit rate indicates the profitability of a business, measured as a percentage and calculated as the ratio of net profit to invested capital.

The government can influence the interest rate and thereby regulate the level of investment expenditures in the desired direction. An increase in the interest rate, all other things being equal, will lead to a general reduction in investments, and only highly profitable investment projects will be pursued. In the case of a decrease in the interest rate, investments with a low expected rate of return become profitable as well, which will, in turn, increase the overall demand for investments.

Besides the interest rate, other factors such as GDP, technological changes, changes in tax levels, and entrepreneurs' expectations also influence investment demand.

The impact of investments on national income can be calculated. The investment multiplier is a coefficient that shows the relationship between the change in income and the change in autonomous investments:

$$M_I = \frac{\Delta Y}{\Delta I}, \tag{6.8}$$

where M_I is the investment multiplier;

ΔI is the increase in investments;

ΔY is the increase in income.

From equation (6.8), it is easy to derive the following formula:

$$M_I = \frac{1}{1 - MPC} = \frac{1}{MPS}, \tag{6.9}$$

where M_I is the investment multiplier;

MPC is the marginal propensity to consume;

MPS is the marginal propensity to save.

The government uses the multiplier and accelerator to regulate the economy.

In macroeconomic modeling, a simple investment function is applied, where the basic variable influencing investment demand is the interest rate only:

$$I = i - br, \quad (6.10)$$

where I is the demand for investment;

i is autonomous investments, which are investments that do not depend on the interest rate and are influenced by other factors;

r is the real interest rate;

b is the sensitivity of investments to changes in the real interest rate level:

$$b = \Delta I / \Delta r. \quad (6.11)$$

The profitability of investments is the main motive for making them. There are two methods for determining the profitability of investment projects: the accounting method and the discounting method. The accounting method involves determining the rate of return as the ratio of profit to invested capital (Rate of return = Net profit / Invested capital).

The net present value method calculates the profitability of an investment project as the difference between the discounted value of expected income and the discounted value of expected costs.

6.2. Macroeconomic equilibrium "AD – AS"

Macroeconomics deals with aggregate indicators. All markets for individual goods and services are combined into a single goods market. Prices for different goods and services are consolidated into a single overall price, representing the general price level.

Aggregate demand refers to the total expenditure by macroeconomic agents (households, businesses, the government, and the external sector – foreign countries) on the purchase of final goods and services produced within the national economy. Thus, aggregate demand (AD) is the total amount of

goods and services that macroeconomic agents are willing to purchase at every possible price level. Aggregate demand can be determined by calculating GDP based on expenditures.

The aggregate demand curve (Fig. 6.4) shows the level of real expenditure by all macroeconomic agents at each potential price level and illustrates the inverse relationship between the general price level (P) and the real volume of national output (Y).

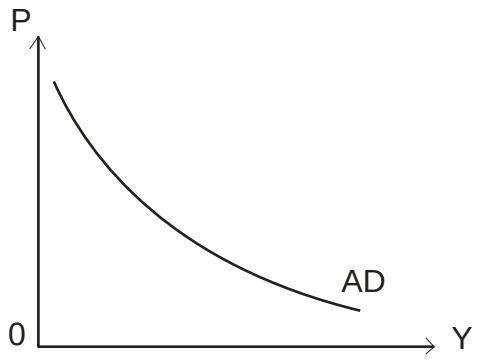


Fig. 6.4. **The aggregate demand curve**

The negative slope of the aggregate demand curve is explained by the following factors:

1. Wealth effect or real cash balances effect. The nominal value of money is fixed, but its real value (purchasing power) is variable. An increase in the price level reduces the real purchasing power of accumulated financial assets, such as deposits. As a result, consumers feel poorer when prices rise and wealthier when prices fall.

2. Interest rate effect. An increase in the price level raises the demand for money, as more money is needed for transactions. With a constant money supply, this leads to an increase in the interest rate (the cost of borrowing money). As a result, consumption and investment that rely on credit become more expensive, reducing their volume and decreasing overall expenditure in the economy.

3. Import purchase effect. An increase in domestic prices, while external market prices remain stable, reduces exports and increases imports, leading to a decrease in aggregate demand.

The above factors are called price factors. They determine the change in the level of aggregate demand, i.e., the movement along the aggregate demand curve.

In addition to price factors, non-price factors also influence the level of aggregate demand. These mainly include factors that cause changes in:

consumption expenditure (due to changes in the welfare of the population, accumulation of debts, changes in income taxes for consumers, consumer expectations);

investment expenditure (due to changes in interest rates not related to price changes, expected returns on investments, excess production capacity, technological development, and changes in taxation);

government purchases (changes in government policy);

expenditure on net exports (due to changes in prices in other countries' markets, fluctuations in exchange rates);

money supply.

Aggregate supply (AS) refers to the total quantity of goods and services that firms are willing to produce at each possible price level. This concept is often used interchangeably with GDP. The aggregate supply curve shows the amount of real national output that entrepreneurs are willing to produce at each possible price level in the economy.

The relationship between the price level and the amount of supply depends on the duration of the period being considered.

In the long run, nominal prices, wages, and interest rates are flexible; they are freely set and changeable, while real variables (such as output, employment levels, and real interest rates) change very slowly. The classical model describes the economy's behaviour in the long run. Classical economists argue that when prices for goods and services change, prices for resources change in the same proportion. Therefore, the long-run aggregate supply curve is represented by a vertical line. In this case, aggregate supply does not depend on the price level but on the available economic resources and the level of production technology.

Advocates of Keynesian theory argue that the economy does not always operate at full employment, and resource prices are not flexible. They contend that if not all resources in the economy are utilized, increasing national output can be achieved by utilizing idle resources without raising prices. Therefore, the aggregate supply curve is represented by a horizontal line.

Unlike the long run, in the short run, nominal variables are considered inflexible, while real variables are more volatile. Several reasons contribute to the relative rigidity of nominal variables, including government regulation of minimum wage levels, the discretionary nature of price and wage changes,

the terms of supply contracts for raw materials and finished goods, the presence of inventory stockpiles, and the activities of labour unions, among others.

The short-run aggregate supply curve is horizontal or has a positive slope, meaning that an increase in the general price level leads to an increase in the supply of goods and services.

Modern macroeconomics synthesizes both classical and Keynesian views on the aggregate supply curve. It identifies three segments of the generalized curve, each corresponding to a different state of the economy (Fig. 6.5).

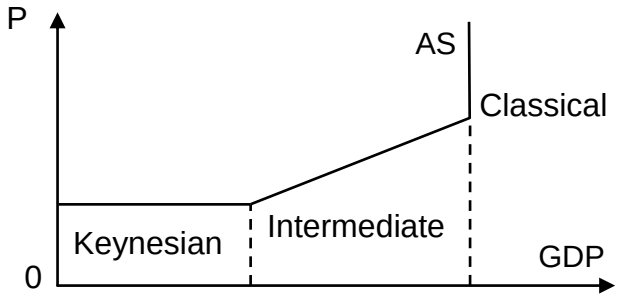


Fig. 6.5. **The aggregate supply curve**

Keynesian (horizontal) segment represents the state of the economy during a deep recession, where a significant portion of resources is underutilized. Therefore, adding additional resources to production does not affect the price level.

Intermediate (upward-sloping) segment. As idle economic resources are used up, the cost of engaging them increases. This means that further increases in real output will be accompanied by a rise in the price level.

Classical (vertical) segment reflects the economy at full employment, at the production possibilities frontier. At this point, any increase in aggregate demand will not result in an increase in real output but will lead solely to an increase in the price level.

There are both price and non-price factors that determine aggregate supply. A change in the price level causes movement along an unchanged aggregate supply curve. Non-price factors cause the aggregate supply curve to shift: upwards and to the left when aggregate supply decreases, and downwards and to the right when it increases.

Non-price factors of aggregate supply include:

changes in resource prices;

changes in productivity;

changes in taxes, subsidies, and government regulations;

expectations of future price levels.

By analyzing both aggregate demand and aggregate supply simultaneously, the mechanism of determining the equilibrium level of national output and the equilibrium price level can be traced. Achieving macroeconomic equilibrium means that the total expenditures equal total income, or the level of aggregate demand equals the level of aggregate supply. The interaction between aggregate demand and aggregate supply occurs through the price system. The intersection of the aggregate demand curve and the aggregate supply curve determines the equilibrium point, which sets the equilibrium price level, real output, and employment levels in the country.

The mechanism for determining the equilibrium level of production in the short run depends on the segment of the aggregate supply curve where it intersects with the aggregate demand curve. Changes in aggregate demand and aggregate supply affect macroeconomic equilibrium parameters.

An increase in aggregate demand in the short run can lead to the following outcomes:

1. If aggregate demand rises within the Keynesian range of the aggregate supply curve, it leads to an increase in the real output of national production (and employment at constant prices).

2. An increase in aggregate demand on the intermediate range of the aggregate supply curve results in higher real output, employment, and price levels.

3. An increase in aggregate demand on the classical segment of the aggregate supply curve leads to inflationary price growth and a rise in nominal GDP, while the real GDP remains unchanged, as it cannot exceed the level achieved under full employment of all production factors.

Thus, in conditions of underemployment of resources, an increase in aggregate demand can stimulate a prolonged rise in aggregate supply until it reaches the potential level. If the government aims to increase real production in the economy under conditions of underemployment and price rigidity, it should stimulate aggregate demand.

A decrease in aggregate demand leads to various consequences. If aggregate demand decreases within the Keynesian segment of the aggregate supply curve, it results in a reduction in the equilibrium level of national production, increased unemployment, and stable price levels. A decrease in aggregate demand on the intermediate and classical segments behaves

differently. In these conditions, prices for both goods and resources become inflexible; once they increase, they do not show a tendency to decrease. This situation illustrates the so-called ratchet effect, where, in the short run, prices do not decrease as easily as they increase.

Regardless of the causes that triggered a change in aggregate demand and deviations from the initial equilibrium, in the long run, the economy returns to the potential GDP level through self-regulation, which is determined by the available factors of production and the technology in use. This self-regulation also occurs when changes affect the short-term period.

In the long run, aggregate demand becomes a less important factor for real production output. Therefore, in classical theory, priority is given to aggregate supply, particularly the factors that cause it, with the most important being the available resources. If the aggregate supply curve is vertical, the real output is determined solely by the potential level of production. Aggregate demand only affects the price level and does not influence the real GDP level.

Thus, the long-term effect of a shift in aggregate demand consists of a change in nominal variables (the price level decreases), but not real variables (production remains at the same level).

The AD – AS model (aggregate demand – aggregate supply) is the basic model of economic equilibrium. Using this model, the impact of demand and supply shocks on the economy can be assessed, as well as the consequences of government stabilization policies aimed at mitigating fluctuations caused by shocks and restoring the equilibrium level of production and employment to the pre-crisis level.

6.3. The "expenditure – output" macroeconomic equilibrium model

The "expenditure – output" model is a model for determining the optimal GDP through the consumption and investment mechanism. In this model, aggregate demand is represented by total expenditure (E), which includes consumption, investments, and government purchases of goods and services (E = C + I + G), while aggregate supply is represented by real GDP (Y). It is important to note that consumption refers to household spending on consumer goods; investments refer to spending by firms and businesses on their consumption (equipment, machinery, materials, and other items needed for expanding production); and government purchases refer to government spending on its own consumption. Therefore, total consumption, or total expenditure

by firms, businesses, and the government, is the sum of C + I + G. Hence, the model is based on a direct relationship between GDP and total expenditures: the higher the total expenditure, the higher the GDP, and vice versa.

To understand equilibrium or disequilibrium in the economy according to the "expenditure – output" model, it is important to distinguish between actual and planned aggregate expenditures. Economic equilibrium is achieved when planned aggregate expenditures (E) equal the produced GDP (Y). Therefore, in the expenditure – output model, aggregate expenditures should refer to planned aggregate expenditures.

In the graph (Fig. 6.6), the real GDP is plotted on the horizontal axis, and aggregate expenditures are plotted on the vertical axis. The line Y = E represents the situation where all produced GDP is consumed by households, firms, and the government, i.e., it equals their expenditures. At any point on this line, total expenditures are equal to the produced income. The line C + I + + G represents total expenditures. At the point with coordinates (Y_1; E_1), these lines intersect, signifying equilibrium between produced GDP and aggregate expenditures, and equilibrium in the economy where demand equals supply (AD = AS).

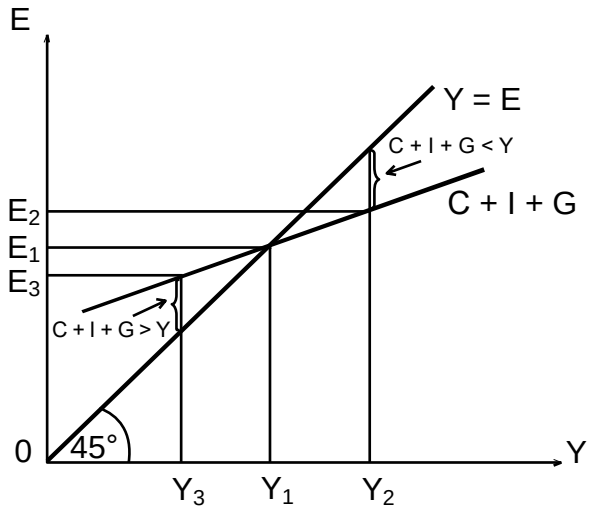


Fig. 6.6. **The expenditure – output model**

If the economy produces GDP of size Y_2, a situation arises where not all produced GDP will be sold because aggregate expenditures are less than the produced GDP (C + I + G < Y), meaning AD < AS. All unsold goods, unrendered services, and other outputs will take the form of inventory, which increases. The rise in inventories forces producers to reduce output, leading

to a decrease in employment. Thus, GDP will decrease to the level Y_1, where income and aggregate expenditures align. Consequently, equilibrium between demand and supply is achieved (AD = AS).

On the other hand, if the economy produces GDP of size Y_3, a situation arises where production is less than required by aggregate demand (C + I + + G > Y), leading to AD > AS. The increased demand (C + I + G) is satisfied by an unplanned reduction in inventories in the economy, which creates incentives to increase production, employment, etc. Therefore, GDP gradually increases to the size of Y_1, and the economy returns to equilibrium where income and total expenditures align, achieving AD = AS.

Thus, the equilibrium GDP is the level of production where total expenditures are sufficient to purchase all the goods produced in the current period. In other words, at the equilibrium level of GDP, the total amount of goods produced equals the total amount of goods purchased (consumption, investment, and government purchases). The economy constantly gravitates towards equilibrium as its natural norm. This means that if aggregate expenditures exceed GDP and there is an unplanned reduction in inventories, firms will be motivated to increase production to match aggregate expenditures. Conversely, if aggregate expenditures are less than GDP and there is an unplanned increase in inventories, firms will be forced to reduce production to match aggregate expenditures.

6.4. The "leakages – injections" macroeconomic equilibrium model

The "leakages – injections" model is based on the idea that, in the "income – expenditure" flow, leakages and injections continually occur. It is important to note that in macroeconomics, two types of quantitative variables are distinguished: stocks and flows. A stock refers to a measure of quantity at a given moment, while a flow refers to a measure of quantity over a specific time period. For example, a stock could be the assets of a consumer, while a flow could be their income and expenditures; a stock might be the number of unemployed individuals, and a flow could be the number of people losing their jobs; a stock might be the government debt, and a flow could be the budget deficit, and so on.

Leakages refer to savings: as we know, any level of production generates a certain amount of untaxed income, and households and businesses may save a portion of this income, meaning they do not use it for consumption.

Therefore, savings reduce expenditures and represent a leakage from the "income – expenditure" flow.

In contrast to savings, investments can be viewed as injections into the "income – expenditure" flow. We know that the source of investment is the savings of households and businesses, and if savings reduce demand, investments increase it. Thus, investments increase expenditures and compensate for the reduction in aggregate demand caused by the leakage of income into savings.

If the leakage from income in the form of savings exceeds the investment injections into expenditure, total expenditures will be less than the actual GDP. Since total expenditures determine the equilibrium GDP, this means the actual GDP will exceed the equilibrium GDP.

On the other hand, if the leakage from income in the form of savings is less than the investment injections into expenditure, total expenditures will exceed actual GDP. This means the actual GDP will be lower than the equilibrium GDP.

The ideal situation is when leakages and injections are equal in size. In this case, the loss in total expenditures due to potential savings is compensated by an increase in expenditures due to investments. Therefore, total expenditures will equal actual GDP, which is simultaneously the equilibrium GDP.

Thus, the equilibrium GDP is the level of GDP that is achieved when there is balance between savings and investments. This means that households' savings plans align with firms' investment plans. Therefore, the condition for equilibrium in the goods market is the equilibrium between savings and planned investments.

Sometimes, in addition to planned investments, unplanned investments can occur, such as investments in inventory. If inventories increase, there is an unplanned increase in investment, and vice versa. Under these conditions, a discrepancy arises between savings and planned investments. However, actual investments are always balanced with savings through unplanned investments. In other words, unplanned investments serve as a balancing element that continuously aligns actual investments with savings. This conclusion is related to the "expenditure – output" method, according to which actual aggregate expenditures always equal GDP, achieved through unplanned investments in inventories.

The determination of equilibrium GDP using the "leakages – injections" model can be illustrated graphically (Fig. 6.7).

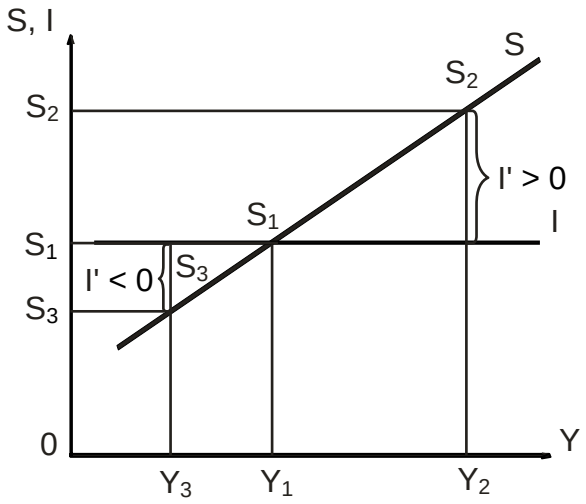


Fig. 6.7. **The "leakages – injections" model**

In the figure, the real GDP (Y) is plotted on the x-axis, and savings and investments (S, I) are plotted on the y-axis. The line S represents household savings, while the line I represents planned investments, which for simplicity are assumed to be constant (hence the horizontal line). According to the graph, only the output level Y_1 is equilibrium, as it is produced under conditions where savings equal planned investments (S_1 = I), and unplanned investments are zero (I' = 0). This means that households save in the amount of S_1, while firms invest in the amount of I.

If household savings increase (shown as S_2 on the graph), while planned investments (I') remain unchanged, households begin saving more than firms are willing to invest. Essentially, households hold back from additional consumption. As a result, firms experience lower demand for additional products and accumulate inventories, or unplanned investments. This will not stimulate growth in production or investment. Output will begin to decline, leading to a decrease in GDP and a leftward shift. Employment falls, income decreases, and savings diminish. This process continues until equilibrium is restored at point (Y_1, S_1).

Conversely, if savings are lower (S_3 on the graph) than planned investments (I' < 0), a situation arises where households save less than firms are willing to invest. Essentially, by reducing savings, households increase consumption. This stimulates firms to increase production and output, which boosts GDP and employment. As incomes rise, savings increase. This growth continues until equilibrium is reached at point (Y_1, S_1).

Therefore, only at point (Y_1, S_1) will the GDP level be achieved that does not cause fluctuations in the macroeconomic system, where there will

be neither overproduction nor shortage of goods. The equilibrium level of savings and investments determines the optimal GDP size.

It is worth mentioning that the model discussed is simplified. In more advanced models, injections include, in addition to investments, government purchases and exports, while withdrawals include savings, taxes, changes in bank reserves, and imports.

Glossary

Household is an economic unit, an individual or a group of individuals (e.g., a family) who live together and jointly manage a common budget. A family and a household are not always the same.

Consumption is the portion of income after taxes that is spent to satisfy needs.

Savings is the portion of income after taxes that is not spent but saved for future use.

Investments is the allocation of capital with the goal of generating profit. It is the flow of goods and services over a certain period that is used to maintain or increase the capital stock in the economy.

Macroeconomic equilibrium is the state of the economy in which total expenditures equal total income, or the level of aggregate demand equals the level of aggregate supply.

Questions for self-assessment

1. Define the concept of a household and outline its key characteristics and functions.

2. Describe the concept of household consumption. Provide and explain the formula for the consumption function and its graph.

3. Define the concept of household savings. Describe the savings function. Provide its algebraic and graphical interpretation.

4. What is the relationship between investment and savings? Define the impact of investment on the economy.

5. Define the concepts of aggregate demand and aggregate supply. Explain how they differ from market demand and supply.

6. Draw the graphs of the aggregate demand and aggregate supply functions. Explain them.

7. Define the concept of macroeconomic equilibrium. What is the basic model of macroeconomic equilibrium?

8. Define the relationship between GDP and total expenditures.

9. What is the difference between actual and planned total expenditures? Graphically represent the "expenditure – output" equilibrium model and explain it.

10. What are withdrawals and injections in macroeconomics? Graphically define the equilibrium GDP using the "withdrawals – injections" model.

Practice tests

1. The marginal propensity to consume is:

a) the ratio of total consumption to total income;

b) the change in consumption expenditure caused by a change in income;

c) the ratio of the increase in consumption expenditure to the unit increase in income;

d) a curve that characterizes the level of consumption.

2. The volume of consumption expenditure in a country depends primarily on:

a) the place of residence of the consumer;

b) the age of the family members;

c) the level of national income;

d) the level of income the family has at its disposal.

3. In the consumption function $C = C_0 + c'Y_d$:

a) C_0 is autonomous consumption, which characterizes the minimum level of consumption required by people;

b) c' is the marginal propensity to consume;

c) Y_d is disposable income;

d) all answers are correct.

4. Suppose in country A there are 100 families. Half of them have a marginal propensity to consume equal to ½, and the other half has ¾. If the income available to the families increases by 10,000 euros and the entire income increase goes to the first half of the families, then total consumption expenditure will increase by:

a) 5 000 euros;

b) 2 500 euros;

c) 7 500 euros;

d) consumption expenditure will not increase.

5. The desire of a person to save part of their income is driven by:

a) the need to have a reserve for a "rainy day" and the desire to ensure their old age, leave an inheritance;

b) the desire to provide income in the form of interest and enjoy a sense of independence;

c) the intention to secure necessary money for commerce and simply being stingy;

d) all answers are correct.

6. What should the increase in investment be when MPS = 0.5 to ensure an increase in income of 2000 monetary units:

a) 2 000 monetary units;

b) 1 000 monetary units;

c) 500 monetary units;

d) 400 monetary units?

7. Non-price factors of aggregate demand include:

a) interest rate effect;

b) wealth effect;

c) changes in consumption expenditure;

d) dynamics of subsidies and taxation.

8. The aggregate supply curve expresses the relationship between:

a) the price level and the consumed real GDP;

b) the price level and the produced real GDP;

c) the price level at which buyers want to buy and producers want to sell goods and services;

d) the produced and consumed real GDP.

9. An increase in aggregate demand will lead to growth in equilibrium GDP and price levels if the shift in aggregate demand occurs on:

a) the Keynesian segment of the AS curve;

b) the intermediate segment of the AS curve;

c) the classical segment of the AS curve;

d) any segment of the AS curve.

10. The aggregate demand function:

a) reflects equilibrium in the goods and services markets at different price levels;

b) is the sum of individual demand functions for goods and services;

c) increases with respect to the price level;

d) defines that the sum of consumer and investment demand is an ascending function of the price level.

Computing tasks with examples of solutions

Task 1. In a country, the initial household income is 10,000 UAH, and consumer expenditures are 7 000 UAH. After some time, income increases by 2 000 UAH, and consumer expenditures rise by 1 600 UAH. You need to calculate the marginal propensity to consume (MPC).

Guidelines

1. The given data:
initial income: 10 000 UAH;
initial consumer expenditures: 7 000 UAH;
increase in income: 2 000 UAH;
increase in consumer expenditures: 1 600 UAH.
2. Calculate the marginal propensity to consume (MPC):
MPC can be calculated using the formula MPC = ΔC / ΔY,
where ΔC is the change in consumer expenditures (1 600 UAH),
ΔY is the change in income (2,000 UAH).
Substitute the values into the formula:
MPC = 1 600 / 2 000 = 0.8.
Therefore, the marginal propensity to consume (MPC) = 0.8.

Task 2. Imagine that the government has decided to increase public spending by 100 million monetary units. In the country, the marginal propensity to consume (MPC) is 0.8. Calculate the total effect on national income (GDP) after this increase in public spending.

Guidelines

1. To calculate the simple expenditure multiplier, we use the formula:

$$\text{Multiplier} = 1 / (1 - \text{MPC}).$$

$$\text{Multiplier} = 1 / (1 - 0.8) = 1 / 0.2 = 5.$$

2. Calculate the total effect on national income:
The total effect (ΔY) on national income can be found using the formula:

$$\Delta Y = \text{Multiplier} \times \Delta G,$$

where ΔG = 100 million monetary units – the change in public spending.

$$\Delta Y = 5 \cdot 100 = 500 \text{ million monetary units.}$$

Therefore, the increase in public spending by 100 million monetary units will lead to an increase in national income by 500 million monetary units.

Computing tasks for self-study

Task 6.1. Table 6.1 shows data on the levels of aggregate supply.

Table 6.1

Relationship between average price level and real GDP

Price level	Produced real GDP
270	2500
250	2500
200	2000
185	1800
140	1400
115	1000
115	700
115	500
100	0

1. Determine:

within which limits the volume of real GDP changes on the Keynesian segment of the aggregate supply curve;

within which limits the price level and real GDP change on the classical segment of the aggregate supply curve;

within which limits the volume of real GDP changes on the intermediate segment of the aggregate supply curve.

2. Construct the aggregate supply curve based on the data from the task.

Task 6.2. Calculate the effect on the overall economy if government spending increases by 500 million, assuming a marginal propensity to consume of 0.75.

Task 6.3. The given consumption function is C = 80 + 0.5Yd.

1. Fill in Table 6.2.

Table 6.2

Consumption and savings scale

Disposable income (Y_d)	Consumption (C)	Savings (S)
0		
100		
200		
300		
400		
500		

2. Construct a consumption schedule.

3. Draw a line at an angle of 45 degrees (bisector). Calculate: at what levels of disposable income (Y_d) consumption expenditures are equal to, less than, and more than its volume.

Task 6.4. The given consumption function is C = 200 + 0.8Yd, where C is consumption and Y is income. Calculate the consumption level when income is 5 000.

Task 6.5. Determine the total increase in aggregate demand when investments rise by 300 million, and the marginal propensity to consume is 0.6.

Task 6.6. If the government increases its expenditure by 200 million euros, and the marginal propensity to consume is 0.7, calculate the multiplier effect.

Task 6.7. Calculate the equilibrium level of national income if the planned investment is 300 million, government spending is 200 million, and consumption is given by the equation C = 150 + 0.75Yd.

Essays

1. The relationship between the intensity of the multiplier effect and the steepness of the savings curve.
2. The "paradox of thrift": causes of its occurrence and conditions for its existence.
3. Disturbance of equilibrium between output levels and price levels in the graphical interpretation of the "AD – AS" model.

Topic 7. Macroeconomic instability. Banking system

The purpose of studying this topic is to form the following competencies: the ability to identify the problems of unemployment and inflation as the main indicators of macroeconomic instability, to analyze the mechanism of functioning and the skills in modeling a banking system.

Study questions:
7.1. Labor market.
7.2. Inflation mechanism.
7.3. Mechanism of functioning of the money market.
7.4. Banking system and money supply.

Recommended literature: [2; 5; 4; 7; 13; 14; 18; 20; 21].

Keywords: unemployment, inflation, full employment, Okun's law, labor market, anti-inflationary policy, money, monetary equilibrium, banking system, money supply.

7.1. Labor market

The entire population of any country can generally be classified into economically active and economically inactive groups.

Economically inactive individuals, who are not part of the labor force, include:

children under the age of 15;

retirees;

homemakers;

homeless individuals;

individuals serving prison sentences;

patients in psychiatric institutions;

people with disabilities;

individuals who have stopped looking for work.

The economically active population, also known as the labor force, consists of both employed and unemployed individuals.

Employed individuals are those engaged in any paid work, as well as those who have a job but are temporarily absent due to reasons such as vacation, illness, strikes, or natural disasters.

Unemployed individuals are those who do not have paid work but are actively seeking employment.

Unemployment is a socio-economic phenomenon in the labor market where a portion of the economically active population is not engaged in production activities.

Some economic schools consider the following types of unemployment:

Frictional unemployment that arises from individuals searching for or transitioning between jobs. It is typically voluntary and short-term in nature. Structural unemployment due to technological advancements that alter the demand for labor. It arises when job seekers' skills do not match market demands. Structural unemployment often requires workers to undergo retraining or skill upgrades.

Frictional and structural unemployment are considered inevitable and even beneficial to the economy, as they contribute to more efficient labor allocation and higher productivity growth.

Together, frictional and structural unemployment form the natural rate of unemployment, which aligns with the economy's potential GDP. When

an economy operates at the natural rate of unemployment, full employment is considered to be achieved.

According to another classification, there are three main types of unemployment:

1. Frictional unemployment. This type arises from individuals searching for or transitioning between jobs. It is typically voluntary and short-term in nature.

2. Structural unemployment. This occurs due to technological advancements that alter the demand for labor. It arises when job seekers' skills do not match market demands. Structural unemployment often requires workers to undergo retraining or skill upgrades.

3. Cyclical unemployment. This type results from an overall decline in economic activity, typically occurring during downturns in the business cycle when spending and production decrease. The presence of cyclical unemployment indicates a deteriorating labor market.

Full employment refers to an economic condition where the unemployment rate ranges between 5 – 7 % of the total labor force. These figures may fluctuate across countries and over time, but full employment does not imply the complete utilization of the labor force.

The key labor market indicator is the unemployment rate (u):

$$u = U / L \cdot 100\ \% \text{ or } U / (E + U) \cdot 100\ \%, \qquad (7.1)$$

where u represents the unemployment rate;

U is the number of unemployed individuals;

L stands for the total labor force;

E refers to the number of employed individuals.

Natural unemployment serves as a benchmark for full employment. When the actual unemployment rate matches the natural rate, the economy is considered to be at full employment. However, if actual unemployment surpasses the natural level, it indicates the presence of underemployment caused by a shortage of job opportunities. In conditions of underemployment, the demand for labor is lower than its supply, leading to cyclical unemployment. Conversely, when the demand for labor exceeds supply, there are fewer job seekers than available vacancies, resulting in labor surplus and an unemployment rate below the natural level.

The major social consequences of unemployment include:

loss of qualifications and practical skills;

increased crime rates and worsening of the country's criminal situation;

prolonged unemployment can lead to depression, an increase in suicide rates, mental and cardiovascular illnesses, as well as rising levels of alcoholism and drug addiction;

intensified social tensions that could potentially result in significant political and social transformations.

The economic impact of unemployment can be quantitatively measured using Okun's Law. According to this principle, if the actual unemployment rate exceeds the natural rate by 1 %, actual GDP will fall below its potential level by β % (GDP gap):

$$\text{GDP gap} = -\beta \cdot (u - u^*), \quad (7.2)$$

where β is the empirical coefficient representing the sensitivity of GDP to changes in cyclical unemployment (Okun's coefficient);

u is actual unemployment rate;

u* is natural unemployment rate.

As a rule, its value is usually 2.5 by default.

This formula allows for the calculation of the GDP gap as a percentage of potential GDP. Potential GDP represents the level of real GDP that an economy can achieve under conditions of full employment and the natural rate of unemployment.

In a formalized form, Okun's law can be expressed by the following equations:

$$(Y - Y^*) / Y = -\beta \cdot (u - u^*), \quad (7.3)$$

where Y is actual national output (GDP);

Y***** is potential national output (GDP).

The labor market refers to the system of economic relationships concerning the buying and selling of a unique commodity – labor.

Just like any other market, the labor market is driven by supply and demand for labor.

Labor supply (workforce availability) is influenced by several key factors, such as:

demographic trends;

the level of economic activity among the population;

the officially established retirement age;

immigration and emigration of the working population;

women's participation in the labor force;

the length of the working day;

the role of labor unions, and more;

labor demand is shaped by factors including:

demand for goods and services produced by workers;

wage levels;

the degree to which labor can be replaced by capital in production processes;

the phase of the economic cycle;

technological advancements, among others.

The commodity traded in the labor market is labor or workforce. Various economic theories define workforce as:

a person's capacity to work;

a combination of an individual's physical and intellectual abilities applied in the production of goods and services;

the portion of the population that includes employed, self-employed, and job-seeking individuals (unemployed).

The unique nature of the labor commodity lies in the fact that:

a person sells only their ability to work for a limited period while retaining ownership of this ability;

both buyer and seller are legally equal parties and socially protected by the government and labor unions;

unlike other goods, labor cannot be stored;

labor is not depleted through use but rather increases in value and actively contributes to the creation of other goods and services.

The primary functions of the labor market include:

economic function that is ensuring an optimal process of workforce reproduction;

social function that is guaranteeing a high standard of living and quality of life for workers, along with fair wages.

The government plays a key role in regulating the labor market. Employment regulation policies can generally be classified into two main types: active and passive.

Active labor market policies consist of a set of measures aimed at creating conditions for the rapid reintegration of unemployed individuals into the workforce. These measures include:

establishing additional employment opportunities;

providing training, retraining, and skill development programs;

enhancing labor mobility;

offering job placement assistance, among others.

In contrast, passive labor market policies focus on ensuring financial support and social protection for workers and employers. This approach involves:

providing financial compensation to partially offset income losses of the unemployed;

registering job seekers with employment services or job centers;

determining the level of unemployment benefits;

organizing an unemployment benefits payment system.

For the employed population, passive policies ensure job retention, wage payments, and social insurance coverage. Employers, on the other hand, are assured of demand for their planned production volume, access to raw materials and supplies, price stability, and targeted financial support.

7.2. The inflation mechanism

Along with unemployment, inflation is another indicator of macroeconomic instability. Modern inflation is not only associated with a decline in the purchasing power of money due to rising prices, but also reflects the overall unfavorable state of the country's economic development. Inflation is a sustained increase in the overall price level that occurs as a result of a disturbance in macroeconomic equilibrium, when a significant portion of the money supply is not backed by economic goods.

The inflation rate can be measured using price indexes, which allow for determining the rate of price growth and the rate of price increase. The price index is also referred to as the inflation index.

The rate of price increase (inflation rate) can be determined using two main methods:

1) a method based on the price index of the base period:

$$B_t = P_t - 100\ \%, \tag{7.4}$$

where B_t is the inflation rate for the current period t;

P_t is the price index for the current period t.

2) a method based on the price index of the previous period:

$$B_t = ((P_t - P_{t-1}) / P_{t-1})\ 100\ \%, \tag{7.5}$$

where P_{t-1} is the price index of the previous period.

The opposite of inflation is deflation – a decrease in the overall price level. In modern economies, this phenomenon is rare and usually seasonal. For example, prices for vegetables, fruits, and grains typically decrease right after harvest, which affects the overall price level. A slowdown or reduction in inflation rates is called disinflation.

The main causes of inflation include:

1) increased government spending, leading to money emission;

2) over-expansion of the money supply due to mass lending;

3) monopoly power of large firms to set prices and production costs, especially in raw material sectors;

4) monopoly power of trade unions, which limits the market's ability to determine acceptable wage levels for the economy;

5) a reduction in the real output of national production, which, with a stable money supply, leads to price increases because the same amount of money corresponds to a smaller volume of goods and services.

Inflation is classified based on various criteria:

1) the rate of price increase:

moderate inflation with the rate of 3 – 5 % (up to 10 %) per year, which is considered normal for modern economies and is even viewed as a stimulus for GDP growth;

galloping inflation with the rate ups to 50 % per year, which is considered a serious economic issue;

hyperinflation that can be measured in percentages per week or even day, with a rate reaching 40 – 50 % per month or over 1 000 % per year;

2) the form of manifestation:

open (visible) inflation which is observed in the noticeable increase of the general price level;

suppressed (hidden) inflation that occurs when prices are set by the government below the equilibrium market level, with its manifestation often being a shortage of goods;

3) the cause of occurrence:

demand-pull inflation caused by a shortage of goods;

cost-push (supply-side) inflation caused by rising resource prices;

4) the scope of spread:

regional, national, or global inflation;

5) the government's ability to influence inflation:

controlled or uncontrolled inflation;

6) the economy's ability to adapt to the rate of price growth:
balanced or unbalanced inflation;
7) the degree of predictability:
expected (forecast) and unexpected (unpredictable) inflation.

Modern inflation can also be explained by several factors, which are conventionally divided into three types:

1. Demand-pull inflation factors. Since inflation is caused by excessive aggregate demand, the factors include:

- excessive government demand (monetary financing of the budget deficit);
- excessive private demand (speculative demand that outpaces the growth of income compared to GDP growth);
- excessive foreign demand for domestic goods and services (a faster growth in exports compared to imports).

2. Cost-push inflation factors. These increase the average costs of producing goods and services. They can be divided into internal factors (such as rising prices for intermediate goods, wage increases that outpace productivity, higher indirect taxes, etc.) and external factors, which occur through imports.

3. Inflation expectations. The actions of economic agents based on their expectations can lead to rising prices. For example, companies may raise prices of goods in anticipation of higher resource costs.

The socio-economic consequences of inflation include: a decrease in the standard of living and real income of the population; the devaluation of financial assets; the disruption of relationships between lenders and borrowers; reduced motivation for investment; and the redistribution of income between the private sector and the government.

The losses from inflation for the population depend on whether the inflation is expected or unexpected, and on how economic agents form their expectations. In the case of expected or forecasted inflation, the relationship between inflation and interest rates for adjusting nominal income can be demonstrated using Fisher's equation:

$$i = r + B, \qquad (7.6)$$

where i is nominal interest rate;
r is real interest rate;
B is expected inflation rate.

Inflation also negatively affects the interests of the government. The main factor here is time, because taxes paid into the state budget are paid later than they are accrued, meaning that the government receives money that has already been devalued.

An increase in inflation caused by additional money issuance forces economic agents to pay what is known as an inflation tax. This tax is not legislated. It refers to the cost borne by those holding cash.

The inflation tax also includes seigniorage – the revenue the government receives from issuing additional money into circulation.

Macroeconomic policy aiming to stabilize the overall price level, mitigate inflationary pressures, and achieve a balance between the growth rates of the money supply and the growth of goods is known as anti-inflationary policy.

Anti-inflationary policy includes a set of measures aimed at stabilization of price levels and combating inflationary processes in the economy. The main goals of this policy are to reduce inflation to an acceptable level, ensure the stability of the national currency, and support economic growth.

The main areas of anti-inflationary policy include:

1. Monetary methods that focus on controlling the money supply and influencing interest rates. The central bank can use tools such as changing the discount rate, open market operations, and adjusting the reserve requirement ratio to control inflation levels.

2. Fiscal methods that involve changes in government spending and taxes to influence aggregate demand and ensure macroeconomic stability. This may include reducing the budget deficit, cutting government expenditures, and increasing tax revenues.

3. Structural reforms, when policies are aimed at supporting competition, combating monopolies, and improving the efficiency of economic processes. This includes reforms to pricing policies, reducing barriers for businesses, and encouraging investments in production.

4. Currency exchange rate regulation, if necessary, to combat inflation. Currency exchange rate regulation may be applied, helping to prevent uncontrolled increases in imported goods and services that could put additional pressure on price levels.

Overall, anti-inflationary policy should be balanced and comprehensive, as applying just one strategy may not be sufficient to effectively control inflation in today's globalized economy.

Anti-inflationary policy includes both adaptive (tactical) and active (strategic) methods. Adaptive methods can be applied when the inflation rate does not exceed 20 – 30 % per year. These methods include:

gradual limitation of the money supply;

indexing the monetary income of the population;

regulating prices and incomes;

stabilizing inflation expectations.

Active methods are used in cases of hyperinflation and involve a sharp reduction in the money supply. These methods include:

direct monetary measures;

control over money issuance;

prohibition of monetary financing of the state budget;

control over the money supply through open market operations;

implementing confiscatory monetary reforms.

Anti-inflationary policy also includes measures against demand-pull inflation and cost-push inflation. Measures against demand-pull inflation include:

reducing government spending;

increasing taxes;

reducing the budget deficit;

implementing a strict monetary and credit policy;

stabilizing the exchange rate.

Measures against cost-push inflation (supply-side inflation are):

limiting the growth of factor incomes and prices;

restricting monopolies and protecting competition;

reducing taxes on individuals and businesses;

strengthening incentives for labor activity through changes in social policy.

The selection of specific measures to combat inflation depends on the nature of inflation and has specific characteristics for each country. The set of measures to fight inflation is determined based on the causes behind it.

7.3. The mechanism of the money market

Money is a collection of financial assets that can be used for transactions. It is also a key macroeconomic category that enables the analysis of inflationary processes, cyclical fluctuations, the mechanism for achieving equilibrium in the economy, and the coordination between the commodity and money markets.

The essence of money is reflected in its functions:

a measure of value;

a medium of exchange;

a unit of payment;

a store of value;

global money.

The money market is a part of the financial market where the buying and selling of short-term, highly liquid assets take place (Liquidity is the ability of assets to be converted into money. Money itself has absolute liquidity). On the money market, the demand for and supply of money determine the interest rate. The interest rate is the price of money on the money market.

Money supply refers to the total amount of monetary assets (money) used within the national economy at any given time. Typically, the money supply refers to the circulating money mass.

Money supply includes both cash and non-cash funds that facilitate the exchange of goods and services in the national economy.

Within the money supply, there are money aggregates – elements of the money mass, which are categorized based on their liquidity. Money aggregates are used to calculate the amount of money in a country. The main money aggregates are:

M0 = banknotes and coins in circulation (cash).

M1 = M0 + demand deposits, savings accounts, and funds in current accounts in national currency.

M2 = M1 + time deposits and foreign currency savings.

M3 = M2 + client funds in trust operations by banks + funds in bank-issued securities.

All assets included in M2 and M3 aggregates are considered almost money, as they are primarily savings rather than payment instruments, but they can always be converted into payment instruments.

The control over the money supply is exercised by the country's central bank (In Ukraine, it is the National Bank; in Germany, for example, it is the Bundesbank). To create additional money in circulation, the central bank uses the monetary base.

The monetary base consists of the circulating cash and the total reserves of commercial banks held in the central bank.

The central bank of the country, with the help of commercial banks, creates banking reserves. Banking reserves refer to the portion of a commercial bank's

money that is not used for active operations (such as lending or investing). Placing reserves in accounts with the central bank is mandatory for commercial banks and is determined by the central bank in accordance with the country's economic policy and laws. These reserves are called the reserve ratio or the reserve requirement:

$$rr = R / D, \quad (7.7)$$

where R is required reserves;

D is demand deposits, checking deposits, and current accounts.

Commercial banks can also hold their own reserves – additional or excess reserves. The size of the excess reserves is determined independently by the commercial banks.

The coefficient:

$$m = 1 / rr \quad (7.8)$$

is called the banking or deposit multiplier. It shows how many times commercial banks can increase the money supply in circulation.

For example, if the reserve requirement is 20 %, then the banking multiplier is 5. This means that the lending capacity of one bank, amounting to 1000 units of currency, can be transformed by the banking system into a money supply of 5000 currency units. The higher the reserve requirement, the smaller the banking system's ability to create credit money.

The money supply model becomes more complete by considering the behavior not only of commercial banks but also of the population, which may convert some of the money from bank deposits into cash. In this case, the multiplier is calculated using the formula:

$$mm = (cr + 1) / (cr + rr), \quad (7.9)$$

where mm is money multiplier that shows how much the money supply changes when the monetary base changes by one unit;

cr is the deposit ratio that characterizes the preference of the population regarding the distribution of money between cash (C) and funds in current accounts (D):

$$cr = C / D. \quad (7.10)$$

Based on this, the money supply can be represented as the product of the money multiplier (mm) and the monetary base (MB):

$$S_m = mm \cdot MB, \quad (7.11)$$

where S_m is the money supply.

Thus, the amount of money in the country increases if:

a) the monetary base increases;

b) the minimum reserve requirement decreases;

c) excess reserves of commercial banks decrease;

d) the share of cash in the total amount of payment money in circulation decreases.

The money supply in all countries is regulated by the central bank, which aims to maintain it at a fixed level. Therefore, the money supply does not depend on the interest rate level.

The demand for money is determined by the total amount of money that individuals and firms wish to hold for transactions, purchasing stocks, and bonds at each possible interest rate level. The interest rate is the cost of borrowing money, expressed as a percentage of the borrowed amount.

The interest rate level is calculated based on an annual period, for example, 10 % annual interest. The product of the interest rate and the amount of money lent is the income for the lender in the form of interest and the cost for the borrower in the form of interest payments.

For macroeconomic analysis, two types of rates are especially important: real and nominal interest rates.

In the money demand function, the nominal interest rate is used. This is the rate set by banks for credit transactions. The real interest rate reflects the actual purchasing power of the income earned in the form of interest. The relationship between the nominal and real interest rates is described by the Fisher equation:

$$i = r + \pi, \quad (7.12)$$

where i is nominal interest rate (the same equation as in (7.6));

r is real interest rate;

π is inflation rate.

The equation shows that the nominal interest rate can change for two reasons: a change in the real interest rate and a change in the inflation rate.

Equilibrium in the money market is the situation where the amount of money supplied and the amount of money that the population and businesses wish to hold are equal. However, such a situation only exists in the short run, and it is constantly disturbed and restored. The equilibrium in the money market can be disrupted by a change in income, a change in the monetary base, or an unbalanced change in both income and the monetary base. The equilibrium of the money market results from the interaction of money demand and money supply, but it is shaped under the influence of the central bank. Achieving and maintaining equilibrium in the money market is possible only in conditions of a well-developed securities market and the existence of stable behavioral relationships between economic agents.

7.4. Banking system and money supply

The banking system is the set of banking institutions that function interdependently within a given country.

In most countries, the banking system has two levels. At the first level is the central bank (in Ukraine, it is the National Bank of Ukraine – NBU). Commercial (deposit) banks and specialized banks (investment, savings, mortgage, foreign trade, etc.) are second-level institutions.

The banking system performs the following functions:

1) accumulation of temporarily free funds;
2) provision of free funds for temporary use;
3) creation of credit money;
4) credit regulation;
5) money issuance;
6) issuance of securities.

The central bank ensures equilibrium in the money market and acts as an intermediary between the government in its borrowing and credit operations. The central bank plays a key role in managing the money supply, exchange rate, and maintaining the country's foreign exchange reserves. In most countries, the central bank has the exclusive right to issue money. For example, the National Bank of Ukraine (NBU) cooperates with the Cabinet of Ministers and provides consultations on monetary, credit, and general state economic policies. The NBU operates independently of the state authorities and is accountable to the President and the Verkhovna Rada of Ukraine.

The main functions of the central bank are:

issuing money and organizing its circulation;

accumulating and preserving the cash reserves of banks and other credit institutions;

ensuring credit to commercial banks and overseeing their activities.

To perform its functions, the central bank uses the following main instruments:

setting the required reserve ratio for commercial banks (the minimum share of deposits that commercial banks must hold as reserves (non-interest-bearing deposits) in the central bank);

conducting open market operations (buying and selling government securities);

setting the refinancing rate, which is the rate at which the central bank lends to commercial banks.

Commercial banks are credit institutions of a universal type that provide credit and other banking services to legal and physical persons under contractual terms by offering services and performing transactions.

The main functions of commercial banks include:

accepting and placing monetary deposits;

attracting and providing loans;

conducting payments on behalf of clients and correspondent banks, and providing their cash services.

The operations carried out by commercial banks are divided into active and passive ones.

Passive operations involve attracting financial resources by accepting deposits, selling shares, bonds, and other securities.

Active operations involve the placement of financial resources through providing loans, purchasing shares, and securities.

Commercial banks differ in several ways:

ownership form of authorized capital (joint-stock companies with limited liability, involving foreign capital, foreign banks, etc.);

types of operations performed (universal and specialized);

geographical scope (regional, local);

specialized credit-financial institutions focus on lending to specific sectors and areas of economic activity that take various forms:

Investment banks. They engage in the issuance and placement of securities, raise capital, and use their capital to invest in various industries.

Savings institutions. They collect savings from the population and direct the funds towards investments in housing construction.

Insurance companies. They attract funds by selling insurance policies and finance large corporations in industries such as manufacturing, transport, and trade.

Pension funds. They raise funds through the issuance of debt securities.

Investment companies. They issue their shares to small investors and use the raised funds to purchase securities in different sectors of the economy.

Glossary

Inflation is a sustained increase in the general price level, resulting from a disruption in macroeconomic equilibrium when a significant portion of the money supply is not backed by economic goods.

Labor market is the total economic relations concerning the buying and selling of a specific commodity – labor.

Money supply is the total amount of available cash and non-cash assets that support the circulation of goods and services in the national economy.

Money market is a part of the financial market where the buying and selling of short-term, high-liquidity assets occur. In the money market, the demand and supply of money determine the interest rate, or the "price" of money.

Unemployment is a socio-economic phenomenon in the labor market where part of the economically active population is not engaged in the production process.

Questions for self-assessment

1. What are the main functions of money in the economy? How does money in the form of cash and non-cash funds perform these functions?

2. How does the banking system influence the money supply in the country? Describe the role of the Central Bank in this process.

3. What is the money multiplier? How does it depend on the reserve requirement and cash in the economy?

4. How does the redistribution of funds between banks and other financial institutions occur? What operations are carried out in the open market?

5. How do you determine the real interest rate? How does it differ from the nominal rate, and how does this affect economic decisions?

6. How do changes in the money supply affect economic growth and the inflation rate? How does the Central Bank regulate these processes?

7. What are the economic consequences of rising interest rates for businesses and households? How does this impact consumer demand?

8. How do you determine the optimal level of minimum reserves for commercial banks? What is their importance for financial stability?

9. How does inflation affect the real income of the population and the level of economic activity in the country?

10. What methods does the Central Bank use to fight inflation and stimulate economic growth?

Practice tests

1. What is the money supply:

a) the sum of all available and non-cash money in the economy;

b) only the physical money circulating in the economy;

c) the part of money controlled by the central bank;

d) only the country's foreign currency reserves?

2. Which of the following instruments does the National Bank use to regulate economic processes:

a) setting minimum wage;

b) open market operations;

c) limiting the import of goods;

d) regulating tax rates?

3. Which of the following is the primary cause of demand-pull inflation:

a) an increase in the cost of production resources;

b) an increase in demand for goods and services while supply remains unchanged;

c) a decrease in taxes;

d) a decrease in the prices of resources?

4. What does the concept of "full employment" refer to:

a) the absence of unemployment in the economy;

b) the presence of unemployed people who are actively seeking work;

c) all people who want to work are employed at maximum employment levels;

d) the level of unemployment at its natural rate?

5. Which of the following policies is an example of passive government regulation in the labor market:

a) creation of government jobs;

b) reducing taxes for entrepreneurs;

c) ensuring a minimum wage;

d) direct subsidies to the unemployed?

6. The highest degree of liquidity is possessed by:

a) jewelry;

b) real estate;

c) money in accounts;

d) cash money.

7. If the price level of goods and services decreases by 50 %, the value of money:

a) will not change;

b) will double;

c) will be halved;

d) will increase fourfold.

8. If nominal income increases by 8 %, and the price level rises by 10 %, then real income:

a) increases by 2 %;

b) increases by 18 %;

c) decreases by 2 %;

d) decreases by 18 %.

9. Anti-inflationary measures are carried out only in conditions of:

a) open inflation;

b) hidden inflation;

c) open and hidden inflation;

d) hidden demand inflation.

10. If a person quits their job voluntarily, then the unemployment type is:

a) frictional;

b) structural;

c) cyclical;

d) natural.

Computing tasks with examples of solutions

Task 1. In a country, there are the following money supplies: cash in circulation (50 billion units); non-cash funds in current accounts (100 billion units); demand deposits (30 billion units); savings deposits (40 billion units); short-term securities in circulation (20 billion units). Calculate the monetary aggregates M0, M1, and M2.

Guidelines

1. M0 includes only the cash in circulation and the reserves of commercial banks at the Central Bank. Since no information is provided about reserves in the problem, we assume that only cash is part of M0:

M0 = cash in circulation = 50 billion units.

2. M1 includes cash in circulation, non-cash funds in current accounts, and demand deposits:

M1 = cash in circulation + non-cash funds in current accounts + demand deposits.

M1 = 50 + 100 + 30 = 180 billion units.

3. M2 includes M1, savings deposits, and short-term securities:

M2 = M1 + savings deposits + short-term securities.

M2 = 180 + 40 + 20 = 240 billion units.

Answer:

M0 = 50 billion units.

M1 = 180 billion units.

M2 = 240 billion units.

Task 2. In the economy of a country, the total labor force is 10 million people. Of these, 8 million are employed, and 1.5 million are unemployed. The number of people not in the labor force (e.g., retirees, students, homemakers) is 3 million. What is the unemployment rate in the country?

Guidelines

1. To calculate the unemployment rate, we use the following formula:

Unemployment rate = number of unemployed / number of economically active people × 100 %.

2. Economically active people are those who are either employed or actively seeking work. Therefore, the number of economically active people is the sum of the employed and unemployed:

Economically active people = 8 million + 1.5 million = 9.5 million people.

3. Now, we calculate the unemployment rate:

Unemployment rate = 1.5 million people / 9.5 million people × × 100 % = 15.79 %.

Therefore, the unemployment rate in the country is 15.79 %.

Computing tasks for self-study

Task 7.1. Cash money = 55 billion UAH, time deposits = 15 billion UAH, current accounts = 65 billion UAH, foreign currency = 12 billion UAH, clients' funds under trust management and bank's own debt securities = 2 billion UAH. What is the value of the M2 aggregate?

Task 7.2. Reserve requirement = 0.17, cash ratio = 0.3. By how much should the National Bank increase the monetary base to increase the money supply by 2.25 billion UAH?

Task 7.3. You took a loan for one year at an interest rate of 50 %, with an expected inflation rate of 40 %. However, the actual inflation rate turned out to be 55 %. What was the amount of your income?

Task 7.4. Calculate the inflation rate in the current period under the following conditions: the price index in the previous period was 120 %; the price index in the current period is 140 %.

Task 7.5. The population of one of the regions of the country is 5 million people, of which: children under 16 years old = 1.5 million; pensioners = 2.1 million; unemployed = 0.12 million; part-time employed = 0.35 million. Calculate:

1) the total unemployment rate;

2) the natural unemployment rate, if the structural unemployment rate was 2.4 % and the cyclical unemployment rate was 2.6 %;

3) the GDP gaps.

Essays

1. Labor market analysis in relation to the response of nominal wage rates to changes in economic conditions.

2. Graphical model of the interaction between the goods market and the money market.

3. Accumulation in the theory of permanent income by M. Friedman.

Topic 8. State economic regulation policy and foreign economic policy

The purpose of studying this topic is to develop the following competencies: the ability to analyze the mechanism of state budget formation, the capability to assess the challenges of balancing budget revenues and expenditures, and the skills required to apply economic regulation instruments, specifically fiscal and monetary policies.

Study questions:

8.1. State economic regulation policy.

8.2. Exchange rate policy.

8.3. Regulation of the country's foreign economic activities.

Recommended literature: [2; 5; 4; 7 – 11; 13 – 15; 20; 21].

Keywords: taxes, state, state budget, deficit, surplus, budget revenues, budget expenditures, budget deficit, public debt.

8.1. State economic regulation policy

Sustainable economic development encompasses a set of measures aimed at increasing national income, safeguarding public health and well-being, addressing demographic challenges, reducing income disparities, and eradicating

poverty. The primary responsibility for implementing these measures lies with the state.

At the current stage, the state performs three fundamental functions:

1) ensuring production efficiency;

2) promoting social equity;

3) maintaining economic stability.

The function of ensuring production efficiency involves establishing taxes and benefits, regulating the money supply and credit system, and creating conditions for the efficient utilization of limited resources.

The function of promoting social equity primarily pertains to tax policies aimed at the redistribution of income within society and funding of social programs that support the underprivileged, unemployed, and disabled.

The third function, maintaining stability, focuses on preventing economic stagnation and fostering steady growth.

To fulfill these functions, the state employs various regulatory instruments, including administrative, economic, incentive-based, and protectionist measures.

Administrative regulation methods include legal acts, licenses, state standards, and sanctions.

Economic regulation methods consist of state planning and programming, fiscal policy, monetary policy, investment policy, foreign economic policy, price and income regulation.

Incentive-based methods include government subsidies, tax incentives, and preferential loans.

Protectionist measures involve shielding domestic industries from foreign competition through quotas and licensing.

Fiscal (budgetary-tax) policy refers to government actions aimed at ensuring full employment and non-inflationary GDP growth by adjusting public expenditures, taxation systems, and overall budget formation strategies.

The primary fiscal policy tools include:

• government procurement of goods and services, which covers public consumption and public investment, represented by the formula:

$$G = Cg + Ig, \quad (8.1)$$

where G is government procurement of goods and services;

Cg is public consumption;

Ig is public investment;

• transfers, which are social payments to the private sector (such as pensions, scholarships, unemployment benefits, and subsidies) that do not require any reciprocal provision of goods or services;

• taxes, referring to "net taxes", defined as the difference between total tax revenues and government transfers to the private sector.

To achieve full resource employment, the government must pursue policies aimed at expanding or contracting aggregate demand.

During an economic downturn, the government implements expansionary fiscal policy, increasing public expenditures and reducing tax rates to stimulate economic activity.

Conversely, during periods of economic growth, contractionary fiscal policy is applied to prevent overheating by reducing public expenditures and raising tax rates.

In the AD – AS model (Fig. 8.1a), expansionary fiscal policy is reflected in a rightward shift of the AD_1 curve to AD_2, indicating an increase in equilibrium output from Y_1 to Y_2 and a rise in the price level from P_1 to P_2. In the Keynesian cross model (Fig. 8.1b), aggregate expenditures shift upward due to expansionary fiscal policy.

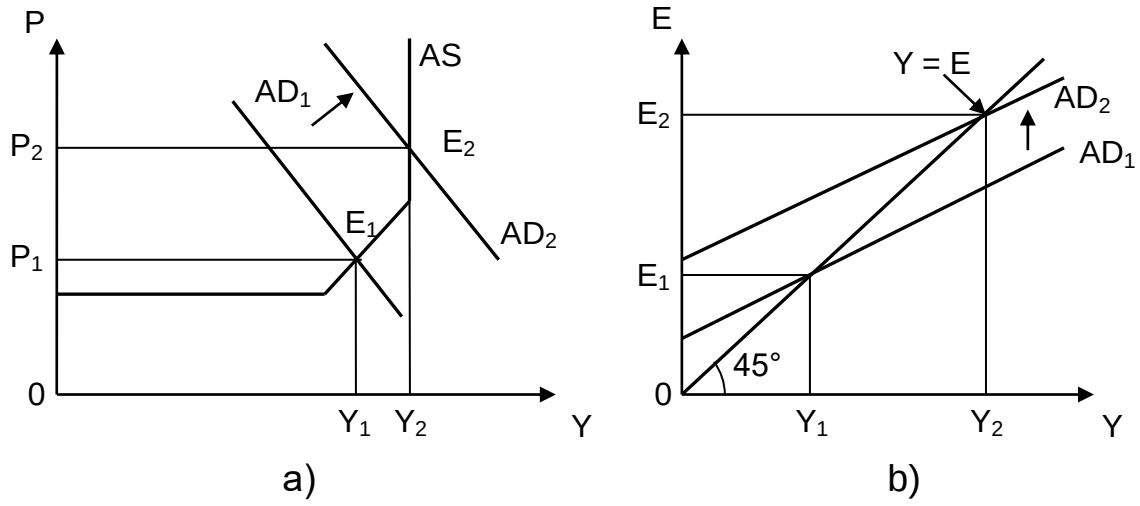


Fig. 8.1. **Expansionary fiscal policy in AD – AS and Keynesian cross models**

In the long run, tax reductions lead to an increase in the supply of production factors and the economy's potential, which is reflected in the AD – AS model by a rightward shift of the AS curve.

Contractionary fiscal policy is aimed at limiting cyclical growth and involves increasing taxes and reducing government expenditures, thereby decreasing overall spending. These effects are illustrated in the AD – AS model by a leftward shift of the AD_1 curve to AD_2, changing the equilibrium output from Y_1 to Y_2 and the price level from P_1 to P_2 (Fig. 8.2a), while in the Keynesian cross model (Fig. 8.2b), the aggregate expenditures curve shifts downward.

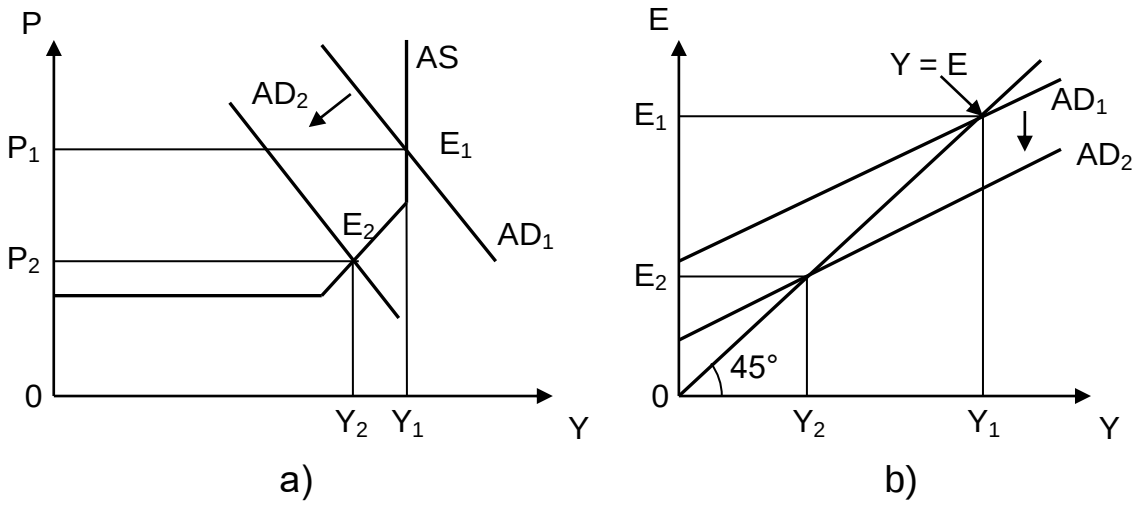


Fig. 8.2. **Contractionary fiscal policy in AD – AS and Keynesian cross models**

In the short term, such measures can reduce demand-pull inflation by increasing unemployment and decreasing production. In the long term, contractionary fiscal measures may lead to stagflation – rising prices alongside declining output and increasing unemployment – resulting in a leftward shift of the aggregate supply curve.

Another classification of fiscal policy should be considered. Depending on the degree of government regulation of the economy, fiscal policies can be categorized as discretionary fiscal policy and non-discretionary fiscal policy.

Discretionary fiscal policy refers to changes in government spending, taxation, and budget balance resulting from specific government decisions aimed at the adjustment of employment levels, production volumes, and inflation rates.

Non-discretionary fiscal policy entails the automatic adjustment of government expenditures, taxes, and budget balances in response to cyclical fluctuations in aggregate income. This type of policy automatically increases

(or decreases) net tax revenues during periods of GDP growth (or decline), providing a stabilizing effect on the economy.

According to the balanced GDP equation, the impact of government purchases on GDP is an increase in government purchases which leads to an increase in autonomous expenditures.

As shown in Fig. 8.3, an increase in government purchases by ΔG shifts the aggregate expenditures curve from E_1 to E_2. Consequently, economic equilibrium moves from point A_1 to point A_2, resulting in GDP growth from Y_1 to Y_2.

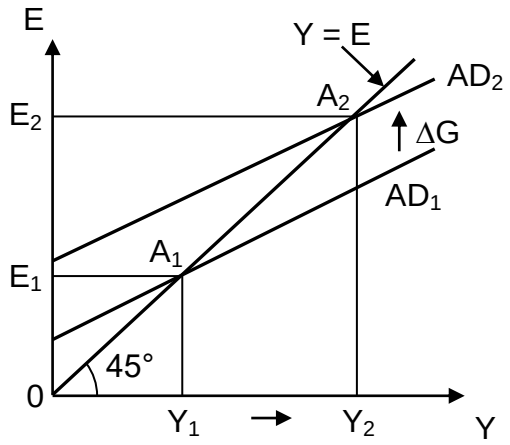


Fig. 8.3. **The impact of government procurement on GDP in the Keynesian cross model**

In this case, the GDP growth rate is greater than the growth rate of government purchases, i.e. ΔY > ΔG, which indicates that government purchases have a multiplicative effect on GDP, and the ratio ΔY / ΔG is the expenditure multiplier. It shows how much GDP (Y) will change if government spending (G) changes by one unit.

Thus, we obtain the expenditure multiplier (M_G):

$$M_G = \Delta Y / \Delta G \qquad (8.2)$$

or

$$M_G = 1 / (1 - MPC\ (1 - t)), \qquad (8.3)$$

where MPC is the marginal propensity to consume;

t is the marginal tax rate.

It is greater than the tax multiplier (M_T):

$$M_T = -\Delta Y / \Delta T \quad (8.4)$$

or

$$M_T = -MPC / (1 - MPC\ (1 - t)). \quad (8.5)$$

The tax multiplier indicates the change in aggregate income (ΔY) resulting from a one-unit change in taxes (ΔT). The tax multiplier is smaller than the expenditure multiplier in proportion to the marginal propensity to consume. By utilizing both expenditure and tax multipliers, it is possible to assess the effect of individual fiscal policy instruments on GDP. The tax multiplier reflects the change in GDP caused by a one-unit change in net taxes. The tax multiplier is lower than the expenditure multiplier in proportion to the marginal propensity to consume. Using both expenditure and tax multipliers, we can evaluate the influence of various fiscal policy tools on GDP. Discretionary fiscal policy also impacts the national budget. Government purchases and transfers affect the expenditure side, while taxes influence the revenue side. A key characteristic of a balanced fiscal policy is that it generates a balanced budget multiplier. The balanced budget multiplier (MB) is defined as the ratio of the increase in GDP (ΔY) to the increase in the state budget (ΔB) (as the cause) and can be expressed in the following form:

$$M_B = \Delta Y / \Delta B \quad (8.6)$$

or

$$M_B = M_G - M_T. \quad (8.7)$$

Fig. 8.4 shows the Laffer curve, which illustrates the dependence of budget revenues on taxes and tax rates.

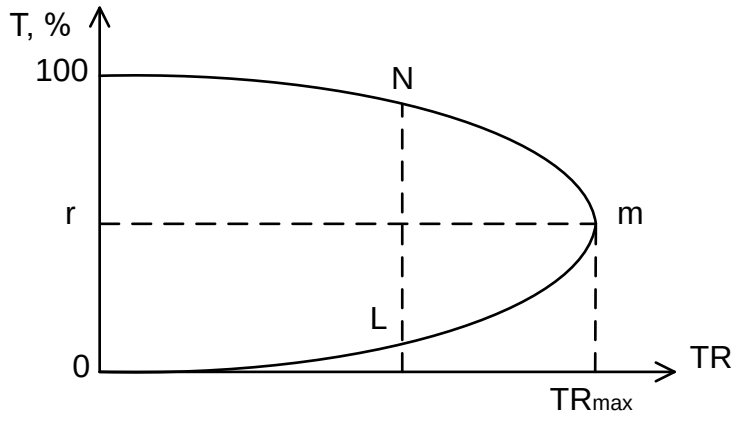


Fig. 8.4. **The Laffer curve**

Let's consider the types of budget. The actual budget reflects the actually received revenues and incurred expenditures. The full-employment budget (structural budget) is a conditional budget in which revenues and expenditures are determined on the basis of the assumption that the economy operates at full employment parameters, that is, when unemployment is equal to the natural rate, and output is equal to potential GDP.

The biggest problem for fiscal policy is budget deficits, which are defined as the difference between net taxes and government purchases.

Types of budget deficits. The actual deficit reflects the difference between real budget expenditures and revenues for a certain period of time. It is formed under the influence of discretionary fiscal policy (structural deficit) and cyclical fluctuations in the economy (cyclical deficit).

The structural deficit (or budget deficit at full employment) is determined by the level of the budget deficit that would occur if the economy achieved the potential output level Y* and at the current real level of government spending, transfers and tax rates.

Cyclical deficit is defined as the difference between the actual and structural deficit.

Another main economic method of state regulation is monetary policy which is a set of measures of the central bank aimed at the regulation the of supply of money in the economy in order to influence the volume and structure of production, the general level of prices, investments and employment, and the state of the country's external economic balance.

The role of monetary policy is determined by its goals and means.

The goals of monetary policy are to increase real GDP, reduce unemployment and reduce inflation.

The central bank takes measures to use certain instruments to achieve the goals of monetary policy. The main instruments of monetary policy are:

open market operations;

foreign exchange market operations;

discount rates;

reserve requirements.

Open market operations are the purchase and sale of securities by the central bank in the open market.

Foreign exchange market operations are foreign exchange interventions carried out by the central bank in the form of purchases and sales.

The discount rate is the rate at which the Central Bank provides loans to commercial banks.

Required reserve ratios are the minimum deposit rates that commercial banks must have on their interest-free accounts with the Central Bank.

The simple deposit (bank) multiplier ($\mu_d = 1 / r$) determines the maximum amount of new deposit money that can be created by one monetary unit of excess reserves at a given level of the required reserve ratio.

Reserves are funds that are deposited as deposits in bank accounts and are not issued as loans or spent in any other way.

Types of reserves:

1) actual, or total reserves (TR);

2) required reserves (R);

3) excess reserves ($E = TR - R$).

The reserve requirement ratio, or reserve requirement (r) is the statutory requirement for the level of reserves against a commercial bank's deposit liabilities.

The central bank chooses one or more types of monetary policy depending on the general economic situation in the country and the goals pursued. Depending on the phase of the economic cycle, they conduct an expansionary monetary policy (expansion) and a contractionary monetary policy (restriction).

Monetary expansion (the policy of "cheap" money) involves lowering discount rates, reducing required reserves, and purchasing securities, in order to increase equilibrium GDP. An increase in the money supply causes a decrease in discount rates, which contributes to an increase in investment, total spending, and the level of income, and, accordingly, aggregate demand.

Monetary restriction (the policy of "dear" money) involves increasing interest rates, increasing the reserve requirement, and selling securities, which leads

to a decrease in the money supply. It is used to prevent the economy from "overheating".

8.2. Exchange rate

Currency is the monetary unit of a country. Currency also includes foreign currency, funds intended for circulation and loan repayment. Currency is also called international units of account and means of payment.

Types of currency:

1) national currency that is issued by the state;

2) convertible currency that is freely interchangeable with any other currency;

3) non-convertible that is used within one country.

Exchange rate is the price of one currency expressed in another currency. It is also the ratio between currencies of different countries, which is determined by other factors, such as purchasing power and balance of payments, inflation in countries and capital migration between countries.

Currency convertibility is the ability of residents and non-residents to exchange their national currency for foreign currency and use foreign currency for transactions with real and financial assets without any restrictions.

Fixing the exchange rate of a national currency to a foreign currency is called a foreign exchange quote, which can be direct or reverse. In a direct quote, the foreign currency is expressed in the national currency (for example, 28.5 hryvnias for 1 US dollar) and vice versa – the national currency is expressed as a foreign currency (0.04 US dollars for 1 hryvnia).

There is a nominal and a real exchange rate. The nominal exchange rate is the relative price of two currencies, which determines the proportion of their exchange for each other.

The exchange rate shows how many nominal monetary units of one country can be bought for a nominal monetary unit of another country.

The national currency rate is the amount of foreign currency that can be bought or sold for a unit of national (domestic) currency:

$$E_d = M_f / M_d, \quad (8.8)$$

where Ed is the nominal exchange rate of the national currency;

M_f is the amount of the foreign currency offered in exchange for the national currency;

M_d is the amount of the national currency offered in exchange for the foreign currency.

The real exchange rate of the national (domestic) currency:

$$RER_d = E_d (P_d / P_f), \quad (8.9)$$

where E_d is the nominal exchange rate of the national currency (index);

P_d is the price of goods on the domestic market in the national currency (index);

P_f is the price of goods on the foreign market in the foreign currency (index) at which goods are imported or exported.

The real exchange rate of a foreign currency:

$$RER_d = E_d (P_f / P_d). \quad (8.10)$$

Currency transactions, or the exchange of one country's currency for the currency of another at a certain nominal rate, are carried out on the foreign exchange market.

The foreign exchange market is a system of relations associated with the purchase and sale of currency and the implementation of other operations. The main purpose of the foreign exchange market is to provide its participants with foreign currency and regulate the exchange rate.

The National Bank regulates the foreign exchange market (ensures the balance of supply and demand on the foreign exchange market) by purchasing and selling currency from its reserves (intervention).

The exchange rate regime is a mechanism for determining the nominal exchange rate on the foreign exchange market with the participation of the state. Exchange rate formation can be carried out using administrative and market mechanisms.

The main market currency regimes:

fixed exchange rate regime is an officially established ratio between national currencies;

regulated floating regime (intermediate) is an officially determined ratio between national currencies.

The currency system is the institutions, rules and methods of international settlements.

Currency systems are distinguished by the type of reserve asset that eliminates the imbalance in international payments. The first world currency system is considered to be the gold standard, which was enshrined in an intergovernmental agreement at the Paris Conference in 1867 and practically existed until 1914. The mechanism of functioning of the currency regime took the form of exchange rate fluctuations within gold points.

Gold points in this context are the upper and lower limits of deviations from the mint parity of exchange rates when countries use gold as a reserve currency and gold can move freely between countries. Within this system, the exchange rate between two currencies can fluctuate within a certain range (from the upper to the lower gold points), determined by the costs of moving gold, such as transportation and insurance.

Mint parity refers to the ratio between the currencies of two countries based on the amount of gold equivalent to a certain sum in the national currency of each country. Under the free movement of gold between countries, this parity cannot deviate significantly without countries beginning to move gold to restore balance.

The is a monetary system where a country's currency is backed by a specific amount of gold. This system was widely used until the early 20th century, when countries pegged their currencies to a fixed amount of gold.

Principles of the Gold Standard:

1. Each country fixed a certain amount of gold to represent one unit of its currency (for example, the US dollar was equivalent to a specific amount of gold).

2. Gold could freely move between countries without restrictions, ensuring stable exchange rates and balance in international trade.

3. The amount of money in circulation was tied to the country's gold reserves. This limited the possibility of excessive money issuance, helping to control inflation.

The gold standard helped stabilize the global economy, but its use was suspended during World War I due to the need for financing large military expenditures. After the war, some countries returned to the gold standard, but ultimately, due to economic difficulties, it was abandoned in 1971 when the United States, under President Richard Nixon, stopped converting dollars to gold under the Bretton Woods system.

The modern financial system: transition to fiat currencies.

Since 1971, the global economy has relied on fiat currencies – money that is not backed by physical commodities (gold or other tangible assets) but is considered legal tender because it is guaranteed by the state or central bank. This allows countries to manage their money supply more flexibly.

Features of the modern financial system:

1. Currency exchange rates are now determined by supply and demand in the international markets. Countries can control their currency through monetary policy.

2. Central banks can increase or decrease the money supply to achieve economic goals such as controlling inflation or stimulating economic growth.

3. Gold is no longer used as the basis for currencies. However, it remains an important asset for reserves and a store of value.

Despite the abandonment of the gold standard, gold continues to play an important role in the modern economy, though it is no longer the foundation of currencies.

8.3. Regulation of foreign economic activity by the state

Almost every national economy is, to some extent, an open economic system, meaning it interacts with the economies of other countries. The national economy engages with entities in the foreign sector through the balance of payments.

The balance of payments is a statistical document that reflects all the financial transactions of a country with other countries over a specific period (usually a year or a quarter). It shows the flows of goods, services, capital, and income between a country's residents and the rest of the world. The balance of payments is an essential tool for analyzing a country's economic stability, competitiveness, and for determining the direction of state economic policy.

Main components of the balance of payments.

Current account. It reflects transactions in goods, services, income, and current transfers:

includes the export and import of goods. If a country exports more than it imports, a positive balance is created;

includes transactions in services such as intellectual services, transport, financial services, and others;

reflects income flows received from investments or wages earned abroad (e.g., dividends, interest, earnings of foreign workers).

These are transfers made without a corresponding exchange of goods or services, such as remittances from migrants or international aid.

Capital account. It covers transactions related to changes in a country's assets, including the purchase or sale of intangible assets such as patents, licenses, and international capital transfers.

Financial account. The financial account reflects capital flows made to finance current deficits or surpluses;

investments that involve control or significant influence over foreign companies (e.g., buying a business);

short-term investments in stocks, bonds, and other securities;

loans, deposits, government and corporate debts.

These are changes in a country's official reserves, held by the central bank.

Errors and omissions. This item accounts for unreported or unrecorded transactions that may arise from statistical inaccuracies.

Positive balance (active balance of payments) indicates that a country is receiving more income from its economic ties with other countries than it is spending. This can result in an increase in foreign currency reserves and stability of the national currency.

Negative balance (passive balance of payments) means the country is spending more on imports of goods, services, and capital than it is receiving from exports. This can lead to an increase in external debt or a loss of foreign currency reserves. The balance of payments is important for the economy. The balance of payments helps evaluate whether a country can finance its deficit (if it has one) and whether it can maintain the stability of its currency. The balance of payments influences the formation of economic policies, particularly monetary and fiscal policies. For example, a current account deficit might require adjustments to the currency exchange rate or changes in tax and customs policies. The balance of payments is also important for determining the conditions of international borrowing and lending. A positive balance can strengthen a country's reputation in global markets, while a negative one can increase the risk of default. The balance of payments determines how a country's foreign currency reserves change, which is crucial for its ability to conduct monetary policy.

Regulation of foreign economic activity refers to the set of measures and policies that a state implements to manage and control its interaction with

the global economy. This includes trade relations, foreign investments, currency exchange, and the movement of goods, services, and capital across borders. The aim of such regulation is to protect national interests, ensure economic stability, promote growth, and maintain a balanced economic environment.

A state's trade policy includes the rules, tariffs, quotas, and other restrictions it imposes on imports and exports. These policies aim to protect domestic industries from unfair foreign competition, support national economic growth, and ensure a stable balance of trade. Trade policies can also include free trade agreements (FTAs) and participation in international organizations like the World Trade Organization (WTO), which help regulate global trade practices.

Customs regulations are used to control the flow of goods into and out of a country. Tariffs are taxes imposed on imported goods, which can make foreign products more expensive and protect local industries. These are often used as tools to control trade deficits or protect sensitive sectors like agriculture or manufacturing.

A state's currency exchange policies play a critical role in foreign economic regulation. Through the management of exchange rates, central banks can influence imports and exports. A state might use tools such as devaluation or revaluation of its currency to make its exports more competitive or control inflation.

Governments establish rules for foreign direct investments (FDI) and portfolio investments. These regulations often aim to control the flow of foreign capital, ensuring that investments benefit the domestic economy. Some countries place restrictions on foreign ownership of certain industries, such as national security or strategic sectors. Others may offer incentives like tax breaks to attract foreign investments.

Foreign economic relations are influenced by international treaties and diplomatic agreements. These agreements can regulate trade, investment, intellectual property, and labor mobility. Participation in regional economic organizations (e.g., European Union, ASEAN) or global institutions (e.g., United Nations, International Monetary Fund) provides a framework for cooperation and conflict resolution between countries.

States may implement controls over certain types of goods and services. These controls can include export bans (for example, on military equipment or environmentally hazardous materials) or import restrictions to protect national security, public health, or the environment.

In certain cases, states use economic sanctions or trade embargoes as a tool of foreign policy. These are typically applied to punish or pressure other states for behavior deemed unacceptable (e.g., violations of human rights, military aggression). Sanctions may target specific industries, individuals, or sectors of a foreign economy.

Many states provide subsidies, tax incentives, and other forms of assistance to domestic exporters. This support helps local companies compete in international markets and increases the country's export volume. Such measures can include export credits, guarantees, and promotional programs.

Foreign labor regulations are designed to manage immigration and employment policies. These can involve the issuance of work permits, visas, and other legal frameworks to govern the movement of workers across borders. Labor agreements between countries can also set standards for wages, working conditions, and social benefits.

With increasing attention to sustainability and environmental protection, many countries have introduced environmental regulations as part of foreign economic activity regulation. These regulations may govern the importation of goods that do not meet specific environmental standards or encourage international cooperation on environmental issues, such as climate change.

Objectives of state regulation of foreign economic activity are the following:

1) ensuring a favorable environment for both domestic and foreign investments that can contribute to job creation and economic development;

2) managing exports and imports to ensure that the country does not suffer from trade deficits;

3) protecting sensitive industries, natural resources, and technologies from foreign influence or control;

4) protecting local labor markets and industries from the negative impacts of globalization and foreign competition;

5) using foreign economic policy tools, such as currency control, to manage economic crises or instabilities.

The structure of the balance of payments is shown in Fig. 8.5.

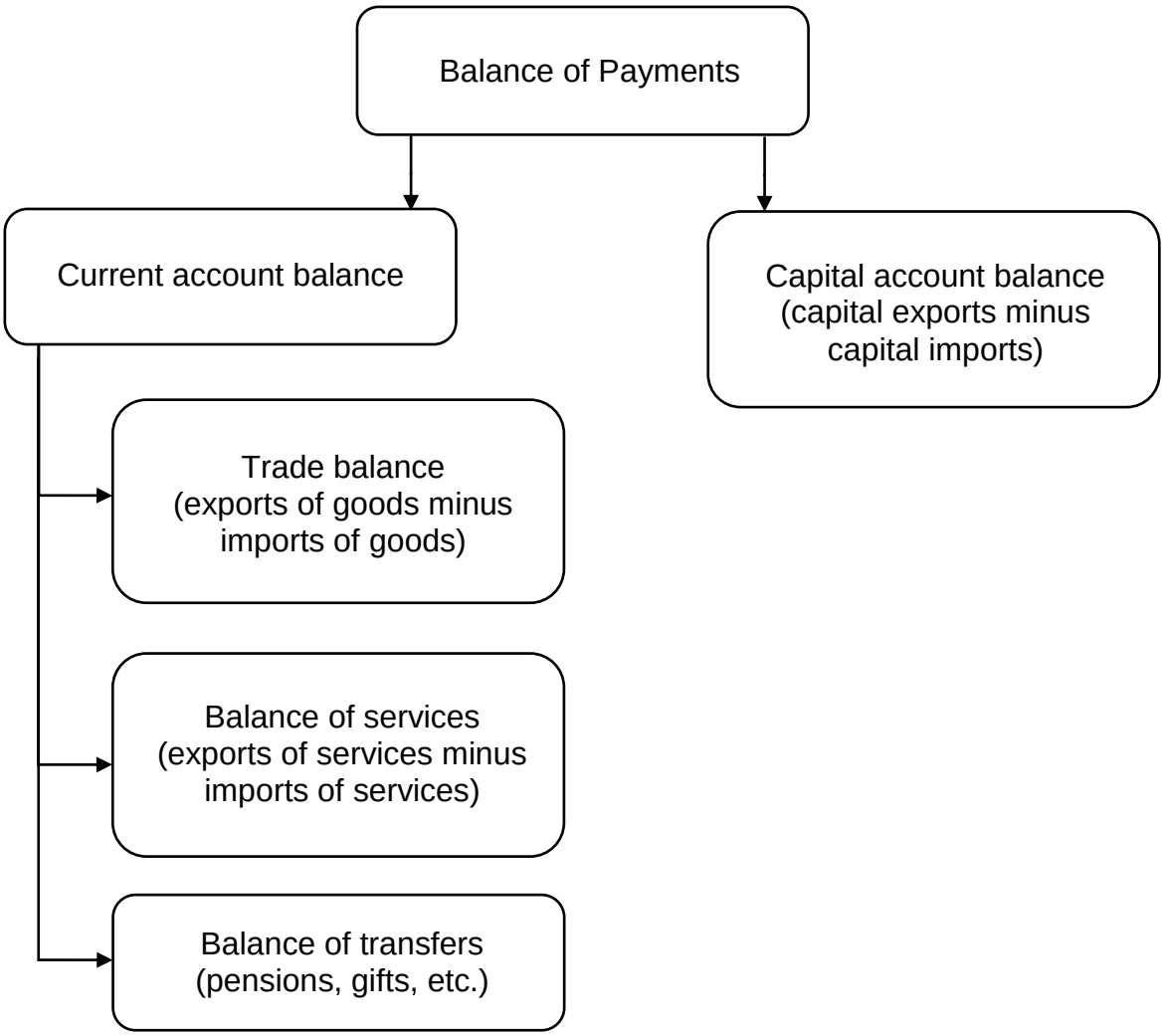


Fig. 8.5. **The structure of the balance of payments**

Thus, the balance of payments represents the total balance of the current account and capital account balance:

$$ZB = (E - Z) + (CE - CZ) = NE - NCE, \quad (8.11)$$

where ZB is the balance of payments;

E is export of goods and services;

Z is import of goods and services;

CE is capital export;

CZ is capital import;

NE is net export of goods and services, or the current account balance;

NCE is net capital export, or the capital account balance.

A positive balance of payments means that the total value of payments received from abroad during the current period exceeds the total value of

payments made to other countries, resulting in an increase in the country's net foreign assets. A negative balance of payments means that the total value of payments received from abroad during the current period is less than the total value of payments made, leading to a decrease in the country's net foreign assets. A balanced balance of payments means that the country is spending and investing as much as other countries are.

The government covers a balance of payments deficit using the official currency reserves of the national bank. Official reserves increase if there is a surplus in the balance of payments. If a balance of payments deficit becomes chronic, a balance of payments crisis occurs. This crisis can only be overcome through macroeconomic regulation.

Glossary

Balance of payments is a document that describes all financial payments coming into the country across its borders and all payments abroad over a certain period (year, quarter, month).

Fiscal (budgetary-tax) policy is a set of forms and means of state influence on the economy through taxation, the formation of the volume and structure of government expenditures to ensure an adequate level of employment, prevent and limit inflation, and mitigate the harmful effects of cyclical fluctuations.

Monetary (monetary and credit) policy is a set of measures in the field of money circulation and credit designed to regulate economic growth, control inflation, ensure the stability of the country's currency, provide employment, and balance payments.

State budget reflects the plan of revenues and expenditures.

State economic regulation is the purposeful activity of the state to create legal, economic, and social conditions necessary for the most effective functioning of the market mechanism and minimizing its negative consequences.

Questions for self-assessment

1. How does fiscal policy impact economic stability?
2. What role do taxes play in regulating inflation and economic growth?
3. How can a government reduce its budget deficit without affecting social programs?

4. What are the potential consequences of a prolonged budget deficit for a country's economy?

5. How do government expenditures influence employment and income distribution within the economy?

6. How do changes in interest rates affect the balance of payments and budget deficit?

7. What are the main differences between direct and indirect taxes?

8. How do government fiscal policies influence the overall level of public debt?

9. What is the impact of budgetary deficits on currency stability and exchange rates?

10. How can a country improve its budget balance through structural reforms in taxation?

Practice tests

1. What is a budget deficit:
a) a situation where government revenue exceeds expenditures;
b) a situation where government expenditures exceed revenue;
c) a balance between income and spending;
d) a situation where government borrowing is zero?

2. Which of the following is NOT a main cause of a budget deficit:
a) high government spending;
b) low tax revenues;
c) reduced public borrowing;
d) economic downturns?

3. What is the primary function of taxes in an economy:
a) to control inflation;
b) to redistribute wealth;
c) to fund government expenditures;
d) all of the above?

4. What is an example of a direct tax:
a) sales tax;
b) value-added tax (VAT);

c) income tax;
d) excise duty?

5. Which of the following is NOT a type of state budget:
a) balanced budget;
b) surplus budget;
c) deficit budget;
d) private budget?

6. What does the balance of payments include:
a) only trade in goods and services;
b) only government spending;
c) all economic transactions between a country and the rest of the world;
d) only capital investments?

7. What happens if a country runs a chronic budget deficit:
a) it may lead to inflation and devaluation of currency;
b) it results in lower taxes;
c) it has no impact on the economy;
d) it strengthens the national currency?

8. What is the role of fiscal policy in economic growth:
a) to regulate inflation and unemployment;
b) to determine the exchange rate;
c) to increase imports and reduce exports;
d) to control the money supply?

9. Which of the following can be used to reduce a budget deficit:
a) increasing taxes;
b) reducing government spending;
c) increasing public debt;
d) both a and b?

10. What is the main risk associated with a large public debt:
a) increased government revenue;
b) higher interest payments on debt;
c) acceleration of economic growth;
d) lower inflation rates?

Computing tasks with examples of solutions

Task 1. Country X recorded the following data for its balance of payments in 2024: exports of goods and services (E) make 500 million USD; imports of goods and services (Z) are 450 million USD; capital exports (CE) amount to 200 million USD; capital imports (CZ) make 250 million USD.

Do the following:

1) calculate the current account balance and the capital account balance;

2) determine the overall balance of payments.

Guidelines

1. The current account balance (NE) is determined by the difference between exports of goods and services (E) and imports of goods and services (Z):

$$NE = E - Z = 500 - 450 = 50 \text{ (million USD)}.$$

Thus, the current account balance is +50 million USD (positive balance).

2. The capital account balance (NCE) is determined by the difference between capital exports (CE) and capital imports (CZ):

$$NCE = CE - CZ = 200 - 250 = -50 \text{ million USD}.$$

Therefore, the capital account balance is −50 million USD (negative balance).

3. The overall balance of payments (ZB) is the sum of the current account balance (NE) and the capital account balance (NCE):

$$ZB = NE + NCE = 50 + (-50) = 0 \text{ (million USD)}.$$

Thus, the overall balance of payments is 0 million USD, which means that country X has a balance of payments for this period.

Therefore, country X has a positive current account balance but a negative capital account balance. Overall, the country's balance of payments is balanced because the balance across all accounts equals zero.

Task 2. Last year, the actual GDP of a country was 500 billion dollars. This year, the government plans to increase GDP to 570 billion dollars to

achieve its equilibrium potential value. In recent years, the marginal propensity to consume in the country has been 0.75.

Determine how much government spending needs to be increased or taxes reduced in order for the economy to reach equilibrium.

Guidelines

1. The difference between actual and potential GDP:

$$\Delta Y = Y_{current} - Y_{actual} = 570 - 500 = 70 \text{ (billion dollars)}.$$

2. Determining the expenditure multiplier:

The expenditure multiplier (M) is calculated using the formula:

$$M = 1 / (1 - MPC),$$

where MPC is the marginal propensity to consume (0.75).

$$M = 1 / (1 - 0.75) = 1 / 0.25 = 4.$$

3. Calculating the required increase in spending or reduction in taxes:

To achieve the equilibrium GDP, total spending needs to be increased by an amount that will result in a GDP increase of 70 billion dollars. Use the formula:

$$\Delta G = \Delta Y / M = 70 / 4 = 17.5 \text{ (billion dollars)}.$$

Thus, to achieve the equilibrium state, government spending needs to be increased or taxes reduced by 17.5 billion dollars.

Therefore, the government needs to increase public spending or reduce taxes by 17.5 billion dollars to achieve the desired equilibrium GDP of 570 billion dollars.

Computing tasks for self-study

Task 8.1. Last year, the actual GDP of a country was 2 500 billion dollars. The government plans to increase it to 2 800 billion dollars to reach its equilibrium potential value. The marginal propensity to consume in the country

is 0.70. Determine how much government spending needs to be increased or taxes reduced to bring the economy to equilibrium.

Task 8.2. In the current year, the export of goods and services is 600 billion dollars, while imports amount to 550 billion dollars. Capital exports are 100 billion dollars, and capital imports are 120 billion dollars. Calculate the current account balance and the capital account balance, as well as the overall balance of payments.

Task 8.3. In 2024, the country had a balance of payments surplus of 100 million dollars. In the next year, exports of goods and services will increase by 50 million dollars, and imports will decrease by 30 million dollars. Capital exports will rise by 20 million dollars, and capital imports will remain unchanged. Determine the changes in the balance of payments for the next year.

Task 8.4. The government of the country wants to reduce the balance of payments deficit by 300 million dollars by increasing exports of goods and services by 150 million dollars. The marginal propensity to consume is 0.80. Determine how much government spending needs to be increased or taxes reduced to achieve this goal.

Task 8.5. Last year, in the country's economy, real GDP was 600 billion dollars, while potential GDP is 700 billion dollars. The government wants to achieve equilibrium GDP. The marginal propensity to consume is 0.85. Calculate how much government spending or taxes need to be adjusted to reach potential GDP.

Essays

1. Directions for reforming Ukraine's fiscal policy.
2. The experience of other countries in economic regulation.
3. The impact of budget deficit on the economy.

Recommended literature

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