Fundamentals of Economics

/Textbook for an Upgrading Module/

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Preface

The present textbook is written for MSc students without sufficient preliminary training in economics, and its objective is to provide a brief summary of the economic concepts necessary for their further studies. The material can be covered in a one-semester course of 14 weeks and 2 contact hours per week. The textbook assumes preliminary knowledge of basic mathematics – not more than what is taught in secondary schools, while the explanations facilitate the refreshment of the necessary mathematical skills, too.

The structure of the textbook follows the general build-up of introductory texts of economics, although in somewhat condensed form, to comply with volume restrictions. The first chapter discusses basic economic concepts, followed by the operations of the market (Chapter 2), then Chapter 3 and Chapter 4 explain the basic concepts and tools of microeconomics (consumer behaviour, producer decisions, production function, short-run costs, profit-maximising decisions), relying on marginal analysis. After that the specialities of factor markets (Chapter 5) and imperfect markets, market failures are discussed (Chapter 6).

The second part of the textbook – that is, Chapters 7 to 11 – overview the functioning of the economy in macro level. First the basic tools and concepts of macroeconomic analysis are explained, then Chapter 8 summarises the indicators of macroeconomic performance and incomes – GDP and related measures. Chapter 9 discusses the two main markets of the economy – the goods market and the money market, – and ends with the Keynesian model of macroeconomic equilibrium. Chapter 10 explains macroeconomic output and aggregate supply, covering production, employment, the labour market and unemployment. The end of the chapter deals with the equilibrium of aggregate demand and aggregate supply, the price level and the causes of inflation. The last chapter (Chapter 11) offers an explanantion for economic policy, relying on the macroeconomic tools and methods developed in the earlier chapters; the key concepts of fiscal and monetary policy are introduced, and some of the current policy issues – the current account, government deficit and national debt, economic growth, development and business cycles – are discussed.

Considering the volume limitations of the textbook it was not possible to discuss the covered topics in full depth – for this purpose many excellent texts are available, and generally used in the faculties of economics of universities not only in Hungary but throughout the world; many of these are listed at the end of the textbook, in the References section. Here our objective was to provide sufficient knowledge for the students of the textbook to understand the processes of the economy in which they live and work – as consumers, employees, or entrepreneurs, or decision makers in the public sector, or voters at parliamentary elections trying to influence economic decision-making; and at the same time, to acquire the skills and knowledge needed for their further business and management studies. The terminology, definitions and concepts discussed here are based on a wide range of excellent textbooks, of which only the most important ones are included in the text itself and in References, to keep them readable, and concise. The textbook does not provide a full mathematical discussion of the topic, and the introduced mathematical formulae do not go beyond the basic secondary school level; instead of mathematical precision the emphasis was on interpretation and explanation of the economic processes discussed.

Chapter 1: The Scope, Problems and Concepts of Economics

1.1. Economy, Economic Decisions, Scarcity, Factors of Production

The majority of students entering university has no previous experience in economic studies. However, in everyday life, we encounter many problems and decisions for which the ability to understand how the economy functions is necessary. The tools and methods of economics give us help for this.

Why do we study economics at all? For many of the students attending a course in economics the answer is simple: because it is a compulsory course in the curriculum. The real explanation, however, was given in the former paragraph. Everyone benefits from understanding the operations of the markets, either as consumers, or producers of some goods. The employees, workers try to sell their knowledge and skills at the labour market to firms, and then they want to spend the received wages or salaries in the market to buy some product or service. It is important to understand the way these markets are influenced by various factors of the economy, how they respond to external influences, because otherwise we are unable to make responsible decisions about when to buy a car, when to start saving for a house, and whether to keep savings in the bank, or buy a washing machine on credit. It is crucial to understand the opportunity cost of our decisions, that is, to know what we sacrifice to attain our aim. Besides, as members of the society, responsible citizens, we can regularly vote in elections about what kind of government we prefer to lead the country. The government directs economic policy, and if we understand the economic background of policy decisions, we have a chance to cast our vote for the economic policy we prefer (Mabry – Ulbrich, 1994). Thus as actors of the society and the economy, as conscious and well informed citizens we may make conscious decisions based on economic knowledge.

Economics is a basic discipline supporting many applied economic disciplines. It defines a set of concepts, rules and relationships. Business management, marketing, finance, agricultural economics, or economic policy cannot be studied without the foundations provided by the science of economics.

The science of economics – similar to mathematics – relies on logical reasoning and mathematical tools. At the same time it heavily builds upon sociology and history, as the object of its analysis is the same as of those, namely the behaviour and decisions made by human beings and social groups.

1.1.1. Principles and Methods of Economics

Economics teaches us to make decisions and choices. The individuals make countless decisions: whether to spend the next hour on studying or going to a restaurant; whether to spend our money on a glass of Coke or of milk; whether to choose nursing or engineering as an occupation, whether to choose weightlifting, wrestling, or playing golf as our recreational activity. As a group, people make decisions through their elected governments about how to spend the tax revenues: whether to construct highways or dams, modernise national defense or build public housing. If all of the above are necessary, then how to share the available resources among them? This means that the individual and the society requires goods and services for maintaining life, and the lack of these creates

motivation to satisfy these needs, or wants. ***Wants*** *are subjective feelings of deficiency, experienced by the individual or the community, motivating them to attain goods and services necessary to maintain life* (Farkasné Fekete – Molnár, 2007). Economics deals with needs related to economic activities, and these needs are satisfied by acquiring goods. The process of satisfying needs or wants by acquiring goods is called *consumption.*

Wy do we have to make choices? Because resources required for producing goods and services are limited, as well as the resources we can use for purchasing and consuming them. Resources, however, could be utilised for almost unlimited purposes. One of the most important limited resource is time. The day lasts 24 hours, the human life span is limited. The time spent on studying cannot be utilised for playing tennis or making a cup of coffee. Agricultural land is also a limited resource, as well as coal, oil, the number of welding machines, concrete, and human labour, while their possible uses are unlimited. Simply there are not enough resources to produce all the cars, jeans, computers, televisions, or food needed by people.

Scarcity: *The availability of resources is limited, while human needs to utilise these resources are unlimited.*

As productive **resources are scarce**, it is necessary to make choices about their utilisation. Economics deals with choices and decisions under the conditions of scarcity. Thus the science of economics is the study of how people allocate scarce resources among competing uses to maximise their satisfaction.

Economics *is the science of decisions and choices in the world of limited opportunities* (Mabry – Ulbrich, 1994). The need to choose is explained by the scarcity of resources - and consequently, of goods -, while the possibility to choose is explained by the existence of alternative uses of these resources.

A common element of decisions made under the conditions of scarcity is the fact, that all choices involve a cost. Choosing one of the options we must give up something else, or each one can only partially be attained – while you are reading this book you are not going for a bike ride. As people want to achieve the best outcome, the greatest enjoyment or highest satisfaction, that is, they expect the maximum benefit from their choices in exchange of sacrificing the other alternatives, understanding the process of decision-making and the costs and sacrifices involved is very important. *The benefit of the second best alternative forgone when making the best choice is called* ***opportunity cost****.* (Mabry – Ulbrich, 1994; Case et al, 2009; Kopányi, 1993; Samuelson-Nordhaus, 1987).

Opportunity cost: *The opportunity cost of using a resource is the value of the next best alternative forgone when using the resource for the best option. Thus, as the choosen activity is the best alternative, the opportunity cost is the forgone benefit of the second best alternative.*

The science of economics is generally applied to the problems of the economy in its strict sense, such as production, markets, or exchange rates. Economics, therefore, is a *social science, dealing with the alternative decisions people or groups of people make in production, distribution, exchange and consumption, as well as with the consequences of these choices.* The science of economics studies how societies utilise scarce resources for producing valuable goods, and how they distribute these among various groups of the population (Samuelson – Nordhaus, 2004).

The economy *is the complexity of interactions and processes related to the production, distribution, exchange and consumption of material goods and services.* The economy closely interacts with the other spheres of society, including politics, culture, or ideology, while it is also separated from those. On the one hand economics provides the material foundations for the other spheres, while they also influence the functioning of the

economy. The sequence of economic activities begins with production and ends with final utilisation, that is, consumption (Farkasné Fekete – Molnár, 2007).

Human needs are satisfied by consuming goods. Goods, therefore, have useful attributes, that make them suitable for satisfying some needs, and the sum *of these useful qualities is called* ***utility***. Some of the goods suitable for satisfying needs are freely available in nature, and can be used in their natural form (as sunlight, air, wild plants, wild animals), not requiring human labour to produce them. These goods are called **free goods**. Other goods are produced by human labour and economic activities, these are **economic goods**. Needs are most often satisfied by economic goods (Farkasné Fekete - Molnár, 2007).

Some goods satisfy individual needs, these are **private goods**, while others serve the needs of a group of people, or a community, and are called **public (or collective) goods**. Therefore private goods are consumed individually, and when someone has consumed one unit of such goods, then noone else can also consume the same unit. Thus the consumers compete for consuming private goods (such as icecream, bread, clothes, etc.). Public goods, on the other hand, are consumed simultaneously by all the members of a community – a country or a village -, they are equally available for every consumer, meaning that either the whole community can consume them, or noone at all (examples of such goods are the public lights system or national defense). Thus noone can be excluded from their consumption (Farkasné Fekete - Molnár, 2007).

Economics focus mainly on the relationships and market mechanisms of producing, distribution and consuming private goods. However, to supply public goods for satisfying the needs of communities or society also requires the use of resources, making the production and distribution of public goods an important economic issue today. Resources freely available (therefore considered free goods) can no longer be neglected either when making economic choices, because due to the harmful effects of human activity on the environment these formerly unlimited resources have also become scarce. The excessive utilisation of natural resources by someone imposes a limitation on the availability of these resources for others, thus worsening their situation, although they are not directly involved in business transactions (this impact is called an external impact, or externality). Modern society experiences the increasing importance of public goods, and negative externalities generated by neglecting environmental and social aspects. Market mechanisms are inefficient in creating and allocating public goods, and in dealing with externalities, so the existence of public goods and externailites may be understood as market failures; the ability of the science of economics has been limited so far in handling these issues (see Chapter 6).

In a wider sense the methodology and logic of economics may be applied to many areas of human behaviour, including the problems of psychology, statistics, politology, management science, and operations research. Many human decisions involve limited resources while looking for the best possible alternative. For such decisions a few basic principles universally hold. Individuals **pursue their self-interest,** the decision-maker compares and assesses alternatives by his or her taste and value judgement, trying to find the one that leads to the greatest benefit for him/her. **Efficiency** means that the individuals utilise the available resources so that they can attain the greatest possible benefit, satisfaction, the best alternative among the available options. Decision-making individuals are assumed to choose **rationally,** that is, they choose the alternative which, according to available information, seems to offer the greatest satisfaction or benefit for them – for instance, when choosing a product to buy, we will choose the cheapest product of the same quality, because the same money would buy more units of it (Mabry – Ulbrich, 1994).

The individual bases the decisions on the logic of **marginal analysis**. In real life we relatively rarely face decisions of the ‘all-or-nothing’ type, and most of our decisions involve some incremental change: whether to consume a little more of a particular product (to have

another dinner in a restaurant, or go to the movies instead), to produce a little more from something (for instance, the baker may produce a little more of the baguettes than the usual amount), with the purpose of maximising benefit or profit. Marginal analysis compares the costs and benefits arising from an incremental change of production or consumption, to help to make the best choice.

Summing up, throughout this book we assume that the *decision-making individual makes choices at the margin about allocating scarce resources among competing uses, considering the opportunity cost of alternatives, engaging in self-interested, rational, profit-maximizing behaviour* (Mabry – Ulbrich, 1994).

Economists often base their decisions on simplified **models** that describe the main components of the decision problem. The first step in setting up a model is to clearly state the problem itself, then the model will be used to describe possible solutions for the problem. The following step is the evaluation and comparison of the various alternatives, with the aim of finding and implementing the best alternative. When building a model several asumptions are made with the aim of focusing the model on the key components of the situation, and neglecting less important factors. The analysis is then focused on these main factors, assuming that all the other factors remain unchanged. This assumption is called '**ceteris paribus**' (in Latin: assuming all else unchanged).

Decisions made by these models may refer to the **short run**, which means that time is too short for one or some of the production factors to be changed. This is a limitation for the decision-maker, and the decision alternatives are assessed assuming that these factors of production are fixed. The **long run**, however, is a time period, which is long enough for any factor of production to be changed, so the decision makers may respond flexibly to economic incentives and take advantage of opportunities. The basic relationships described in models are often represented in graphs, or quantified in formulas, and statistically analysed, or compared to true data of the real world[1] (Mabry – Ulbrich, 1994; Case et al, 2009).

1.1.2. Factors of Production

Economists classify scarce productive resources into five groups. ***Productive resources** are**:** factors of production, including labour, natural resources (as land, or minerals), capital resources, enterpreneurial skills and information* (Mabry – Ulbrich, 1994). Time may also be considered a productive resource, but it is not a resource in itself but a necessity for using other resources, so it will be handled together with them.

1. **Natural resources (*A – Agricultural Land*)**: Physical resources occurring in nature, that are used in production in their raw, natural form.
2. **Labour (*L –Labour*)**: The human physical and mental skills used in production. Human capital is considered an important component of labour. ***Human capital*** is the accumulated physical and mental skills acquired by education or experience. While labour, that is, the working capability of individuals, is a natural phenomenon of all human beings, and in this aspect it is similar to natural resources, the skills and knowledge acquired in education or experience are in many aspects similar to real capital.

[1] It is assumed here, that readers are familiar with the basics of graphs, graphical representations of functions, and with the following terms: independent variable, dependent variable, positive and negative relationships, the slope of a line or a curve, increasing slope, decreasing slope. These terms are included in elementary mathematics courses taught in secondary schools.

3. **Capital (*K –das Kapital (in German)*):** Capital resources are productive resources created by an earlier production process, and utilised in a future production process to generate income. Within capital resources ***real capital*** includes all the physical resources produced as machines, tools, buildings. Money is also classified as capital resource, and it is called ***nominal capital***, as a distinction from physical capital. The role of money in the production process is to buy all the other necessary factors of production. needed. Another capital resource is ***technology:*** the available knowledge of techniqued and processes of producing goods or services.
4. **Enterprise, entrepreneurial skills *(E - Enterprise, Entrepreneur):*** the scarce human ability to organise and operate other resources efficiently to produce desired goods and services. The entrepreneur is an individual who engages in enterprise, organising the utilisation of resources, taking risk, and innovating.
5. **Information:** Information about production, the economy and the environment are accessed by communication technology and some of them are utilised in the process of decision-making.

1.2. The Basic Economic Questions, the Production Possibility Frontier

1.2.1. The Three Basic Economic Questions

In the history of mankind all societies have had to answer three economic questions (Farkasné Fekete – Molnár, 2007; Mabry – Ulbrich, 1994; Samuelson-Nordhaus, 1987):

- What to produce?
- How to produce?
- Whom to produce for?

1. What to produce, and in what quantity?

Society must decide what to produce, and in what quantity and quality, whether consumer goods (food, clothes, weapons, etc.) or productive goods (machinery, tools, plantations, vehicles, roads, etc.) should be produced. Producing consumer goods increases the well-being of society in the present, while producing productive goods leads to the same result in the future. The individual producer also faces the same decision: what goods to produce considering the available limited productive resources. The produced goods must satisfy some existing – or evolving - demand in the economy, and the economy, or the producer must be able to produce them efficiently, at reasonable costs.

2. How to produce the goods?

The question of ‘how’ refers to the choice of technology, that is, the choice and application of one of the available mixes of resources. In a national economy it must be decided how to employ labour (in agriculture, manufacturing, service, trade, etc.), what materials and energy sources to use (oil, coal, solar power, or metals, plastics, etc.), how to combine them, that is, which technology option to choose (an environmentally damaging one or a less polluting one)? The individual producer can also choose a technology, considering the costs involved and the efficiency of resource utilisation.

3. Whom to produce these goods for?

The question 'for whom to produce' refers to the expected consumers of the various goods and services produced. For the economy as a whole the question refers to the distribution of produced goods and generated incomes among the individuals and various groups of society. For the individual entrepreneur or producer the question refers, in a slightly modified way, to the identification of the targeted consumers. The question of 'for whom to produce' is closely linked to the question of 'what to produce', the answers to them must be harmonised.

1.2.2. The Production Possibility Frontier

As explained, in a world of scarcity, choices must be made about the allocation of resources to possible uses. A baker may bake buns and croissants, but every day he/she must decide how much to produce of each. If all the available resources - e.g. the full capacity of ovens and other equipment needed for baking, all the labour force (number of hours worked), the raw materials (flour, yeast, salt) are used to bake buns, then production is specialised, and the maximum possible amount of buns can be calculated. On the other hand, the baker may decide to use a part of the available resources for producing buns, and the rest for baking croissants. Clearly, allocating a part of the resources to baking croissants, less remains for the production of buns, so the amount of buns produced will decrease. In other words, the decision about the amount of buns to be baked will determine the amount of croissants that can be produced using the resources left. Thus, for any amount of buns (assuming less than the absolute maximum amount) the baker can calculate the amount of croissants produced using all the remaining resources.

This process may be understood not only for two products of one enterprise, but also for two industries of an economy. The left panel of *Figure 1.1* shows an expamle. The economy in the figure produces food and machines, using its productive resources at full capacity. The points *A-B-C-D-E-F* represent the possible amounts of food and machinery that can be produced together. The curve connecting the possible combinations of food and machinery is called **Production Possibility Frontier (PPF):** *a curve showing the combinations of the maximum output of too goods that can be produced by fully using the available resources in an efficient way. Each point of the curve defines a combination of the two goods, and increasing the production of one of them will lead to a decrease in the other.* Such combinations of goods are called **Pareto-efficient combinations** (Farkasné Fekete – Molnár, 2007). Thus, the Production Possibility Frontier curve in the left panel of *Figure 1.1* shows the Pareto-efficient food-machinery combinations. Clearly, increasing the amount of food from *0* tons to the possible maximum amount of *5* million tons, the amount of machinery must decrease; and as the amount of food increases, more and more units of machinery must be sacrificed for producing an additional unit (*1* million ton) of food – in other words, the PPF curve is concave.

In the example a *1* million ton increase of food from *0* tons to *1* million tons requires giving up *5* thousand units of machinery (see points *A* and *B*). When we already have *3* million tons of food, producing an additional *1* million ton requires sacrificing *23* thousand units of machinery (points *D* and *E*, decreasing machinery output from *70* thousand units to *47* thousand units). The same is true when the production of machinery is increased. This means, that the more food we want to produce, the more machinery must be given up for an

additional ton of food. This is the principle of decreasing returns, or increasing relative costs (Farkasné Fekete – Molnár, 2007).

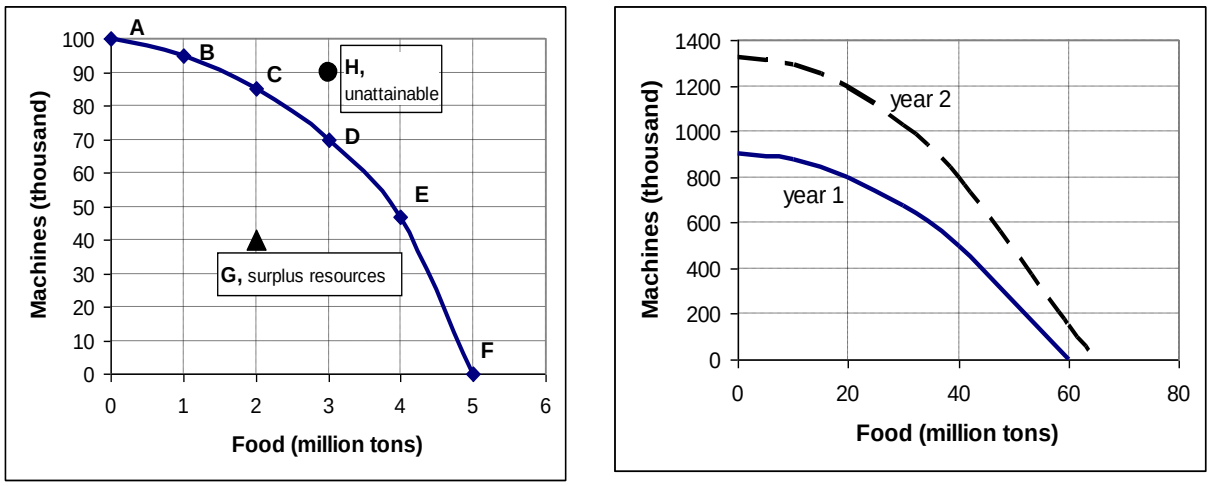


Figure 1.1: ***The production possibility frontier, and its growth***
Source: Author's own construction, based on Farkasné Fekete – Molnár (2007)

Point *G* in the left panel of *Figure 1.1* lies below the PPF curve. Point *G* is not Pareto-efficient, because the amount of food can be increased without decreasing the machinery output, and the amount of machinery can also be increased without decreasing the output of food, so in point *G* some resources are unused. Point *H*, on the other hand, is unattainable with the current resource limits, because producing the amount of machinery represented by *H*, food output cannot be higher than in point *D*.

The right panel of *Figure 1.1* shows the change in the production possibility frontier of a country or a national economy. When the production capacity – the amount of productive resources – of the country increases, the attainable output combinations also increase, and formerly unattainable combinations become attainable. Such an increase in the resources may be the increase in the number or skills of the labour force, the introduction of more machines and modern technology in the production processes.

1.2.3. Economic Coordination

Economic coordination is the harmonisation of the activities of economic agents. Modern economies may be described by three basic types of economic coordination: spontaneous market coordination, bureaucratic (centralised) coordination, and mixed coordination (Farkasné Fekete - Molnár, 2007).

Spontaneous market coordination is a typical attribute of market economies. In this economic system market actors are independent, equal in their market relationships, noone has significant power over the others. Their basic objective is to maximise their economic gains expressed in money. The organisation and coordination of economic processes is done by the market, no economic agent or organisation has economic power to restrict or control the actions of individuals or firms. The market agents are guided by market prices, these prices inform them and influence their behaviour. Money flows provide the most important information for the individuals' decisions, through prices, costs, incomes, profit, and loss.

Bureaucratic (centralised) coordination is the attribute of command economies, where the economy is directed by central plans and decisions. Some economic agents are

subordinate to others, the government directs the organisation of the economy by commands and prohibitions. The government will plan the needed amounts of products and services, and then it commands producers to produce these amounts, allocating them the necessary resources. The government also decides about the prices that consumers pay for getting the products and services, and therefore it is also the government's decision, how much an individual may consume of particular products. The implementation of central decisions are forced by law, the role of the market is negligible. Although theoretically it might be possible for a government to precisely forecast the demand of the economy and society for any particular product, and to plan efficient resource allocation according to this demand, in practice the system does not work, as is clear from the history of Eastern and Central Europe before 1990. The slow and rigid operation of central planning makes command economies not competitive enough among the rapid market changes. Modern economies can only temporarily return to command ruling, in times of natural disasters or wartime.

Contemporary developed economies are mixed economies, characterised by **mixed economic coordination**. In mixed economies the elements of both market and command economies are present, although the elements of the market play the key role. Government intervention is done mainly in the market, and it is usually aimed at correcting the market anomalies, or at substituting the market, or to prevent the emergence of situations that restrict market competition. Government intervention is usually justified when the market equilibrium leads to an outcome not acceptable for the society. The labour market is a good example, where the government sets a minimum wage that is usually higher than the market equilibrium. The justification for such an intervention is, that the market equilibrium wage is too low to provide a suitable standard of living for workers. Nevertheless, government intervention often fails to provide the optimum outcome expected by the society, as is seen in the relationship between rising minimum wages and unemployment.

1.3. Microeconomics and Macroeconomics

Economics include two great fields: microeconomics and macroeconomics. **Microeconomics** is the branch of economics that is concerned with the behaviour of the individual decision-makers at specific markets, the basic entities of the economy; the individual market agents (consumers, households, enterprises) and market laws. It can analyse the price trends of running shoes, the impacts of taxes on petrol prices and petrol consumption, the impact of spring chills on the price of orange juice, and help us decide whether road construction is more efficient by many workers and only a few machines, or many powerful machines and only a few workers (Mabry – Ulbrich, 1994). **Adam Smith** is considered to be the founder **of microeconomics** (by his book *The Wealth of Nations* published in 1776).

On the other hand, **macroeconomics** is concerned with aggregates, that is, with the sum of transactions in the various markets. Macroeconomics analyses the economy as a whole, including total output (and not output of a particular product), aggregate price level (and not the price trends of one specific product), employment and unemployment in the economy (and not the labour demand of one particular firm, or the labour supply of an individual). The evolution of **macroeconomics** in its current form is attributed to the book *General Theory of Employment, Interest and Money* by **John Maynard Keynes** published in 1936.

In everyday life, as individual decision-makers we may be more involved in microeconomic decisions, while in newspapers and TV programmes dealing with economic policy the topics of macroeconomics are discussed: inflation, recession or growth, budget deficit, unemployment and employment. In our study of economics the fundamentals of both fields will be covered (Mabry – Ulbrich, 1994; Samuelson-Nordhaus, 1987).

But why should we be concerned about aggregates, why to analyse the economy as a whole separately from its parts? Having understood the behaviour of individual decision-makers in microeconomics, should it not be sufficient to simply 'add up' the results of microeconomics to explain the processes of the macroeconomy? The *'fallacy of composition'* shows that the whole is different from the sum of its parts, and if a statement is true for the individual, it is not necessarily true for the sum of all individuals. If a producer slightly raises his/her output for sale (e.g. by *10 %)*, then the additional product will probably be sold at the same price as all the former units (because the extra output is negligible compared to the total supply in the market), and the producer receives higher revenues. Now if all the producers increase their output for sale by *10 %*, this is a considerable increase in the total supply, and assuming unchanged consumer demand, it must be sold at lower prices. This may result in lower revenues for all the producers, even if higher amounts were sold. Although all of them expected a raise in the sales revenues, the result turned out to be the opposite. The individual decision-maker assumed a 'ceteris paribus' situation, expecting unchanged supply of the other producers. However, for the whole group of producers – that is, for the macro level – the 'ceteris paribus' condition is no longer true, meaning that the laws of microeconomics cannot be simply adapted to macroeconomics.

Besides microeconomics and macroeconomics the science of economics covers several other special areas. International economics deals with the interactions of national economies at macro level (analysing e.g. export, import, capital flows, currency exchange rates). The theory of economic systems - comparative economics - is concerned about national economies of different types, as market economies, command economies, and mixed economies, analysing the specific economic systems of particular countries. The history of economic theories describes the historical evolution of the science of economics, discussing the key features of schools and branches of economic theory.

Besides, several applied sciences are built upon the theoretical results of economics, such as business management, corporate finance, industrial organisations, trade and commerce, agricultural economics, and today new areas, as health economics and education economics have evolved, too. Economics itself relies on the methodologies developed by other sciences, e.g. mathematics, statistics, sociology and psychology. Economists base their theories on statistical data of the past. **Econometrics** provides important methods and tools for assessing the data and drawing simple, but statistically acceptable and true conclusions.

When analysing economic processes a clear distinction must be made between approaches involving facts and empirical evidence, and those involving value judgements and norms of fairness. The first approach is the realm of **positive economics**, while the second one is of **normative economics**. **Positive economics** intends to analyse properties and processes of the economy free of any value judgements and interests, restricting itself to figures and facts. The standpoint of a positive economist is: 'this is the present, this *will be* the future'. **Normative economics** on the other hand, involves norms of fairness and ethical concepts, too. The normative economist says: 'this is the present, this *should be* the future'. The decision-maker's choice is influenced by his/her norms and values, too. The issues raised by normative economics may be resolved by social and political debates, and not by economic analysis alone (Samuelson-Nordhaus, 1987).

1.4. The Key Actors of the Economy: Households, Firms, Government

The key actors of the economy are economic units, organisations, institutions; these units interact in economic processes with each other, and with institutions that were set up to organise and regulate these interrelationships and processes. The organisational structure of a national economy comprises the following entities: households, firms, and the state (the government).

Households are the people of the country, their main role in the economy is consumption – they purchase and consume most of the goods that the firms produce. The second important role of households is to provide labour for the firms selling their working capacity in the market of productive resources. They spend the wages received in exchange of work on buying the products and services produced by the firms. Households may save a part of their income, and these savings, if deposited in banks, are provided as loans for others. Households are also owners of a considerable amount of national wealth – in the form of houses, real estate and other durable goods, and they may also produce some goods for home consumption (occassionally selling small amounts, especially agricultural products). Households are not the same as families, although they have much in common. A family is defined by economics and sociology as a group of people connected by biological relationships, while households are economic units. The household is the economic community of people living together, sharing their incomes, engaging in joint consumption decisions and sharing the cost of their economic activities (Farkasné Fekete – Molnár, 2007).

Firms, business units produce goods – products and services –, with the purpose of selling these goods in the market. For their activities they need productive resources, that they buy in the market of the factors of production. They earn their revenues by selling their output, and they have to pay the costs of productive resources needed for the production process. The difference of their revenues and costs gives their profit. In the rest of this book it is assumed that the key motivation for the firms' behaviour is the intention to maximise their profits. The business units are characterised by independent decisions, separation from the other actors of the economy, the purpose of profit maximisation, risk taking, and the fact, that they mobilise their resources for attaining profit, and their success is measured by the market (Farkasné Fekete – Molnár, 2007). Usually the term 'firm' refers to some form of organisation, while a business unit covers all forms of firms, corporations, sole traders, family farms, who have one thing in common: they produce some goods for sale. In the rest of this book the term 'firm' will be used in a general sense for all forms of business units.

Government, and governmental institutions play important roles in modern societies, although their efficiency is constantly debated. The state (the government) is a special agent in contemporary economies, that represents public power actively influencing all economic relationships and processes. The government interventions have three key functions in the economy (Farkasné Fekete – Molnár, 2007; Samuelson-Nordhaus, 1987): to enhance the efficiency of the economy, to maintain macroeconomic stability, and to guarantee social justice, fairness and equity.

Review Questions

1) What does scarcity mean?
2) What is opportunity cost?

3) Describe the decision-making process of an individual as defined by the principles of economics.
4) What does the concept 'ceteris paribus' mean?
5) Explain 'short run' and 'long run'.
6) List and describe the factors of production.
7) What is the meaning of the production possibility frontier, how does the PPF curve looks like for fixed opportunity costs, for increasing, or decreasing relative costs?
8) What are the three basic economic questions?
9) What is economic coordination, what are the main types, and which one is typical for contemporary developed economies?
10) Describe the topics of microeconomics and macroeconomics.
11) Describe the roles and functions of firms, business entities in the economy.
12) Describe the main role of households in the economy.
13) Describe the role and main functions of the government, and government institutions in the economy.

Problems and Questions to Develop Competence [2]

1) A student signed up with an internet provider for a fixed fee of 5000 HUF per month. This fee covers unlimited access to the world-wide web. During an average month last year the student was logged onto the web for 17 hours. What is the average cost of an hour of web time to the student? What is the marginal cost of an additional hour?

2) For each of the following situations identify the full cost of the activity – in terms of opportunity cost.

a. A worker earning an hourly wage of 2500 HUF decides to cut back to part-time work, to attend a college.
b. A student spends the night in a wild party, and stays out all night before his physics exam.
c. Alex's father has a small grocery shop, and Alex works 40 hours a week here, without receiving wages.

3) A country has fixed quantities of productive resources, and uses these resources for producing two goods: bread and ovens. The following table shows the possible combinations of bread and ovens:

Bread (million kg)	Ovens (thousands)
75	0
60	12
45	22
30	30
15	36
0	40

The figures above assume that the country owns a certain amount of ovens produced previously, that are available in the current period for baking bread.

[2] Source: Case et al. (2009)

a. Using the figures in the table, graph the production possibility frontier. (Use the horizontal axis for the number of ovens.)
b. What happens to the opportunity cost of baking bread (measured in the number of ovens) if the quantity of bread baked increases?
c. If the country keeps producing both bread and ovens, what happens with the production possibility frontier over time? (Explain your answer!)
d. Now suppose that a new technology is introduced, and then every oven can produce twice as many kg of bread than before. Graph the new production possibility frontier.
e. Suppose that before the introduction of the new technology the country produced 22 ovens. After introducing the new technology the country produces 30 ovens. What is the impact of the new technology on the quantity of bread produced? (Give the amount of bread produced before and after the new technology was introduced.)

Chapter 2: Basic Concepts of the Market

2.1. The Market, Key Factors and Basic Forms

As it was described in the previous chapter, households, that is, people satisfy their many wants by purchasing goods – products and services. These goods are produced by firms, who use the labour of households in the production process. Thus, households will buy the products and services produced by firms, spending the income that they receive from these firms for their labour[3].

These transactions take place in the market. The market is the location where the exchange of goods and services, or the sale of productive resources – such as labour – takes place. In the market of consumable goods – e.g. of food, clothes, CD-s – the buyers' purchase intention, that is, their *demand*, is focused on the goods that can satisfy some of their wants, and the money that they can afford and want to spend on these goods has an important influence on their behaviour. Of course, they want to spend their income in a way, that provides the greatest level of satisfaction for them, that is, allows the purchase of the largest possible quantity of goods. Firms, however, intend to sell their products or services at the highest possible price, because the sales revenue covers partly the cost of buying productive resources for the next period, and partly their profit. For producers the sales revenue received in exchange of products and services is the source of their income. The relationship between sellers and buyers is established through the market mechanism. Thus, the term 'market' can be defined in the following way:

*The **market** is the mechanism where buyers and sellers meet to carry out transactions, therefore the market consists of interactions of sellers and buyers, and its key elements are: demand, supply, price and income.*

It is worth noticing, that two types of markets exist actually: the market of consumer goods serve the households, they are the buyers, and the firms, the producers are the sellers. The situation is just the opposite in the market of productive resources, in other words, of the factors of production, where the firms, the producers are the buyers, because they need these factors for production, while the households are the sellers, who want to earn income for their labour, or other, privately owned resources. The market of labour, as a productive resource is a good example for the above: the households offer their labour resource, in order to earn income necessary to maintain life. The labour sold by households is purchased by the firms and business organisations, as it is needed for their production process. The wage for which the labour is exchanged is the market price of labour, and it is paid by the firms to the households. This price, at the same time, generates the income for the seller of labour, and becomes a cost for the buyer (the firm), who must pay it from the revenues.

The **market of consumer goods** is called *output market*, while the **market of productive resources (**or, in other words, **the market of factors of production)** is called *input market.* The basic market mechanisms are the same in both markets, so these mechanisms will be presented in the example of the output market. The specialities of the input markets will be described in Chapter 5.

The role of the market is to allow **buyers and sellers** to interact, and the result of their bargaining process will define the price of the goods and the quantity sold. **Demand**

[3] Really, labour is not the only resource that households own; they can rent out land, buildings, or lend their savings to firms, companies.

is the buyers' willingness and ability to purchase the goods, it shows the quantities the buyers are able and willing to buy at different prices. **Supply** is the sellers' willingness and ability to sell, showing the quantities the sellers are able and willing to sell at different prices. The **price** of the goods expresses the value that the buyers and the sellers attribute to the product, in terms of money. The sellers earn their **income,** as the difference of the price and the cost of production, while income for the consumers is their capability of purchasing the goods they want, or in other words, it is the consumers' purchasing power. The money available for the consumer to spend on goods is called **nominal income**, while the amount of goods (products and services) that can be bought for this money is called **real income**. Because the price of the product or service is the source of income for the sellers, they try to increase it, by selling the goods at the highest possible price, to maximise their profit (which is the difference of the sales revenue and the costs of production). The buyers, on the other hand, want to buy the goods at the lowest possible price, because they want to use their limited (that, is, scarce) income to buy the largest possible quantities of goods (to satisfy their wants). Thus, buyers and sellers have opposing interests, the first want to attain high prices, the second low ones in the market exchange process. The market processes are shaped by the decisions of rational, self-interested individuals, but in spite of this, the market mechanism shows regular, predictable behaviour, where general laws prevail, that are called **market automatisms**.

2.2. Demand, Supply, Market Equilibrium and Its Graph, Market-Clearing Price

2.2.1. Demand

As it was explained above, demand describes the buyer's behaviour in the market.

Demand *shows the quantities of a particular good that the buyer is able and willing to buy at various prices (Kopányi,1993).*

It is assumed that the buyer's objective is to spend his/her income in the best possible way, that is, to maximise his/her level of satisfaction. Demand describes the quantity of the goods that the buyer intends to buy, and the buyer not only wants it, but is able to pay for this amount from his/her income. Individual demand is the demand of one individual, one consumer. Market demand of a particular good is the sum of the individual demands of all buyers present in the market.

Demand is determined by the price of the product, but many other factors influence it too. Other determinants are the income available for the consumer, the consumer's tastes and habits (or preferences), the attributes of the product (its quality, usefulness), the prices of other products related to the demanded product (e.g. the price of substitute goods, that can be used interchangeably to the demanded good, or the price of complementary goods that are consumed together with the demanded good), as well as the consumer's expectations about the future (e.g. expectations about increasing incomes or price changes). These factors influence both individual and market demand, while market demand is also influenced by the number of buyers present in the market. *Table 2.1* summarises the above factors.

Table 2.1: **Factors influencing the demand of a given product, beside its price**

Factor	Impact
The utility	The key property of a product is its utility: it shows the ability of the product to

(usefulness) of the product	satisfy some want for the consumer, in better or worse quality, higher or lower level. If the producer improves the quality of a product, or changes its design, size, colour, the demand for the product will usually change. The utility of the product refers mainly to the objective properties of the product.
The consumer's preferences	The preferences express the consumer's relationship towards the product, his/her attitude, value judgement, or opinion about the utility of the product. Instead of the objective features of the product, the preferences describe the consumer's subjective opinion about it. A food may be very healthy, but the consumer may not like it, or may not believe in its wholesomeness, or, just the contrary, the consumer may believe in the value of a product, although no objective proof exists about its usefulness. It is the main aim of advertisements and commercials to change consumer preferences.
The buyer's income	With higher incomes the consumer is able, and usually willing to purchase larger amounts of the goods. The impact of decreasing incomes is just the opposite[4]. Income is a limiting factor over consumer demand.
Prices of other products	Consumers usually find many similar goods in the market that can be used as substitutes for each other. Various brands of milk, orange juice, or DVD players can serve nearly the same purpose and satisfy the same wants. The consumer may substitute the preferred product by another similar product, if the latter is sold at a cheaper (discounted) price, and this decreases the demand temporarily, or even permanently for the originally preferred product. Complementary goods, that is, when the product is usually consumed together with other goods, also influence the demand of a product. Cream for coffee is consumed together with coffee, and there is an interrelationship between the demand for cream and coffee. When the price of coffee increases, less coffee is bought, and the demand for cream also decreases.
The consumer's expectations about the future	If the buyers believe that the price of the goods they want to buy rise in the near future, then they may buy larger quantities today at the lower price, bringing ahead the purchases planned for the near future, thus the demand increases. If the buyers expect a price decrease in the near future, they may decide to postpone the present purchase, and the demand would decrease. When the consumers expect an increase in their income, they may start to consume more now, so the result is increased demand, but if they expect to lose their jobs, they would start to save their income for the hard times, and decrease their current demand.
Number of buyers	The total market demand is higher when more buyers are present in the market, while with lower number of consumers the demand is also lower. The increase in the number of buyers leads to increasing demand in the market, while decreasing numbers of buyers result in decreasing demand.

Source: Author's own construction based on Samuelson-Nordhaus (1987).

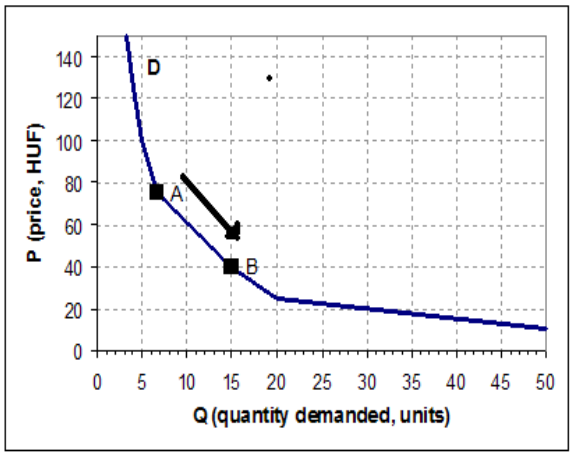
Individual demand is influenced by many factors. Some of these are objective facts independent of the decision-making individual, others are subjective, closely related to the person. Every buyer forms his/her own opinion about the purchase, and decides about the quantity to buy at the given prices. Some consumers can and want to buy a particular product at very low prices, others will buy it even at high prices. The ***reservation price*** *is the maximum price an individual buyer is willing to pay for one unit of the product.* The reservation price is different for each buyer, and this is the reason why some units of a product may be sold even at high prices, although more buyers can afford it at low prices.

[4] This is true for the so-called normal goods. Demand for inferior goods, however, behave in a different way. When the consumer's income rises, he/she stops buying these goods, and turns to more expensive goods of better quality; the increasing income leads to decreasing demand for inferior goods. Examples of inferior goods are cheap food, or cheap clothing of poor quality.

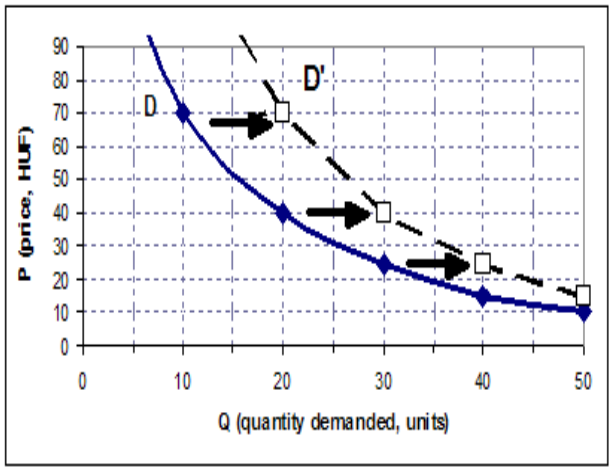
Demand can be described in functional form. *The **demand function** measures the demanded quantity of a product as a function of price, ceteris paribus, assuming that other factors remain constant.*

The **demand curve** is the graphical representation of the demand function, in the coordinate system of price and demanded quantity. The price of the product is denoted by ***P*** (*Price*), the quantity demanded is denoted by ***Q*** (*Quantity*). The letter ***D*** denotes demand. The demand curve is downward-sloping, describing a negative relationship between the price and the demanded quantity of the product. With high prices the buyer can buy less of the product, assuming unchanged income, and there are fewer buyers in the market who can purchase the product at high prices (that is, whose reservation prices are higher that the actual price). With lower prices the consumers are able to buy more units of the product, and there are more buyers whose reservation prices are above the actual price.

The law of demand: *when the price of a good increases, the quantity demanded will decrease, and when the price decreases, the quantity demanded will increase, ceteris paribus (assuming other things influencing the demand remain constant).* A demand function can be constructed for the total market demand as well as for the individual demand. The latter is called individual demand function, and its graphical representation is called individual demand curve[5].



The impact of a price change: moving along the demand curve



The impact of a change in the income: shifting the demand curve

Figure 2.1: ***Demand curve, the graphical representation of the demand function***
Source: Author's own construction

As the left panel in *Figure 2.1* shows, a price change leads to the change of the demanded quantity, at point *A* a higher price leads to a smaller quantity demanded, while at point *B* a lower price leads to a higher quantity demanded. Therefore, a change in the price leads to a movement along the demand curve. This is so, if the other determinants of demand remain unchanged. But what happens if some other factor changes? What is the impact of a change in the consumers' income on the demand schedule? With this change the initial

[5] As it is stated in the definition of the demand curve and the demand function, the demanded quantity *(Q)* is expressed as the function of the price *(P)*, so price should be the independent variable and quantity the dependent one. Then the price should be shown on the horizontal axis and quantity on the vertical axis. Following Alfred Marshall's work, the opposite way has become the standard graphical representation, with price on the vertical axis, and quantity on the horizontal one. An explanation may be, that in perfectly competitive markets market agents decide about quantities, and the actual market price will evolve as the equilibrium of the demand and supply schedules.

conditions assumed for the original demand function are no longer valid, the demand function itself will have to change, a new demand function will be defined.

The right panel of *Figure 2.1* illustrates the change in the demand function itself, as a result of changing incomes. Suppose that the consumer's income has increased. Then he/she can afford to spend more, and buy more of the product than before, at any price. Then at any price the quantity demanded is higher than before, so the demand curve shifts upwards, to the right, so instead of curve *D* the new demand curve becomes *D'*.

It is easy to see that the situation is the same when the consumer's preferences change in favour of the product, or when the consumer expects a price rise in the future, or when the number of consumers increase. Naturally, a decrease in the consumer income, or a negative change in the consumer's preferences, or a decrease in the number of consumers will lead to the opposite result, and the demand curve will shift downward to the left.

Summing up, the impact of price change, assuming no change in all the other factors, is a movement along the demand curve, while the impact of any other change is a shift of the demand curve itself.

Economic analyses often use *linear demand functions*. A linear demand function describes the relationship of price and quantity as: $Q = a - b \times P$, where Q and P are the demanded quantity and the price of the product, respectively, b shows the decrease in quantity at a unit price rise, and a shows the quantity demanded at $P=0$. The *inverse demand function* gives the price P as a function of the quantity demanded. With a linear demand function the inverse demand function is also linear. It is easy to see that for the above demand function the inverse demand function can be written as: $P = (a/b) - (1/b) \times Q$.

Q (units)	P (HUF)
0	45
1000	40
2000	35
3000	30
4000	25
5000	20
6000	15
7000	10
8000	5
9000	0

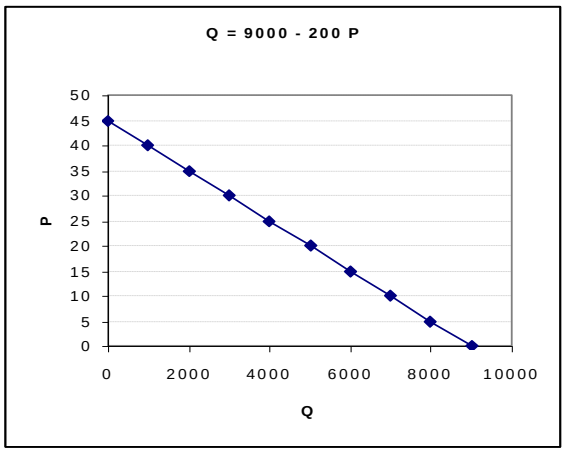


Figure 2.2: ***Example of a linear demand function***

Source: Author's own construction

In *Figure 2.2* the equation for the linear demand function is $Q = 9000 - 200 \times P$ and the inverse demand function can be written as $P = 45 - 0{,}005 \times Q$. The table shows that a price increase of *5 HUF* decreases the demand by *1000* units, so a price rise of *1 HUF* leads to a *200* unit decrease in the demand.

2.2.2. Supply

The ***supply*** *of a commodity shows how much of this commodity the seller is able and willing to offer for sale at various prices (Kopányi, 1993).*

We can assume that the aim of the seller is to maximise his/her profit. Supply expresses the quantity of the product offered for sale, the seller does have this amount, and is willing to sell it at the actual price. Similar to the definition of demand, supply can also be defined for individual sellers (individual supply) and for the market as a whole (total market supply), or in more general terms, the total supply of an industry.

Supply is also influenced by many factors beside price. Such influencing factors may be the cost of production, the availability of productive resources, the price or supply of other products competing with the actual product, or competing for the scarce productive resources needed for the actual product, the seller's expectations about the future, and total market supply also depend on the number of sellers (producers) present in the market (see *Table 2.2).*

Table 2.2: **Factors influencing supply besides price**

Factor	Impact
The costs of production of the good	With higher production costs for a commodity the seller requires higher sale price to attain profit. The technology used for producing the commodity usually determines the costs of production, thus a change in the production technology leads to change in the supply of the product. A cheaper and more efficient way of production may lead to increased supply, while an increase of the prices of raw materials, energy, or other inputs lead to decreased supply, assuming unchanged product prices.
The availability of the productive resources needed for producing the good	Even if the production technology for the commodity is cheap, some scarce productive resource - e.g. a raw material - may earn higher profits when used in the production of some other product, so producers may decide to use this input for the production of this other product. Then the producers of the original commodity may access this resource at higher prices, which raises production costs, leading to decreased supply. Sometimes, with very rare resources, the producer cannot access the required amount even at high prices, thus the availability of this scarce resource limits the supply of the commodity it is needed for. Such a scarce resource may be, for example, the specially trained labour.
The prices and supplies of other products	Sellers must assess the possible competitors and substitutes of the product in the market, checking their price and quantity. Then the sellers may estimate the chance of attaining profit when selling their product. If there is no hope of attaining profit some sellers may choose to exit the market, thus decreasing the market supply of the commodity. If, on the contrary, some sellers expects high profits due to their advantageous position, they may be inclined to increase production. The price and supply of other products using the same inputs also have an impact on the supply of our commodity; if the market shows higher demand for buns with sesame-seed than for croissants with sesame-seed, then producers may give up producing croissants and choose to produce buns instead, thus decreasing the supply of croissants.
The seller's expectations about the future	When sellerw expect a price rise for thei product in the near future, then they may choose – if possible, - to leave the product in the inventory, waiting to sell it after the price rises. This leads to decreased supply in the current period. The impact of an expected change in the goverment regulations is similar. An expected quality-related regulation may imply a necessary investment in the production technology, and this may motivate some sellers to sell out all the output inventory and move out of the market, while more favourable tax regulations may convince the sellers to increase their production and sale capacities.

The number of sellers in the market	The total market supply of a product is larger in markets where many sellers are present, the increase in the number of sellers usually leads to increased supply, while with fewer sellers the supply also decreases.

Source: Author's own construction based on Samuelson-Nordhaus (1987).

Similar to demand, the schedule of supply can also be represented as a function. *The **supply function** measures the supplied amount of a commodity as a function of its price, ceteris paribus, that is, assuming all other factors held constant.*

The **supply curve** shows the graphical representation of the supply function, in the coordinate system of price and quantity offered for sale. The product price is denoted by ***P*** again, and the supplied quantity is ***Q***. Supply itself is denoted by ***S***. The supply function describes a positive relationship between the price of the commodity and its supplied quantity, the supply curve is upward-sloping. This means that the sellers wish to sell more of the good at higher prices, and less at lower prices. At low prices some sellers may try to keep the commodity in the inventory, waiting for a future price rise, and attaining higher profit. Others cut back production when the prices are low, because the lower sales revenue allows them to buy smaller amounts of productive resources than before, or the resources are more profitably employed in the production of some other product. Some producers may even decide to exit the market, and finish production. The price rises of the commodity will lead to the opposity impacts.

The law of supply: *when the price of a commodity increases, then the amount offered for sale also increases, while with decreasing price the amount for sale also decreases, assuming other factors held constant.*

The left panel of *Figure 2.3* illustrates the supply curve. As the figure shows, the seller offers less of the commodity for sale at low prices (at point *A*), while he/she offers more to sell at high prices (at point *B*).

We can ask again, what happens with the supply function and the supply curve, when some influencing factor other than the commodity's price change. Suppose that the producer finds a possibility to access some resource at lower prices than before, so the cost of production falls. It is easy to see that the product can earn still the same profit at a lower price. In other words, the producer may offer a larger amount for sale at unchanged prices, because the unit cost of production is lower, so higher output can be produced at the same total cost.

The right panel of *Figure 2.3* shows, that the original supply curve (*S*) shifts downward, to the right (*S'*), indicating, that at any price the seller offers more of the product for sale than before.

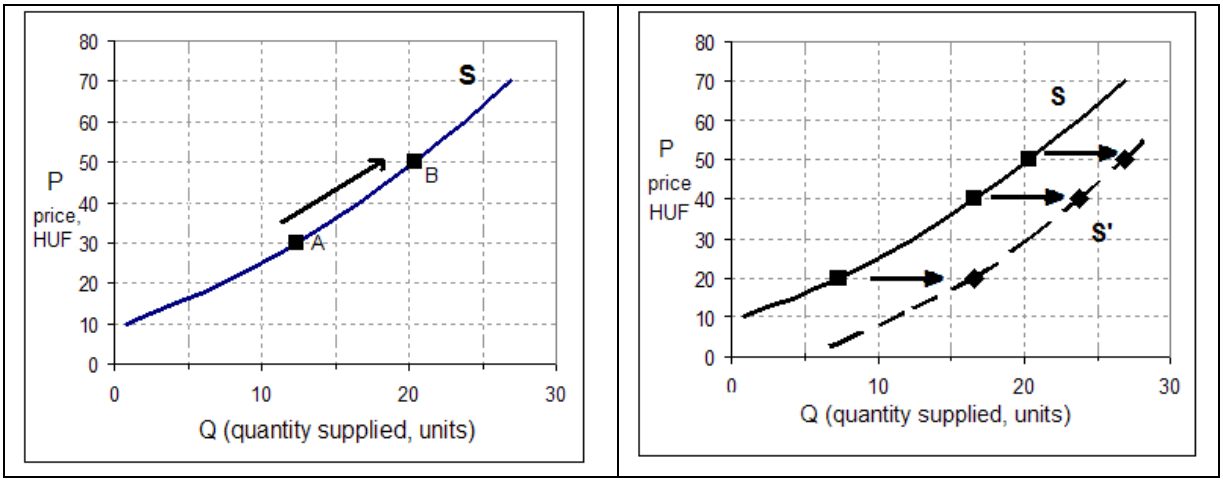


Figure 2.3: ***The supply curve and its downward shift***

Source: Author's own construction

It is easy to see that the situation is the same when the number of sellers in the market increases, because with more sellers the amount offered for sale is higher at any price. The decrease in the number of sellers, or an increase in the cost of production will lead to the opposite result, the supply curve shifts upwards, to the left. The impacts of the other factors listed in *Table 2.2* can be estimated in a similar way. As it was seen about the demand curve before, we can conclude again, that the impact of change in the price of the commodity is a movement along the supply curve, while the impact of a change in any other factor is a shift of the supply curve itself.

2.2.3. Equilibrium of Supply and Demand

We have defined the factors determining the demand for and supply of a commodity, we can describe the demanded and supplied quantities in response to price. But how will this price be formed?

Figure 2.4 shows the demand for and supply of eggs in the market of a town. We saw that at high prices supply is high and demand is low, so supply is larger than demand. At low prices, on the contrary, demand is larger than supply. *There is only one price, at which the demanded quantity is equal to the supplied quantity*, and this price is called **equilibrium price.** *The quantity demanded, and supplied at this price is the* **equilibrium quantity**.

When the actual price is below the equilibrium price, the buyers want to buy more than the sellers want to sell. The market experiences **excess demand**, that is, *shortage*. Sellers notice that the commodity offered for sale is running out, but buyers still want more. So the sellers' usual reaction to this phenomenon is to raise the price. In response to the higher price the buyers's demand starts to decrease, while the sellers' willingness to sell grows, and the excess demand decreases. If the market still experiences excess demand, the sellers continue to increase the price and the supplied quantity. The buyers' willingness and ability to buy continues to decrease with higher prices, and the process goes on until the equilibrium price is attained. Therefore, the non-equilibrium prices create competition among consumers or producers, and this leads to the automatic adjustment of the price towards the equilibrium. The final outcome of this automatic adjustment is the disappearance of excess demand, and the market attains the equilibrium.

In the opposite situation *the actual market price is higher than the equilibrium price, causing* **excess supply** *(surplus) in the market*, the quantity offered for sale is larger than the quantity demanded by the buyers, and the commodity is in surplus. Then the sellers, realising that they are unable to sell all of their product, start to decrease the price, and the buyers respond to that by increasing demand. The process goes on until the equilibrium price is reached, and the surplus disappears. The equilibrium price is also called **market-clearing price**, because it clears both surpluses and shortages from the market. These adjustment processes are called **market automatisms**. Adam Smith called this self-regulating property of the market generated by interactions of innumerable individual decisions, the '*invisible hand*', guiding individual decision-makers in the market towards the equilibriun (Farkasné Fekete - Molnár, 2007; Kopányi, 1993).

The market balance is illustrated by the supply-and-demand diagram. This presents the demand curve and the supply curve in the same coordinate system. The intersection of the two curves shows the market equilibrium, the price belonging to the intersection (P_e) is the equilibrium price, and the quantity belonging to the intersection (Q_e) is the equilibrium quantity.This type of analysis was first applied by Alfred Marshall (1842-1924), the famous

British economics, whose major work (*Principles of Economics)* established the currently used methodology for supply-demand analysis.

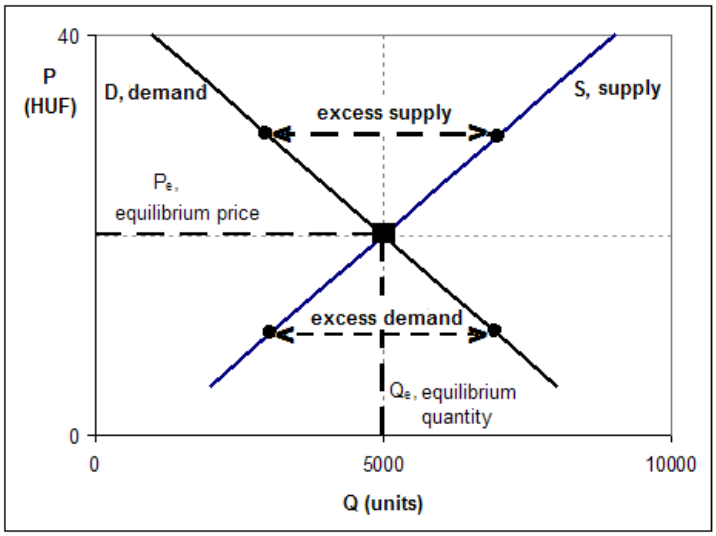


Figure 2.4: ***Equilibrium of supply and demand***
Source: Author's own construction

Note, that if, for some reason, the market cannot reach the equilibrium price, then the actual amount sold will be equal to the demanded quantity in case of excess supply, and to the supplied quantity in case of excess supply – and this means, that the actual quantity sold is always equal to the smaller one of the demanded and the supplied quantity. This also implies, that the quantity sold is largest when the price is in the equilibrium position, so the market is cleared [6].

Assume now, that due to a change of some influencing factor the demand curve, or the supply curve shifts, e.g. the cost of production increases, because some of the inputs becomes more expensive. This leads to an upward shift of the supply curve, meaning that any quantity is offered for sale at a higher price than before, as curve *S'* shows in *Figure 2.5*.

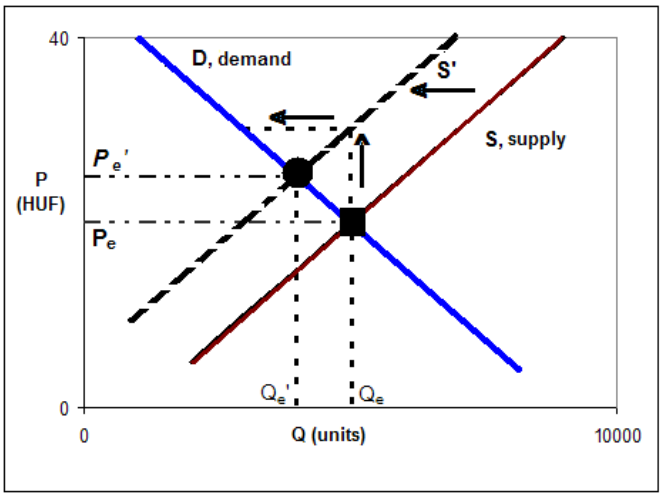


Figure 2.5: ***Change of the market equilibrium***
Source: Author's own construction

[6] Note, that the above market mechanism is true in competitive markets (market structures will be described in detail in Chapter 5.). In a monopolistic market, or when government regulation prevents the self-regulation of the market, the market may remain out of balance for a longer period.

The former equilibrium quantity Q_e will now be sold at a price higher than the former equilibrium price P_e. However, the buyers would purchase less than Q_e at this higher price, so the market shows excess supply. As a result, producers start to decrease the price and the quantity offered for sale, and the buyers respond to the price decrease by somewhat larger demand. Eventually the new market equilibrium is attained at a higher price (P_e'), and smaller quantity Q_e') than in the original market clearing situation.

2.3. Elasticity of Demand and Supply

As was shown earlier, the demand curve is downward-sloping, meaning that growing prices lead to decreasing demand. The price elasticity of demand measures how exactly the demand – the quantity demanded - responds to price changes. It is important, however, to know, how a price change of e.g. *100 HUF* relates to the original price, whether this change happens to the price of a loaf of bread, of an initial price of *200 HUF/kg*, which is an enormous change, or to a DVD-player of an initial price of *20000 HUF/unit*, causing a negligible change.

*The **price elasticity of demand** shows the percentage change of the demand for a commodity in response to a one percent change in its price.*

As it was seen earlier, the demand for a commodity may be influenced by many factors other than its price, and the response of demand to the change in one of these factors can also be measured in terms of elasticity. Generally speaking, the **elasticity of demand** measures the percentage change of the demand for a commodity in response to a one percent change in any specific factor influencing the demand. For the **income elasticity of demand** this influencing factor is the consumer's income, while for the **cross-price elasticity of demand** the influencing factor is the price of some other related commodity.

The elasticity of demand is measured by the **coefficient of elasticity**. The formula is the following: $\varepsilon = (\Delta x/x) / (\Delta z/z)$, where x is the current (initial) value of the demanded quantity, Δx is the change in this quantity, z is the initial value of the influencing factor, while Δz is the actual change in its value. Therefore:

The **coefficient of price elasticity of demand** is: $\boldsymbol{\varepsilon = (\Delta x/x)/(\Delta p/p),}$ where x is the initial value of the demanded quantity, Δx is its change, p is the price of the commodity, and Δp is the price change.

The **coefficient of income elasticity of demand** is**:** $\boldsymbol{\varepsilon = (\Delta x/x) / (\Delta I/I),}$ where x is the initially demanded quantity, Δx is its change, I is the consumer's income and ΔI is its change.

The **coefficient of cross-price elasticity of demand** is: $\boldsymbol{\varepsilon = (\Delta x/x) / (\Delta p_y/p_y),}$ where x is the initial quantity, Δx is its change, p_y is the price of another good, and Δp_y is its change.

The value of the coefficient of price elasticity of demand is usually negative, as the impact of price rise is usually a decrease in the demand. The value for the income elasticity of demand is, however, positive, because the rising income leads to higher quantity demanded. The coefficient of cross-price elasticity of demand may be positive when the increasing price of another product leads to an increasing demand for our commodity (which is typical for substitute products), and negative, when the increasing price of another product leads to a decreasing demand for our commodity (a typical property for complementary products consumed together). The elasticity of demand is classified by the absolute value of the elasticity coefficient. When the absolute value of this coefficient is above 1, then the demand is called elastic, meaning that the percentage change in demand is larger than the percentage change in the influencing factor. When the absolute value of this coefficient is below 1, then

the demand is called inelastic, meaning that the percentage change in demand is smaller than the percentage change in the influencing factor. When the absolute value of this coefficient is exactly 1, then it is called unitary elasticity, meaning that the percentage change in demand is exactly the same as the percentage change in the influencing factor. (Samuelson-Nordhaus, 1987).

The concept of supply elasticity is defined in the same way. *The **price elasticity of supply** shows the percentage change in the supplied quantity of a commodity in response to a one percent change in its price.*

The price elasticity of demand reflects the relationship between a price change and the change in the sales revenue. When the demand for a commodity is elastic, that is, the price elasticity coefficient is above 1 in absolute value, then a small change in prices leads to a relatively large change in demanded quantites. Thus, a small price decrease will lead to a large increase in the demanded quantity, resulting in increasing sales revenues. A small price rise, however, will lead to a large decrease in the quantity, with an overall negative impact on the revenues. For elastic demand the price decreasing strategy will have positive impact on revenues, while a price raising strategy will have a negative one. For inelastic demand the situation is the opposite, with price decreasing strategies causing smaller revenues and price increasing strategies resulting in growing revenues.

Review Questions

1) What is 'market', what are its essential elements?
2) What does 'demand' mean, and what factors can influence it? Explain the concept of the demand function.
3) What does 'supply' mean, and what factors can influence it? Explain the concepts of the supply function. How can we graph it?
4) What is market equilibrium, and how can we illustrate it graphically? What is the meaning of the following terms: equilibrium price, equilibrium quantity, excess demand, excess supply?
5) Explain the following terms: price elasticity of demand, income elasticity of demand, cross-price elasticity of demand.
6) Explain the sign and value of the elasticities, and give the formula for calculating its value.

Problems and Questions to Develop Competence[7]

1) The supply and demand for eggs in the town market are shown in the table below.

   a. Draw the graphs of the demand and supply functions (the demand curve and the supply curve).
   b. Find the equilibrium price and the equilibrium quantity of eggs.
   c. How will the market equilibrium change after an increase in the consumers' incomes, that increases the demand for eggs by 10 % at any price? Draw the

[7] Source for problems 2 and 3: Case et al. (2009)

graph of the new equilibrium situation, and calculate the new equilibrium price and quantity.

The demand and supply for eggs in the town market

Supply		*Demand*	
P (HUF/unit)	*Q_D (units)*	*P (HUF/unit*	*Q_S (units)*
40	9000	40	1000
35	8000	35	2000
30	7000	30	3000
25	6000	25	4000
20	5000	20	5000
15	4000	15	6000
10	3000	10	7000
5	2000	5	8000

2) The market of a rock band's new CD is described by the following demand and supply functions: $Q_D = 30000-5 \times P$, $Q_S = 10 \times P$.

Draw the supply and demand curves, calculate the equilibrium price and quantity.

3) Suppose that the market demand and market supply for pizza are given by:

$Q_D = 3000 - 2 \times P$ and $Q_S = 2 \times P - 1000$ respectively, where P is the unit price of pizza.

a. Graph the supply and demand functions for pizza for prices from *500* to *1500* HUF.

b. How many pizzas are sold in market equilibrium, and at what price

c. What happens in the market is the sellers set the price at *1200 HUF*?

d. Suppose that hamburger is a substitute for pizza, and the price of hamburgers doubles. This leads to the doubling of the demand for pizza, (at any price consumers demand twice as much pizza as before). Give the new market demand function for pizza.

e. Calculate the new equilibrium price and quantity using the new demand function.

Chapter 3: The Demand Side of Output Markets - Elements of Consumer Behaviour

As it was explained in the previous chapter, the demand in the product market is described by the consumer's willingness and ability to purchase the goods. The total market demand for a commodity is the sum of individual demands for the same commodity. The present chapter describes the main factors that define the individual consumer's demand, that is, his/her willingness and ability to purchase a particular commodity, and the way these determine the actual quantity that the consumer demands of this commodity.

Consumption is the driving force of any economy, and the consumer plays the key role. Eventually, all economic activities are determined by the wants to be satisfied, and the consumers' behaviour is also defined by these wants and needs, and the pursuit of goods that satisfy them. The utility of goods, that is, their ability to satisfy some wants, depends partly on their objective properties, and partly on the consumers' subjective value judgements. Thus demand is determined by the consumer's wants and the utility of goods, that is, their capacity for satisfying these wants. At the same time, this capacity for satisfying wants is limited by the consumer's income and its purchasing power – which is the relative value of the income compared to the prices of commodities. Therefore the consumer's choice is mainly based on the value he/she attributes to the utility of the goods, while his/her budgetary constraint limits the available options. The true quantity demanded is determined by these two factors[8].

The present chapter begins with a discussion on the factors that determine the consumer's ability to buy a certain quantity of a product, and then the chapter continues by describing the consumer's intention or willingness to buy. Finally we examine how the individual's ability and willingness to purchase leads to individual demand. At the end of the chapter the sensitivity of demand is analysed in relation to changes in the influencing factors.

3.1. Budget Constraints, the Budget Line

Looking at the individual consumer's demand the first question is how much a consumer is able to buy of a commodity at all? Everyday experience tells us that the available, disposable income constrains the attainable quantity of any particular product, and the higher the price of a particular commodity, the smaller the quantity we are able to purchase. However, we cannot neglect the fact, that the total disposable income is usually distributed among several commodities, and cannot be spent on only one thing. Thus, the constraints that limit our purchase intentions are the disposable income, the price of the commodity we want to purchase, and the prices of other commodities that we also wish to buy of our disposable income. The available income and the prices of the commodities that we may purchase impose a limitation on the purchase options, defining a budget constraint.

The decision problem and budget constraint described above is illustrated by a simple example. Suppose that the consumer – a student, – spents 2000 HUF each day in the canteen to buy two things: scones and sandwiches. The given income is spent every day, on these two

[8] Following the logic of the main text it may seem reasonable to start the chapter by assessing the consumer's subjective system of preferences, but the introduction of the budget constraint is easier to explain in a beginner's text. For this reason the chapter begins with the explanation of the budget constraints and its influencing factors, and the more abstract topic of consumer preferences and utility assessment are discussed afterwards.

goods and nothing else. The question is how much the student can buy of each product, spending all the money he has.

To answer the question, besides the income we have to know the prices of the two goods One scone costs *100 HUF* in the canteen, and the price of one sandwich is *250 HUF*. Knowing the prices and the income the student has many purchase options, as the following examples show:

- If all the income is spent on scones, then *20* units of scones can be purchased *(20 × 100 =2000 HUF)*
- If all the income is spent on sandwiches, then *8* units of them can be purchased *(8 × 250 =2000 HUF)*
- If the income is divided between the two goods, then – for example – *2* sandwiches may be bought for *500 HUF* and the remaining *1500 HUF* is enough for buying *15* scones.
- Similarly an attainable option is the purchase of *4* sandwiches *(4 × 250 = 1000 HUF)* and *10* scones *(10 × 100 = 1000 HUF).*
- The student may also buy the bundle of *6* sandwiches *(6 × 250 =1500 HUF)* and *5* scones *(5 × 100 = 500 HUF).*
- Furthermore, assuming the units are divisible, then *7* sandwiches *(7×250=1750 HUF)* and *2.5* scones (*2.5 × 100 = 250 HUF)* is another possible choice (of course, in the present example this is only a theoretical option).

Really, to identify the purchase options, the available income (*2000 HUF*) was divided into two parts, a sum spent on scones (which is the number of scones multiplied by the unit price of scones, *100 HUF*) and a sum spent on sandwiches (that is, the number of sandwiches multiplied by the unit price of sandwiches, *250 HUF).* Therefore:

2000 HUF = 250 HUF×the number of sandwiches + 100 HUF×the number of scones.

This relationship is called **budget constraint,** or **budget line**.

The budget constraint (budget line) *is the set of all bundles of two goods that the consumer is able to purchase at given prices and a given income, assuming all the income is spent on these goods (*Farkasné Fekete – Molnár, 2007*).*

The formula for the budget constraint (budget line) is the following:

$$I = p_x \times x + p_y \times y,$$

- where I is the consumer's income,
- x is the amount of the first product (sandwiches), and y is the amount of the second product (scones) purchased,
- p_x is the unit price of product x (the sandwiches) and p_y is the unit price of product y (the scones).

In our example the income and prices are $I = 2000$, $p_x=250$, $p_y=100$, and the formula for the budget line is: $2000=250 \times x +100 \times y$

The equation for the budget line holds for exactly those *(x ; y)* combinations of goods that the consumer is able to buy at the given income and given prices, spending all the income on these goods. Thus, feasible product-combinations are the following sandwich-scone pairs *(0;20), (8;0), (2;15), (4;10), (6;5)* and even *(7;2,5).* The consumer's income and the unit prices of the two commodities exactly define the budget constraint.

The budget line is graphed in a coordinate system that has the purchaseable quantities of the two products on the horizontal and the vertical axes, respectively. In our example the *x*-axis shows the amount of sandwiches, and the *y*-axis shows the amount of scones to be

bought, and each pair (or bundle) of attainable products is represented by a point in the budget line.

Note that the white boxes in the budget line of *Figure 3.1* represent the *(sandwich, scone)*-combinations described in our example. The other points in the budget line also fit the budget constraint, but really such combinations are attainable only if the products are divisible, that is, both product *x* and *y* are sold and bought in fractional units, too.

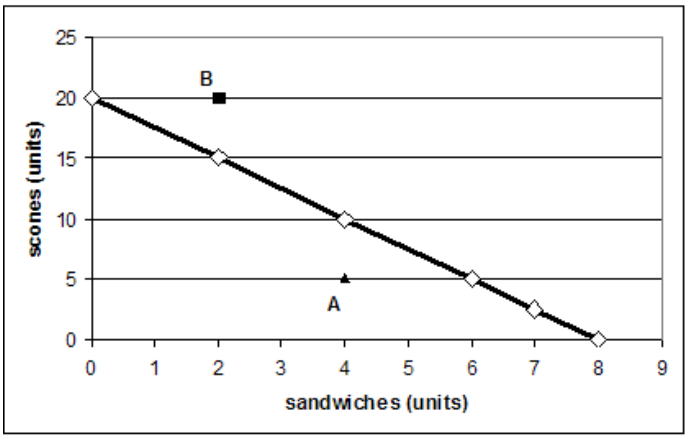


Figure 3.1: ***Plotting the budget line 2000=250 × x +100 × y***
Source: Author's own construction

Note that the points lying below the budget line represent product combinations that cost less than the consumer's disposable income. Point *A* in the figure is like that *(4* sandwiches and *5* scones cost only *1500* HUF), because with *4* sandwiches the consumer could buy as much as *10* scones without breaking the budget constraint. Choosing point *A* the consumer saves *500* HUF. On the other hand, the points lying above the budget line, – like point *B* in the figure – represent product combinations that are more expensive than the available income. Point *B* indicates a bundle of *20* scones and *2* sandwiches (that cost altogether *2500* HUF), although with *20* scones no sandwiches could be bought. For attaining the bundle represented by point *B* the consumer should borrow *500* HUF.

The transformation of the equation of the budget line $I = p_x \times x + p_y \times y$ gives the equivalent formula: $I - p_x \times x = p_y \times y$.

Then expressing *y* we have the following form: $I / p_y - (p_x / p_y) \times x = y$, therefore the budget line equation can be written in the following form: $\boldsymbol{y = (I / p_y) - (p_x / p_y) \times x}$.

For our example: $y = (2000/100) - (250/100) \times x$, that is, $\boldsymbol{y = 20 - 2.5 \times x}$. Comparing this latter formula to the graphical representation of the budget line we see, that the budget line intersects the vertical axis at $y = 20$ (that is, at I/p_y), and the slope of the line is *-2.5*, which is the negative of the ratio of the prices of the two commodities: $-p_x/p_y$.

How can the consumer's budget constraint change? Can the currently less expensive point *A*, or the unattainable point *B* become points of the budget line under changed circumstances? How will the budget line respond to a change in the consumer's income or the prices of the products?

Suppose, for example, that the consumer's income is halved, that is, instead of *2000* HUF only *1000* HUF can be spent daily on scones and sandwiches, so $I = 1000$. Then the formula for the new budget line is $1000=250 \times x + 100 \times y$, that is, $y = 10 - 2.5 \times x$. This means that spending all the income on scones, *10* units can be bought instead of *20*, and spending all the income on sandwiches only *4* units are attainable instead of the previous *8* ones. Similarly, for any formerly attainable product combinations the current income allows only half of the previous quantities (e.g. instead of the previous combination of *4* sandwiches

and*10* scones now the attainable bundle contains *2* sandwiches and *5* scones). This means that the budget line shifts, downwards with decreasing incomes – and upwards with increasing incomes, proportionally to the change in the income. As the prices are unchanged, their ratio remains the same, so the slope of the budget line also remains the same, and the new budget line is parallel to the previous one (see, line *(2)* in *Figure 3.2*).

To understand the impact of price changes suppose, that with the previous income *(I=2000 Ft*) the unit price of sandwiches doubles in the example – while the price of scones does not change. When we spend all our income on scones, altogether 20 scones are attainable as before, but when spending all our money on sandwiches only *4* units can be bought instead of the previous *8* ones. The new budget line is described by the equation: $2000=500 \times x + 100 \times y$, that is, $y = 20 - 5 \times x$, and, as is shown by line *(3)* in *Figure 3.2*, the slope of the line has changed.

The impact of the change in scone prices – e.g. the doubling of scone prices (from *100* HUF to *200* HUF) – can be described similarly with unchanged income (*2000 HUF*) and unchanged unit price of sandwiches (*250 HUF).* Now the bundle of (*8 sandwiches; 0 scones*) is still attainable, but spending all our money on scones (buying *0* sandwiches), only *10* scones are attainable at the increased prices. The new budget line is: $2000=250 \times x + 200 \times y$ that is, $y = 10 - 1.25 \times x$, as is shown by line *(4)* in *Figure 3.2.*

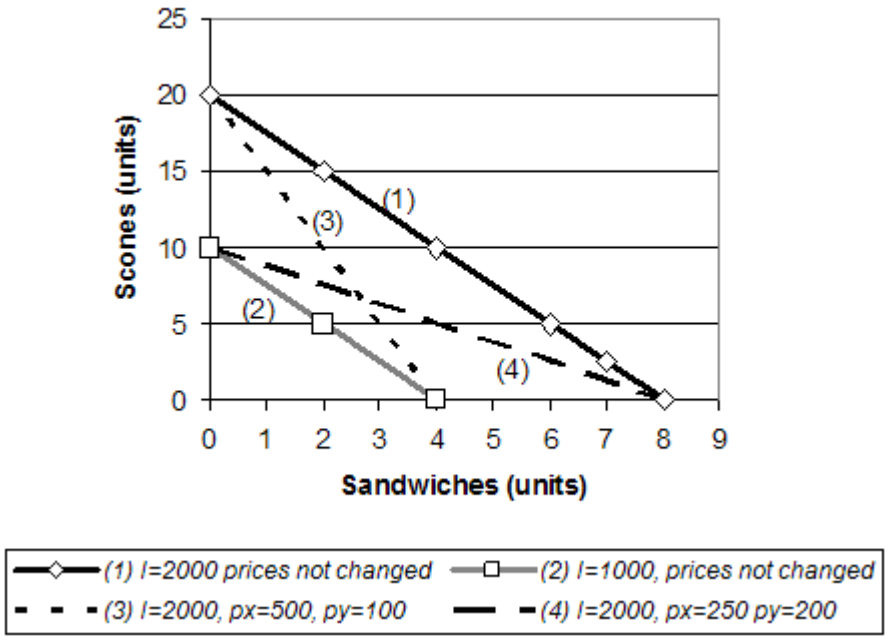


Figure 3.2: ***The impact of income or price changes on the budget line***
Source: Author's own construction

Finally suppose that with the same income the prices of the two products change in the same proportion, e.g. both of the prices double. When we spend all our money on sandwiches, we can buy only half of the previous amount, spending all our money on scones, again half of the previous amount is attainable, and choosing to buy any combination of scones and sandwiches, the amounts will be exactly half of the previously attainable bundle. The new budget line is: $2000=500 \times x + 200 \times y$, or in the other form: $y = 10 - 2.5 \times x$. This equation has been graphed earlier as line *(2)* in *Figure 3.2*, so the product bundles attainable for the consumer are exactly the same, as the ones that are attainable at unchanged product prices and halved income. Therefore it is no difference for the consumer to experience a general price rise of a certain proportion, or a fall in income in the same proportion, because the eventual

outcome is the decrease of the attainable product bundles - in other words, the consumer's **real income** - by the same proportion. The rise in the consumer's income, or the decrease in the product prices can be similarly interpreted as the increase in the consumer's real income, because both will lead to the increase in the product bundles attainable for the consumer.

The **real income** *is the amount of material goods and services that the consumer can purchase for his/her money income (nominal income)* (Farkasné Fekete – Molnár, 2007.)

In the above paragraphs the consumer's budget constraint (budget line) and its influencing factors were discussed for the case when the consumer's income is spent on two goods. In the real world, however, the consumers divide their incomes among many products and services at the same time. The model of two goods is an idealistic, simpified situation, although this simple model can serve as a useful starting point to describe more general situations[9].

3.2. Consumer Preferences, Indifference Curves and Substitution

The previous section summarised the amounts of goods that the individual consumer is able to buy under the budget constraint defined by the consumer's income and the prices of the goods. The next question is how to choose among the attainable bundles, how to find the most valuable bundle. To answer this question we have to find out how the consumer assesses the goods and bundles of goods, how useful and how preferred he/she thinks they are. The various products and services satisfy various wants and needs for the consumer, and under the conditions of scarcity the consumer must choose which needs he/she will satisfy by purchasing commodities, and which ones he/she will sacrifice. Of course the consumer will want to safisfy the needs and wants that are more important than the others, so he/she tries to rank these wants either consciously or in a subconscious, instinctive way. The individual ranking order of wants is called the consumer's *scale of preferences* (Farkasné Fekete - Molnár, 2007). The consumer's scale of preferences is an individual ranking, and it depends on the consumer's tastes, habits, and reflects mainly the individual's subjective opinion and value judgement, although the actual socio-economic environment may influence it, too. It is important to understand that the consumer's preferences are not the same as the consumer's choices, because preferences depend basically on the utility of the product for the consumer, which is independent of the price of the product, while the actual amount purchased strongly depends on the consumer's budget constraint, including the price of the product. In the following section the consumer's scale of preferences will be discussed, and the utilities and uses of commodity bundles or commodity combinations will be described.

Take our example introduced in section 3.1, and suppose that the bundles of scones and sandwiches are compared again – but this time not by their costs, but by the usefulness or satisfaction their consumption provides for the consumer. Assume an initial situation, when the consumer has *4* sandwiches and *8* scones to consume. All the other bundles will be compared to this initial bundle by their utilities. Suppose that the consumer likes both the sandwiches and the scones, then he/she will find it beneficial to have *8* scones and *5*

[9] The described simple version of two products for the budget constraint can be generalised for more products, as in reality consumers spend their incomes on a lot more than two goods (products, or services). In theory a multi-product budget constraint can be written as $I = p_1 \times x_1 + p_2 \times x_2 + p_3 \times x_3 + \ldots + p_n \times x_n$, where p_i is the price and x_i is the quantity of product i , but a more useful version for practical applications is the one in which the income is divided between a particular product x and all the other commodities that the consumer buys. For this version the equation of the budget constraint is: $I = p_x \times x + 1 \times y$. Here x stands for the quantity of the particular product of interest, p_x is its price, y represents a fictitious product measuring the income left after buying product x (applying $p_y=1$ as its fictitious price).

sandwiches with it, instead of *4* ones. Similarly, higher utility, or satisfaction is attained from any bundle having more than *4* sandwiches with the *8* scones, because any such bundle contains the initial option of *8* scones and *4* sandwiches to consume, and offers some additional sandwiches to be used. The consumer may eat these additional sandwiches, or he/she can offer it to a friend in exchange for some favour, so the additional sandwiches can be used for some valuable purpose. The situation is similar when the bundle contains a fixed amount of *4* sandwiches and the amount of scones is increased from *8* units up. Summing up, the consumer prefers – that is, attributes higher use to - all the commodity bundles in which the amount of one commodity is the same as in the initial bundle, and the amount of the other commodity is higher. Of course, all bundles are preferred to the initial bundle, that contain larger amounts of both commodities.

Applying the same reasoning, when the consumer's bundle contains the same amount of sandwiches as in the initial bundle of (*4* sandwiches; *8* scones) and the amount of scones decreases, then these bundles become less valuable, less preferred. The situation is the same when the amount of scones is unchanged and the amount of sandwiches are decreased. The bundles with fewer scones and fewer sandwiches than in the initial bundle are also dispreferred.

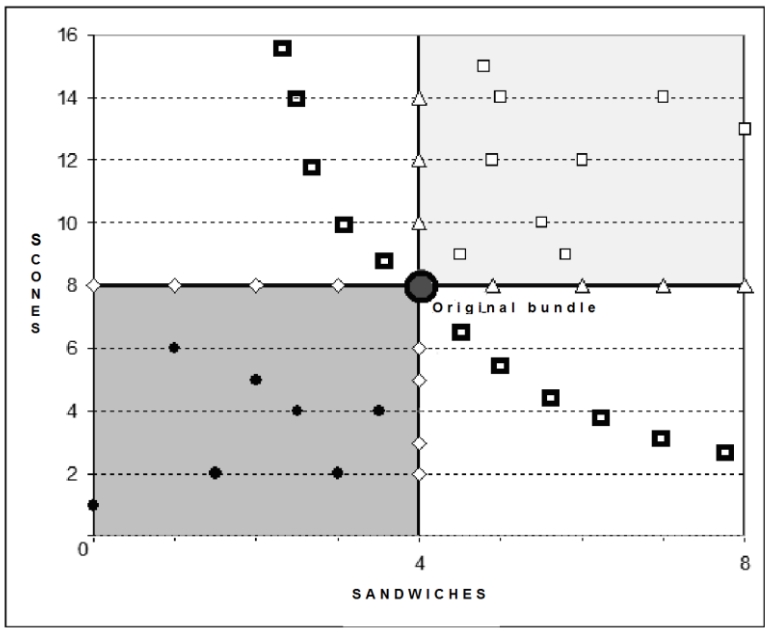
Thus, compared to the initial consumer bundle of (*4* sandwiches; *8* scones) clearly preferred and clearly dispreferred consumer bundles have been identified. We cannot decide the exact preference ranking of consumer bundles containing more than *4* sandwiches and less than *8* scones, or more than *8* scones and less than *4* sandwiches. The preference ranking of these bundles depend on how many scones the consumer is willing to exchange for one sandwich without experiencing a change in his/her well-being, that is, how many units of one commodity to sacrifice for one additional unit of the other product.

Figure 3.3 demonstrates the original consumer bundle (*4* sandwiches and *8* scones), and the definitely preferred or dispreferred bundles. Clearly, the bundle of *(4;8)* divides the space of attainable bundles (the space of consumption) into 4 sections. The lower left section (dark grey area) contains bundles definitely dispreferred to the initial one, the upper right section (light grey area) contains the bundled definitely preferred to the initial one. However, it is not clear whether the bundles in the lower right and the upper left sections (white areas) are preferred or dispreferred compared to the initial bundle. In these areas some of the bundles are preferred, some others are dispreferred, and others are exactly as useful as the initial bundle. It is certain, however, that bundles of the same usefulness as the initial bundle must lie here, namely in the upper left and the lower right sections of the graph, and nowhere else.

Bundles representing the same level of satisfaction for the consumer as the initial bundle are called indifferent bundles for the consumer's choice, compared to the original bundle. When plotting all these indifferent bundles, the resulting series of points is called indifference curve.

The indifference curve *defines the consumer's bundles (commodity combinations) in the consumption space that represent the same level of utility, to the consumer (*Farkasné Fekete – Molnár, 2007*).*

Assuming the divisibility of commodities the indifferent product combinations are scattered infinitely densely in the consumption space and the indifference curve is a continuous curve. In the rest of the text we will assume this, although real-world situations are rarely like this. Still, this assumption leads to many useful results that can be applied to non-continuous situations in practice.



△ preferred bundle: more of one good, same of the other good
◇ dispreferred bundle: less of one good, same of the other good
□ preferred bundle: more of both goods
● dispreferred bundle: less of both goods
◘ indifferent bundle: more of one good, less of the other good, the bundle has the same value as the initial one

Figure 3.3: ***Preferred and dispreferred bundles of goods***
Source: Author's own construction

The indifference curve belonging to the commodity bundle *(4;8)* is constructed as described above. Naturally, indifference curves may be constructed to any other initial bundle. Thus, for example, after constructing the indifference curve of the initial bundle of *(4; 10)* we can declare, that this curve is preferred to the indifference curve of the bundle *(4;8)*, - because the *(4;10)* bundle is preferred to the *(4;8)* bundle -, and lies above it in the consumption space. Similarly, the indifference curve of a dispreferred bundle will lie below the indifference curve of the initial bundle. This way an infinite number of indifference curves may be plotted in the consumption space. The diagram of these indifference curves is called **indifference map**, containing all combinations of two goods and the relevant indifference curves.

The indifference map is shown in the left panel of *Figure 3.4.* The figure demonstrates the **most important properties of indifference curves**. These are the following:

- **Indifference curves are downward-sloping:** This feature comes from the fact that when moving down along the same indifference curve, increasing the amount of product *x* the amount of product *y* must decrease to keep the utility of the bundle unchanged.
- **Indifference curves running higher represent higher levels of utility:** Taking commodity bundles with the same amount of product *x*, the more amount of *y* we have, the higher preference is attributed to the bundle; then the indifference curves containing such preferred bundles lie above the initial curve. The indifference curves *(1)*, *(2)* and *(3)* in the left panel of *Figure 3.4* demonstrate this property.
- **Two different indifference curves cannot intersect:** Assume that the indifference curves *(3)* and *(4)* in the left panel of *Figure 3.4* are different, but intersect in point *B*. As they are different curves they must have different points, as point *C* in curve *(3)* and point *A* in

curve *(4)*. Assume that points *A* and *C* represent commodity bundles in which the amounts of product *x* are the same, and the amounts of commodity *y* differ (higher for *A* than for *C*). This means that bundle *A* is preferred to bundle *C*. However, bundle *A* is indifferent to bundle *B* as both lie along the indifference curve *(4)*. But bundle *B* is also indifferent to bundle *C* along the indifference curve (*3)*. Therefore, as both bundle *A* and bundle *C* are indifferent to bundle *B*, then they must be indifferent to each other, too. This is a contradiction, as their *y*-amounts differ, while *x*-amounts are the same. This means that our initial assumption of the existence of an intersection point *B* was false.

- **Indifference curves are convex:** Instead of using the exact mathematical definition for convexity let's take the intuitive geometrical interpretation: a curve is convex if connecting any two points of the curve the connecting line lies above the curve. This is illustrated in the right panel of *Figure 3.4.* The commodity bundle represented by point *A* contains a lot of commodity *y*, and only a little of commodity *x*. On the other hand bundle *B* contains only a small amount of *y* and a lot of *x*, therefore both *A* and *B* contains somewhat extreme combinations of the two goods. Let's connect the two bundles *A* and *B*, and take the commodity bundle represented by point *D* in the connecting line. Bundle *D* contains less of *y* and more of *x* than bundle *A*, and more of *y* and less of *x* than bundle *B*, therefore its content is more balanced than either *A* or *B*. However, bundle *D* lies above the *A*-*C*-*B* indifference curve, so it is preferred to all of them (to *A*, *B* and *C* alike), its utility is higher than of those. Thus, convexity means, that the consumer prefers the balanced commodity bundles to any extreme bundle.

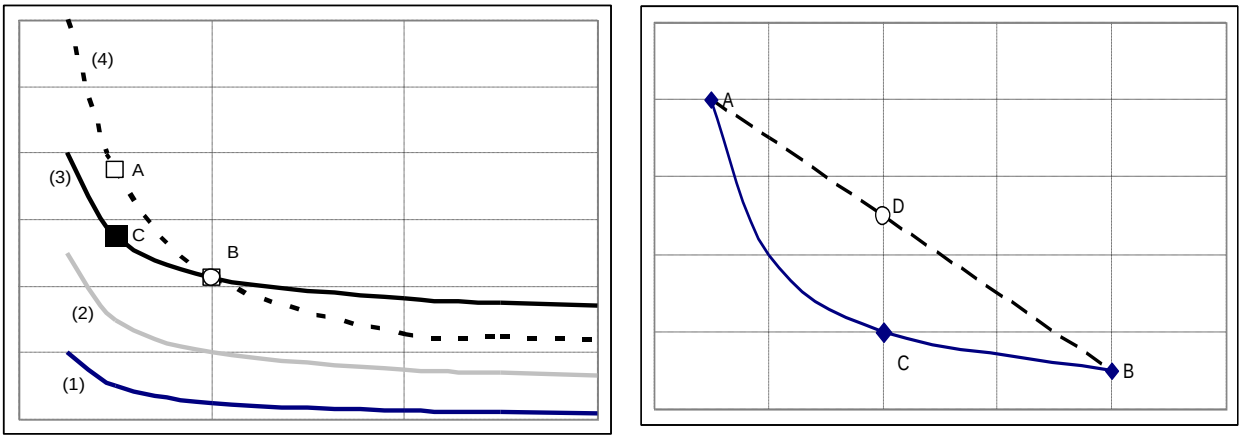


Figure 3.4: ***Properties of the indifference curve and the indifference map***
Source: Author's own construction

Continuous indifference curves having the above properties are usually called 'well-behaved' indifference curves. Some consumers, or some goods may have specific properties that make the relevant indifference curves behave in a different way, but most of the consumers and most of the commodity bundles generally show the above characteristics. In the rest of the text – when it is not indicated otherwise – well-behaved indifference curves are assumed.

The negative slope of the indifference curve means that the consumer is willing to exchange any two bundles lying along the curve. In other words, for getting an additional unit of commodity *x* he/she is willing to give up a certain amount of commodity *y*, and the other way round, the consumer is willing to give up one unit of commodity *x* for getting some additional units of commodity *y*. This phenomenon is called substitution along the indifference curve, that is, the consumer substitutes a certain amount of commodity *y* for one additional unit of commodity *x*. The rate of the exchange between the two commodities is an

important property of the shape of the indifference curve. Naturally, the substitution depends on the actual amounts that the consumer owns of the two commodities, because having a lot of one of the commodities and a very small amount of the other, the consumer is willing to give up more of the first one for getting an additional unit of the second one.

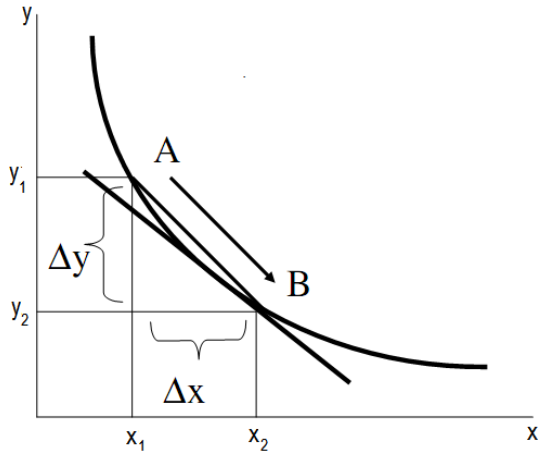


Figure 3.5: ***Substitution along the indifference curve***
Source: Author's own construction

In *Figure 3.5* the consumer is exchanging bundle *A* for bundle *B*, decreasing the amount of *y* for some additional amount of *x*. Then for giving up *Δy* of commodity *y* an additional amount of *Δx* is requested of commodity *x* as a compensation. The quotient of the absolute values of these two amounts is called the **Rate of Substitution** *(RS).*

The formula for computing the Rate of Substitution is: RS = |Δy / Δx | = - Δy / Δx, and this formula measures the absolute value of the slope of the line connecting points *A* and *B*. It is easy to see that this slope depends on the positions and the distance of *A* and *B* along the indifference curve. When point *A* is moved towards point *B* along the curve, the absolute value of the slope of the connecting line decreases, as well as the Rate of Substitution. For this reason an additional term is introduced: the **Marginal Rate of Substitution** *(MRS)* measures the amount of commodity *y* that the consumer is willing to give up for an infinitely small additional unit of commodity *x*, assuming that the utility of the new bundle remains the same as that of the initial bundle.

The formula for the Marginal Rate of Substitution is: MRS = |lim Δy/Δx| = |dy /dx | = - dy / dx. The Marginal Rate of Substitution gives the absolute value of the slope of the tangent line of the indifference curve at point *B* (that is equal to the first derivative of the curve by *x*).

3.3. Utility, Utility Function, Marginal Utility

Assume that the consumer may change the consumption of only one commodity keeping the consumed amounts of other goods constant. In our model of two commodities this means that the currently consumed amount of commodity *y* remains constant at the level y_0, while the consumer may *ceteris paribus* increase the consumption of *x*, attaining increasingly preferable consumer bundles, and respective indifference curves. The left panel of *Figure 3.6* illustrates this situation, with *U1*, *U2*, *U3* and *U4* indicating the increasing levels of satisfaction. The lower part of the panel shows the increasing utility levels that the consumer attains by increasing the consumed amounts of *x ceteris paribus*.

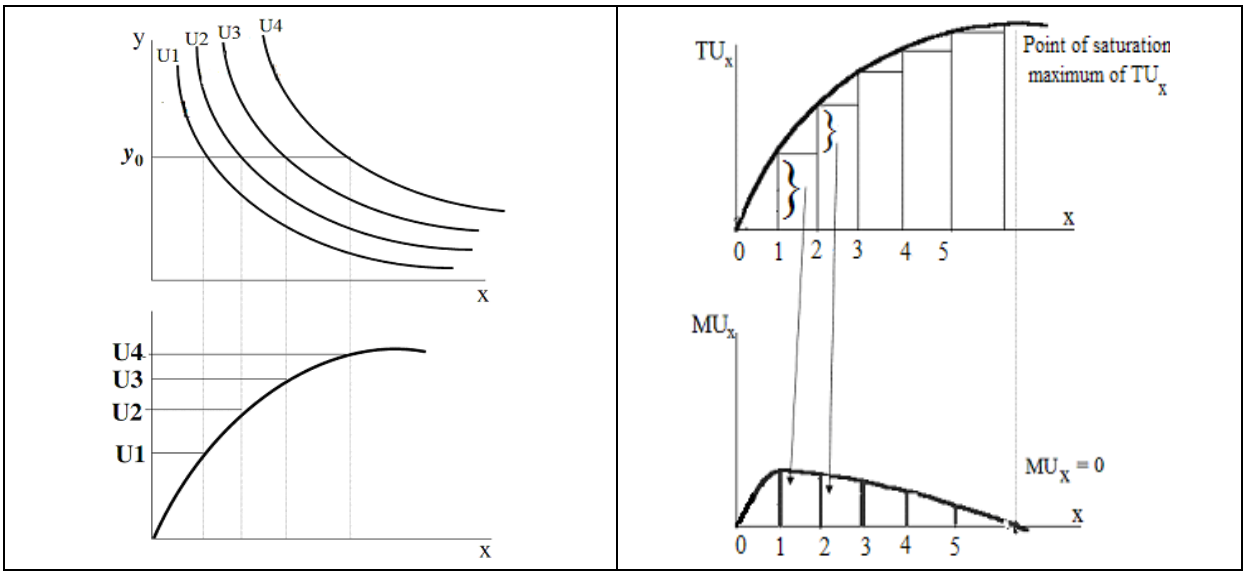


Figure 3.6: ***Indifference Curves and the Utility Function***
Source: Author's own construction

Utility (*U*) means *the useful properties of a commodity, or in other word, the satisfaction that the consumption of the commodity yields for the consumer*. The left panel of *Figure 3.6* measures the increasing utilities the consumer gains by increasing the comsumption of commodity *x*, *ceteris paribus*[10].

Consuming subsequent units of a product the utility experienced by the consumer increases, assuming other circumstances constant. However, consuming an additional unit of the product will not yield always the same increase in the total utility. Applying the definition to our previous example (with product *x* being the amount of sandwiches), when we are very hungry (because the amount of scones we have is very small, or zero), the first sandwich yields very high utility, but as we increase the amount of sandwiches consumed, our hunger subsides, and the satisfaction gained from the additional units decrease.

The additional utility gained by consuming an additional unit of the commodity is called the **marginal utility** *(MU)* of the commodity. Assuming unlimited divisibility of commodities the notion of marginal utility can be defined more precisely, as the change in utility experienced by consuming an infinitely small additional unit of the commodity. The **utility function** (*TU_x – Total Utility*) measures the total utility obtained by consuming y certain amount of commodity ***x***. Therefore total utility is equal to the sum of all marginal utilities obtained by consuming subsequent units of the commodity.

Therefore, the marginal utility of commodity *x* can be computed as:

$MU_x = \Delta TU_x / \Delta x \quad (\Delta x \rightarrow 0)$, the total change in utility obtained by changing the consumed amount of commodity *x* (*ceteris paribus*, with the consumption of *y* kept constant). The total utility (TU_y), and the marginal utility (MU_y) of commodity *y* is defined similarly, assuming, *ceteris paribus*, the consumption of *x* kept constant: $MU_y = \Delta TU_y / \Delta y \quad (\Delta y \rightarrow 0)$.

[10] How can we measure the utility of a commodity bundle? Measuring utilities is not an easy problem. It is not obvious whether the consumer can measure the satisfaction attained by consuming some goods. This problem is handled by various utility theories in different ways. **Cardinal utility theory** says that the utilities of consumer bundles can be measured by absolute numerical values, so their utilities are not only comparable to each other but the proportion of their utilites can me expressed, too. **Ordinal utility theory**, however, states, that the bundles can be compared, and ranked by their preferences, so the consumer can decide which is more useful of any two bundles, but the difference of their utilities cannot be measured. In the rest of the text the approach of the cardinal utility theory is used, assuming the notion of measurable utilities.

As the consumed amount of a product increases, then the additional units yield less satisfaction. The utility of the first sandwich for the hungry consumer is enormous, the second and the third sandwiches yield somewhat less satisfaction, and the tenth one may not be desirable at all. *Reaching a level of consumption, the additional unit will not yield any satisfaction, the consumer feels saturated, he* **saturation point** *of the utility function is attained. As the consumption of an additional unit does not yield any increase in the total utility, the value of marginal utility becomes zero* (see the right panel of *Figure 3.6*).

This rule is known as **Gossen's First Law (**Farkasné Fekete – Molnár, 2007; Kopányi, 1993; Samuelson-Nordhaus, 1987**)**: *As the consumption of a good is increased (ceteris paribus), then the increase in total utility attained by the additional units consumed will decline (the law of diminishing marginal utility***).**[11]

3.4. The Consumer's Optimal Choice

Summing up the previous sections, the consumer ranks the various commodity bundles comparing the satisfaction, or utility they offer. The bundles generating the same feeling of satisfaction, or the same utility, belong to the same indifference curve, and the consumer is willing to exchange these bundles. Suppose, that the consumer has two such bundles, the first bundle containing x_1 units of commodity x, and y_1 units of commodity y – as is shown by point A in *Figure 3.7*, using the notation $A(x_1;y_1)$ for this bundle. The second bundle is represented by point B with more of x and less of y: $B(x_2,y_2)$. Both bundles give the same utility, denoted by *U2*. Having the same utility, the consumer is willing to substitute one for the other. Let's have a closer look at the substitution of bundle A for bundle B.

The substitution will be done in two steps. First take bundle A, and decrease the amount of y to the level of y_2, keeping the amount of x at x_1, so that bundle A is exchanged for bundle $C(x_1,y_2)$. Obviously, this exchange results in a decrease of total utility, as one commodity has been constant, the other has decreased. Therefore point C lies below our initial indifference curve (in another curve of a lower utility level *U1*). Then in the second step bundle C is exchanged for bundle B, by keeping the amount y_2 constant while increasing the amount of commodity x from x_1 to x_2, increasing also the total utility level of the bundle, and getting back to the initial indifference curve *U2*.

In the first step (substituting C for A) a negative change of *U1-U2* takes place in total utility, with the amount of x kept constant, so the definition of the marginal utility of commodity y can be applied ($MU_y = \Delta TU_y / \Delta y$) to measure the resulting decrease in total utility: $\Delta TU_y = \Delta y \times MU_y$. In the second step (substituting B for C) a positive change of *U2-U1* is obtained in total utility, with a constant amount of commodity y consumed. Thus using the definition of marginal utility of commodity x ($MU_x = \Delta TU_x / \Delta x$) the resulting increase in total utility is: $\Delta TU_x = \Delta x \times MU_x$. And finally, the sum of these two successive steps gives the eventual change in total utility – the utility level decreasing from *U2* to *U1* and then increasing from *U1* to *U2* – the sum of these changes equals zero.

[11] In the real world there are consumption situations with increasing marginal utilities: for devoted collectors of something an additional unit of the collection yields increasing satisfaction. The same is true for harmful addictions – as drugs or alcohol. However, increasing marginal utility may be experienced even for normal goods, when a new product is just introduced to the consumer, and the consumption of the first unit creates only moderate satisfaction. Then as the consumer learns to enjoy the commodity, the successive units bring about growing satisfaction, and dinimishing marginal utility described by Gossen will be encountered only after having consumed a substantial amount

Therefore the total change in utility is: $TU_y + \Delta TU_x = 0$, so $\Delta y \times MU_y + \Delta x \times MU_x = 0$. Rearranging this equation[12] the following formula is obtained: $-\Delta y/\Delta x = MU_x / MU_y$. However, as it was seen when defining the marginal rate of substitution, and also shown here in *Figure 3.7*, *MRS* is equal to the proportion of the changes in *y* and *x* (assuming infinitely small change in commodity *x* – which was also the assumption when defining the marginal utilities of commodities *x* and *y*). Therefore $MRS = -\Delta y / \Delta x$, so taking into account the relationships above we get: $\boldsymbol{MRS = MU_x / MU_y}$, that is, the marginal rate of substitution is equal to the ratio of the marginal utilities of the commodities *x* and *y* at the consumption levels of the actual bundle.

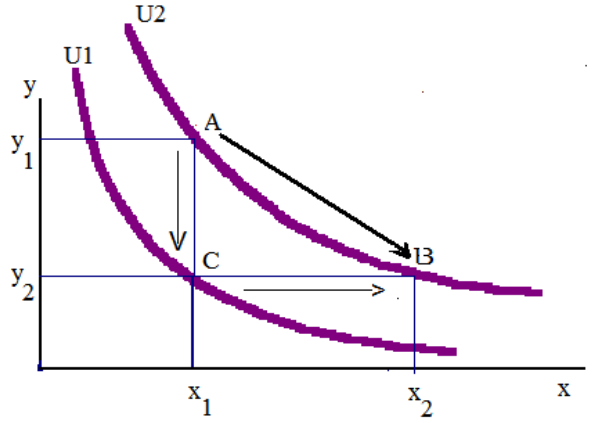


Figure 3.7: ***The relationship of Indifference Curves and Marginal Utility***
Source: Author's own construction

Now we have all the necessary tools to select the optimal bundle for the consumer.

As it was stated in section 3.1 the consumer's choice is limited by his/her income and the unit prices of the commodities, and these define the budget constraint (budget line) containing all the commodity bundles available for choice. The question is how to find the best of these bundles, that is, how to choose the point of the budget line that has the highest utility level.

The process of the consumer's choice is illustrated by *Figure 3.8*. Plot the budget line and the indifference map in the same diagram. Some of the bundles of the indifference curves lie below the budget line – being cheaper than the consumer's income -, others lie just in the budget line – costing just the consumer's income - and others lie above the budget line, being unattainable. There are two bundles in the indifference curve *U1* (marked by the two stars in the figure) that are just as expensive as the consumer's income. However, it is possible to attain the utility level *U1* spending less, as the bundles lying in the indifference curve between these two bundles all are falling below the budget line, indicating lower expenditures. Therefore the consumer can choose better than the bundles denoted by stars. Because the same utility level can be attained cheaper, with the current level of income higher utility is attainable. Such a higher utility level is represented by curve *U2*, but again, there are bundles along this curve that lie below the budget constraint, so this curve is not optimal either. The curve *U3* however, is unattainable, all the bundles of this curve lie beyond the budget constraint. The consumer should find the indifference curve of the highest utility level among all the curves having at least one attainable bundle, - that is, *at least one point of the curve*

[12] The equation is rearranged as follows: $\Delta y \times MU_y + \Delta x \times MU_x = 0$, that is, $-\Delta y \times MU_y = \Delta x \times MU_x$. Hence, dividing both sides of the equation by the quantity MU_y the following is obtained: $-\Delta y = \Delta x \times MU_x / MU_y$, and finally dividing both sides by Δx the equation becomes: $-\Delta y / \Delta x = MU_x / MU_y$.

lying in the budget line, and no point of the curve falling below the budget line. This is the indifference curve denoted by *U** in *Figure 3.8.* Therefore the consumer's optimal choice is the bundle represented by the **tangency point** of the indifference curve *U** and the budget line *(assuming well-behaved indifference curves).*

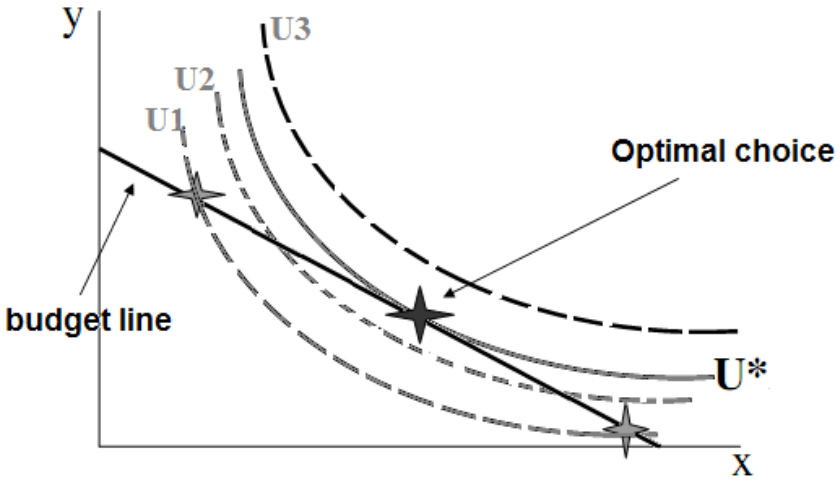


Figure 3.8: ***The Consumer's Optimal Choice***
Source: Author's own construction

The budget line is tangent to the indifference curve *U** in the optimal point.

The slope of the tangent line to the indifference curve is defined by the marginal rate of substitution: $dy/dx = -MRS$**.** On the other hand, **the slope of the budget line is –by definition - determined by the price ratio of the two commodities,** that is $-p_x / p_y$. In the point of the optimal bundle the two slopes must be equal (as the tangent line to the indifference curve is the budget line itself), so the equation $MRS = p_x / p_y$ holds. From the previous sections we know that $MRS = MU_x / MU_y$, the marginal rate of substitution is equal to the ratio of the marginal utilities of the two commodities. Then, for the optimal bundle the following relationship must hold: $MU_x / MU_y = p_x / p_y$, meaning that the ratio of the marginal utilities – representing the consumer's opinion – must be the same of the ratio of the market prices of the commodities, representing the opinion of the market.

Rearranging the relationship: $MU_x / p_x = MU_y / p_y$. This formula can be generalised to more than two commodities:

$$MU_x / p_x = MU_y / p_y = MU_v / p_v = MU_w / p_w \ ...etc.$$

Thus **Gossen's Second Law** can be stated as **(**Farkasné Fekete – Molnár, 2007; Kopányi, 1993; Samuelson-Nordhaus, 1987**)**: *A consumer will spend his/her income in an optimal way achieving maximum satisfaction when the marginal utility of the last unit of income spent on each good is exactly the same (this is called the equimarginal principle).*

The above relationship offers a simple way of deciding whether a particular bundle of commodities is optimal or not. An example is shown in *Table 3.1*.

As the table shows, the consumer buys two products, chocolates and oranges. For both products the table shows the changes in utility generated by increasing consumption, that is, the marginal utilities. Thus, for instance, eating 2 units of chocolates instead of 1, the consumer's utility increases by *50* units, so the marginal utility is *50* (assuming no other change in the circumstances). As we know, the consumer spends his/her income in the best possible way when the ratio of the marginal utility of the last consumed unit and the unit

price of chocolate is equal to the ratio of the marginal utility of the last consumed unit and the unit price of oranges. As the table shows, this is the situation with consuming *3* units of chocolates and *5* units of oranges. The decision process is the following: At first the consumer decides whether to choose an orange or a chocolate as the first unit to consume. As the value of *MU/p* is higher for the first unit of oranges *(2.00),* than for the first unit of chocolates *(1.33),* the first consumption choice is to buy *1* orange, spending *20* HUF. The second purchase is another orange, as the *MU/p* value of the second orange is *1.50*, is still higher than the same value for the first chocolate *(1.33).* The consumer spends again *20* HUF. The third purchase, however, is a unit of chocolate, because the *MU/p* value for the first chocolate is *1.33* while it is only *1.00* for the third orange. Similarly, the fourth purchase is an orange again, as the ratio of marginal utility to price is *1.00* for the third orange, and it is only *0.83* for the second chocolate. The fifth purchase is a chocolate (with *0.83* for the second chocolate while it is only *0.6* for the fourth orange), while the order of the sixth and seventh purchases cannot be decided, because the *MU/p* values for third chocolate and the fifth orange are the same *0.5*, so the order of these purchases does not matter for the consumer.

Table 3.1: **Example for Maximising the Consumer's Utility**

Chocolates				**Oranges**			
Chocolates	$MU_{choc's}$	$P_{choc's}$	$MU_{choc's}/P_{choc's}$	***Oranges***	$MU_{oranges}$	$P_{oranges}$	$MU_{oranges}/P_{oranges}$
1 db	80	60	1,33	**1 db**	40	20	2,00
2 db	50	60	0,83	**2 db**	30	20	1,50
3 db	30	60	**0,50**	**3 db**	20	20	1,00
4 db	20	60	0,33	**4 db**	12	20	0,60
5 db	10	60	0,17	**5 db**	10	20	**0,50**
6 db	5	60	*0,10*	**6 db**	4	20	0,20
7 db	2	60	0,03	**7 db**	2	20	*0,10*
8 db	2	60	0,03	**8 db**	1	20	0,05
9 db	1	60	0,015	**9 db**	1	20	0,05
10 db	1	60	0,015	**10 db**	0,5	20	0,025

Source: Adapted by Farkasné Fekete – Molnár (2007), page 82.

Naturally, to attain the optimal choice the consumer must have sufficient income, that is *280* HUF in the example (with three chocolates costing *180* HUF and five oranges costing *100* HUF). With income less than this amount the decision process described above will stop earlier, while with more income the process continues, as shown in the table, where the purchase of *6* chocolates and *7* oranges also satisfy the equimarginal principle.

When the consumer wishes to decide whether a given commodity bundle is an optimal bundle or not, a similar method is followed. Suppose that the consumer's income is *500* HUF, and the bundle he/she intends to buy is *5* chocolates (costing *300* HUF) and *10* oranges (costing *200* HUF). With this bundle, however, $MU_{choc's}/P_{choc's} = 0,17 > MU_{oranges}/P_{oranges} = 0,025$. Therefore the decision is not optimal. How to rearrange the consumer's bundle? The *MU/P* value should be decreased for the chocolates and increased for the oranges. As the consumer cannot change the unit prices of the commodities, the marginal utilities should be changed, namely decreased for chocolates and increased for oranges. This can be attained, as is shown in the table, by increasing the amount of chocolates and decreasing the amount of oranges. Thus the consumer should buy more chocolates, and the additional money for that will be spared by buying less oranges.

3.5. The Impact of Changes in Incomes and Prices on the Consumer's Optimal Choice

As the previous sections described, the consumer determines the optimal commodity bundle relying on the indifference map representing the utilities of the commodities, and the budget constraint. This latter, on the other hand, depends on the consumer's income and the prices of the commodities. The prices, and the income, as external conditions for the consumer, may change in time. How will this affect the consumer's optimal choice?

First, let's analyse the **impact of the change in the consumer's income**. Suppose that the income that the consumer intends to spend on a particular bundle of commodities increases for some reason (e.g. due to a wage rise or a tax cut, or a decrease of other expenditures such as the cost of heating, leaving more money for the consumer to spend). The increased income will change the budget constraint, expanding the set of attainable commodity bundles, and the budget line shifts upward, parallel to the initial line. Thus the optimal indifference curve tangent to the budget line will also change, as well as the tangency point. Let's have I_1, I_2 and I_3 three incomes in the following order: $I_1 < I_2 < I_3$, and $(x_1; y_1)$, $(x_2; y_2)$ and $(x_3; y_3)$ the respective optimal bundles in the budget line.

The **ICC (***Income-Consumption Curve, Varian, 1991) is: the curve representing the consumer's optimal commodity bundles at varying incomes and constant prices.*

The impact may be assessed looking at only one of the commodities, e.g. commodity *x*. For a graphical representation let's put the amounts of commodity *x* on the horizontal axis, and income on the vertical axis, and allocating the incomes to the *x*-values of the optimal bundles for the relevant income levels, the resulting set of points define the Engel –curve (see the left panel in Figure *3.9*).

The **Engel-curve** *represents the relationship between the consumer's income and the consumed amount of a particular commodity assuming constant prices.*

Now let's look at the **impact of price changes.** Suppose that the consumer's income is constant as well as the price of commodity *y*, while the price of commodity *x* keeps decreasing. As one of the prices is decreasing, the slope of the budget line is also changing in a way, that allows the consumer to buy more of product *x*, shifting the intersection of the budget line and the *x*-axis to the right, towards larger amounts of *x*. Therefore the optimal indifference curve fulfilling the tangency condition also changes, as well as the point of tangency. Let's have $P1_x > P2_x > P3_x$ three different prices of commodity *x*, with $(x_1; y_1)$, $(x_2; y_2)$ and $(x_3; y_3)$ the three optimal bundles of the respective budget lines.

PCC (*Price-Consumption Curve, Varian, 1991): A curve representing the consumer's optimal commodity bundles chosen at changing prices of one commodity while the consumer's income and price of the other commodity are kept constant.*

Looking at the impact of the decreasing prices on the consumption of the commodity, let's draw a graph with the changing prices of commodity *x* on the vertical axis and the consumption of commodity *x* on the horizontal axis. Allocating the *x*-values of the PCC curve to the respective price levels the resulting set of points define the individual demand curve of the commodity (see the right panel in Figure *3.9*).

The ***individual demand curve (function)*** *shows the quantities of a particular commodity that the individual consumer is willing and able to consume at different prices.*

The shapes of *ICC* and *PCC* give very valuable information about the properties of the commodities and the consumer's opinion or judgement about them. In *Figure 3.9* both curves are upward-sloping, but in specific cases both of them may be downward-sloping as well. The present text cannot discuss these specific cases in detail, but the interested reader is referred to the texts listed in the References section for more information.

Note, that knowledge of price and income trends, or at least a reasonable estimation of them may be crucial for an enterprise – producer or trader alike -, because this allows them to estimate the expected changes in demand, as a result of e.g. increasing incomes of the local community generated by regional development programmes, or a price rise necessitated by a government regulation such as increased value added tax. The approximate knowledge of the shapes of *ICC* and *PCC* may help enterprises to estimate the impacts of such changes and to respond to them appropriately.

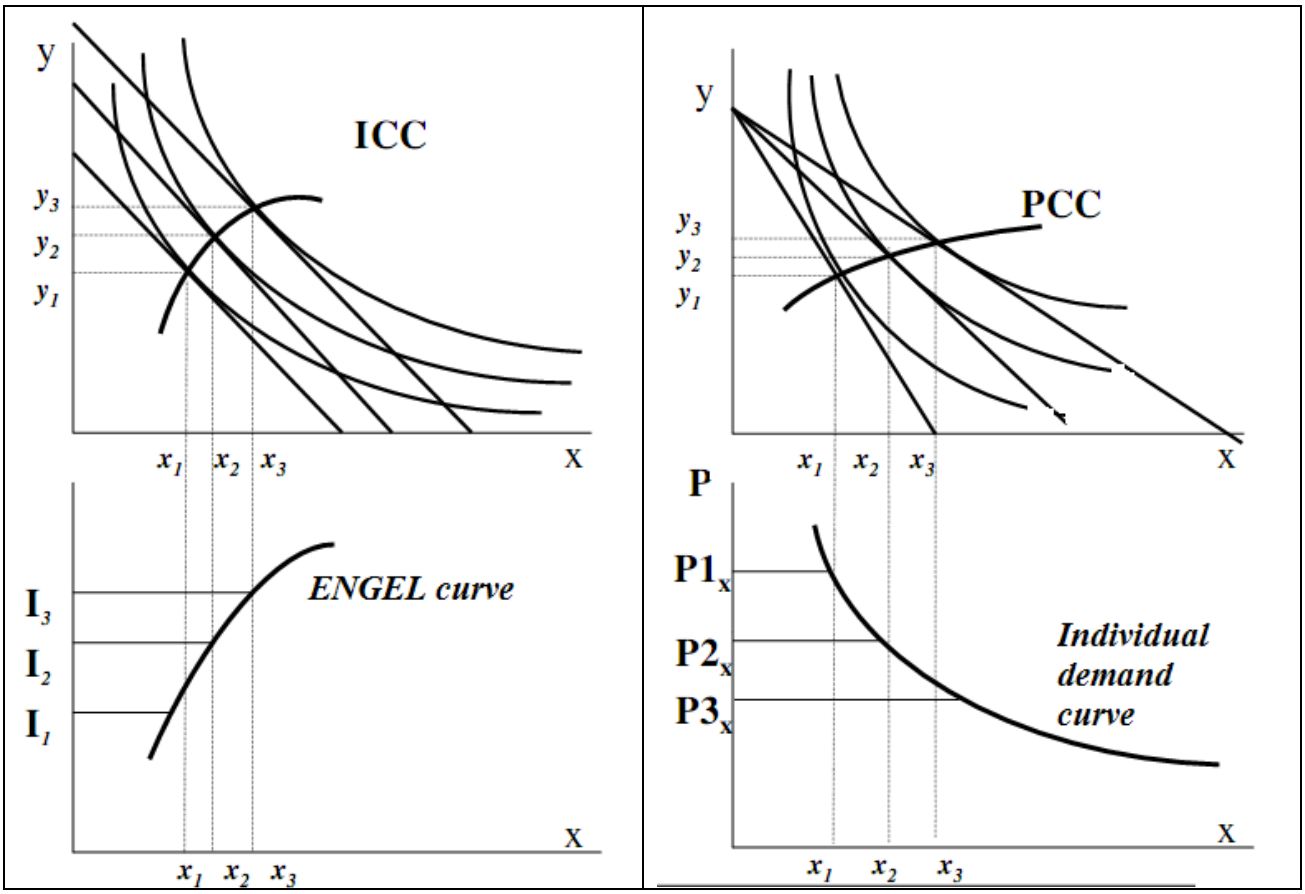


Figure 3.9: ***The ICC and PCC***
Source: Author's own construction

Review Questions

1) What is the budget constraint and what factors affect it?
2) What does the indifference curve mean?
3) What does the preference ranking of the consumer's commodity bundles mean?
4) Explain the notions of substitution, rate of substitution and marginal rate of substitution.
5) Explain the notion of utility. Define the utility function. What does saturation mean?
6) Explain marginal utility, give the formula for computing its value.
7) Explain Gossen's First Law.
8) Explain the relationship of the marginal rate of substitution and marginal utility.
9) Describe the consumer's optimal choice.
10) Explain Gossen's Second Law.

11) What does ICC represent, and how is it related to the Engel-curve?
12) What does PCC represent and how is it related to the individual demand curve?

Problems and Questions to Develop Competence [13]

1) What will the impact of a government decision – e.g. increased value-added tax - be on the demand for a product, if the producer must respond to the government decision by raising the price of the product? What happens with demand, if another government decision – e.g. an increase in the rate of personal income tax – leads to a *5 %* decrease in the consumers' disposable income? Illustrate the changes in the diagrams of *ICC* and *PCC*. Collect data about contemporary events that support the principles of the theory.

2) On 1st January a professor made a resolution to lose some weight and save some money. Therefore he decided that he would spend exactly *24 thousand* HUF for lunches each month. For lunch, he has only two options: the university canteen, where the price of a lunch is *1200* HUF, and a nearby restaurant, where the price of a lunch is *2400* HUF. Every day that he does not eat lunch, he runs *5* kms.

a. Assuming that the professor spends the *24000* HUF for lunch each month, eating either in the restaurant or the university canteen, sketch his budget constraint, giving the actual numbers of lunches on the axes.
b. Last month the professor chose to eat at the canteen *10* times and in the restaurant *5* times. Does this choice fit within his budget constraint? Explain your answer.
c. Last month the restaurant offered a special half-price lunch all month, that is, all lunches were reduced to 1200 HUF. Show the effect on the professor's budget constraint.

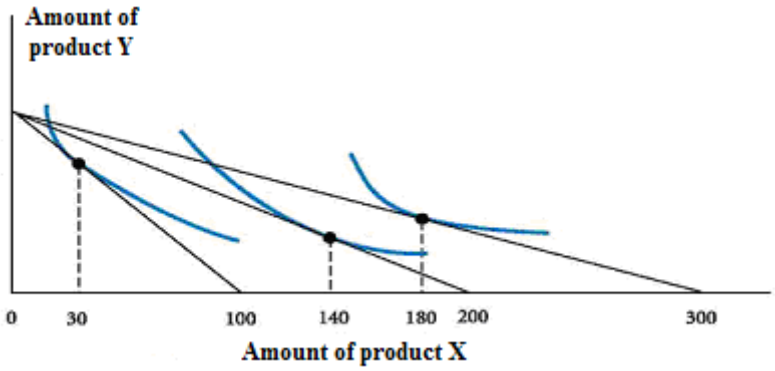
3) The following table gives the total utility schedule for a cookie fan:

Cookies consumed (units)	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Total utility (TU)	*0*	*100*	*200*	*275*	*325*	*350*	*360*	*360*

Calculate the marginal utilities for the respective consumption levels. Draw a graph of the total utility and the marginal utility schedules. Suppose that the unit price of cookies is *60* HUF, and the disposable income of the cookie fan is very high. What is the maximum number of cookies she would most likely eat?

4) The weekly income of a household is *30000* HUF. If the figure below represents the choices of that household as the price of *X* changes, plot three points on the household demand curve.

[13] Source for problems 2, 3 and 4: Case et al. (2009)


Amount of
product Y
0
30
100
140
180
200
300
Amount of product X

Chapter 4: The Supply Side of the Product Market

The producer, or the seller plays the key role in the supply side of the product market. The production of goods (products and services) is carried out by the firms, the business organisations. As it was explained in section 2.1 the role of an enterprise is to allocate and combine productive resources to provide products and services wanted by consumers. Thus a business organisation produces its output with the aim of selling it in the market, and maximise its profit earnings. To achieve its objectives it will make decisions and take risks. While making decisions the enterprise answers the questions of 'what, how and whom for' that is, it will choose the product or service and its amount, the technology and the resources to use, and the market where the output will be offered for sale.

The profit is the difference of the sales revenue and the production costs, so the enterprise is trying to increase its revenue and decrease its costs. To achieve this objective it will utilise the resources in an efficient way, choosing an efficient technology, and trying to produce the largest possible amount of output using the available resources, or, in other words, use the fewest possible resources to produce the same amount of output. Besides efficiency the entrepreneur must look at the profitability as well: to choose the technologically efficient option may not result in financial gains. Suppose, that the small amount of some resource required by the efficient technology is simply too expensive compared to the very low price of the output, which is produced in large quantities, and therefore the enterprise faces losses in spite of technological efficiency.

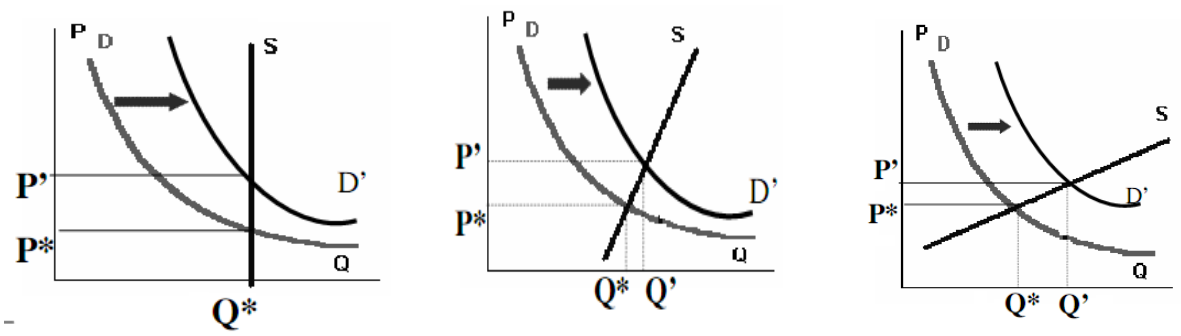
The choice of a technology means the choice and change of the amounts of various productive resources. The ability of the firm to change the amount of some resource in the production process depends – among other things – on the time available for the change. In everyday life the firm is often unable to increase the number of available machinery in a limited time period, because the purchase of a new piece of machinery is a decision with long-term impacts, and to raise money for it may be difficult, whereas the new machine may not be needed permanently. Thus the producer may often face situations when the amounts of some resources are possible to change, while others not. Such decisions are called short-run decisions – most of the real-life decisions are like that, while long-run decisions are faced when the time available is long enough for the decision-maker to change the amounts of all productive resources if needed.

The producer's decisions are highly influenced by the surrounding market structure. There may be many similar producers in the market, each selling very similar goods, and then our firm must adapt to the market processes, being unable to influence them to any significant extent. This is a typical property of the so-called competitive markets, or perfect market competition. In such markets our firm is only one of many sellers, its output is only a small fraction of the total market supply, and it has no market power to influence prices. If, however, our firm has control over the market due to its excessive market share, then it is able to influence, or determine the price. In the most exterme case the firm is the only seller present in the market, selling without competition – this is the so-called monopoly – and it will determine the prices alone. Markets with only a few sellers are called oligopolies. It such markets any single seller (producer) may be able to influence the market processes, also taking into account the behaviour of the other sellers, and responding to them while making decisions. Market structures determining the producers' decisions are discussed in Section 4.6 in detail.

4.1. Time in Microeconomics

The length of time for the producers refers to their ability to change the quantities of some, or all of the resources. *The time period in microeconomics is defined by the way and time needed for the decision-maker to respond to economic or market changes and impulses* (Farkasné Fekete – Molnár, 2007). Microeconomic time periods are of great importance for producers and firms, because out of the elements of the market they can influence the supplied quantities – by changing the amount of resources used. Producers can therefore respond to changes in market conditions by changing the supplied amounts, if they are able to change the inputs utilised.

Depending on the ability to change the amount of resources used in the production process, three time periods are distinguished in microeconomics, as they are illustrated in *Figure 4.1*.



Very short run (Immediate) ***Short run*** ***Long run***

*Figure 4.1**: Time in Microeconomics***

Source: Author's own construction

Immediate 'run'(very short run)*: the time period during which the producer is unable to change any of the inputs.* Then, in response to a change in market demand, no change in the supplied quantity is possible, and only the market price can adjust.

Short run: *the time period, during which the producer is able to change at least one input, but not all of them,* so in response to a change in demand the supplied quantity may somewhat adjust.

Long run: *the time period during which the producer is able to change all of the inputs,* so in response to a change in demand the supplied quantity may adjust to a large extent.

4.2. Technical Relationships of Production

4.2.1. The Short-Run Production Function, Average Product, Marginal Product

The production function is a technological relationship that defines the maximum possible output produced using specific combinations of inputs at a given technological level of development (Farkasné Fekete – Molnár, 2007).

The formula for the production function is: ***Q = f(K,L),*** where *Q* denotes the quantity of output, *K* and *L* are the utilised amounts of capital and labour, respectively.

It often happens in real life that the firm cannot change all of its inputs, therefore it faces short-run decisions. Then, the quantities of some resources may be changed, while others are fixed. Most of our everyday decisions are like that. Long-run decisions are encountered when the time is long enough for the decision-maker to change the used quantities of all resources.

Let's have a closer look first at the short-run production function. Assume, therefore, that we have two resources, capital and labour, and within the available time span the amount of labour can be changed, while the capital factor is fixed. Thus the amount of capital is a constant value, K_0. *The **short-run production function** gives the amount of output as the function of the amount of one input, assuming that the other inputs are constant.* The short-run production function is given by the following formula:

$\boldsymbol{Q = f(K_0,L)}$, where K_0 is fixed, L is changing. A usual notation for the amount of output is ***TP*** , short for *Total Product*: $\boldsymbol{TP = f(K_0,L)}$

A simplified way of notation is the following*:* $\boldsymbol{Q=f(L)}$, or $TP=f(L)$.with a fixed level of capital at K_0 .

The top panel of *Figure 4.2* shows the short-run production function.

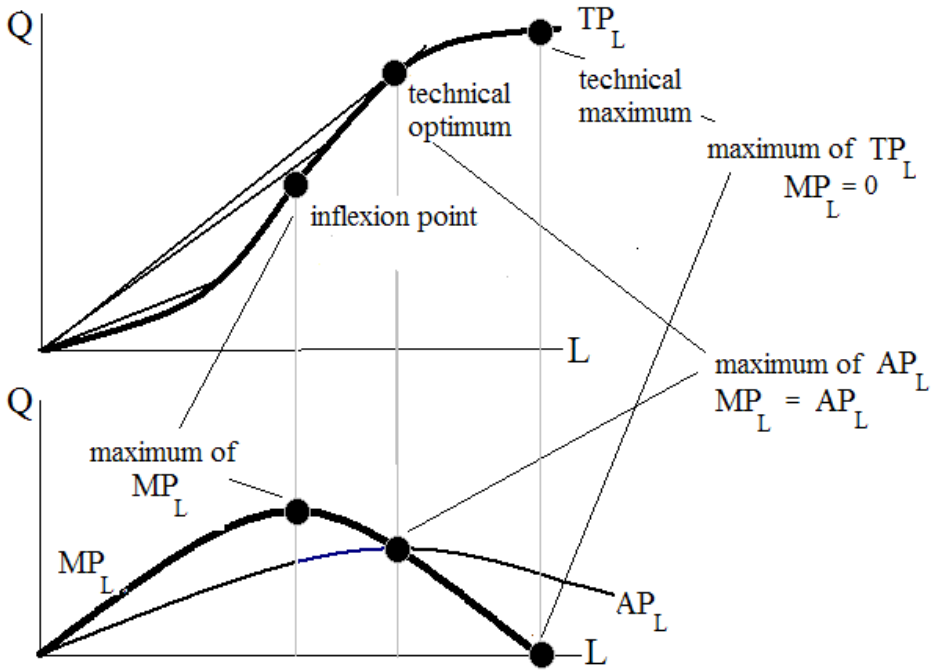


Figure 4.2 ***: Short-Run Production Function and its Significant Points***
Source: Author's own construction

The short-run production function describes the change of output as a result of a small change in the changeable input – labour, in our example. This relationship is measured by the **marginal product** of the input *(MP).*

*The **marginal product of labour** ($\boldsymbol{MP_L}$) shows the change in total output when an additional (small) unit of labour is used in production:* $\boldsymbol{MP_L = \Delta Q/\Delta L}$ *(if* $\Delta L \rightarrow 0$*).*

Marginal product, therefore, measures the speed at which the production function (total product) is changing, in other words, it is the slope of the production function in a given point. (The slope of a curve is defined as the slope of the line tangent to the curve in the given point.) The value of marginal product shows the response of the output to a change in the input compared to the current situation. Another important information is the productivity of the input at the given level of use.

The average product of labour, AP_L *shows the average amount of output produced by each unit of labour:* $AP_L = Q/L$.

The marginal product of capital, and the average product of capital can be defined in the same way, when the labour may be the fixed factor and capital the variable one (e.g., in crop production, when the variable input is the amount of fertiliser). Then the short-run production function is: $Q=f(K)$, with L_0 being constant. Thus the ***marginal product of capital*** (MP_K) *shows the change in total output when an additional (small) unit of capital is used in production:* $MP_K = \Delta Q/\Delta K$ *(if* $\Delta K \rightarrow 0$*).* ***The average product of capital*** (AP_K) *shows the average amount of output produced by each unit of capital:* $AP_K = Q/K$.

The shape of the production function is usually non-linear, that is, the same additional increases of the variable factor do not imply the same additional increases of output, as it is illustrated by the top panel of *Figure 4.2*. At small values of labour (the variable input), with sufficient amounts of capital a small increase in labour leads to large increase in output, for the following reason. As every worker has enough material and tools to work with, each new worker can repeat what the others have done. On top of that the new workers can cooperate with the old ones, and everyone may specialise in the task that he/she is best at. So, at low levels of labour any new unit of labour leads to larger increases of output than the former one, the slope of the production function increases, the marginal product rises. This, however, cannot go on infinitely. After attaining a certain level of labour the new worker will not have enough tools, or machinery to work with (as capital is constant), so the output cannot rise as before. Although output may still rise, as the new worker can work efficiently for short periods, while the others have a break, this additional output becomes less than that of the former workers. So adding some more units of labour may still be reasonable, resulting in growing output, although at a decreasing rate. Still, after some more units the capacity of the capital factor is reached and new workers cannot find anything to work with, their marginal product falls to zero, output cannot be increased any further. This process is illustrated in the top panel of *Figure 4.2*, showing a typical S-shape of the production function. At first the production function grows at an increasing rate, and later this switches to a decreasing rate, and eventually the growth stops.

The bottom panel of *Figure 4.2* shows the shape of the marginal product of labour. While the increase of labour brings about growing outputs at increasing rates, the same increments of labour result in growing increments of output, and marginal product rises. When the growth of the production switches to decreasing rates, the marginal product starts to fall. The average product of labour can be described similarly. While the additional units of labour lead to increasing additional output, then the output per unit of labour (that is, average product of labour) will grow. The average product will continue growing as long as the additional output produced by the addititional unit of labour (that is, marginal product) is higher than the output per labour (the average product) of the former labour units. Therefore the average product will increase as long as marginal product is higher than the average product. When average product reaches the level of marginal product, the continuing decrease of marginal product starts to pull down the average product. Average product can be interpreted in a graphical way, too. At any level of labour, connect the production function at this labour level to the origin. The slope of the connecting line can be measured as the ratio of the vertical and the horizontal coordinates of its endpoint in the production function, in other words, the ratio of the output and the amount of labour belonging to this output, which is the average product itself.

Now we can summarise the properties of the short-run production function. In its first stage the short-run production function grows at increasing rates. In this stage the marginal product, that measures the growth rate of the production function, also increases. In the second stage the short-run production function still increases, but at decreasing rates, until it

reaches its maximum value. Because of this decreasing rate the marginal product, although positive, decreases. Therefore marginal product is positive and increasing at low levels of labour, while reaching a particular level of labour input, it turns to positive but decreasing. *The output level, at which the growth rate of the short-run production function turns from increasing to decreasing, is called the* ***inflexion point*** *of the production function.* Marginal product reaches its maximum value at this point, it is growing up to this point and is falling afterwards. *The level of output where the production function reaches its maximum value, and the marginal product becomes zero, is called* ***technical maximum*** (as with the present technology no higher output is attainable).

The shape of average product can be graphically described if the origin is connected to a point of the production function, and this point is moved upwards along the production function. The slope of the connecting line is equal to the value of average product. As is obvious from the graph, this slope increases at first, then, from the point where the line is just tangent to the production function, it starts to decrease. Therefore the average product grows at first, and reaching its maximum, starts to decrease. *The point of the production function, where the value of the average product is the highest, is called* ***technical optimum.*** This point is optimal in the sense, that the output per unit of labour is the highest, so the productivity of labour is the best at this level of input use.

It was shown, that the maximum value of the average product is attained at the level of input, at which the line representing the average product is tangent to the production function, However, the slope of the tangent line has to be equal to the marginal product of labour at this input level. We can state, that *at the point of technical optimum the average product reaches its maximum value, and it is equal to the marginal product*, too.

Therefore the use of the variable input can be divided to stages according to the shapes of the production function (the total output) and the marginal product.

- In the first stage of production – from the origin to the inflexion point – the total output grows, the marginal product also grows, and this is called the stage of increasing returns.
- In the stage section – from the inflexion point to the technical optimum – total output grows at a decreasing rate, the average product grows, the marginal product decreases already.
- In the third stage – from the technical optimum to the technical maximum – the total output grows at decreasing rates, the marginal product decreases, but is positive, and the average product decreases.
- In the fourth stage – after the technical maximum is reached – total output does not grow any more, it may even start to decrease, the marginal product is negative and decreasing, while average product is also decreasing.

The first stage is called the stage of increasing returns, the second, third and fourth stages together are the stage of diminishing returns. ***The principle of diminishing returns*** *means, that when additional units of a variable input are added to the former units – keeping the other inputs constant – the marginal product of the variable input declines.*

4.2.2. Long-Run Technical Relationships of Production, Isoquants

Let's look at the technical properties of production, assuming that the producer is able to change the amounts of all inputs. Take a simple example for illustrating the main relationships. Suppose that a firm deals with excavations, earthwork for construction. The firm employs manual labour (*L*), and it can rent machines, excavators (*capital, K*). The firm

is contracted to dig out a 10 km long canal within one week (therefore the planned output – the answer to 'what, and for whom' – is known). Considering 8 working hours a day, and 5 days a week, the total time available for the job is 40 hours, and the possible technology options are shown in *Table 4.1*:

Table 4.1: **Alternatives of Technology**

	1.	**2.**	**3.**	**4.**	**5.**
L, labour (persons)	100	60	30	25	25
K, number of machines	1	2	3	4	5

Source: Author's own construction

As the above table shows, the last alternative, *no 5*. is certainly not reasonable, as the same output is achieved using more resources than option *no. 4.* (This situation may occur when we plan to use more machines, but some tasks still require the exclusive use of manual labour, as the surface, or the access to the work area is not suitable for the machine.) Therefore we have four technically efficient options to choose from.

Let's plot these efficient alternatives in a diagram that has the available capital on the horizontal axis, and the available labour on the vertical one. The common property of the four alternatives is the same level of output that they produce. Each alternative of labour and capital combinations is represented by a point in the diagram, and joining these points the result is a curve of the same output, called **isoquant**.

The ***isoquant*** *is a curve connecting all combinations of capital (K) and labour (L) that can be used to produce a given level of output (*Farkasné Fekete - Molnár, 1997; Case et al, 2009*).*

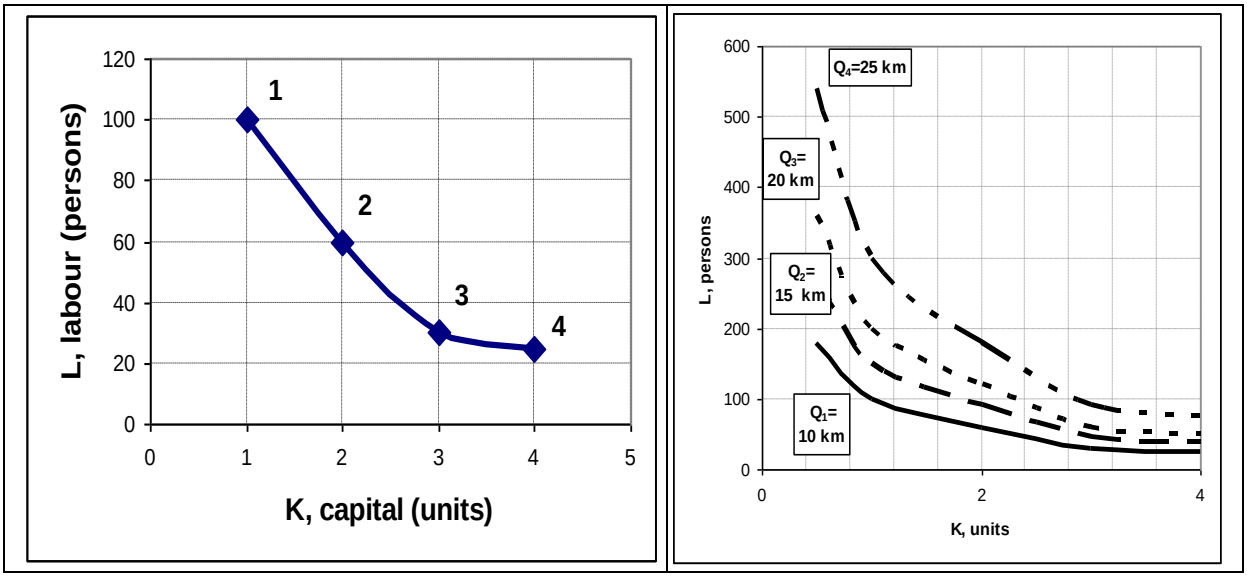


Figure 4.3: ***Isoquants and the Isoquant Map***

Source: Author's own construction

The left panel of *Figure 4.3* shows the isoquant curve of the *10 km* canal. The curve is drawn as a continuous curve, that is, the points of the four alternative technologies are connected. The curve shows that if the number of labour is to be decreased, the number of machines must be increased. Taking the first alternative, and decreasing the number of the *100* units of labour to *90* units we have to increase somewhat the number of machines, to about *1.2* units. This, of course, does not mean cutting up a machine to pieces, but the second machine will not be used for *8* hours a day, but only *20 %* of the time, that is, about *1.6* hours.

This is the way to interpret fractional units of labour and capital in the diagram, identifying them with fractions of total working time.

Similar isoquants will represent the outputs of *11* km, *15* km, *20* km, *25* km canals during a week. It is easy to see that if we need 100 units of labour for a 10 km canal, we will need more labour, and maybe more machines for digging out a 20 km canal during the same time; therefore the combinations needed to achieve higher outputs must lie above, or rightwards from, the isoquant plotted in the left panel of *Figure 4.3*. Therefore the isoquants for all the possible levels of outputs are drawn, creating an isoquant map containing the family of all isoquants (see the right panel of *Figure 4.3*).

As it was shown, to decrease the quantity of one input while maintaining the level of output the other input must be increased – thus the slope of the isoquant is negative. How do the changes in the two inputs relate to each other? How many units of extra labour should be employed to maintain the level of output when the quantity of capital is decreased by a small unit (e.g. the machine works a few hours less)? This proportion, that is, the ratio of the change in labour and the change in capital is measured by the *Rate of Technical Substitution* (*RTS).* More precisely, *RTS* measures the absolute value of the ratio of the change in labour to change in capital, as the following formula defines**:** $\boldsymbol{RTS = |\Delta L/\Delta K| = -\Delta L/\Delta K,}$ using the notations of the left panel of *Figure 4.4* .

The ratio itself is negative, as a positive value of ΔL implies a negative value of ΔK, and the absolute value of their negative ratio is obtained multiplying it by *-1*. In the left panel of *Figure 4.4* point *A* represents a capital-intensive technology while point *B* is a labour-intensive one, and the change of technology from *A* to *B* results in a rate of substitution that is equal to the absolute value of the slope of the *A-B* line. It is easy to see that this line is steeper when *B* lies far from *A*, and the value of *RTS* changes according to the position of *B*. Therefore it is also reasonable to measure the rate of substitution assuming an infinitely small distance of *B* from *A*.

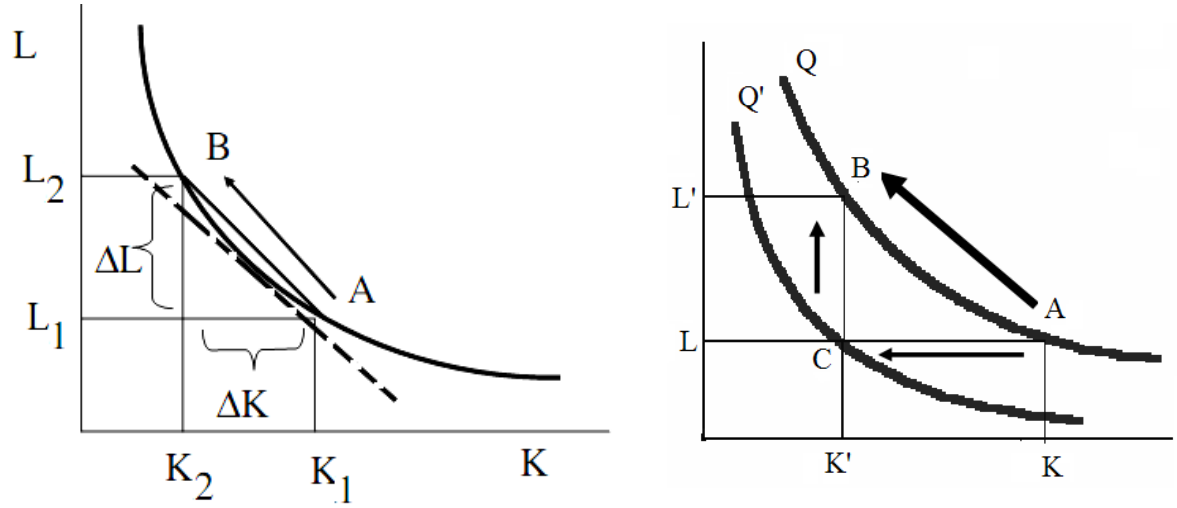


Figure 4.4: ***Substitution Along the Isoquant***
Source: Author's own construction

The ***Marginal Rate of Technical Substitution (MRTS)*** *shows the increase of one input necessary to produce the same level of output, while the other input is decreased by an infinitely small quantity* (Farkasné Fekete – Molnár, 2007).

The formula is the following: $\boldsymbol{MRTS = lim\,|\Delta L/\Delta K| = lim\,(-\Delta L/\Delta K),}$ which measures the absolute value of the slope of the tangent line drawn to the isoquant.

Really, the isoquants describe the relationship between the input combinations and the maximum output attainable using these inputs. This relationship can be described in a functional form, defining the long-run production function.

The right panel of *Figure 4.4* illustrates the relationship between the production function – more precisely the marginal product functions – and the isoquants. Using the notations of the figure, assume that out current output level is Q with inputs L and K (see point A in the figure). Now with a change of technology we intend to use less capital (K'), and holding the output constant, we have to increase labour to the level L', as is shown in the figure as a movement from point A to point B along the isoquant. This change is carried out it two steps. First holding labour unchanged at the level L the value of capital will be decreased from K to K' , that is, moving from A to C. This results in a decrease of output: $\Delta Q = Q' - Q$ moving from isoquant Q to isoquant Q'. As labour remained fixed during this step, the concept of the marginal product of capital is applied: $MP_K = \Delta Q / \Delta K$, tso the change in output can be calculated as: $MP_K \times \Delta K = \Delta Q\ (= Q' - Q)$.

Then in the second step the value of labour is increased to L', holding capital fixed at K' , moving from point C to point B. This leads to an increase of output, of the amount $\Delta Q = Q - Q'$, and with capital fixed, the concept of the marginal product of labour can be applied: $MP_L = \Delta Q / \Delta L$, that is, $MP_L \times \Delta L = \Delta Q\ (= Q - Q')$.

Applying the two steps together, the decrease of output in step 1 is offset by its increase in step 2, so the output eventually remains the same. Thus, $MP_K \times \Delta K + MP_L \times \Delta L = 0$. Hence: $MP_K \times \Delta K = - MP_L \times \Delta L$, that is, $MP_K / MP_L = - \Delta L / \Delta K$. The value of $- \Delta L / \Delta K$ is, however (assuming infinitely small changes) equal to the marginal rate of technical substitution by definition, being equal to the absolute slope of the tangent line to the isoquant. Eventually the result is the following equation: $MP_K / MP_L = MRTS$, the absolute value of the slope of the line tangent to the isoquant is equal to the ratio of the marginal product of capital and the marginal product of labour at the relevant labour-capital combination.

4.2.3. Returns to Scale, Economies of Scale

The next question to examine is a decision, when the producer changes both of the inputs at the same time – making long-run decisions instead of short-run ones. Then the producer may increase both inputs at the same rate and the resulting output may also increase at the same rate. If the technology is not changed, then applying twice as many inputs as before the output could also be doubled.

The return to the scale of production is defined by the ratio that shows how the output increases when increasing all the inputs at the same rate (Farkasné Fekete – Molnár, 2007). Using the general formula of the long-run production function $Q=f(K,L)$ the return to scale measures the relationship of an increased output $Q'=f(\alpha \times K,\ \alpha \times L)$ to the value of Q (with α being any positive coefficient), that is, increasing both of the inputs at the same rate, the increased output may grow at this (or higher or lower) rate.

- **Increasing returns to scale** occur, if $Q' > \alpha \times Q$, that is, $f(\alpha \times K,\ \alpha \times L) > \alpha \times f(K,L)$.
- **Constant returns to scale** occur, if $Q' = \alpha \times Q$.
- **Decreasing returns to scale** occur, if $Q' < \alpha \times Q$.

Increasing the scale of production, doubling all of the inputs may facilitate the doubling of the output in fte form of two production units identical to the initial one, but it is possible to create a different production structure combining the inputs in a more efficient way, employing the capacities better, and achieving higher productivity of all or some of the

inputs. This implies increasing returns to scale and it is called the **economies of scale** associated with larger scales of production.

Finally, after discussing the technical properties and efficiency measures of production the notion of economic efficiency can be defined. *The economic efficiency of production is understood as the production of a given level of output with the least possible costs incurred, or as the production of highest possible level of output with given costs incurred.*

With the production function of $Q=f(K,L)$ the costs incurred by Q output are the costs of using the resources K and L. Using the notation *TC (Total Cost*) for the cost of production, and p_K and p_L the unit prices of capital and labour respectively, the total cost of production is written as: $TC= p_K \times K + p_L \times L$. To attain economic efficiency we have to attain the given level of (Q) at the lowest possible value of *TC*, or attain the highest Q at a given fixed *TC*.

Suppose that the producer spends a given amount on production, so the value of *TC* is fixed. Using the above formula the producer is able to identify the possible combinations of K,L that cost altogether exactly *TC*. The above equation for *TC* obviously defines a line in the K,L coordinate system, which can easily be transformed into the following form: $L = TC/p_L - (p_K/p_L) \times K$. Our line intersects the vertical axis at $L=TC/p_L$ while its slope is $-(p_K/p_L)$. This line is called *isocost* line. *The **isocost line** is a line of all input combinations representing the same total cost, giving all the input combinations that can be purchased for a fixed amount of money (*Farkasné Fekete - Molnár, 2007*).*

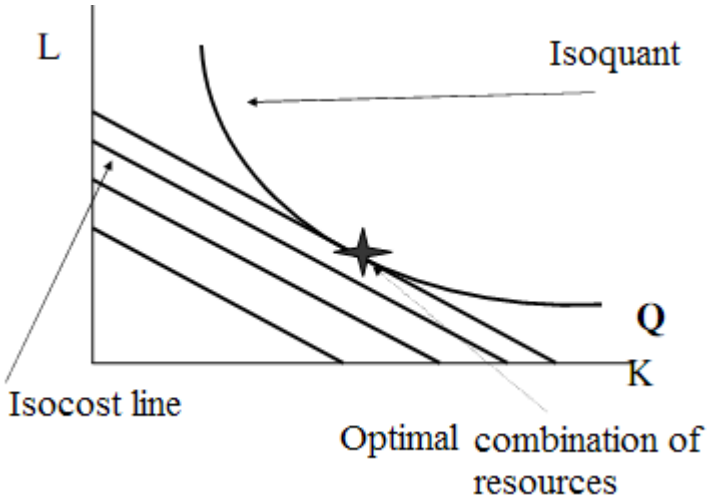


*Figure 4.5**: Isocost Lines and Economic Efficiency***
Source: Author's own construction

Figure 4.5 shows the isocost lines representing various values of *TC,* together with the isoquant representing the targeted output level Q. The various isocost lines are parallel to each other (because their slope is defined by the price rates of the two inputs), and the higher the value of *TC* the higher runs the isocost line. Our aim is to find the isocost line that contains an input combination (K,L) that produces the requires output level, lying on the isoquant Q. At low levels of *TC* the isoquant is unattainable, while gradually increasing the value of *TC* the isocost line gets closer to the isoquant. The point at which an isocost line first touches the isoquant – that is, when this isocost line is tangent to the isoquant -, defines the input combination of the lowest cost level, which is able to produce the desired output. The point of economic efficiency is the tangency point of the isoquant and its tangent isocost line (denoted by the star in *Figure 4.5*).

Therefore the isocost line is tangent to the isoquant in the point of economic efficiency. However, the slope of any tangent line to the isoquant is known to be equal to the

negative of the marginal rate of technical substitution, which is, on the other hand, equal to the ratio of the marginal products of capital and labour. Thus the following relationship holds in the optimum point:

$$p_K / p_L = MRTS = MP_K / MP_L.$$

This means that for the economically efficient input combination the ratio of the marginal products of inputs must be equal to the ratio of the unit prices of these inputs.[14]

4.3. Costs of Production, Short-Run Cost Functions

As it was discussed above, the producer most often faces short-run decisions. This means that answering the 'what-how-for whom' questions he/she decides about the type and quantity of resources to be used for production in the next period. In the short run the producer is unable to change the quantity of some resources, and may change the quantities of some others.

The **cost of production** *is the money value of the resources utilised in the production process (Farkasné Fekete – Molnár, 2007),* and this is compared to the sales revenue of the output produced and sold, thus decreasing the profit obtained by the producer, or firm. As it was explained earlier, the profit is the attained sales revenue (that is, the market value of the products or services sold) minus the costs of production (the money value of resources, factors of production). It is of crucial importance for the producer to keep the costs as low as possible. As it will be shown in the following section, this does not simply mean the quantity of output produced at minimum cost, because the costs are related to the level of output, which, on the other hand, will determine the revenues.

In the former section the short-run production function was analysed and its response was examined to changes in the variable input (e.g. labour). Short-run cost functions describe the inverse of this relationship, explaining the response of costs to the changes in the level of output.

The total costs of production (*TC*) is divided to two parts in the short run: **fixed costs** and **variable costs.**

Fixed costs (FC) *are the costs of resources that the firm cannot change in the short run, so these are the costs that do not depend on the level of the output in the short run, being fixed regardless of the level of output* (Samuelson-Nordhaus, 1987; Kopányi, 1993; Farkasné Fekete – Molnár, 2007).

Variable costs (VC) *are the costs of the resources that the firm will change together with the level of output* (Samuelson-Nordhaus, 1987; Kopányi, 1993; Farkasné Fekete – Molnár, 2007).

Thus the total cost is the sum of the two above costs: ***TC=FC+VC.***

Fixed costs may include the rent for the workshop or the place of production, which the firm must pay even if production was stopped temporarily due to large unsold inventories. Another fixed cost is the interest to be paid after the borrowed money that is needed to carry on production, the insurance fee paid for the machinery, or the flat rate of veterinary service that a farmer pays for the vet for regular checkups; but fixed cost may be the salary of an office worker who will carry out the administration of the business regardless of the actual level of the output. Typical variable costs are the costs of raw materials, fuel, wage of labour

[14] Note that the above relationships of the technical properties of production are very similar to those of consumer behaviour discussed in Chapter 3 and 4, the relationships are analogous. Thus the indifference curve is analogous to the isoquant, the budget line to the isocost line, *MRS* to *MRTS*, and the marginal utility *MU* to the marginal product *MP*.

directly employed in production (whenever this labour is adjusted to the level of output, or wages are paid by output produced), the costs of fertilisers, herbicides or pesticides (the application of those being directly related to yield), fodder costs in livestock farming, and packaging material used for selling the product. The distinction of fixed and variable costs always depend on the actual production process, and some costs (e.g. labour costs) may be partly considered fixed, partly variable. To decide about a cost being fixed or variable the key factor is to see whether the cost is changing when output is changed, or not.

Variable costs change together with changing output. This does not mean that their change is proportional to the change in production, although it may occur, the variable costs may show a *linear* pattern. The variable costs are *degressive* when these costs change (grow) less than the output, and *progressive*, when the variable costs change (grow) more than the output *(*Farkasné Fekete – Molnár, 2007*).* In real world situations one firm may encounter all of the above situations, facing degressive variable costs at a certain range of output, linear costs in another and progressive costs in a further one. The short-run cost functions of production describe the costs *VC, FC* and *TC* as functions of the output (*Q*) (*Figure 4.6*).

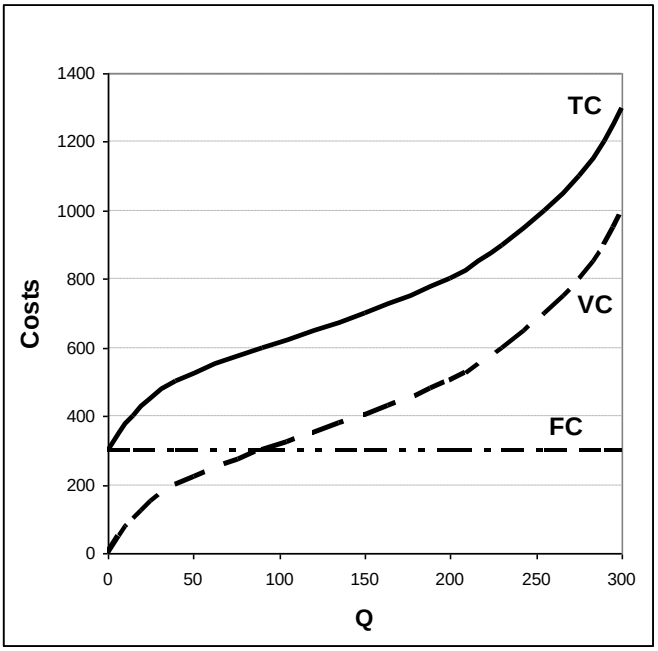


Figure 4.6: ***Short-Run Cost Functions (VC, FC and TC)***
Source: Author's own construction

The shapes of short-run cost functions are derived from the shape of the short-run production function. Assume again, that the variable input is labour, *L*. Then, as it was shown earlier, the growth rate of the short-run production function is increasing in the initial stage, which turns to decreasing growth rates at higher levels of input use. The variable cost of the input is $VC = w \times L$ denoting the unit cost of labour by *w*. As long as the unit increase of labour leads to larger and larger increase in output, the same increase of output will require less and less labour, which incurs less and less additional wage costs, therefore the variable cost function increases at a decreasing rate. When the growth rate of the production function turns to decrease, the same increase in the input will lead to decreasing growth in output, and this means that more additional input is needed to achieve the same increase in output. Thus the variable costs grow at increasing rates. Therefore the variable cost function starts with a stage of decreasing growth rate (that is, of degressive costs), and reaching a particular level of output its growth rate turns to increase (the stage of progressive costs).

Fixed costs remain the same at any levels of output (and occur even at zero level of output), as is shown in *Figure 4.6*. Finally, the total cost function is the sum of the variable and fixed costs. As the figure shows, the shape of the total cost function is the same as that of the variable cost function (first degressive, then progressive), but its value is higher than *VC* by the value of *FC*.

The decision-making firm considers not only the general pattern of costs, but it has to know the impact of a small change in the quantity of output on the total costs – and this is expressed by the notion of marginal cost. The other important question for the firm to answer is whether the sale of a certain amount of its output at the current market prices result in profit or not – and the notion of average cost, or unit cost of production helps answering this question.

The **average cost** *(AC) measures the cost divided by quantity of output*. The notion of average cost is defined for all types of costs discussed earlier in this chapter:

Average total cost *(ATC): ATC =TC/Q*

Average variable cost (*AVC): the variable cost divided by quantity of output, the variable cost falling to unit of output, AVC=VC/Q.*

Average fixed cost (*AFC): the fixed cost divided by quantity of output, the fixed cost falling to unit of output, AFC=FC/Q.*

Note that *ATC=AFC+AVC* .

Marginal cost (*MC): the change in total costs divided by the (very small) change in output*, that is, the change in costs brought about by producing an additional small unit of output. The formula for marginal cost is: $MC = \Delta TC/\Delta Q = \Delta VC/\Delta Q$ (where, in theory, the value ΔQ is an infinitely small change, while in real-world situations it is approximated by a unit change in output instead)[15]. It is easy to see, that the change in total cost is always equal to the change in variable costs, because fixed costs do not change with a change in output.

Figure 4.7 illustrates the shapes of the average cost functions and the marginal cost function. As the figure shows, the average fixed cost curve decreases as the output increases (as the same fixed cost is divided among more and more units of output). The marginal cost curve is declining at first, because as long as the variable cost function grows at a decreasing rate, an additional unit of output brings about a smaller increase in costs than the former one. The increase in costs brought about by an additional unit of output is the marginal cost, by definition, so the marginal cost curve is decreasing throughout the degressive stage of the variable cost. Whenever the variable cost curve switches to increasing growth rates, any additional increase in the output will generate a higher increase in costs than the former one, so marginal cost starts to grow, and remains like that. This means that the marginal cost curve is a *U-shaped* curve.

Similarly, the average variable cost curve is also *U*-shaped. While the *VC* curve grows degressively, the *AVC* curve shows a decreasing shape, because an additional unit of output increases the costs by the value of the marginal cost ($MC=\Delta VC/\Delta Q$, thus $\Delta VC=MC\times\Delta Q$), and this value keeps decreasing with any additional unit of output, so the average of the variable costs will fall. Whenever the *VC* curve switches from degressive to progressive growth, the marginal cost starts to rise, but for a while it remains lower that the value of *AVC*. Therefore, as the additional unit of output ΔQ generates an additional increase in costs which is smaller than the former *AVC* value, this will decrease the value of *AVC* (as it is easily seen by the example of average school test grades: when the test result of a new student is poorer than the average of the former ones, the new average will become lower than before). This fall continues as long as the value of *MC* is below *AVC*. When *MC* gets higher than *AVC*, then the higher additional cost of the additional output will pull *AVC* up, so the average variable cost

[15] Precisely, *MC* measures the rate of growth of the cost functions *TC* and *VC*, which is equal to the slopes of these functions, or the first derivatives of them by variable *Q*.

starts to rise. This also means, that *AVC* reaches its minimum value when it is equal to *MC* (see point *A* in *Figure 4.7*).

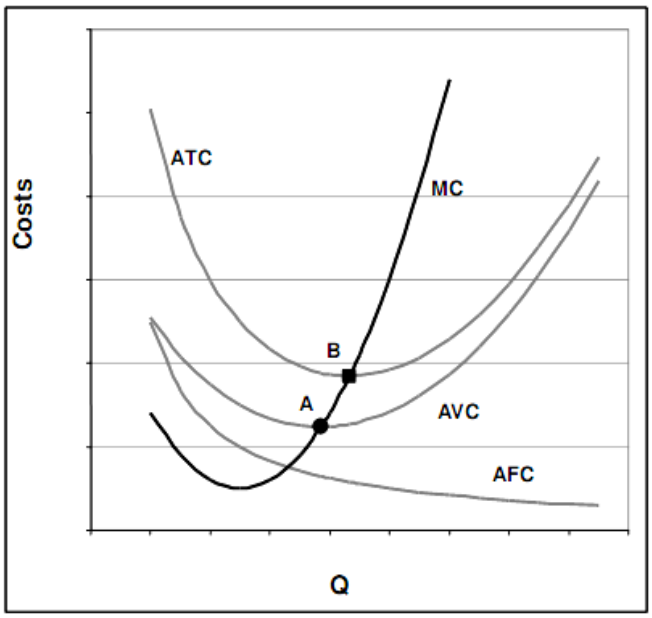


Figure 4.7: ***Average Cost and Marginal Cost Functions***
Source: Author's own construction

The average total cost curve is also *U*-shaped, and as output grows, it gets closer to the *AVC* curve. As *ATC=AVC+AFC*, at lower output levels – at which *AVC* is still decreasing, as well as *AFC* – the *ATC* curve is decreasing, too. The decrease of *ATC* continues as long as *AVC* is falling. After reaching its minimum the *AVC* curve starts to rise, but *AFC* still continues to fall. As long as the increase in *AVC* is smaller than the decrease in *AFC*, the value of *ATC* - being the sum of them - continues to fall. Later, as *AVC* grows considerably, while the decrease in *AFC* remains small, *ATC* starts to increase. We can state again, that while *MC* is below *ATC*, then *ATC* is decreasing (as the response of *TC* to change of output is caused entirely by variable costs), and when *MC* > *ATC*, the cost change measured by *MC* leads to an increase in the average total cost. Therefore the curves *ATC* and *MC* intersect at the minimum point of *ATC* (see point *B* in *Figure 4.7)*, which, due to the impact of *AFC*, belongs to higher output than point *A*.

4.4. Expenditures and Costs, Revenues and Profit

The notion of **expenditure** includes any spending of money, while costs refer to the value of resources used in production. It is important to distinguish these terms, because the production process may incur expenditures, which cannot be fully accounted for as costs of the actual production period. When the firm purchases a factor of production, e.g. a machine, which will be used for several production cycles, then it is not reasonable to account for the total purchase price of the resource as the cost of the actual production cycle. Then the money spent for buying the machine is an expenditure, but the whole amount cannot be considered a cost. The **cost of this resource** will be only the part, that will be used up in the current production cycle. Productive resources like this are called long-run capital investments (capital assets), and the key property of them is that their purchase for production purposes

generates large expenses in one point of time, while their value is gradually transferred to the product, and paid back by the sales revenues over a long period of several production cycles. The entire value of factors of production that are completely used up during one production cycle are costs associated with the current production cycle. **Operating costs** are the costs that occur in the actual production cycle and are expected to be paid back (returned) completely by the sale of the products. For long-run capital assets the operating cost is only the one year decrease in the value of the asset, that is, the so-called depreciation.

Explicit costs are the costs associated to the current production, paid in cash or by bank transfer (they are actually the out-of-pocket costs, and comprise most of the operating costs of the production cycle).

Implicit costs ('hidden costs') are costs of resources that are incurred in the actual production cycle (production year), without generating cash payments or invoices to be paid, but which the firm must take into account to assess the exact performance of the business. An example of the implicit costs is **depreciation,** because the firm will include it in its accounts as a cost, but its value will not be paid to anybody, as it will be incurred as the asset wears out physically, or becomes obsolete.

Another example of implicit costs is the well-known **opportunity cost,** which is the gains of the best alternative that we give up for choosing to deal with the actual production process. (Examples are: the lost interest on our savings that are invested in the firm instead of a bank deposit, or the salary of a former job that the entrepreneur has given up, or the profit attainable in other enterprises using the same productive resources).

Accounting costs are the annual costs of production that are legally allowed to account for in a profit-and-loss account. These include all the explicit costs and the accountable part of the implicit costs. Currently depreciation is the only legally accountable implicit cost (in Hungary, 2013).

The **accounting profit** is the total sales revenues minus accounting costs. The term **gross profit** is used to measure the total revenues minus explicit costs, so gross profit includes accounting profit plus accountable implicit costs.

The **economic costs of production** equals accounting costs plus the opportunity costs.

Normal profit (or normal rate of return) means the typical profit, or income attainable in a given economy or industry by any economic agent having the same capital assets. Therefore normal profit may be understood as an opportunity cost, as this is the normally expected return (profit) of the productive resources that the enterpreneur owns. The value of normal profit should also be compared to the actual interest rate on bank deposits, because the firm must take into account the alternative of depositing its capital in a bank for earning an interest, instead of investing it in the enterprise for profit. (When the entrepreneur uses a loan instead of his/her own capital, then the interest payable for the loan will be a true explicit cost).

Economic profit is the total sales revenues minus economic costs, that is equal to the accounting profit minus opportunity costs (or normal profit). In other words, the accounting profit is the sum of economic profit and normal profit. A firm will be taxed on its accounting profit, but to assess its true economic performance it is the economic profit that should be considered, because it shows whether the firm could achieve at least as good performance as it is usually possible with the same resources in the industry.

It is worth considering what happens when an industry generates positive economic profit in the long run. Then accounting profit is higher than the normal profit, so business actors start to flow into this industry. Their capital increases the productive capacity in the industry, leading to increased supply, which will soon decrease the price. The decreasing price leads to decreasing total revenues and decreasing economic profit in the industry. At the same time, as business actors have left less profitable industries, the decrease of productive

capacities will decrease supplies and raise prices there, with the consequences of increasing total sales revenues, accounting profits and economic profits. The process will run as long as one industry shows higher accounting profit than all the others.This process is called the adjustment tendency of profits to long-run competitive equilibrium, and the crucial message of this is that in the long run all competitive industries will run zero economic profits. Naturally, an individual fims may respond quickly to the decreasing trend of economic profit, introducing an innovation, or it might have some specific productive advantage over the other producers, so economic profit may remain positive for this particular firm, but this will not be true for the whole competitive industry.

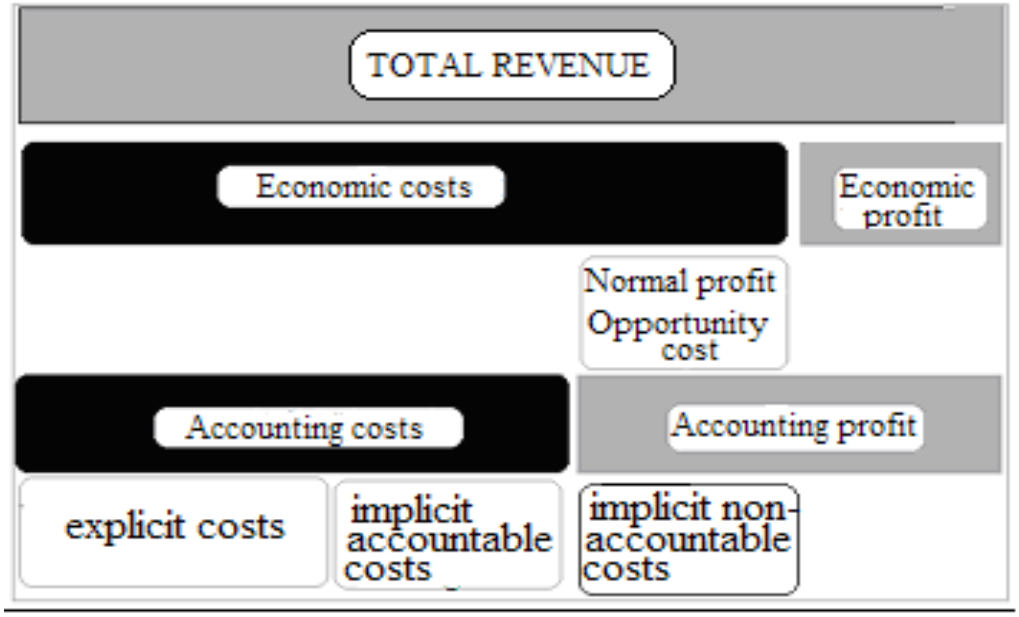


Figure 4.8: ***Cost and Profit Categories***
Source: Author's own construction

Besides costs, the sales revenues are the second crucial factor in assessing the profitability of a firm. Profit is the difference of revenues and costs, and the only difference among the various profit categories is the range of costs considered. For accountancy purposes the accounting costs will be considered, while for business management purposes the economic costs of the firm should be assessed

The total revenue (*TR*) is measured by multiplying the quantities and unit prices of the outputs sold, as the following formula shows: $TR = \Sigma (p \times Q)$, where p is the price of the output and Q is its quantity sold. When the firm increases its output and thus the quantity sold rises, the sales revenue will change. However, larger quantities sold do not always imply larger sales revenues, because the larger supply may lead to falling prices and decreasing revenues, as it was explained about the price elasticity of demand. To handle the impact of increased output on revenues the notion of marginal revenue is introduced.

Marginal revenue *(MR),* is t*he additional revenue that a firm takes in when it increases its output sold by one additional (infinitely small) unit:* $MR = \Delta TR / \Delta Q$. When a small increase in the firm's supply does not lead to a change in the market price, then the additional unit of output is sold at the same p price as the former ones, and $\Delta TR = p \times \Delta Q$, that is, $MR = p$.

4.5. The Supply of a Competitive Firm, Profit Maximisiation in Competitive Markets

As it was shown above, the marginal revenue shows the expected change in revenue for a firm increasing its output for sale. The marginal revenue will depend, however, on the size of the firm – and its volume of output - compared to the market as a whole, to the total demand and supply, as well as on the number and properties of competitors, its power to control the market, or the prices to any extent.

A ***perfectly competitive market*** is composed of many firms, each one being small relative to the size of the total market supply. Similarly, the demand side is also characterised by many consumers, all buying only a small proportion of the total amount sold. This means, that neither in the supply side nor in the demand side can any single actor have power to control the prices. If a firm decides to increase its output for sale, this is insignificant compared to total market supply, therefore it will not create excess supply, nor price decreases. Similarly, a small change in the consumers' demand will go without any noticeable change in the market. The entry to and exit from perfectly competitive markets is easy, without any restrictions, therefore a producer or a consumer may choose to enter to, or exit from the market any time. Every firm in a perfectly competitive market produces exactly the same homogeneous product; the output of one firm can be substituted by that of any other producer. Therefore, producers cannot charge a price of their own for their unique commodity, they are forced to accept the market price. As there are many sellers, they are unable to agree on a high price to sell at, and the many consumers are also unable to agree on a low price to buy at. Thus, the price will be determined as the result of the bargaining process in the market, no single market actor has any control over it, they will have to accept it as an external factor, so they are *price takers.* In the real world of mixed economies such perfectly competitive markets do not exist: each market has spatial limitations, including limitations of information flows, the governments intervene in markets, the products of various firms are not completely homogeneous – but still, many markets show more or less the basic properties of competitive markets, and the perfectly competitive market as an ideal model helps us to understand the operations of them (Farkasné Fekete – Molnár, 2007).

*The **perfectly competitive market** is a market structure, in which there are many producers and consumers, each being relatively very small compared to the market, the product is homogeneous (virtually identical), entry to the market is free, the market agents are price takers, and the flow of information is free.*

The firm in a perfectly competitive market will freely choose how much to produce for sale. Knowing, and taking the actual market price its objective is to maximise its profit, which is the difference between the attained sales revenue and the costs incurred by production. For this purpose the firm will decide about the size of its production, the volume of the output. Therefore:

Profit = Total Revenue – Total Cost =TR-TC, where $TR = p \times q$, *and* $TC = VC+FC$

The firm will choose the quantity of output q with the aim of maximising the difference ***TR-TC,*** knowing that larger quantities imply larger revenues but larger variable costs as well. In the real world the firm will probably make a decision in the following form: if we have produced the quantity q so far, *could we achieve higher profit by increasing our output by a small quantity* Δq*?* The firm should increase its output as long as the increase implies increasing profit, up to the possible maximum level of profit.

Compare the values of profit generated by the outputs q and $q+\Delta q$ respectively. The profit of output q is $= p \times q - VC(q) - FC$ (because VC depends on the quantity pf output, while FC does not). If the quantity of output is raised now by the additional amount of Δq,

the total revenue will increase by $p \times \Delta q$ (or, if the increment of Δq is a unit of output, then the resulting increase in total revenue is equal to the value of marginal revenue *MR*, which is equal to the actual market price *p*). However, the additional costs incurred by the additional output are equal to the change in variable costs, and by the definition of marginal costs, the change in costs incurred by a small increase Δq of output is equal to the marginal cost $MC = \Delta VC/\Delta q$. The resulting change in costs is therefore: $\Delta VC = MC \times \Delta q$.

So the increase in total revenue ($p \times \Delta q$) will increase the value of profit, while the increase of total costs ($MC \times \Delta q$) will decrease it, and the total change in profit is $= p \times \Delta q - MC \times \Delta q$. Output should be raised whenever this difference is positive (or non-negative, because the increased output with the same profit means that the firm will be able to employ more people, and increase its market share without losing profit) .

Therefore the output should be increased as long as the following inequality holds: $p \times \Delta q \geq MC \times \Delta q$ that is, while $p \geq MC$. *The* ***profit maximising level of output*** *for a firm in a perfectly competitve market is the largest quantity of output for which the marginal cost does not exceed the market price of the product. Figure 4.9.* illustrates this process.

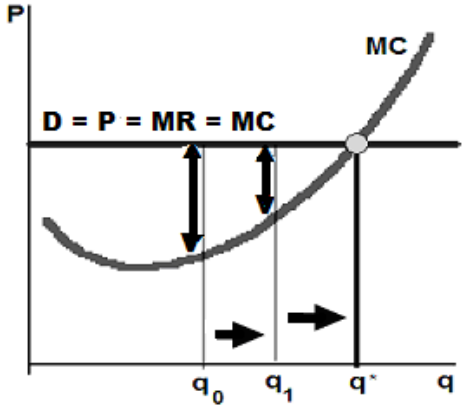


Figure 4.9: **Profit Maximising Output for a Perfectly Competitive Firm**
Source: Author's own construction

The notation *D=P=MR=MC* in *Figure 4.9* implies that all the producers can sell their total output at price *P*, that is, each of them face an infinitely large demand at this price.Therefore the demand curve for all of them is horizontal *(P=D)*. On the other hand, the marginal revenue, or the additional revenue of an additional unit of output is equal to the unit price *P (P=MR).* Finally, the producer will attain the highest prossible value of profit when the marginal cost of this output is equal to the market price, or marginal revenue (*MR=MC*).

4.6. Imperfect Competition

The above model of perfect competition describes an idealistic situation which is hardly ever seen in real life. Close approximations of perfect competition are those market situations, when a product or a service is provided by large numbers of small producers, and none of the producers have a market share considerably higher than that of the others. However, the properties of perfect competition – the large number of market agents, homogeneous product, perfect information, no barriers to prevent entrance to and exit from the market, and the resulting price-taker behaviour – do not occur fully in modern markets, because of many reasons. The most frequent causes of deficiency include the existence of large-scale companies in the supply side of the market, or the unique properties of the

products, but the government intervention, and the imperfect flow of information may have similar impacts. As a result of the above properties the firms – or some of them – are not price-takers, but they will set their prices on their own, or at the level commanded by the government, and therefore the consumers will access the commodity at prices different from the market equilibrium. Thus the firms are no longer able to sell an 'unlimited' amount at the market clearing price (facing a horizontal demand curve), but every single firm faces a negative relationship between price and demanded quantity. Samuelson and Nordhaus (1987) use the above properties to define imperfect competition:

'Imperfect competition' *prevails in an industry (or in a group of industries) in which the demand curves faced by single firms are not horizontal, so that the firms have some control over the price of their products and competition.*

Typical examples of imperfect competition are : the monopoly (with a single producer representing the total market supply), the oligopolistic market (with the overwhelming market share of a few large companies), and monopolistic competition (with many firms in the supply side of the market, but their products, while being close substitutes of each other, show unique properties which makes the consumer differentiate among them, and thus they are sold at unique prices). The following section will explain the supply decisions of perfect monopolies in detail, and summarise briefly some specialities of oligopolistic markets amd monopolistic competition.

4.6.1. Monopoly, Oligopoly, Monopolistic Competition

Monopoly *is a market structure composed of only one firm that produces the total market supply.* Monopsony is demand-side monopoly, that is, the total market demand is represented by one single consumer – the government, for example, or a trader acting as the exclusive buyer of some commodity. Bilateral monopoly means, that both the supply and the demand side are represented by monopolies (Kopányi, 1993).

Many reasons may lead to the emergence of monopolies. The essence of the monopoly is the fact, that the consumer finds no alternatives, no substitutes for the commodity produced by the monopoly.

Both perfect competition and perfect monopoly occur very rarely, if ever, in the real world. Instead, we usually encounter mixed market structures, where the sellers find themselves in somewhat competitive situations, while they are also able to have some control over market prices. Such mixed market structures are the oligopolistic markets and monopolistically competitive markets.

Oligopolistic market structures *are made up of a few rather large firms in the supply side of the market, the activities and supply decisions of each affecting the market positions of the others.* This means that the basic property of the market is the small number of independent firms in the supply side. Although 'the small number' of firms is difficult to quantify in exact terms, the key feature of such markets is the fact, that whenever one firm modifies its supplied quantity or the price of its product, it will noticeably affect the total market supply, as well as the prices and behaviour of its competitors (Kopányi, 1993). The market agents, when making their decisions, will take into consideration the expected behaviour, or reactions of the other agents. Many examples of oligopolistic markets exist in contemporary economy, e.g. the market of cellular phone services, or automobile manufacturing. *Duopoly* is a special case of oligopoly, with two firms providing the total market supply, therefore they must try to forecast the other's reactions when choosing their output levels or prices.

Monopolistic competition *is a market structure with many firms in the supply side of the market; their products are not homogeneous but differentiated, therefore the firms have price-setting power, while no barriers exist to prevent entry to or exit from the market (Kopányi, 1993).* This means, that although the products of the firms may satisfy similar – or nearly the same – consumer wants, the products of various firms have unique attributes, which create high appeal and strong preference for the brand in the consumer, and minimise the danger of being substituted by another product. Therefore each firm becomes a monopoly in the market of its own product, setting its own price, although they must not forget that the consumers might change their mind and turn to other products under specific conditions (e.g. when excessive price differences are seen). Thus, monopolistic competition shows some attributes of monopoly, oligopoly and perfect competition at the same time. Advertisements, commercials are typical marketing tools in monopolistic competition, emphasising differentiation and generating additional costs. A few examples of monopolistically competitive markets are the market of blue jeans, where sellers try to inform and attract consumers by their brand names, creating strong consumer preferences; or the market of soft drinks, where large companies as Coca-Cola and small local juice companies also find their customers. .

A common feature of perfect competition and monopolistic competition is free entrance to the market. In monopolistic and oligopolistic markets, natural or artificial **barriers to entry** prevent other firms to enter the market. *Such **barriers** may be the high level of capital needed for entering the market, or high levels of fixed costs which make only high volumes of output profitable (the minimum efficient scale[16]is high compared to the total size of the market). Other typical barriers may be the difficulties of accessing resources, or the high costs of licences, patents or know-hows of production technology, or government regulations requiring permits to provide a product or a service.*

Natural monopoly (or natural oligopoly*) is a market structure in which one firm (or a few firms) can produce an additional unit of output at lower costs than a firm newly entering the market.* In other words: in naturally monopolistic market the single firm produces the total market supply at lower average costs than if the same amount were produced by several firms in smaller quantities. This is often explained by high fixed costs and low variable costs, with the minimum efficient scale being high compared to the size of the market. Natural monopolies are usual in the markets of public services, and in such situations the government may guarantee the monopoly of a single service provider by law. Natural monopolies prevail in the markets of gas, electricity, or phone services and other energy supplies, although attempts have recently been made to liberalise these markets.

4.6.2. Profit Maximising Behaviour of the Monopoly

A firm – and therefore a monopoly – intends to maximise its profit, and to achieve this, it will decide about the supplied quantity. As it was explained about perfectly competitive markets, the logic of profit maximisation means maximising the difference between the total revenue and production cost. In perfectly competitive markets the firm takes the market price as an external attribute of the market and determines the level of output that maximises the profit. The monopoly, on the contrary, – being the only supplier of the product, and facing the total market demand alone – can set the price as it likes. Thus the monopoly

[16] Minimum efficient scale *(MES*) is the level of output when the average total cost is at its minumum within the range of total market demand (Varian, 1991).

decides first about the quantity to be produced, and then it finds the right price that maximises the profit.

The supply decision will be defined the same way as for the perfectly competitive markets. Assuming that the firm currently produces the quantity Q, the impact of producing an additional amount ΔQ is calculated to see if this change increases the profit or not. (Using the capital Q instead of q for the volume of output indicates that the output of the monopoly is the total market supply in itself.) The profit associated with quantity Q is the difference of total sales revenue and production costs, that is:

$$Profit(Q) = p(Q) \times Q - TC(Q) = p(Q) \times Q - FC\text{-}VC(Q)$$

Increasing the volume of output by the quantity ΔQ, both the revenues and the costs will be changed. The change in costs, ΔTC will be determined using the notion of marginal cost, $MC = \Delta TC/\Delta Q$, so the change in total costs is $\Delta TC = MC \times \Delta Q$. To measure the change in revenue we will use the notion of marginal revenue, as this measures the change in total revenues ΔTR incurred by a change in output ΔQ, as: $MR = \Delta TR/\Delta Q$, therefore the change in total revenue is $\Delta TR = MR \times \Delta Q$.

Now we know, that due to a ΔQ increase in output, the total revenue of the monopoly will increase by $MR \times \Delta Q$, while total cost grows by $MC \times \Delta Q$, so the change in profit is equal to $MR \times \Delta Q - MC \times \Delta Q = (MR\text{-}MC) \times \Delta Q$. This shows us, that as long as the inequality $MR\text{-}MC \geq 0$ holds, an increase in output will lead to an increase in profit (or, assuming equality in the formula, leave the profit unchanged). We can conclude, that **the profit-maximising level of production for a monopolistic firm** *is the largest output for which the marginal revenue of the firm is at least as high as its marginal cost, that is, the inequality* $MR \geq MC$ *holds.*

However, to apply the last formula for decision-making the shape of the marginal revenue should be known for the monopolistic firm. In perfectly competitive markets we have seen that the firms face practically unlimited demand at the actual market clearing price, therefore the marginal revenue always equals the market price. In monopolistic markets the supply of the firm is compared to the total market demand, which is a decreasing function of price. Thus, the monopoly can sell more of the output if it allows the price to decrease. Therefore the marginal revenue of a monopoly will reflect the joint impact of increased quantity and decreased price.The total sales revenue is $TR = p(Q) \times Q$, and the actual market price $p(Q)$ is the price the consumers are willing to pay to buy the quantity Q, that is, the market price defined by the demand function at quantity Q.

As the increasing quantity will decrease the market price, the revenue will depend on the way these two changes are related to each other. As it was shown about the price elasticity of demand, depending on the shape of the demand curve a small price decrease may come together with a large increase in demanded quantity (elastic demand, when a price cut leads to increased revenue) or a large price cut may lead to only a small increase in demand (inelastic demand, when price cuts lead to decreased revenue). Therefore the change in total revenues, that is, the pattern of marginal revenue, depends on the demand function.

Note that marginal revenue defined by the formula $MR = \Delta TR/\Delta Q$ is exactly the first derivative of the total revenue function TR by the quantity Q (assuming infinitely small ΔQ). The calculation of the marginal revenue is the following, when TR' denotes the total revenue associated with the increased output:

$$TR' = (P+\Delta P) \times (Q+\Delta Q) = P \times Q + P \times \Delta Q + \Delta P \times Q + \Delta P \times \Delta Q, \text{ therefore:}$$

$$\Delta TR = TR' - TR = (P \times Q + P \times \Delta Q + \Delta P \times Q + \Delta P \times \Delta Q) - P \times Q = P \times \Delta Q + \Delta P \times Q + \Delta P \times \Delta Q$$

$$\text{Thus } \mathbf{MR} = \Delta TR/\Delta Q = P + \Delta P \times Q/\Delta Q + \Delta P = \mathbf{P + \Delta P \times (Q/\Delta Q + 1)}.$$

As with positive ΔQ the value ΔP must be negative, for any value $\Delta Q>0$ the value of *MR* is smaller than *P*, ***MR<P ,*** *which means , that the marginal revenue curve always runs below the demand curve, the marginal revenue is smaller than the market price*.

Take the example of a linear demand function to show the calculation of marginal revenue in detail. Let's take the inverse demand function: $P= a – b\times Q$, *and denote the market price belonging to the quantity* $Q+\Delta Q$ *by* $P'=P+\Delta P$. *Then this price is* $P'= a – b\times (Q+\Delta Q)= a – b\times Q – b\times \Delta Q = P – b\times \Delta Q$. *Thus the amount of price decrease will be the following:* $\Delta P= P'–P = – b \times \Delta Q$. *Using the above formula for calculating marginal revenue:*

$$MR = P + \Delta P \times (Q/\Delta Q +1) = P– b \times \Delta Q \times (Q/\Delta Q +1) = P – b \times Q - b \times \Delta Q.$$

Now using the formula of the inverse demand function ($P= a – b \times Q$) for the price, we get the following formula: $MR = a – b \times Q– b \times Q - b \times \Delta Q= a –2 \times b \times Q – b \times \Delta Q$

Assuming that the change in quantity is infinitely small, that is, $\Delta Q\rightarrow 0$, the marginal revenue function is written as $MR(Q) = a – 2\times b\times Q$. Comparing this formula to the formula of the inverse demand function $P= a – b \times Q$ we can see that *the slope of the marginal revenue function is the double of the slope of the inverse demand function*, A monopoly's marginal revenue curve bisects the quantity axis between the origin and the point where the demand curve hits the quantity axis (see the right panel of *Figure 4.10*).

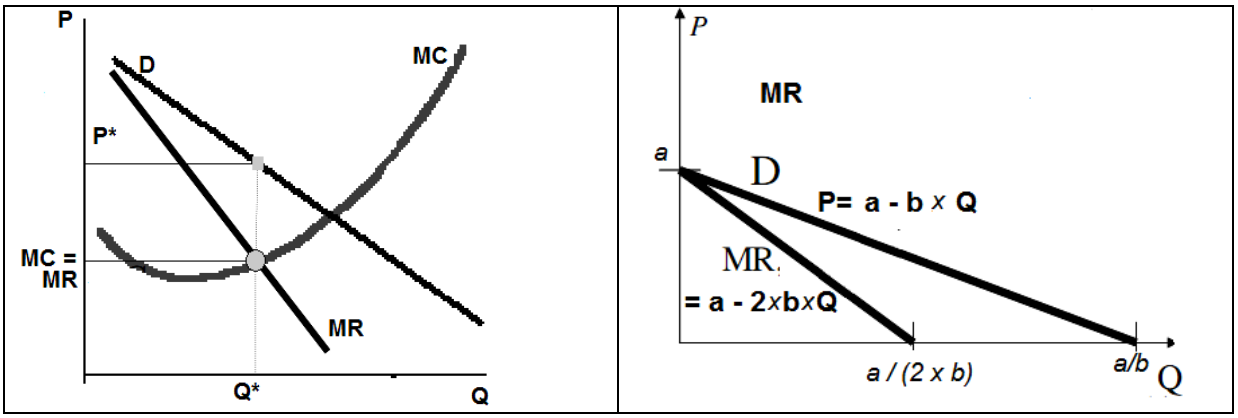


Figure 4.10: **Profit Maximising for a Monopoly – Marginal Cost and Marginal Revenue**

Source: Author's own construction

Note that the monopolist choses to produce the profit maximising quantity defined by the intersection of marginal revenue and marginal cost, and sells this quantity at the price taken from the demand curve. This price is always higher than the marginal revenue, therefore it is also higher than marginal cost. *The monopoly will always sell its output at a price higher than its marginal cost, while the perfectly competitive firm sells its profit-maximising output at the market price that is equal to its marginal cost* (left panel of *Figure 4.10*).

Review Questions

1) What does the short-run production function measure, what are the properties of the short-run production curve?
2) What does the isoquant mean, what is the marginal rate of technical substitution?
3) Explain the notions of average product and marginal product, and their relationship to the marginal rate of technical substitution.
4) Explain the meaning of technical maximum, technical optimum and the point of inflexion?

5) What do the terms ’return to scale’ and ’economies of scale’ mean?
6) Explain the following terms: accounting cost, economic cost, explicit cost, implicit cost, accounting profit and economic profit.
7) Explain the adjustment tendency of profits to long-run competitive equilibrium.
8) Describe the following cost categories: fixed cost, variable cost, and describe the shapes of these cost curves. Explain the terms ’average cost’ and ’marginal cost’.
9) Explain the reasons why monopolistic and oligopolistic markets exist.
10) Describe the properties of perfectly competitive markets, monopoly, oligopoly, monopolistic competition, natural monopoly/oligopoly.
11) How does a perfectly competitive firm determine its profit-maximising output?
12) Explain the meaning of marginal revenue, and its value in perfectly competitive markets. Calculate the value of marginal revenue of a monopoly assuming linear market demand.
13) How does a monopoly determine its profit-maximising output?

Problems and Questions to Develop Competence [17]

1) Two former university students worked in an investment bank earning a salary of 200 thousand HUF each for 2 years after they graduated. Together they saved 3 million HUF during this time. After 2 years, they decided to quit their jobs and start a business designing Web sites. They used their savings of 3 million HUF to buy computer equipment, desks, and chairs. For the next 2 years, they took in 4 million HUF in revenue each year, paid themselves 1 million HUF annually each. They rented an office for 1 million 200 thousand HUF per year. Prior to the investment, their savings of 3 million HUF were in bonds earning interest at a rate of 10 percent. Are they now earning economic profits? Explain your answer.

2). Assume that in a production process, with the currently used amounts of labour (*L)* and capital (*K)* the marginal products of the factors are $MP_L = 5$ and $MP_K = 10$. Assume, furthermore, that the factor prices are $P_L = 6$ and $P_K = 15$. Should the producer substitute labour for capital? Why?

3) Suppose that there are two technology alternatives *A* and *B* for producing an electronic device. The table below shows the resource requirements of the two technologies at five levels of output.

Output	**Q=1**	**Q=2**	**Q=3**	**Q=4**	**Q=5**
Technology	***K L***	***K L***	***K L***	***K L***	***K L***
A	2 5	1 10	5 14	6 18	5 20
B	5 2	8 3	11 4	14 5	16 6

a. Suppose that the price of labour is $P_L = 300$ and the price of capital is $P_K = 600$, calculate the total production cost of each level of output assuming that producer always chooses the best (the cheapest) technology.
b. Give the quantity of labour and the quantity of capital used for each level of output.

[17] Source of problems: Case et al. (2009)

c. Plot the total cost function for the five levels of output. Plot costs on the *Y*-axis, and quantities *(Q)* on the *X*-axis, assuming that each output is produced using the optimal technology.

d. Answer questions a – b – c again, with factor prices $P_L = 900$ and $P_K = 600$.

4) The following table shows the variable costs of a production process. The value of total fixed costs is *100*. Suppose that the market price of the output is *15*, and calculate the desirable level of output for the firm. Calculate the total revenue, and the total cost for this quantity, and give the value of its marginal cost.

Q	0	1	2	3	4	5	6
VC	0	5	10	20	40	65	85

5) The following table gives some cost components for a perfectly competitive firm.

a. Fill the table calculating the missing short-run costs.

b. Calculate the profit-maximising output of the firm assuming the following respective market prices: *P= 50, 60, 90, 120, 150, 180, 240, 300, 400*.

Q	**FC**	**VC**	**TC**	**AVC**	**ATC**
0	300	0			
1		100			
2		150			
3		210			
4		290			
5		400			
6		540			
7		720			
8		950			
9		1240			
10		1600			

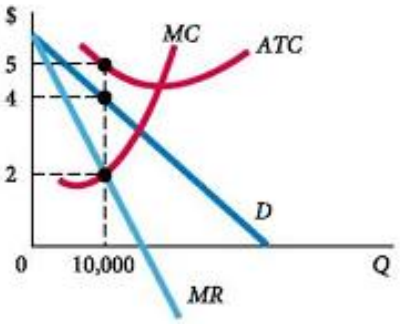
6) One hundred partners are offered the chance to buy a gas station. Each partner would put up *$10,000*. The expected revenues from the operation of the station are *$420,000* per year, as the past experience shows. The costs (not including opportunity costs) of operating the station - including maintenance and repair, depreciation, and salaries - have also been steady at *$360,000* per year. Currently, *5*-year Treasury bills are yielding *7.5* percent interest.

Should the partners take the chance? Explain your answer.

7) Uncle Joe just died and left *$10,000* to his nephew you payable when he turns *30* years old. The young man is now *20*. Currently, the annual rate of interest that can be obtained by buying *10*-year bonds is *6.5 %*. The nephew's brother offers him *$6,000* cash right now to sign over his inheritance.

Should the nephew do it? Explain your answer.

8) The diagram below shows the cost functions of a monopoly together with the market demand curve. Calculate the following quantities, and identify them on the graph:



a. the profit-maximising quantity of output,
b. the profit-maximising market price,
c. total revenue,
d. total cost,
e. total profit or loss of the firm.

Chapter 5: The Market of the Factors of Production

5.1. Demand and Supply of the Factors of Production

In Section 2.1 the basic properties of product and factor markets were briefly summarised. As we have seen, the demand in product markets was determined by the households', that is, consumers' willingness and ability to purchase goods (products and services) for satisfying their wants. At the same time, in factor markets the buyers are firms, producers, and they need the resources to produce goods for the product market. Therefore, the demand for factors of production depends eventually on the amount of resources needed for the goods that the firm intends to produce. A firm will obviously buy resources, if the goods (products or services) produced using them can be sold in the product market, because the firm's main objective is to make profit, and the purchased resources are costs for the firm, while the output produced using the resources generates revenues.

The demand for factors of production is **derived demand**, *that is, the firm demands a quantity of some input if and only if consumers demand the output those resources are used to produce, so that the costs of the demanded resource and the revenues received by selling the output make profit for the producer (*Samuelson-Nordhaus, 1984-2004; Kopányi, 1993; Farkasné Fekete – Molnár, 2007*).*

Households provide the **supply of the factors of production**. Households offer their labour for sale, to earn income. Most of the natural resources – the land, for example – are owned by households, and they offer it for use, renting or selling it to to agricultural enterprises. Most of the capital resources are also supplied by households. Household savings are deposited in banks, who can loan them to firms. Similarly, many of the buildings used for business activities are also owned by households, who rent them out to firms.

Remember, a profit-maximising firm will increase its output as long as the additional revenue is not smaller than the additional cost generated by the additional output. As a consequence, the firm will increase the use of some resource as long as the resulting additional cost is not higher than the resulting additional revenue generated by selling the output produced by the additional resource.

The factors of production are classified into two broad categories. Primary factors of production are resources existing in nature without any economic reason, such as labour or natural resources. Secondary factors of production are inputs that are created for, or by some economic activity: these are the capital goods (real and nominal capital), and the entrepreneurial skills. The following section will briefly overview the markets of particular factors of production.

5.2. The Labour Market

The labour factor refers to the ability of humans to do work, and this ability is a natural attribute of human beings, a primary factor of production. The demand side of the labour market is represented by the firms' demand for labour, the supply side is the labour force offered by households. The objective of households is to sell their labour force to earn income, which they use for buying goods that satisfy their wants. The price of labour is wage, and, as the market laws tell us, the seller (the household) prefers high wages, while the buyer

(the firm) prefers low ones[18]. The *households' supply of labour* is determined by two factors: first they intend to have as much income as possible, so that they can buy more goods to satisfy their wants., and second: the demand for leisure time, as an important component of the quality of life. The worker is obviously unable to work 24 hours a day, 7 days a week, 52 weeks a year, he/she will need time to rest, recover, leisure. Therefore, workers must share the available time between work and leisure. The time used for work will decrease the time available for leisure, while leisure will decrease the time available for earning income. Therefore the wage (or salary) can be interpreted as the opportunity cost of leisure. The worker earning very low wage might find that this low wage is not enough to cover the costs of going to work or maintaing life. So it may not be worth accepting a job that pays a very low wage, and choosing leisure as an alternative will bring about only a very low opportunity cost. Leisure time may also be used to other activities that improve the quality of life, while decreasing the costs of living (e.g. producing vegetables for home consumption in the kitchen garden, providing day care for old relatives or for children, etc.). When the wage increases, the opportunity cost of leisure also increases, the worker looses more income by not taking a job, therefore his/her willingness to work increases. With very high wages (salaries), however, the worker will assess the situation: the barrier to maintaining a high living standard is no longer the wage, and the worker can earn sufficient income working less hours than before. The time available for leisure becomes the bottleneck, so the worker may decide to cut back on his/her labour supply, in order to increase the time available for leisure. Therefore labour supply is illustrated by a 'backward-bending' supply curve.(see the left panel of *Figure 5.1)*.

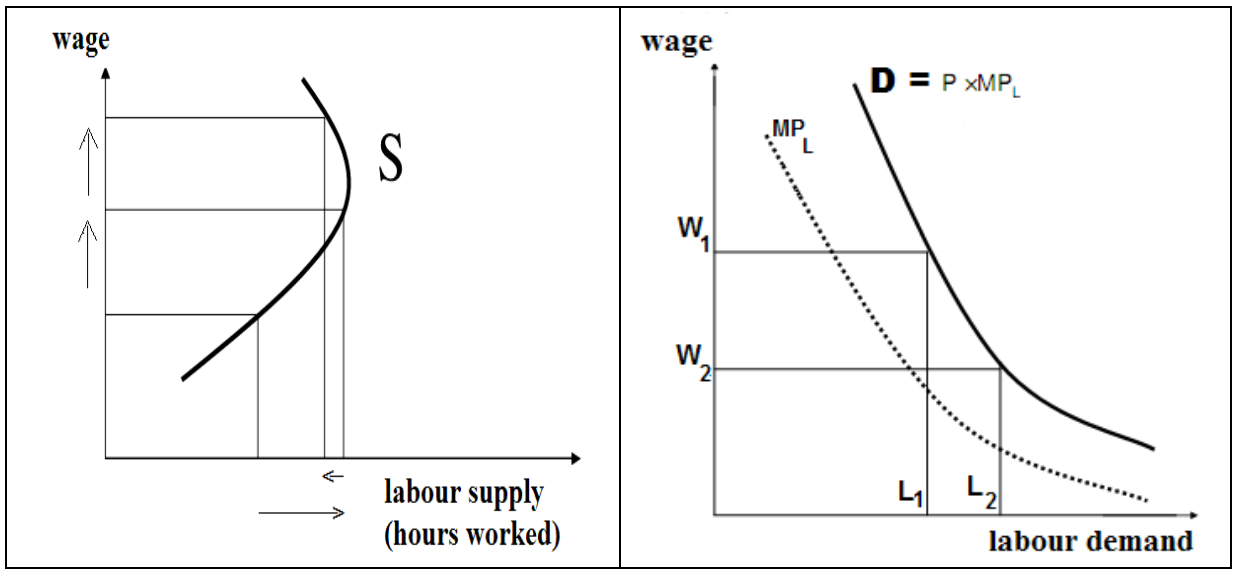


Figure 5.1: ***The Labour Supply Curve and the Labour Demand Curve***
Source: Author's own construction

When describing *labour demand* it must be considered, that the firm is able to pay no more wage for a unit of labour than the market value of the output produced by this unit of labour (the market value of the marginal product of labour) – therefore: $W \leq P \times MP_L$. This is the **upper limit of wages**, that is, the maximum wage that a firm is able to pay in market conditions. The **lower limit of wages,** however, is defined by the income needed for the

[18] The labour cost for a firm will include not only the wage (salary), but the additional social insurance taxes (payroll taxes) as well, which are usually proportional to the wage. The gross wage (salary) paid to the worker will not be freely disposable either, because the worker will also have to pay social insurance tax and personal income tax.

worker to recreate each day his/her ability to work in the short-run, and to reproduce the labour force needed for the economy in the long-run, by bringing up and educating the young generation of workers. Thus the wage should cover the costs of living for the worker and for his/her family, and the education for the children. In real life wages are not determined by an unrestrained bargaining process in the labour market. Wages usually differ from the market-clearing price, the labour market is one of the markets where goverment intervention is substantial. Chapter 10 will discuss this process in detail.

5.3. The Market of Capital Goods

Capital is considered to be a secondary factor of production, and its two main forms are real capital and nominal capital. Real capital comprises machinery, buildings, tools, equipments, and material to be used in the production process, while nominal capital means the financial funds used for production, either in the form of money or as stocks and bonds. The market of real capital is called the market of capital assets, while the market for nominal capital is made up of two markets: the financial market (market of money and loanable funds[19]), and the securities market (or stock market, the market of stocks and bonds).

5.3.1. The Market of Real Capital

The market of real capital, that is, the market of capital assets deals with the sale of machinery, equipment, raw materials, fuels. For materials used up completely during one production cycle, the firm making a purchase decision, will simply compare the costs of buying these factors and the total revenue received after selling the resulting output. The situation is more complicated when capital assets are used for more than one year, during several production cycles, contributing to the total sales revenues of many years, but the cost of buying them occurs now. Such long-term assets are e.g. buildings, expensive machinery, and vehicles. The decision-maker must consider the impact of the time factor: it is important to know whether the revenue generated by the asset is earned now or one year later. Assume that this year the revenue earned was *100000 HUF,* and we decide to deposit this revenue in the bank for a year at *5%* interest rate, therefore next year we will own *105000 HUF*. If, however, the revenue of *100000 HUF* will be earned only next year, but we need money now, we have to take out a loan from a bank, and, of course, as next year we can pay back only the *100000 HUF* including the interest, the bank would now offer a loan less than this amount. Therefore any costs and revenues earned or paid in different times have to be re-valued to current money, using the notions of present value and future value.

The **future value (*FV*) of a cash flow received today** is calculated using the formula for compound interest. The future value of a present cash amount C in t years time, at annual rate of interest r is calculated by the following formula: $\boldsymbol{FV_t = C \times (1+r)^t}$. Assume, for example that we receive *1000000 HUF* today, and in *5* years time, at an annual interest rate *10 %*, this amount of money is worth: $FV_5 = 1000\,000 \times (1+0{,}1)^5 = 1000\,000 \times 1{,}61051 = 1610510$ *HUF*.

[19] The money market handles short-term loans to be paid back within a year, while the market of loanable funds handle long-term loans to be paid back later than a year (or with no specified maturity date) (Farkasné Fekete – Molnár, 2007).

The opposite logic gives us **the present value (PV) of a cash flow to be received in the future,** in *t* years time, and it is calculated by the method of discounting. The present value of a cash amount of *C* due in *t* years time, at an annual interest rate of *r* is given by the following formula: $\boldsymbol{PV_t = C / (1+r)^t}$. For example, we are going to receive the sum *1000000 HUF* in *5* years from now, and the annual rate of interest is *10 %,* so the present value of this future sum is: $PV_5 = 1000000/(1+0,1)^5 = 1000000/ 1,61051 = 620\ 921$ *HUF*.

The notions of present value and future value are used in investment decisions, when the firm decides whether to purchase a valuable piece of machinery. The valuation of the asset is done by the logic of business management: the capacity of the asset to generate income is assessed, and the capitalised value of the machinery is calculated as the discounted sum of the successive revenues or profits that the machine will earn. Assume, for example, that the machine will earn a profit of *1000000 HUF* each year of its life span, and it will operate for *5* years. Assuming 10 % interest rate per year, the sum of the present values of the annual earnings is: *PV=1000000/1,1+ +1000000/1,12 +1000000/1,13 + 1000000/1,14 + 1000 000/1,15 = 909091 + 826446 +751315+ + 683014 + 620921 = 3790787 HUF*. Should the firm buy the machine, if the price payable today is *3600000 HUF*? The decision is made by calculating the net present value of the investment. **Net present value (*NPV*)** *is the difference of the present value of the yield of investment and the cost of establishing the investment.* In the former example *NPV= 3790787 HUF – 3600000 HUF = 90787 HUF*. A general rule is that investments of positive net present value may be established, but naturally the investor must consider the risks of future cash flows and the risk of changing interest rates, therefore an expected small positive NPV may easily turn negative in the future. Economic decisions about the future involve double uncertainties or risks. One is about the expected earnings, that are predicted with great uncertainty. The other is about the expected interest rates, which are also difficult to forecast. The business agents differ in their expectations about the future, and that is the explanation why some agents exit a business negotiation earlier than others, as they are more pessimistic about the earnings or interest rates than others.

5.3.2. The Financial Markets

The **market of money and loanable funds** handles transactions about the right of using money (Farkasné Fekete - Molnár, 2007). In the supply side we find all the agents having excess money, or savings, while borrowers represent the demand side. *Interest is the fee for the use of borrowed money,* savers earn *interest by their deposited funds,* borrowers pay *interest for the loan they take,* the latter being usually higher than the former. The banks are financial intermediaries acting between savers and borrowers, they pay the interest payable on deposits from the interest taken from borrowers. The difference between the loan interest rate (the interest income of the bank) and the deposit interest rate (the interest expense of the bank) is *interest margin* which covers the expenses of the bank's operations and contributes to the profits of the bank. *The interest rate* is simply the annual interest payment divided by the principal (the amount of the loan or the deposit), expressed in percentages. The demand for loanable funds is determined by the market value of the goods produced using these funds, which the borrower compares to the costs of the loan, that is, the interest payable.

A firm may take a bank loan to raise funds, but it might do so by exchanging securities (stocks or bonds) as well. *A* **security** *(also called a financial instrument) is a tradable claim on the issuer's future income or property that is subject to ownership.* The main types of securities are discussed below.

A **promissory note** *is a legal promise in written form of paying a specified sum of money to a specified payee at a specified time in the future*. A promissory note is usually issued when a firm may need some resource, e.g. raw materials for production, but it does not have money to pay for it. The firm expects to sell the product within a fixed time in the future, e.g. within 3 months, for a price that covers the firm's costs as well as some profit. Therefore the firm would be able to pay for the raw materials after the sale of the output. The firm wanting the raw material, but lacking money promises to the owner of the raw material to pay the price of the resource after the sale of the output – paying not only the current price but an interest as well. The transaction can be understood as if the firm borrowed the price of the input from its owner for the specified time (three months in the example). Naturally, our firm cannot force the input provider to accept a promissory note instead of the actual payment. The input provider will do that only if he/she considers the borrower a trustworthy partner, and believes that it will repay the borrowed sum and its interest by the specified deadline. The promissory note can be *transferred to other parties* as a form of payment instead of money (assuming that the other party accepts it), and it can be *discounted* in a bank, that is, sold to the bank for cash before its expiry date, for which the bank charges interest.

A ***bond*** *is a debt security that promises to pay a fixed yield to maturity, making pre-defined payments periodically for a specified period of time.* Firms or institutions issue bonds when they need a loan, and savers will purchase these bonds. The *face value (also called the principal) of the bond* is the nominal value written on the bond, and the *fixed interest* is paid on this face value. The *issue price of the bond* is the price at which the first bondholder can buy the bond (this may be equal to the face value of the bond, or lower than that). The *price of the bond* between the date of its issuing and its maturity is determined by its demand and supply. *Government bonds* are long-term debt instruments issued by the government to finance the deficits of government budget. They are issued at larger units than the private (corporate) bonds, and their maturity is longer than those. *Treasury bills* are issued in smaller units and for shorter maturity with the same purpose of financing budget deficits.

The ***common stock*** *(typically just called a stock) represents a share of ownership in a corporation. It is a security with no maturity date, that is a claim on the earnings and assets of the corporation.* Stocks also have face value, issue value and market price. The meanings of these are similar to those of the bond, but the issue value of the stock cannot be lower than its face value. The stockholder is the owner of the stock, who, by purchasing the stock, gives his/her funds to the corporation for good, the stockholders cannot return their stock for money, but they can sell it to someone else interested in buying it. The stockholder is entitled to a share of the corporate profit, called **dividend**, in proportion to his/her share, and has a right to vote about the decisions of the corporation. The yield of the stock is either the dividend, or capital gains collected when selling the stock at a price higher than the price at which it was purchased. Naturally, the stockholders must bear the risk of capital losses as well. Stocks are usually classified by their tradability and ownership rights, some stocks may restrain the stockholder's interference to managerial decisions, others may restrain the tradability of stocks.

The **primary market** of securities deals with the trade of newly issued securities, here the securities are sold to the first owner, the capital saved by the first owner is transferred to the issuer of the security. The **secondary market of securities** deals with the trade of securities that had been issued earlier and that are owned by their holders. Transactions in the secondary market do not have any direct impact on the corporation that issued the security, there transactions take place among savers. The top institution of secondary security markets is the **stock exchange.** The main role of the stock exchange is the trading of securities, although the stock exchange prices also provide valuable information for the economic agents about the market processes and market value of corporations, too. Some of the stock-

exchange transactions – purchases or securities – take place with the objective of long-term investment, others are done with the aim of speculation, for capital gains. *Hausse speculants* expect a bull market in stocks (that is, they expect stock prices to rise), so they buy stocks today at lower prices to sell them later at higher prices, earning gains by the price difference. *Baisse speculants* expect a bear market in stocks (that is, declining stock prices), so they sell stocks today at higher prices to buy them back at lower prices, earning gains by the price difference. Speculation in the stock exchange plays an important role vitalising the market, therefore the normal forms of speculation are not prohibited, but regulated. However, incorrect behaviour, such as collusion, fake transactions, misinformation, and the abuse of information is heavily penalised (Farkasné Fekete –Molnár, 2007).

5.4. The Land Market

The essential property of the market of land and natural resources is the fact, that these resources are available in fixed, limited supply, their supplied quantity cannot be increased. The demand for natural resources – including land – is similar to the other factors of production, and is defined by way of the market value of their marginal product. The demand for land is derived demand, depending on the demand for agricultural products that are produced on it.

Land, as well as all natural resources – including mines, oil fields, thermal springs - is available in fixed supply, its supply is perfectly inelastic. Therefore the price to be paid for its use is determined by its demand. The price of (or return to) such factors of production is called rent (pure economic rent). **Pure rent** *is the return to any factor of production that is available in fixed supply (*Farkasné Fekete – Molnár, 2007*).* A factor of production available in fixed supply can be sold or rented to the user, and in the latter case the rental price is paid by the user to the owner. The economic rent is the pure return on land, that remains after the costs associated with its use are deducted from the sales revenues of its output.. If the land is cultivated by its owner, then this rent is included in the owner's profit, and if the user just rents the land, then he/she will have to pay the rent to the owner. The profit after deducting production costs from the revenue depends on the fertility, quality of the land as well as its location which determines the climatic conditions, and the distance from the markets. Therefore **differential land rent** *is the land rent that is defined by the quality differences of various lands. This land rent is further classified, defining fertility-related differential rent* (because more fertile lands produce higher yields with the same costs*) intensity-related differential rent* (as the additional resources will yield higher outputs in more fertile lands), and *location-related differential rent* (because location closer to markets decreases the costs of purchasing inputs and of selling the output).

Differential land rent is not the only type of land rents. As land is available in fixed supply, the demand for food may require the cultivation of less fertile lands, too. The least fertile lands that are cultivated cannot earn differential land rents. If such lands are rented out to users, the owner's earnings are not paid by the differenctial land rent, but by the rent due to the owner of a resource in short supply. Therefore this return, being a pure rent, is called **pure land rent.**

The paragraphs above explained the concepts of the rental market of land. However, land may not only be rented, but sold, too. The owner will consider a **sale price** reasonable, if the amount of money can earn him/her a return equal to the former rental income. Therefore, depositing the price of the land in a bank, the annual interest should be equal (or not less) than the former rent. The theoretical **price of land** is determined by the present value of the stream

of land rents. Land prices, however, considerably differ from this theoretical price in the real world, because land is not only a factor of production, but also a form of storing wealth, and it can be used for many - and more profitable - purposes other than farming.

Contemporary land markets are determined by many factors besides the relationships described by classical theory. Rental payments prevail, because most of the land is rented to users in Europe, as well as in Hungary. The rental price and the income earned by users are considerably affected by non-market instruments, such as subsidies. The value and price of land are better explained by demand-related factors, speculation or the capacity of land as a store of wealth.

5.5. The Entrepreneurial Skills

The role of the entrepreneur is to combine the (other) resources for production in an efficient way, so entrepreneurship should be assessed separately from labour. Entrepreneurship is also seen as a managerial job, but the entrepreneur differs from the employed manager because the enterpreneur may not earn a salary, and certainly takes risks, and occassionally faces losses instead of profits.

When assessing the value of entrepreneurial activities, the returns to entrepreneurial skills are considered to be the economic profit earned by the business. The economic profit is the sum of money left after the costs of all other factors of production, including rents of natural resources and returns on own capital (equal to the opportunity cost of this capital, or the interest payable for a loan of the same amount) are deducted from the total revenue of the enterprise. When this economic profit is positive, then the entrepreneur earned an accounting profit higher than the normal profit, so that the enterprise was more successful than the average firms working in the industry using the same resources. This is the result of the entrepreneur's knowledge and capabilities, organisational qualities, risk taking behaviour – altogether, his/her entrepreneurial skills.

Enterpreneurs can work in various business forms. The basic types of businesses can be classified by several aspects. The activity of the business defines categories of enterprises dealing with production, services, commerce; the ownership structure defines privately owned, state-owned businesses, or firms owned by foundations, organisations, firms being in municipal ownership, cooperative ownership, or mixed ownership. The profit-related categories are the profit-oriented ('for-profit') businesses and the non-profit ones, by size of activity defines micro-, small, medium and large-scale enterprises, and finally, the legal form of the business defines categories of sole proprietorship, and partnerships, the most frequent partnerships being the private partnership, the limited liability company and the corporation (owned by stockholders).

A **sole proprietorship** is a business structure in which a single individual forms a single business entity for tax and liability purposes. This business can be started easily with a small amount of capital. It is suitable for implementing a good business idea quickly, and its greatest advantage for its owner is its flexibility, the possibility to make decisions alone without the involvement of others. The main disadvantages of this business structure are the limitations on available capital, difficulties of taking loans, and the unlimited liability of the owner. This latter means that the owner of the sole proprietorship is liable for any business debts, and if the business incurs losses then the private property of the owner must be used to pay for the debts of the business.

A **partnership** is the relationship of two or more entities (individuals) conducting business for mutual benefit. The private partnership has at least one internal partner and one

external (sleeping) partner, the internal partner should actively take part in the management of the business and bears unlimited liability for business debts. The external partner usually provides (most of) the initial capital needed for the business, bearing limited liability, that is, risking only the capital introduced into the partnership. For establishing a private partnership the partners have to prove that they can provide a legally required mimimum capital for the partnership.

A **limited liability company** is a business structure of legal entity, in which all the owners bear only limited liability for the debts of the business, their private properties are not risked. The relevant legal regulation defines the minimum amount of initial capital that is required for the foundation of a limited liability company, and the partners (the owners) are expected to take part personally in the operations and management of the company.

A **corporation** is a business structure of legal entity, which raises the initial capital by issuing stocks. The corporation – opposite to the formerly discussed partnership and company structures, which are based on the *personal cooperation of all owners* – is based on *the financial contribution of the owners.* The stockholders are owners of the corporation, their share is proportional to the stock they hold, they bear limited liability, and acquire *property rights* and *membership rights* in exchange of the stocks they own. Property rights mean that the stockholder is entitled to a dividend, that is, a share of the corporate profit, the membership right means that the stockholder is entitled to vote about the managerial decisions of the corporation at the annual general assembly of stockholders. The general assembly of stockholders elects the board of directors, and they appoint managers to direct the operations of the corporation throughout the year. Holders of small stocks usually do not take part at the general assembly, because their primary interests lie in their property rights and not their membership rights, therefore the management of the corporation will be decided by a few holders of large stocks. The decisions made at the general assembly require the majority votes of the stockholders present, and this is often achieved by a relatively small proportion of stocks. The proportion of stocks that is sufficient for the majority vote in the general assembly is called *'control stock'*, the owner of such stocks has '*controlling interest'* over the corporation (Farkasné Fekete – Molnár, 2007).

To sum up the above, the contribution of the various factors of production can be determined in the value of the product, and the share of various factors in the income earned by the output can be calculated. This is called the **functional distribution of factor incomes** (also called *Pareto's marginal productivity theory of income distribution)* and is calculated by the following formula*:* $Q = MP_L \times L + MP_K \times K + MP_A \times A + MP_E \times E$, where Q is the quantiy of output, L, K, A és E are the amounts of labour, capital, natural resources and entrepreneurial skills, respectively, and the various values of MP are the marginal products of the respective factors of production. Measuring the factor shares in the money value of the output the above formula is multiplied by the price of the output, p giving: $p \times Q = p \times MP_L \times L + p \times MP_K \times K + p \times MP_A \times A + p \times MP_E \times E$. As the prices of the various factors of production are determined by the value of their marginal product, their share in the value of the output also reflects the ratios of their marginal products (Kopányi, 1993; Farkasné Fekete - Molnár, 2007).

Review Questions

1) Describe the demand side and supply side of the factor markets.
2) What are primary and secondary factors of production?
3) What does the term 'derived demand' mean?

4) Why is the labour supply curve a ’backward –bending’ curve?
5) What determine the lower and upper limits to wages?
6) What types of capital can you list?
7) Explain the notions of present value, future value, net present value.
8) Explain the notions of promissory note, bond, stock, and describe their yields.
9) What does economic rent, differential rent and pure land rent mean?
10) Describe the main attributes of sole trader, partnership, limited liability company and corporation, as forms of business entities.
11) Explain Pareto’s marginal productivity theory of factor incomes.

Problems and Questions to Develop Competence

1) Collect data in your place of residence about land prices, land rents and their relation to land quality. Explain the data.
2) Collect data in your place of residence about the wage levels of the past 5 years, and about the number of employed and unemployed people. Plot the wages against the employment data. Explain your results.
3) Describe the yields of bonds in the past 10 years in your country. Collect data about the interests that government bonds yielded, and the dividends that major corporate stocks yielded in the period. Explain your findings.

Chapter 6: Market Imperfections, Market Failures

6.1. Differences of Private and Public Choices

As it was discussed in section 2.3, in the markets of contemporary developed economies mixed coordination prevails, with the joint action of market components and government intervention . Government intervention is justified by the fact that the equilibrium generated by free markets does not fully agree with the interests and expectations of society. The reason for that is the fact, that the market measures and evaluates only a part of the interests and values that are important for the society, and similarly, it cannot measure fully all the processes considered harmful by the society.

A good example for such *market imperfections* is the monopoly, when one single firm will produce all the supply of a commodity. Then, this firm may decide to produce less than before and raise the price, focusing only on maximising its own profit. Consumers will be provided less of the product, but they have to spend more on it, and this has a negative impact on their welfare, while the monopoly fails to allocate efficiently the available resources. The state restricts the emergence of monopolies and their use of market power by antitrust laws and regulates market competition in order to maintain *efficiency*. Another reason for government intervention is the situation, when some members of the society do not own sufficient resources to earn their living – being ill, or handicapped, or just too old. Then the state intervenes into the market mechnanism on the principle of *fairness* – providing social support for citizens lacking the means to earn sufficient income, at least in the so-called welfare societies (social market economies). Some economic activities may bring about side-effects that are harmful for the society, disturbing the environment and the people living in the neighbourhood of the activity – e.g. protecting themselves against noise, smell, etc. causes extra costs for the people living in the neighbourhood, without getting any compensation from the firm generating the unpleasant effects, so the activities of the firm create *negative external economic impacts (negative externalities).* In such situations government intervention is needed again, to force the profit-oriented firm to consider the interests of the society, too. Finally, there are many services and activities that are very useful for the society, but cannot be provided for the consumers by the usual market mechanisms. Participation in public schooling is in the best interests of the whole society – therefore the state provides the basic education free of charge to all of its citizens, financing the service from the tax collected from the society, and does not leave it to the citizens to decide how much education they are able and willing to buy at the market price defined by supply and demand. Such services and products are called *public goods*, and it is the task of the state to arrange the production of such goods, as well as their provision to all citizens free of charge.

The market agents will try to optimise their own situation, maximising their income or total utility, and minimising their costs. The market measures the gains (income or utility) attained by the individual market agent by the individual's private marginal benefit (*MR*), or private private marginal utility (*MU*), and the costs the individual has to pay by the marginal cost *(MC*). The individual will improve his/her own situation as long as the private marginal cost remains below private marginal utility or private marginal income: $MU \geq MC$ *(*or $MR \geq MC$*).*

Many examples may be mentioned in various areas of the economy, where the result of an economic activity cannot be measured in money, and its utility is not measurable. This is the case when business entities focusing on maximising their own benefit, positively or negatively influence the business environment or the living conditions of others. This is also

true about costs: one economic activity may have negative side-effects not on the firm doing it, but on other agents, independent from this firm. These facts make it reasonable to make a distinction between the private and the social intepretations of the costs and benefits associated with an economic activity. The notions of marginal cost and marginal utility as they have been used up to now, will be expanded:

- **Marginal Private Cost** (*MPC): is the sum of all marginal costs that are imposed on economic agents as a result of their own economic activities, as measured by the market.*
- **Marginal Private Benefit** *(MPB): is the sum of all marginal revenues and marginal utilities that are bestowed on economic agents as a result of their own economic activities, as measured by the market.*

In addition, to measure the full social impacts of any transaction the following concepts are introduced:

- **Marginal Social Cost** *(MSC): is the total cost to society of producing an additional unit of a good or service. MSC* is equal to the sum of the marginal private costs of producing the product – that is, the marginal costs measured by the market - and the correctly measured damage costs of production imposed on others outside the transaction.
- **Marginal Social Benefit** (*MSB): is the total utility to society of producing and consuming an additional unit of a good or service.* Marginal social benefit, therefore, is equal to the sum of marginal private benefits – that is, marginal revenues and utilities measured by the market – and the marginal utilities and revenues that are bestowed on others not involved in the transaction (production or consumption).

The requirement of **market efficiency** says that *the allocation of factors of production is efficient, if the marginal private benefit attained by producing and consuming the good that was produced by the last unit of the factor is equal to the marginal private cost of using this factor: MPB = MPC.*

The principle of **socially efficient resource allocation** is an extension of the above requirement of market efficiency: *The allocation (use) of a factor of production is optimal for the society if the marginal social benefit attained by producing and consuming the good that was produced by the last unit of the factor is equal to the marginal social cost of using this factor: MSB = MSC.*

If the market was able to measure all factors that are important for the society, then the following equations would hold: *MSC= MPC* and *MSB=MPB.* In the real world, however, *MSC > MPC,* as some resources are used, but not measured by the market (such as the pollution of natural resources). On the other hand, *MSB > MPB*, as some economic activities may have positive impacts not measured by the market (when, for example, a hotel builds a nice park around its building, and not only its clients, but all the people living in the neighboruhood can enjoy this park). For this reason, the resource allocation declared optimal by the market may often be very different from the socially optimal resource allocation, and most of us do not have any idea about it (Farkasné Fekete – Molnár, 2007; Kopányi, 1993.).

In *Figure 6.1* point *A* denotes the market equilibrium measured by the private marginal benefit and the private marginal cost in the market, as the intersection of the *MPB* and *MPC* curves, wirh optimum output at *Q**. The principle of social efficiency would, however, lead us to the intersection of the *MSB* and *MSC* curves to identify the socially optimal output level – as is shown by point *B,* assuming *MSB* much higher than *MPB*, and *MSC* also somewhat higher than *MPC*. In the graphical example, point *B* illustrates that the marginal benefits not measured by the market are much higher than the marginal costs, therefore point *B* indicates a higher output level (Q_1) than point *A* – , although higher price, too, because of the higher costs. In the real world, however, the situation is usually the

opposite, the negative impacts not measured by the market are much higher than the positive impacts not measured by the market, as is shown be the position of the *MSC'* curve, and by the resulting socially optimal equilibrium (point *C* in the figure). This equilibrium suggests a quantity (Q_2) much smaller than that of the former market equilibrium Q^* in point *A*, and a price (P_2) much higher than the original price P^*. Economic activities incurring substantial environmental damage are like this: when we want to consume the products of such industries, the negative environmental impacts would justify a quantity much less than is currently consumed, and a price much higher, to help the rehabilitation of the damaged environment.

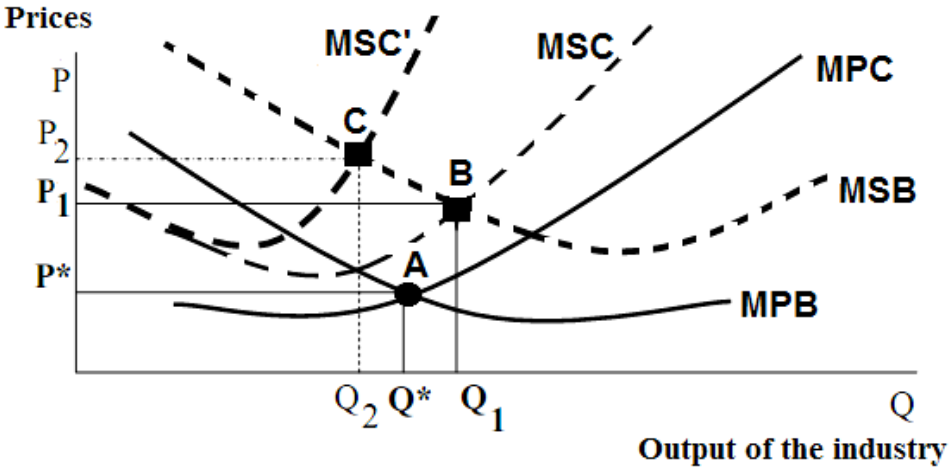


Figure 6.1: ***The Difference of the Private Optimum Measured by the Market and the Social Optimum Measured by MSC and MSB***
Source: Authors's own construction

As the above illustrate, the correction of the market is necessary in many areas, to eliminate, or at least diminish the market imperfections. The market cannot measure all the inputs used and utilities generated by actual economic activity; the flow of information is not perfect, the market can only measure the costs and benefits that are related to those directly involved in the transaction. The operation of the market mechanism neglects the interests of the non-market agents, therefore it cannot guarantee the maximum welfare and balanced development for the whole society. In the following sections two typical examples of market imperfection - public goods, and externalities – will be discussed in detail.

6.2. The Concept of Public Goods, Demand and Supply

Before explaining public goods, first the notion of private goods will be specified.

Private goods are goods that are consumed *individually*, and if a unit of them has been consumed by someone, then noone can also consume the same unit. Private goods are scarcely available, and consuming a unit will decrease the amount available for further consumption. Therefore consumers compete for private goods, private goods are ***rival*** in consumption, and consumers can consume them if they pay the price, the ***nonpayers are excludable*** from consumption (Farkasné Fekete - Molnár, 2007, Kopányi 1993).

The **public goods** are consumed *collectively*, so they are provided for all members of a community, ***noone can be excluded from their consumption***, while the ***consumption by one person does not decrease the consumption possibilites for others.*** These goods are available

for everybody *without paying* for them, but these goods cannot be rationed, they are provided for either the whole community, or for noone. Examples of such goods are the public lighting system, town pavements, public roads, radio broadcasts, national defence, lighthouses, and many other public services. Private goods are therefore goods that are rival in consumption, and the non-payer is excludable of their consumption, while public goods are non-rival, and their benefits are non-excludable (Farkasné Fekete - Molnár, 2007, Kopányi 1993).

Mixed goods are goods that show ***one of the properties of public goods, but not the other.*** Thus mixed goods may be rival in consumption, but their benefit is non-excludable (as for free university education, where admission is limited to the best students), or they may be non-rival in consumption, but the non-payer cannot access them (like cinema, where the film is watched together by those having bought the ticket) (Farkasné Fekete - Molnár, 2007, Kopányi 1993).

Public goods are not bought or sold in the market, they have **neither market demand nor market supply**. The production of public goods incur costs – and often very high investment costs. The citizens, however, consume these goods free, therefore no price is paid, and no revenue is generated. Public goods – products, or mainly services – are goods that should be consumed by every member of the society. It is the best interest of the society that every single person participate in basic education, receive vaccination against contagious diseases, because only one person not participating may substantially worsen the quality of life for the whole society. Therefore it is not reasonable to charge a fee that covers the production costs of public goods, because this would prevent consumption by the poorer members of the society. Therefore public goods are provided by the state (or a municipal authority), acting as the 'buyer', buying the chosen amount of public goods from a firm, and paying for it from the tax revenues, then providing the purchased public goods for the citizens free of charge.

The reader may ask why it is impossible to let the consumer pay for public goods and public services, and leave their allocation to the market. For this first we should be able to measure the quantity that an individual consumes, separately from the others. In many cases of public goods this is technically impossible, or would incur very high costs. Take the example of public lighting: to measure the individual's consumption, we should measure how much time every member of the society is spending in the streets during the evenings when the lights are on, or what kind, and how much of their properties are protected by the good visibility during the nights. Second, if consumers pay the market price of these goods, the provision (that is, production) should be adjusted to individual demand. Continuing the example of public lighting, the provider should provide different amounts of light to those who usually come home from work at night, and those who usually go to bed early, never going out in the dark hours. As the service cannot be varied like this (it can be provided in the same quantily for all), everyone can consume it only in the same quantity.

Consumers use public goods without paying for them (or, occassionally paying very low fees), while they know well that the state buys these goods from the tax revenues collected from them. Therefore the self-interested individual wants to use as much as possible of the available public goods – to recover the value of the tax he/she paid for the state (or, if possible, even more). He/she wants to decrease the costs of the public service and increase the benefits received. This behaviour is called the free rider problem[20]. As a result of

[20] The Tragedy of the Commons is a well-known example of the free rider problem. Every farmer wants to keep as many cows in the common grazing land as possible. This approach will work for all as long as the number of cows is not higher than the capacity of the land. As all the farmers want to maximise their own profit, everyone tries to graze one more cow in the common land. Soon the total number of cows will be too high for the land, and it will be overgrazed, not providing enough feed for the cows. The milk yields of all the cows decrease, then they will starve and die. The free use of the common grazing land brings disaster to all (Varian, 1991.).

the free rider behaviour, it seems that citizens need more of the public goods than the current provision. If, in response to that, the state decides to increase the provision of public services, then taxes should be increased to cover the extra costs of this – therefore even the free rider will have to pay more for an additional amount of public service that is not really needed.

While it is undoubtedly the state who can most efficiently provide pure public goods, for the provision of mixed goods mixed arrangements have emerged. Some kind of public regulation or coordination is needed for these, too, but the market mechanisms will work if consumption is associated with paying for the consumed amount. Although government intervention has spread in many areas of public goods for increasing the welfare of the society, excessive government intervention endangers the efficiency of the economic system (Farkasné Fekete – Molnár, 2007; Kopányi, 1993).

6.3. Externalities

6.3.1. The Concept and Categories of Externalities

Externalities, or external economic impacts *occur when an economic agent influences the situation of another economic agent incurring costs or bestowing benefits without market transactions between them.*

Externalities are grouped by their impacts, whether they incur additional costs or bestow additional benefits, and also by the process that generates them.

- ***Negative externalities*** *impose additional costs on the individual or group, who is outside, that is, external to the transaction.*
- ***Positive externalities*** *bestow additional benefits to the individual or group, who is outside, that is, external to the transaction.*
- ***Production externalities*** *occur, when the external impact – being either positive or negative – is caused by a production process.*
- ***Consumption externalities*** *occur, when the external impact – being either positive or negative – is caused by the consumption of a product or a service..*

An example for negative production externality is the following: A factory of washing powder lets sewage into the river without filtering. Therefore the factory does not have to pay the cost of the filtering, so the costs of production, and the variable costs are lower, and the **marginal costs (MC) of production are also lower**. The firm can sell the washing powder at low price and still earn profits. The factory is involved in market transactions with its consumers, who are interested in buying more washing powder at lower prices, as the market demand is higher when the prices are lower. At the same time, the people living near the river find that the quality of their environment has deteriorated, because of the polluted water. Therefore the total utility of the people living in the neighbourhood of the factory has decreased, regardless of their buying washing powder or not. The costs of the environmental damage, the clearing of the polluted water must be paid by the society, if they are unable to reclaim it from the polluter.

The case of the beekeper and the orchard is a classical example of positive producer externalities. A beekeper's bees pollinate the blossoms of the neighbouring orchard 'free of charge', so the fruit yield is high. On the other hand, the bees also benefit from the blossoms in the orchard, honey production becomes more successful. Therefore both the owner of the orchard and the beekeper benefit from the 'service' provided by the other without paying for

it, both enjoy the benefit of positive production externalities. (Farkasné Fekete - Molnár, 2007, Kopányi, 1993).

An example of a negative consumption externality is the lawnmower of our neighbour that disturbs our relaxation in a summer afternoon, and a positive consumption externality is our favourite CD played by our neighbour loudly enough for us to enjoy in our own flat.

6.3.2. Economic Theories on Externalities, the Internalisation of Externalities

Welfare economists claim that the occurrence of externalities diminish the allocative efficiency of the society, and lead to welfare losses: because of externalities the social benefits differ from private benefits and social costs differ form private costs, the principles of market efficiency lead to a market equilibrium that differs from social optimum.

The British economist A. C. Pigou (1920) analysed the causes of externalities, and made recommendations on how to handle them. Pigou said that to resolve the problem of externalities, they should be internalised, that is, the external impacts should be incorporated into market valuation: the positive externalities should be transformed to a revenue measured by the market, and negative externalities should be transformed to costs measured by the market. Therefore the externalities will not disappear, but they will be built into the market processes, and will be taken into account in the market equilibrium. The process of internalisation may go through the following stages:

- *Voluntary agreement:* the party causing the externality and the party affected by its impacts will make an agreement by their free will about the value of the damage caused and the compensation to be paid.
- *The involvement of an independent expert*: when the two parties cannot agree about the impact of the externality, they call an independent expert, who will assess the damage caused and give a recommendation about the compensation. Accepting the expert opinion the two parties can make an agreement.
- *Legal procedure to force compensation:* when the parties refuse to make an agreement, then the damaged party may go to court to initiate a legal procedure, that involves assessment of the situation by experts, and the court will decide about the damage and the compensation that the damager is forced to pay.
- *Administrative measures:* some activities that cause negative externalities – e.g. environmental pollution – are legally prohibited, and if anyone continues such activities, a penalty will be charged. Therefore the negative externality becomes a cost for the polluter (in the form of the penalty). Activities generating positive externalities are encouraged by subsidies – e.g. a firm employing formerly unemployed people will enjoy a deduction from the payroll taxes.

Another approach to resolving the problem of externalities identifies the causes in the poorly defined **laws and property rights.** By this approach externalities exist because the property rights of some of the economic resources (e.g. water, air, other natural resources) are not defined clearly. The key concepts of this theory were defined by *Ronald Coase.* He argued that by clarifying and assigning the property rights of all resources, and making society accept these rights, externalities and the consequent problems may be resolved without the involvement of the government, by private bargains in the market. When a firm uses a natural resource, and by polluting this resource restrain others in using the same resource, the first thing to decide is to identify the ownership of the resource. The owner of the resource will decide about its use. If the owner is someone else, not the firm, then this

owner may prohibit for the firm to use and pollute the resource – or they can bargain about the price for which the owner is willing to allow the firm to use the resource. If the bargaining ends with a price acceptable for the firm, then paying it, the firm becomes the user of the resource, and pays the compensation for the pollution (Farkasné Fekete – Molnár, 2007; Kopányi, 1993).

If the firm is the owner of the resource, then property rights mean the right of use as well, and the firm can prohibit others to use the resource, and pollution will not cause externalities. In this case the person harmed by the pollution can start bargaining with the firm, offering compensation for the firm to diminish or stop pollution – and if the firm finds the offer satisfactory, it may give up it polluting activity.

Therefore the resource will be used by the party who assigns higher value to it (if the firm pays for the damage caused, this means that the firm values the use of the resource higher than its owner), therefore efficient resource allocation is attained. All this takes place, by voluntary negotiations, without any government intervention, making the natural resource the object of private bargaining in the market. Coase argues that this procedure works if the property rights can be clearly defined and assigned, and the negotiation process, that is, the bargaining does not incur very high costs. Unfortunately, in most of the real world situations very high numbers of people are involved, and the negotiation prcedure is nearly impossible to conclude, so the resolution suggested by Coase is often impossible in practice.

Review Questions

1) Explain the notion of market imperfections. Give some examples.
2) How can you classify goods, what are private goods, public goods and mixed goods?
3) How can you describe the supply and demand of public goods? What is the free rider problem?
4) What do the terms ’marginal social benefit’ and ’marginal social cost’ mean, how does social efficiency differ from market efficiency?
5) Explain the notion of externalities, and define their main categories.
6) What is the resolution suggested by welfare economics to the problem of externalities?
7) Explain the approach of poorly defined property rights to the problem of externalities, and to its resolution?
8) Explain environmental pollution, as an externality.

Problems and Questions to Develop Competence [21]

1) A company produces fruit pulp, and the production process generates bad smell, polluting the air. Higher outputs generate more damage to the air quality. The pollution affects mainly the residents of the area. Assume that the fruit pulp is sold in a perfectly competitive market, and its marginal cost function is linear. The marginal cost of the pollution (that is, the marginal cost of the externality) is proportional to output, and is equal to one third of the marginal cost of production.

a. Draw a diagram, in which you sketch the costs and revenues of the company, as the functions of output. Mark the output level that maximises the company’s profit.
b. Indicate the social costs of production in the diagram?

[21] Source of problems: Case et al. (2009).

c. Indicate the level of output in the figure, that is optimal for the society. Is this quantity larger or smaller than your answer to a) ?
d. How could you convince the company to produce the socially optimal quantity?

2) Collect information about environmental problems, or production-related environmental disasters that occurred in the last 10 years in your place of residence. What solutions have been established since for eliminating or diminishing the negative externalities?

3) Describe a few services available in your place of residence that may be considered public goods. Explain why it is necessary to provide these services as public goods.

Chapter 7: Tools and Concepts to Analyse the Macroeconomy

7.1. The Objectives, Problems and Tools of Macroeconomics

The first six chapters discussed the microeconomic aspects of the economy. The second half of the book will focus on macroeconomics, analysing the economy from a different viewpoint. As it was discussed in Chapter 1, microeconomics studies the individual decision-making units (households and firms), their economic activities and economic relationships, to define the methods and criteria they use looking for optimal decisions.

Macroeconomics takes a different view, looking at the economy as a whole. It looks at its key attributes (total output, employment, change in the overall performance over time, price rises, etc.), analyses its processes and interactions and tries to explain its problems.

Macroeconomics *is concerned with the behaviour of the homogenous groups (aggregates) of economic agents in the macroeconomy (the national economy), assessing their relationships based on overall income flows and other economic processes, using total (aggregated) indicators and categories* (Misz – Tömpe, 2006).

The operation of a national economy is the sum of the activities of its economic agents. An average economic agent, as an individual actor, cannot make any impact on the overall situation of the national economy – though there are a few significant economic agents who may be able to -, but the changes in the overall economy will fundamentally affect the economic situation of all the individuals. The changes in the overall economy, however, are different from the simple sum of the actions of individuals, as it was explained by the notion of 'the fallacy of composition' in Chapter 1; the interrelationships and conflicts of interests between individual economic units may essentially change the conditions of the whole economy.

Thus, the economic units, that macroeconomy is concerned with, are not individuals and particular markets, but so-called **aggregates**. Macroeconomics uses the method of double aggregation. First, the homogeneous groups of economic agents are aggregated to define the **sectors (spheres) of economy**: the firms, households, employers, the government. Second, the goods, commodities and services produced are also aggregated into homogeneous groups, called **commodity groups**, and the sum of all these product groups represent the **total output of the economy**.

Macroeconomics analyses the problems of the macroeconomy (the national economy), such as:

- The conditions and ways of **efficiency in the economy,** tryíng to amend inefficiencies. Within this, the priority is given to:
  - the issue of *economic growth* – that is, the growth of total output of the economy;
  - the short-term fluctuations of total output, that is, *business cycles*;
  - issues of *employment and unemployment*;
  - the changes in *price levels (inflation), exchange rates and foreign balance*.
- The other essential problem that macroeconomics is concerned with is **the efficient management of the state budget,** as this has a crucial impact on the regulation of the economy. This includes the efficient application of government instruments available to influence the economic processes, such as *taxes and deficit management.*

Altogether, ***macroeconomics*** *explains the way the economy, as a whole works, describes the internal relations, rules and mechanisms of its operations, identifies the factors that determine the performance, the equilibrium and disequilibrium of the national economy,*

*and provides theoretical foundation for the economic policy of the government (*Misz-Tömpe, 2006*).*

Assessing macroeconomic performance of periods of several decades, it is clear, that the output of all national economies tends to grow. This growth, however, is not free of breaks, periods of outstanding growth are followed by periods of decline. Therefore the long-term behaviour of the economy follows a growing trend, while the short-term performance shows frequent fluctuations - these latter are called *business cycles*. Typical features of business cycles are the fluctuations of output and employment, the changing patterns of recessions and expansions. This cyclical behaviour is not beneficial for the economy, even with the long-term growth trends in the background, because fluctuations are irregular, and difficult to forecast. During the periods of expansion the output grows together with employment, while the number of unemployed decreases. During recession, however, the opposite processes are experienced: output falls, employment declines, unemployment rises. Therefore one of the main goals of economic policy is to maintain stable long-term growth, while the other is to diminish short-term economic fluctuations, and to stabilise the economic environment (Mankiw, 1989).

The instruments to achieve **the long-term goal**, that is, to **promote economic growth** are the following:

- *Develop public education (to increase the so-called human capital.)*
- *Encourage savings and investments (to increase physical capital, or real capital).*
- *Research and development (technological development, innovation).*
- *Stable legal and political environment (that provides favourable business environment for economic growth)*

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In the short-run, stabilisation policy is used to diminish economic fluctuations, focusing mainly on *diminishing the fluctuations of total output and employment*, *stabilising the price level* and *slowing down inflation*, by influencing the total demand for goods and services, using the following instruments (Misz-Tömpe, 2006; Hall-Taylor, 1997):

- *Fiscal or budgetary policy*, affecting the spending and revenues of the state budget.
- *Monetary policy*, affecting the amount of money in circulation and the interest rates.
- *Income redistribution policy*, consisting of government measures directly affecting the decisions about prices and wages, with the purpose of slowing down inflation, while keeping unemployment low, and preventing economic recession. Besides, supporting the poorest and weakest members of the society, this policy also attains social policy objectives.
- *Foreign trade policy:* it is concerned mainly with maintaining the external and internal balance of the economy, by the instruments of exchange rates, trade policy (tariffs, contingents, etc.), and occassionally by the instruments of fiscal and monetary policy.

It is a subject of debate, even among economists, to decide which of fiscal or monetary policy is more efficient. There is no universal answer to the question, it always depends on the actual situation which one will lead to long-term and efficient results. The decision is especially difficult, because of the time lag that elapses between the time of action and the effect of it, because from the time of the policy decision to its impact the external economic environment may considerably change. The group of *Keynesian economists* argue that the stabilisation policy is desirable and efficient, and both fiscal and monetary policy instruments are suitable to promote the welfare of the society. Keynes himself preferred fiscal instruments, while most of contemporary Keynesian economists prefer monetary policy. The economists belonging to the so-called *monetarist school of MIT, Chicago* (represented by its most famous member, *Milton Friedman*) argue, that although stabilisation is a desirable goal,

goverment intervention cannot be efficient, and it may even enhance fluctuations instead of diminishing them, because of the lags involved between goverment action and the response of the economy. The *theory of real business cycles (RBC)* argue, however, that economic fluctuations are not harmful, but natural responses of the economy to external shocks, therefore prevention of them will cause damage for the overall economy (Misz, 2007).

7.2. Basic Concepts of Macroeconomics

7.2.1. Output, Consumption, Investment, Price Level, Inflation

Macroecenomics is concerned with the whole of the processes of a national economy. The terms discussed here, in the rest of Chapter 7 are defined – whenever otherwise not indicated - by the following sources: Misz-Tömpe (2006); Misz (2007); Samuelson-Nordhaus (1987) and Hall-Taylor (1997).

Economic processes *are annual movements of goods and money related to the production and consumption of goods, as well as the generation and distribution of incomes within a year.* Some of these are real processes, others are income processes.

Real processes *are the processes of producing goods (production process), distribution of goods (distribution process), and utilisation or consumption of goods (consumption process).* **Income processes** *are the processes of earning (generating) incomes, and spending of incomes, that is, money flows.*

The ***total output*** **(***Q) of the macroeconomy is all the goods (products and services) created by the economy. The value of realised (sold) total output is* **macroeconomic income** *(Y, Yield), that is distributed among the owners of resources used in the production process, and it is divided into two main parts:* **labour income** *and* **capital income**.

Nominal output *is the value of total output of the macroeconomy measured at current prices.* **Real output** *is the value of total output of the macroeconomy measured at constant prices (base-year prices), therefore neglecting the impact of price changes (inflation) on the value of output.* **Potential output** *is the level of macroeconomic output that is attainable at the current level of resource endowment with their most efficient use at full capacity (when no unemployment and no unused capacities exist in the economy).*

The difference between nominal and real output is caused by the annual change – usually increase – in prices. Therefore, assuming that the economy produces exactly the same amount of goods in two successive years, the nominal output may still change. If, for instance, the prices of goods rise uniformly by 5% from the first year to the second, then the nominal output of the second year will be 5% higher in the second year, than in the first one, although the amount of goods – available for consumption for the society – remains the same as before. The value of real output in the second year is calculated taking the prices of the first year with the amounts of goods producted in the second year. In our example real output is the same in both years, while nominal output in the second year increases by 5%.

One of the generally used measures of macroeconomic (or national) income is **GDP (***Gross Domestic Product).* There are three ways to measure GDP. First: by measuring the output, second: by measuring the factor incomes received by owners of productive resources, and third: by measuring the spending of all incomes earned while producing the GDP.

A part of national income is consumed, the rest is saved. **Consumption** (C) is the part of the income which the members of society spend on goods (products and services) to satisfy their wants. **Saving** (S) is the part of income not spent on consumption.

The incomes not spent on consumption, i.e. savings are the source for financing the accumulation of capital. **Capital accumulation** consists of goods to be used for expanding productive resources. Capital accumulation is divided into two categories: investment goods and inventories. **Investment** consists of goods purchased by individuals to add to their capital stock, more precisely **business fixed investment** is the purchase of capital assets for either replacing used equipment to maintain productive capacity, or installing new equipment to expand productive capacity. **Inventory investment (accumulation of inventories)** consists of goods that the firms hold in storage, that is, inputs needed for future production, or finished products waiting to be sold. *The replacement of used fixed capital is called* **replacement investment**, *its role is to compensate for the wear and tear of fixed assets (depreciation),* therefore it does not expand productive capacity but maintains its current level. **New capital investment**, *on the other hand, means the expansion of productive capacities by installing new fixed capital (e.g. equipment), increasing the amount of fixed assets. The value of* **net investment** *is calculated by deducting the value of depreciation from the value of total investment,* therefore net investment consists of new capital investment, while gross investment is the sum of replacement investment and new capital investment: *gross investment = replacement investment+new capital investment = depreciation+net investment.*

When the notions of nominal and real output were defined, the annual price changes of goods were briefly mentioned, together with their impact. The prices of all goods do not usually change at the same uniform rate, there prices of some goods increase at above-average rates (e.g. prices of energy and fuels), while prices of other goods may remain the same, or even decrease (e.g. electronic appliances, cellular phones, computers). Therefore the **price level (P)** *is the average of prices of goods weighted by the quantity of these goods*. This means that taking the goods that the economy produces (or consumes) during a year, the unit prices of these goods are weighted by their produced (or consumed) quantities, and the average value calculated this way is the price level.

Price index is the commonly used measure of changes in price levels. **Price index** *is the ratio of the current price level to the price level of the previous year, measured as a fraction, or as a percentage value.* Denoting the current price level by P_t , and the price level of the former year by P_{t-1} , then *price index =* P_t / P_{t-1} in a fractional form, and *price index* $= 100 \times P_t / P_{t-1}$ in a percentage form. For example, if the value of the price index is *1.06* (or *106 %*) then the average price rise from one year to the other is *6%.* A price index of *93%* means an agerage price decrease of *7% (= 100% - 93%).*

Naturally, it is important to define which goods, products and services are included in the calculation of the price level, together with the weights attached to their unit prices. Therefore several indicators of similar content are used for measuring price level changes.

The most frequently used indicator to measure price changes is the **Consumer Price Index** (*CPI*), *for which the basket of goods used in the calculation contains all the goods (products and services) that the people of the country purchase in the given year* – including goods produced at home as well as imported goods, e.g. cars, electronic devices, etc. The other popular indicator is **GDP deflator**, *which is the ratio of nominal value of output (nominal GDP) and real value output (real GDP)*. Thus, GDP deflator compares the value of total output of the current year measured at current prices to the value of total output of the current year, measured at the prices of the previous year (that is, at constant, or base year prices), so technically it follows the same logic as the price index. The main *differences between GDP deflator and CPI* are:

- The basket of goods used in computing the *GDP* deflator contains goods produced domestically, by the national economy. It does not contain imported goods, but contains exported goods produced domestically. The basket of goods used for

consumer price index, however, contain goods bought by consumers, so exported goods are excluded, and imported goods consumed domestically are included.

- *CPI* contains goods purchased by households, and does not contain goods purchased by firms and the government, while *GDP* deflator does.
- The basket of goods used in the calculation of *CPI* is a fixed basket, in which the range and quantity of goods are defined by the statistical bureau of the country based on the consumption statistics of households of several years. This constant consumer basket is used for several years - so the prices are weighted every year by the same quantities (although from time to time the basket is updated). The GDP deflator, however, uses the actual basket of goods produced in the actual year, so both the range and the quantity of goods change each year in the basket.

The changing price level implies a change in the purchasing power of incomes. As prices, and the price level rise, the same money can buy less and less amounts of goods, the purchasing power of money decreases. Therefore the price level and the purchasing power of money are inversely related. Thus *the purchasing power of money is defined as the reciprocal value of the price level, giving the amount of goods that one unit of money can buy*. **Inflation** *is a persistent increase of the price level, that is, the continuous decrease of the purchasing power of money.*

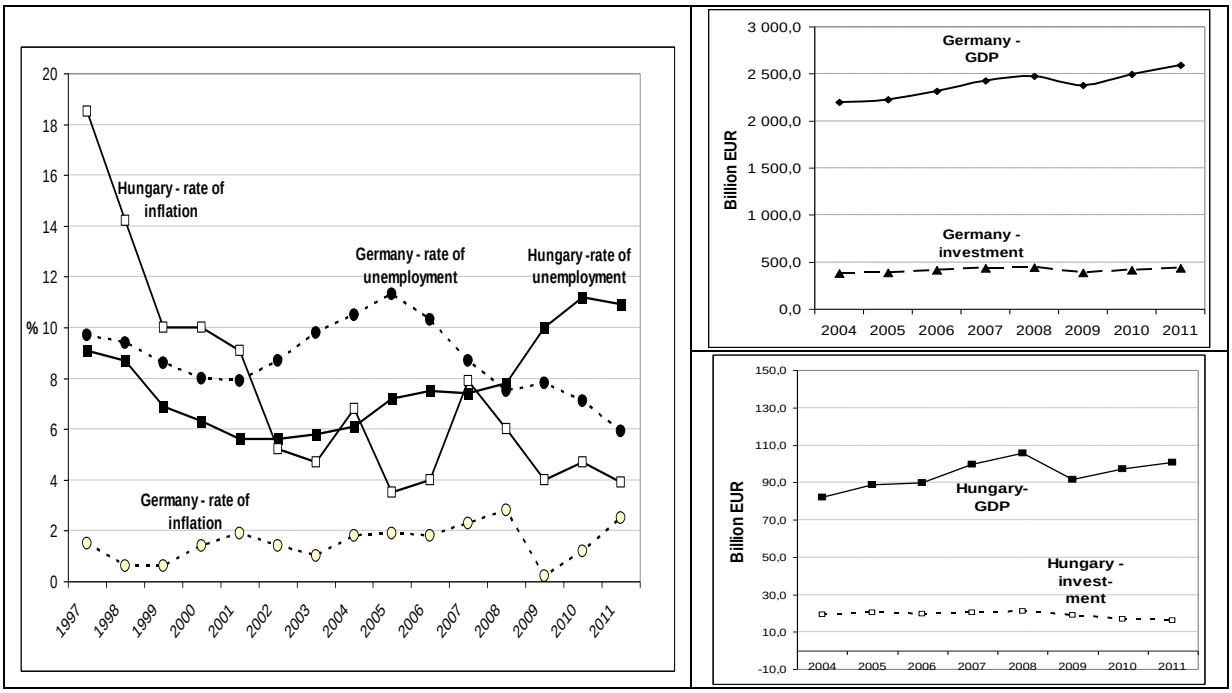

Figure 7.1: ***Macroeconomic Indicators – Examples of Germany and Hungary***
Source: Author's own construction based on data published by Eurostat (http://epp.eurostat.ec.europa.eu/)

7.2.2. Aggregate Demand, Aggregate Supply, Unemployment

At given prices the producers make decisions about production, and the quantities produced will define the total output of the economy. Similarly, at the given prices the consumers will make purchase decisions, and the sum of these individual demands will define the total demand of the macroeconomy.

Aggregate supply *is the total quantity of output that the economic agents intend to produce and sell at given prices, productive capacities and costs. The* **aggregate supply curve (AS)** *is the aggregate supply plotted as a function of the price level.*

Aggregate demand *is the quantity of goods, that the economic agents (households, firms, and the government) desire to purchase at given prices. The* ***aggregate demand curve (AD)*** *is the aggregate demand plotted as the function of the price level.*

The macroeconomic output and the price level are defined by the interaction of aggregate supply and aggregate demand, and this mechanism will be discussed in detail in the following chapters.

The level of output is closely related to the level of productive resources, factors of production, that are used in the economy, including the amount of labour employed. In the real world, contemporary developed economies utilise only a part of the available labour force, while a part of the working age population is looking for work without success, being unemployed. Unemployment is one of the major problems of modern market economies, because the unemployed cannot earn income, therefore they cannot buy goods to satisfy their wants by consumption. The socially sensitive market economies, the so-called social market welfare states provide goverment support for the unemployed – for varying lengths of time. Unemployment is measured by the unemployment rate, which compares the number of unemployed to the number of the labour force (that is, those wanting to work, employed and unemployed together). An important goal of economic policy is to decrease the number of unemployed people and increase the number of employed workers, because this will lead to an increase in the total output of the economy (the aggregate supply), and the income earned by the newly employed will increase their intention and ability to purchase goods (aggregate demand). This is a step to the direction of economic growth and improved welfare of the society.

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7.3. Sectors of the Macroeconomy

Economic agents may be categorised according to their relations to the goods produced by the economy. The firms (business entities) produce the goods (products and services), while households consume them. Aggregating the economic agents four spheres (sectors) of the economy are defined, each of them consists of individuals playing the same role and function within the economy. (Misz, 2007; Misz-Tömpe, 2006).

- *The sector of* **households** *consists of individuals, i.e. the citizens of the country, as economic agents who spend their income to consume goods. The main function of households is consumption, and they earn the income needed for consumption as employed workers earning wages, or collecting payments by selling their other productive resources, to the producers of the economy.* Households may also produce (goods or services) for their home consumption, but this is not markedly separated from their role as consumers.
- *The sector of* **firms (business entities)** *consists of economic agents producing goods or services with the purpose of selling them in the market. The key role of the sector of firms is, therefore, to produce the total output of the economy, and for this the sector buys or rents factors of production – labour, money saved, natural resources - from the household sector, paying their income in exchange.* The sector of firms, therefore, sells its products and services in the market.
- *The sector of* **the state, or government** *consists of bodies and institutions of the central goverment, the institutions of local governments, municipalities, the bodies of social*

security, and the organisations and bodies handling the financial funds and wealth of the state. The role of the government (the state sector) in the economy is to collect taxes from the private sector – households and firms – and use them to maintain its own institutional system, provide public goods and services, support the needy and handicapped, and implement its economic policy to provide favourable environment for the economic processes.

- *The sector of* **the rest of the world** *(***foreign economic agents)** *consists of all individuals, bodies, organisations who are not permanent residents of our country, and whose activities have not been integrated into the national economy. To put it simply, all the exonomic agents are included in this sector who do not belong to any of the formerly defined three sectors.* Note, that business units owned completely or partially by foreigners, but working in our country for more than one year, do not belong to the sector of the foreigners.
- *The sector of banks* should be mentioned as a separate sector of the economy, its role is to collect the savings of the other sectors, and to offer these savings to others for use in the form of loans (Misz-Tömpe, 2006). This sector cannot be entirely considered a private sector, nor a part of the government, while its role in the macroeconomy is very significant.

Review Questions

1) What is macroeconomics concerned with, what kind of problems does it analyse?
2) What is 'double aggregation'?
3) Explain the instruments of stabilisation policy.
4) Explain the following notions: nominal output, real output, potential output, consumption, saving, accumulation of capital, investment, price index, inflation, aggregate demand, aggregate supply.
5) Explain the meanings of CPI and GDP deflator, and explain their differences.
6) List the sectors of the macroeconomy, and describe their main functions.

Problems and Questions to Develop Competence [22]

1) Which of the categories of consumption, investment, government spending, net export do the following economic processes belong to?

a. The American Boeing factory sells an aircraft to the US Air Force.
b. The American Boeing factory sells an aircraft to American Airlines.
c. The American Boeing factory sells an aircraft to Air France.
d. The American Boeing factory sells an aircraft to Amelia Earhart.
e. The American Boeing factory produces an aircraft to sell it in the following year.

2) An economy produces and consumes two goods: bread and cars. The following table gives the production and consumption data for two years:

Year	**2000**	**2010**
Price of a car	*5000000 HUF*	*6000000 HUF*
Price of a kg of bread	*100 HUF*	*200 HUF*

[22] The source for problems 1.-2. is Mankiw (1999)

Number of cars producted	*100*	*120*
Amount of bread produced, in kg	*500000*	*400000*

a. Taking the year *2000* as base year, calculate the following inticators for both years: nominal *GDP*, real *GDP*, *GDP*-deflator, consumer price index (*CPI*).
b. How much did the prices rise from *2000* to *2010*?
c. A member of the parliament proposes that social security benefits and pensions should be increased by the level of inflation to compensate people for the increased costs of living. Should the level of price increase be measured by *GDP*-deflator of by the consumer price index? Explain your answer.

3) Collect data from the past *10* years about nominal *GDP*, real *GDP*, *GDP* deflator and consumer price index. Compare in a diagram the pattern of the *GDP* deflator and the consumer price index (*CPI*). Can you see any considerable difference between the two indicators? If yes, what might be the reason for that?

Chapter 8: Measuring the Performance of the Macroeconomy, the Flow of Incomes

8.1. Basic Concepts of Measuring Macroeconomic Performance, the SNA

To measure the performance of macroeconomy the total annual output of the economy must be taken into account, the values of all produced commodities and services should be summed up. However, the yearly performance of the macroeconomy may be interpreted not only as the total output. The value of this output is divided among the owners of productive resources (labour and capital resources) that were involved in the production process, and this is called the primary distribution of incomes. Nevertheless, the owners of productive resources cannot spend all their income by their own will, because this income will be modified by government redistribution – that is, they have to pay taxes to the state, and may receive support, subsidies (so-called transfers) from the state. Factor owners can use their disposable income, i.e. the available income left after income redistribution, to buy the goods produced by the economy – therefore the sum of the spending of all incomes must be equal to the total output of the national economy. The incomes not spent by their owners on goods – that is, the savings of economic agents - are offered by the banking system for others as loans, and then spent by these borrowers to buy goods. This circular flow of incomes is shown in *Figure 8.1.* The values mentioned in the circular flow diagram – e.g. consumption, savings, wages, etc. – are regularly measured by national economic statistics.

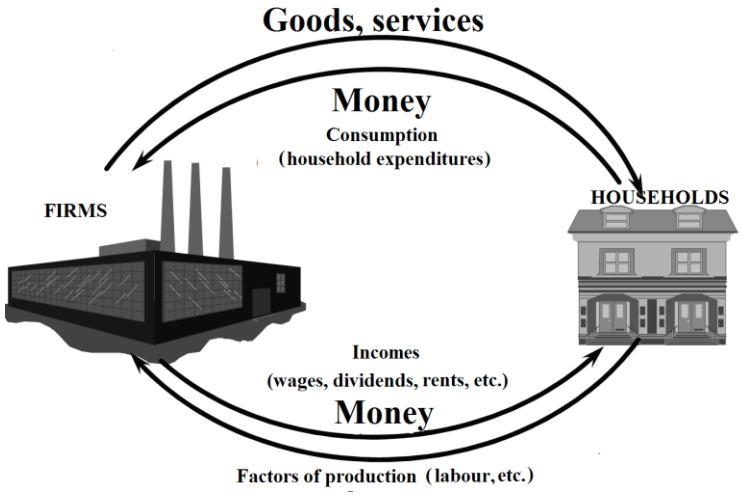

*Figure 8.1:**The Circular Flow of Incomes in the Macroeconomy***
Source: Author's own construction

In order to facilitate the comparison of the annual economic performance (output) among countries of the world a standardised methodology of measurement is needed.

The *System of National Accounts (SNA)* was constructed by the *UNO* in 1953 to account for the macroeconomic performance of the nations. In 1993 the system was amended

and today this is the only internationally acknowledged system in use to measure national macroeconomic performance (Misz-Tömpe, 2006; Misz, 2007).[23]

The structure of *SNA* is summarised in *Table 8.1*. The table contains three rows – gross, semi-net (or semi-gross) and net indicators –, and three columns – indicators of domestic, national and disposable values. The 1993 adjustment of the system deleted the line of gross indicators, and changed the name of the second line (the semi-gross or semi-net line) to gross indicators (Misz-Tömpe, 2006)[24].

Table 8.1: ***Indicators of SNA***

	Domestic	**National**	**Disposable**
(Gross)	**GO:** *Gross Output*	-	-
Semi-net (semi-gross)	**GDP:** *Gross Domestic Product*	**GNI:** *Gross National Income*	**GNDI**: *Gross National Disposable Income*
Net	**NDP:** *Net Domestic Product*	**NNI:** *Net National Income*	**NNDI:** *Net National Disposable Income*

Source: Author's own construction

The ***domestic indicators*** of *SNA* refer to the outputs produced within the borders of the country, the ***national indicators*** measure the incomes earned by the residents of the country regardless of the place of their production**,** while ***disposable indicators*** adjust the national indicators, taking into account the international transfers, supports, grants, subsidies, membership fees to international organisations, paid to, or received from other countries.

The difference between ***gross*** and ***semi-net indicators*** and the actual contents of the various indicators are easy to understand by the following example. Assume, that the economic activities in a country are wheat production, processing, and consumption of the final product. The wheat grower produces *20 tons* of wheat each year, using home-produced wheat seeds, and no other purchased input, therefore the total annual output of this farmer is *20 tons* of wheat. The farmer sells the wheat to the mill at the unit price of *20 thousand HUF per ton*, so the value of the farmer's output is *20 000 HUF/ton × 20 tons =400 000 HUF*.

Thus the mill purchases wheat for *400000 HUF*, and produces *15* tons of flour. The flour is sold to the baker, at a unit price of *50 thousand HUF/ton*, thus the value of the baker's output is *50000 HUF/ton ×15 tons =750 000 HUF*.

The baker purchases the flour for *750000 HUF*, and bakes *30* tons of bread, selling it to the grocery shop at a unit price of *100 thousand HUF/ton,* therefore the value of the baker's output is *100000 HUF/ton ×30 tons =3 000 000 HUF*.

The grocery buys *30* tons of bread for *3 000 000 HUF*, and sells it to the consumers at a unit price of *150 thousand HUF/ton*, so the value of the grocery's output is *150000 HUF/ton ×30 tons =4 500000 HUF*.

The value of **GO, gross output,** *is the sum of the values of all outputs produced by the economic agents within the country.* In the example *GO* is the sum of the values of the outputs

[23] Before 1990 (the socio-economic transition) Hungary, together with the former socialist countries, used the so-called *MPS* (*Material Product System*) to measure the performance of the national economy. This system accounted for the values of material production and services, and did not include the values of immaterial services (education, health care, government administration). Since 1968, besides the official *MPS* figures Hungary has calculated the indicators of SNA as well, and since 1990 Hungary has also switched to *SNA* to account for the performance of its national ecoomy (Misz-Tömpe, 2007).

[24] The European Union uses the so-called ESA (European System of Accounts) which is harmonised to the indicators of SNA, but focuses more on the specialities and data requirements of the economies of the EU.

produced by the wheat farmer, the mill, the baker, and the grocery: *GO = 400000+750000+3000000+4500000= 8650000 HUF.*

However, eventually the consumers of the country consumed only *30 tons* of bread, worth of *4500 000* HUF (the value of the bread sold by the grocery), and not *8650000* HUF. The explanation of the difference is that the latter sum contains substantial multiplications of the same values: the mill's output already contains the farmer's output purchased as input for the mill. The baker's output contains the mill's output , which again contains the farmer's output. The grocery's output contains the baker's output, which again contains the mill's output, and the farmer's output. Therefore all the intermediate products – that will be further processed by another producer – are included in double counting, in the value of *GO*. The true output produced by any economic agent is the added value of the total output above the values of the inputs purchased from elsewhere.

Therefore the added value produced by the farmer is *400000 Ft* (because the farmer does not purchase any inputs), the mill's added value is *750000 - 400000 = 350000 HUF*, the baker's is *3000000 – 750000 = 2250000 HUF*, and the grocery's is *4500000 – 3000000 = 1500000 HUF*. Summing up the added values produced by all the producers *the total value added is =400000 + 350000 + 2250000 + 1500000 = 4500000* HUF.

Note that the sum of total value added is exactly the same as the value of *30 tons* of bread purchased by the consumers. This value is defined by *SNA* as the *gross domestic product of the country, the GDP*. Therefore *GDP* is defined as the *total value of final goods for consumption*, and it can also be measured as *the sum of value added at each stage of production.* Outputs that are produced to be sold to other firms for further processing are called *intermediate goods*. In our example the farmer, the mill and the baker produce intermediate goods: *the value of intermediate goods is = 400000 + 750000 + 3000000 = 4150000 HUF*. Note that deducting the value of intermediate goods from gross output we get the value of *GDP* again: *8650000 - 4150000 = 4500000 HUF*. Relying on the example the domestic indicators of *SNA* are defined below.

Gross output (GO): *the sum of the values of all outputs produced by the economic agents within the country.* **Intermediate goods (producer goods)** *are the goods produced to be sold to producers for further processing.*

Gross domestic product (GDP): *The total value of domestically produced goods and services for final consumption in a year.* In other words, *the GDP is the total gross income without double counting, earned domestically during a year, or the sum of all value added within the country, that is equal to the value of Gross Output minus the value of intermediate goods.* Note that computing the annual *GDP* an adjustment must be made: besides final consumption the *value of inventories - outputs produced, yet unsold, and intermediate goods yet unused –, and investment goods should be added* because these values have been produced during the actual year, but not included yet in final consumption or in the value of final products. Looking at *GDP* as the sum of goods produced, it is the sum of all final goods and services that are ready for household consumption, or for investment purposes (not needing any further processing), or government use, or for export. Looking at GDP from the viewpoint of value added, it includes all new values produced including replacement goods (replacing depreciated goods), and from the viewpoint of incomes it is equal to the primary incomes of owners of factors of production, plus the value of capital depreciation. **Net domestic product (NDP)** *is the total net income earned domestically during a year, which is equal to GDP minus the annual capital depreciation of fixed assets.*

Now we are ready with defining the 'domestic' column of *SNA.* The 'national' indicators differ from the domestic ones in that domestic indicators account for incomes produced within the territory of the country, while the national indicators contain incomes earned by the residents of the country anywhere in the world. Therefore, when calculating a

national indicator, the primary incomes (labour and capital incomes) earned within the country by foreigners are deducted from the relevant domestic indicator, and primary incomes earned by the residents of the country abroad are added to it.

Gross national income (GNI): *The total annual primary income of all residents of a nation. It is calculated from GDP, adding the primary incomes (labour and capital earnings) of the residents of the country earned abroad, and deducting the primary incomes of foreign residents earned in the country.* **Net national income (NNI):** *the value of gross national income (GNI) minus capital depreciation.* The data published by the Central Statistical Bureau (KSH) about Hungary give the value of *GDP* for *2005*, at current prices as *22027 billion* HUF, while *GNI* was somewhat less, *20759* billion HUF, thus equal to *94.2%* of the annual *GDP*, while in *2008* the *GNI* value of Hungary was *83.3%* of the annual *GDP*.

The incomes generated in the national economy are not the same as the incomes actually spent by the residents of the country. The residents may send a part of their incomes to foreign countries without any compensation – e.g. as an aid to a country severely hit by a natural disaster, or paying the annual membership fee for an international organisation - , and similarly, they may receive income transfers from abroad, - as a gift, aid, subsidy, or grant. The national income indicators are corrected for international transfers to calculate the indicators of 'disposable income'.

Gross national disposable income (GNDI): *The total annual income that the residents of a country can spend on their own purposes. It is calculated from GNI by adding the international transfers incoming from abroad, and deducting the international transfers outflowing from the country.* **Net national disposable income (NNDI):** *the value of GNDI minus capital depreciation.*

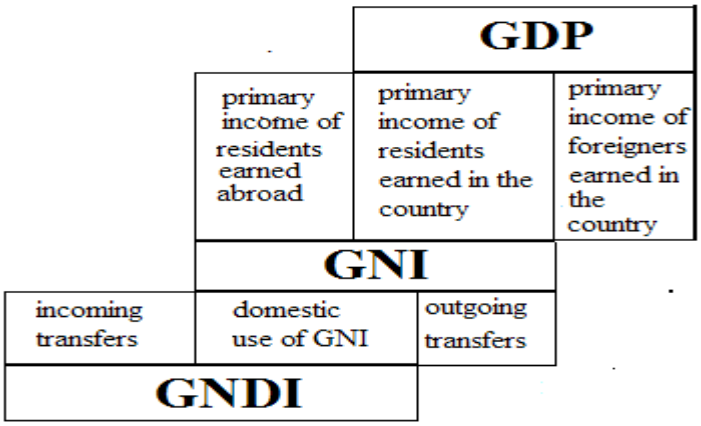

Figure 8.2: ***The Relations of the SNA Indicators***
Source: Author's own construction

The residents of a country spend the gross national disposable income for their own purposes, either for consumption, or saving (capital accumulation). The capital accumulation consists of gross investment (including new and replacement investments) for gross indicators, and only new investments for net indicators. The amount of produced incomes and spent incomes differ considerably in many countries, as *Figure 8.2* shows. When the residents of a country own very few productive resources, the incomes earned by the residents in the country make only a small part of *GDP*. However, labour incomes earned by the residents working abroad may be considerable, and a poor country may expect significant amounts of international grants (transfers), too. Therefore, although *GDP* may be small, the value of *GDNI* may still be reasonably high.

Produced and disposable income are essential in assessing the economic welfare of a country, but they are not the same as the actual amount of consumed income. Taking a large foreign loan may considerably increase the amount of consumed income in a given time, but later the obligation of paying back the loan and its interests will decrease the consumption possibilities of the country.

The indicators of the *SNA* may be calculated at the current price level of the actual year, to produce nominal indicators. To compute the real values of the indicators the constant prices of a base year will have to be used instead. Having the nominal indicators, an easy way to calculate the real indicator is to divide the nominal indicator by the fractional form of the price index between the current year and the base year. Real indicators are useful for comparing the income indicators for several years, because nominal indicators cannot tell us whether an increase or decrease of an indicator is due to the impacts of changing output levels or to price changes. Therefore, when income indicators of several years are compared, it should be done using real indicators instead of nominal ones.

Remember, the above indicators are all based on the methodology of computing the *GDP*, so they are based on the sum of all the goods (the total output) produced by the country. However, the high value of *GDP* does not necessarily imply high living standards, and good living conditions for the population. As it was mentioned in Chapter 6, many things highly valued by the society, are not measured by the markets, so these are not included in the flow of incomes; and on the other hand, many activities may generate incomes and contribute to the increase of *GDP*, though they worsen the quality of life. A car crash will result in the purchase of health care services for the injured driver, and payment of the cost of repair for the damaged car, therefore these expenditures increase *GDP*, but clearly, the living standards of the people involved in the crash would have been higher without the accident. Thus the income indicators derived from the notion of *GDP* are not very well suited for measuring the quality of life, or the welfare of the society, and many attempts have been made to define new indicators more appropriate for the purpose – as will be discussed in Chapter 11.

8.2. The Circular Flow of Incomes in the Macroeconomy, Equilibrium Conditions in the Four-Sector Model

The flow of incomes in the four-sector model consist of the interactions between firms, households, the government and the rest of the world, and these flows among the four sectors take place through the goods market and the capital (financial) market, or directly from one sector to the other. The goods market represents the market for final goods – products and services for consumption and not for further processing (but including investment goods, too).

The following notations will be used to describe the flow of incomes:

- *Y: Total national income, Q: (total) output*
- *W: Wages (and all other factor earnings paid by firms to households)*
- *C: Consumption, I: Investment;*
- *G: Government expenditures;*
- *X: Export; IM: Import*
- *S: Savings; S_F: Savings by Firms; S_H: Savings by households; S_W: Savings by the rest of the world; S_G: Savings by the government (the state budget)*
- *T: Taxes; T_F: Taxes paid by firms; T_H: Taxes paid by households*
- *TR: Transfers; TR_F: Transfers paid to firms; TR_H: Transfers paid to households.*

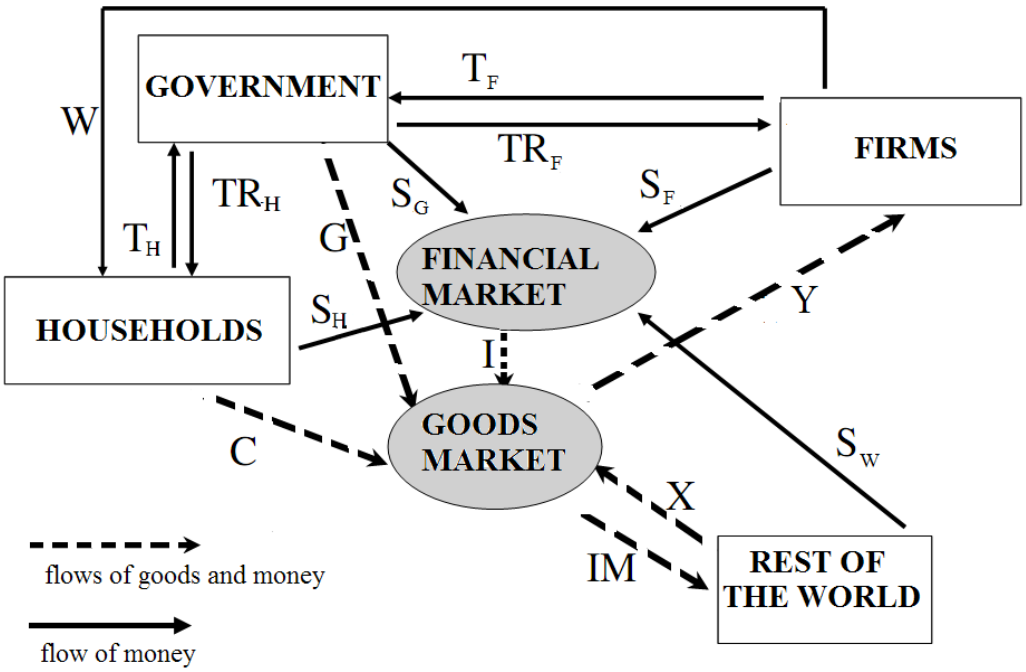

Figure 8.3: ***Cirular Flows of Incomes in the Macroeconomy***

Note: for 'lows of goods and money' the arrow points to the direction of money flow, while goods flow into the opposite direction

Source: Author's own construction

The sector of firms produce the total output of the macroeconomy, that is, the total quantity of final goods, and sells these goods in the goods market. The total value of these final goods gives the total income (*Y*) of the macroeconomy, which is the incoming flow of money into the sector of firms. The firms will use this income to pay for the factors of production purchased from the household sector, the most important of these being labour, for which the firms pay wages (*W)*. (Really, the firms pay the primary income of households not only for labour, but all other productive resources including rent for land and other natural resources either rented or purchased, for dividends or interests for the savings of households invested in the firms as capital. For the sake of keeping the model as simple as possible, all these factor incomes will be incorporated into the value of *W).* Productive resources purchased from other firms are intermediate goods, therefore the value of these inputs are already included in *Y* – which contains the value of all final goods, including investment goods. The values of intermediate goods are flowing between firms within the sector, not causing any inflows to or outflows from the sector of firms. The firms have to pay tax to the government (T_F), and they may receive transfers (TR_F) from it – e.g. subsidy for introducing environmentally safe investments. The difference of the sum of inflows to the sector and the sum of outflows from it is the savings (S_F) of the sector, which the firms will deposit in the financial market – e.g. puts it into a bank, or, borrow from it, when S_F is negative.

The main income source for households is the wages and other factor incomes received from the firms (*W*). A part of this income is paid to the government as tax (T_H), although they may receive transfers from the government (TR_H) as well – maternity benefits, unemployment allowances, grants, etc.. The income left with the households after paying taxes and receiving transfers will be spent on purchasing consumer goods in the goods market (*C*), or saved (S_H), and deposited in banks (in the financial market).

The govenrment (the sector of the state) earns its revenues by collecting taxes from the firms and households (T_F and T_H), although a considerable part of these taxes are paid back to

these two sectors as transfer payments. The rest of the government revenues is spent on government expenditures (*G*) – covering the costs of maintaining and running the government administration -, spent on products and services sold in the goods market. If the goverment revenues were higher than the amount spent on transfers and government expenditures, then the state would save the remaining money (S_G), and would deposit it in the banking system. In the real world there are hardly any countries with positive government savings. Most of the governments spend more than they collect as tax revenues, so the value of S_G is usually negative, and instead of depositing its savings the government takes loans from the bank to cover the deficit, absorbing a considerable part of the private savings deposited in the banks.

The fourth sector of the economy is the 'rest of the world', which sells its own products for our national economy, which is our import (*IM*), and purchases goods and services from our economy, which is our export (*X*). When the export and import values are equal, then our goods market still contains the same value of goods as produced by the firms in our national economy (*Y*), although its composition is different. If import is higher than export, then our goods market contains more goods for home consumption than our own production, but the income left at the economic agents of our country is less than *Y* (because more money was paid for imports than received for exports). Therefore the residents of our country would spend more on consumption than their income, while the rest of the world, owns more income than the goods available in their market for consumption. Thus, the rest of the world saves the unspent income (S_W), and offers it as a loan for our economy, our country takes this loan and then spends it in the goods market. This means that the saving of the rest of the world is equal to the difference between import and export. Naturally, when out import is less than our export, our country will spend less than its income, so our country provides loans for the rest of the world, and the saving of the rest of the world is negative. The difference *X-IM* is also called *net export* (*NX*).

Finally let's consider savings accumulated in the financial market. The sum of these savings – that is, the balance of positive and negative values – reflects the share of national income not spent by the economic agents in the goods market, so this is the share of *Y* left after spending *C*, *G* and *X-IM*. When the sum of savings is positive ($S_F+S_H+S_G+S_W > 0$), then the value of *Y* is larger than the sum of *C*, *G* and *X-IM*, therefore there must be some goods left in the goods market not included in the above three items. These goods are the investment goods (*I*) purchased by those wanting to invest in productive capacities, using the savings of the economic agents.

Now we have described the flows of income in the macroeconomy. For each sector of the economy the inflows and outflows of incomes can be written in the form of 'T-accounts', to get the so-called ***current income accounts,*** and similar accounts can be defined for the goods market (*national income account*) and the financial market (*financial account*).

Table 8.2: ***Income identities for the owners of the incomes***

Firms		***Households***		***Government***		***Rest of the world***		***Financial account***		***National income account***	
Out	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**
W	Y	C	W	G	T_F	X	IM	I	S_H	Y	C
T_F	TR_F	T_H	TR_H	TR_F	T_H	S_W			S_F	IM	G
S_F		S_H		TR_H					S_G		I
				S_G					S_W		X
Financial account: $I = S_F + S_H + S_G + S_W$											
National income account: $Y + IM = C + G + I + X$											
National income accounts identity: **$Y = C + G + I + X - IM$**											

Source: Author's own construction

The financial account is worth of special attention, because it states that the total value of investments in an economy must be equal to the sum of the savings of the four sectors, that is, the savings of the domestic and foreign economic agents. Consequently, a high deficit of the state budget (a negative value of S_G) will absorb a large amount of the private savings, leaving only a small financial capital available for investments, that is, for improving the future productive capacity of the economy.

The national income account describes the equilibrium condition for the goods market, which – in a sligthly rearranged form - is called **the national income accounts identity**:

$$\mathbf{Y = C + G + I + X\text{-}IM}$$

This equation may be interpreted as the equality between the amount of goods supplied by, and the amounts of goods demanded by the four sectors of the economy, and also as an income equality, with Y on the left-hand side being the source of all incomes in the economy, and the various purposes of spending this income on household consumption, government expenditures, investment spending, and net export on the right-hand side.

Table 8.3: **Macroeconomic indicators for selected developed countries, 2008**

	Hungary	**Germany**	**USA**	**China**
GDP, current prices, billion USD	154.2	3623.7	14219.3	4521.8
GNI, current prices, billion USD	129.3	3491.3	14561.6	4030.7
C – Household consumption, as a % of GDP	55	56	71	35
I – Gross investment, as a % of GDP	22	19	18	44
G –Government expenditures, as a % of GDP	22	19	16	13
X – Export, as a % of GDP	82	48	13	35
I – Import, as a % of GDP	81	42	18	27
Total national debt, as a % of GDP	74.3	43.1	55.5	-

Source: Author's own construction based on data of World Bank Data and Statistics and the website of KSH (http://econ.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/, and http://www.ksh.hu/docs/hun/eurostat_tablak/, accessed: 21st 09. 2012.)

Review Questions

1) Describe the indicators of *SNA*, explain the difference of 'domestic' and 'national' indicators.
2) Define the following indicators: *GDP*, *GNI* and *GNDI*.
3) Sketch the circular flow of incomes in the four-sector model of the national economy.
4) What do the current income accounts mean?
5) Write the 'national income accounts identity', and explain its meaning.

Problems and Questions to Develop Competence

1) Collect data of Hungary and at least two other countries for *GDP*, household consumption, government expenditure, investment, export and import in the last *5* years (use the newest available data). How is the *GDP* spent? What percentage of it went for *C, G, I,* and

X-IM? What similarities and differences may be pointed out between Hungary and the two other countries?

2) The following data are known about the economy: $Y = 3500$, $C = 1800$, $W = 2500$, $I = 1000$, $S_F = 800$, $S_G = 40$, $T_F = 280$, $T_H = 580$, $X = 40$, $IM = 45$. Calculate the following indicators:

a. government expenditure: $G = ?$,
b. household saving: $S_H = ?$
c. transfers paid to firms: $TR_F = ?$,
d. transfers paid to households: $TR_H = ?$

Write the current income accounts for the four sectors of the economy and explain the meaning of the notations.

3) What are the impacts of the following events on the value of real *GDP*? Will the change of real *GDP* cause the same change in the welfare of the country?

a. A hurricane in Florida makes Disney World shut down for a month.
b. The discovery of a new, easy-to-grow variety of wheat increases the harvested yields of wheat.
c. Increased hostility between unions and management of corporations leads to a series of strikes.
d. Firms throughout the economy experience falling demand, causing them to dismiss workers.
e. The Parliament passes new environmental laws that prohibit firms from using production methods that emit large quantities of pollution.
f. Many high-school students drop out of school to take jobs mowing lawns.
g. Fathers around the country reduce their workweeks to spend more time with their children.

Chapter 9: The Goods Market and the Money Market, Aggregate Demand

Looking at the equilibrium condition of the goods market, i.e. the national income accounts identity $Y = C+G+I+X-IM$ we see, that the left side of the equation represents the supply of the goods market (that is, the total market value of the final products and services, that defines the total income of the macroeconomy), while the right side describes the desired spending of the sectors of the economy (household consumption, planned investment, government expenditure and net export). The identity compares the supply and demand sides and requires their equality[25]. We will examine one by one the components of the demand side, to explain their values and trends. The following chapter relies on Samuelson-Nordhaus (1993); Hall-Taylor (1997); Meyer-Solt (1999); and Misz-Tömpe (2006).

9.1. Key Factors of Consumption and Investment

9.1.1. Disposable Income and Household Consumption

First let's examine the consumption behaviour of the households.

The amount of income available for comsumption *C*, depends on the income left at households after primary income distribution (earning factor incomes from firms) and redistribution of incomes (paying taxes to and receiving transfers from the government), and this amount of income is called *disposable income*.

The sources of household income includes the wage W received from firms (together with other factor incomes), and the transfers TR_H received from the government. The households use these two income components to pay taxes to the state (T_H), while the rest is used for consumption (C), or saved (S_H). Consequently the wage must cover the households' consumption expenditure, savings, and net payments to the state (in other words, net taxes, $NT_H = T_H - TR_H$), therefore: $W = C + S_H + NT_H$.

The wage W on the other hand, comes from the revenues of the sector of firms, eventually from Y, the national macroeconomic income, which must cover the W wage, the net taxes paid by the firms to the state ($NT_F = T_F - TR_F$) and finally the savings of the firms (S_F), so the following equation holds: $Y = W + NT_F + S_F$.

Summing up, the macroeconomic income covers household consumption, household savings, net taxes paid by households, net taxes paid by firms, and savings by the firms:

$$Y = C + S_H + NT_H + NT_F + S_F.$$

Obviously, the national income is used to cover household consumption, the savings of the private sectors, and the net taxes paid by the private sectors[26]:

$$Y = C + S_{H+F} + NT_{H+F}$$

[25] According to the generally accepted Keynesian approach the equilibrium income of an economy is determined by the demand side, because there are always unused capacities in the economy (as is shown by unemployment), therefore any changes initiated in the demand side will lead to the automatic adjustment of the supply side in the short run. This explains why government intervention usually focuses on the demand side.

[26] In the rest of the text $S_{H+F} = S_H+S_F$, and the notations T_{H+F}, TR_{H+F}, NT_{H+F} will be similarly interpreted. Later the notations T, TR, NT will also be used as short forms for T_{H+F}, TR_{H+F}, NT_{H+F} .

Thus the disposable income of the private sector, which is either saved or spent on consumption is the share of national income left after paying the net taxes: $Y - NT_{H+F} = C + S_{H+F}$. The private sector can decide freely about the utilisation of this income, therefore this income is called the *disposable income of the private sector*.

The **disposable income of the private sector** ***(****also called discretional, or disponible income****)*** is: $\boldsymbol{Y^{DI} = Y - NT_{H+F}}$ *, national income minus net taxes (taxes plus transfers).*

As it was explained, the value of household consumption is determined by the amount of disposable income, and a part of this is spent on consumption, the other part is saved by households. We may ask, whether the current consumption is affected by incomes earned in the previous years, or only the income earned in the current year. Keynes introduced the so-called **Keynesian absolute income hypothesis**, arguing that current consumption is determined by the disposable income of the current year (Hall-Taylor, 1997; Samuelson-Nordhaus, 1987), and this hypothesis is supported reasonably well by the statistical data[27].

Now let's look at the impact of annual disposable income on the annual level of household consumption.

9.1.2. The Consumption Function

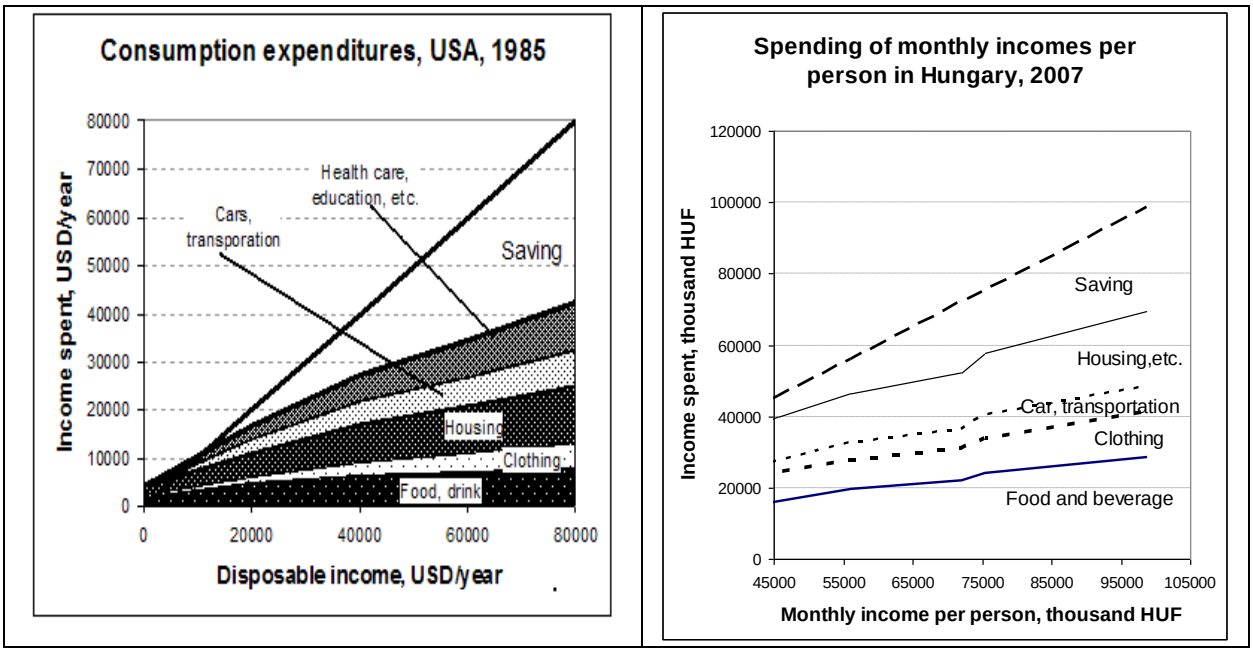

*Figure 9.1****: Consumption as a Function of Disposable Income***

Source: Author's own construction based on *Samuelson-Nordhaus (1987),* and *Tárki Monitor Jelentések 2008 (eds: Szívós P – Tóth I.Gy., 2008)*

The left panel of *Figure 9.1.* presents the consumption patterns of American households in 1985, presented by Samuelson-Nordhaus (1987), as the function of disposable

[27] Economists also use more refined approaches including the ***relative income hypothesis*** by *Duesenberry,* stating that people base their current consumption of the highest income level of the past years, and the ***permanent income hypothesis,*** that argues that current consumption responds to permanent changes in income, which is measured by a properly weighted average of the past incomes. Applying these theories in practical analyses would require very detailed and refined collection of data, and their power and accuracy to explain consumption patterns would not be much better than the simple Keynesian theory (*Samuelson-Nordhaus, 1987)*

income. The figure shows, that at various levels of disposable income the various components of consumption and their sum, total consumption, grow together with disposable income, although at slower rates than that. This is obvious looking at the American statistical data, but it is also true for Hungarian households. The right panel of *Figure 9.1* shows the monthly consumption patterns of the Hungarian population in the year *2007*, published by TÁRKI.

Therefore the planned consumption expenditure of households can be approximatly described as a linear function of disposable income, written in the following formula:

$$C(Y) = C_0 + \check{C} \times Y^{DI}, \quad \text{where}$$

- C_0 is called **autonomous consumption**, showing the minimum level of planned consumption that would occur at zero national income (although this is only a theoretical assumption),
- $\check{C} \times Y^{DI}$ is the amount of **consumption induced by an increase in income**, and
- $\check{C}$ is the **marginal propensity to consume**, (falling between zero and one: $0 < \check{C} < 1$) that shows the proportion of additional disposable income spent on consumption.

The above formula of a linear relationship assumes that the marginal propensity to consume is a constant value. This is not quite true in everyday life, but it is a good approximation of true consumer behaviour in the short run. In everyday life the marginal propensity to consume is usually high at low levels of disposable income, while it is smaller at high levels of disposable income, because less of the needs are not satisfied.

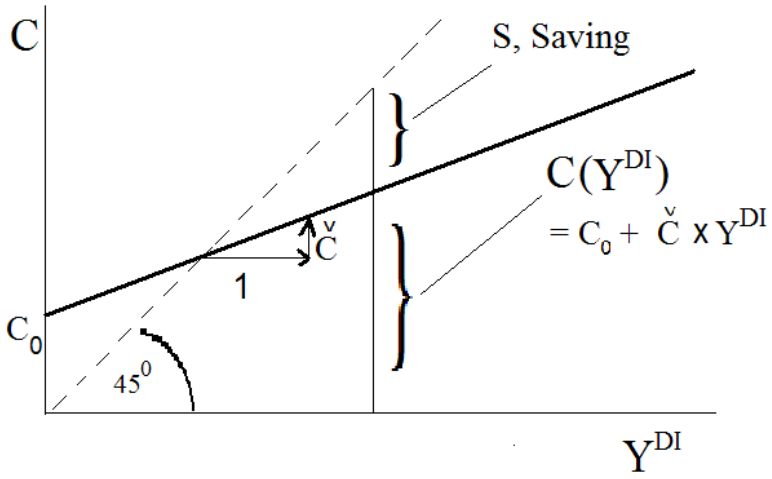

Figure 9.2: ***The Consumption Function***
Source: Author's own construction

Consumption shows a positive relationship to disposable income (Y^{DI}) the two grow or fall together; and disposable income is equal to national income minus net taxes. Therefore, with rising taxes the disposable income falls, and so does consumption, while an increase of the transfer payments will increase disposable income and leads to increasing consumption.

The line in *Figure 9.2* starting from the origin with a slope of $45°$ represents the national income, or the supply of the macroeconomy, while the consumption function $C(Y^{DI})$ shows the proportion of disposable income spent on consumption. The proportion of national income left above consumption represents the saving of the private sector, and shows the share of the total supply of the macroeconomy that economic agents buy for purposes other than consumption. By definition, saving is: $S = Y^{DI} - C$, the saving function is also determined by the disposable income:

$$\boldsymbol{S} = Y^{DI} - (C_0 + \check{C} \times Y^{DI}) = \boldsymbol{-C_0 + (1-\check{C}) \times Y^{DI}}$$

Taxes determine the disposable income, but taxes themselves are changing together with income, because some taxes are directly related to incomes earned by the private sectors (e.g. personal income tax, corporate tax, etc.), while other taxes are independent of incomes (e.g. property tax, car registry tax, etc.). Thus the total amount of taxes will be divided into two parts: T_0 is the amount of autonomous tax (which does not depend on income) and $z \times Y$ is the amount of tax induced by growing incomes, where z $(0<z<1)$ is the tax rate, understood as the average percentage of income taken as tax. At higher levels of income the total value of taxes is also higher, therefore a unit growth of income will lead to a less than unit growth of disposable income. The value of transfers, on the other hand, does not reflect any relationship to the annual national income, because the government will decide about transfers to be paid in the law about next year's state budget, and the transfers are not tied to the level of GDP. Therefore transfers are considered an autonomous factor, independent of Y. Now the net taxes can be determined as taxes minus transfers, by the following formula: $NT=T_0+z \times Y-TR$. Therefore disposable income can be written as:

$$\boldsymbol{Y^{DI}} = Y+TR-T_0-z \times Y=\boldsymbol{TR-T_0+(1-z) \times Y.}$$

Consequently, ΔY increase of total income will lead to $z \times \Delta Y$ increase of net taxes, and disposable income will grow by $(1\text{-}z) \times \Delta Y$. Therefore consumption[28] will grow by the proportion of the taxed income that the consumers wish to consume: $\Delta C = \check{C} \times (1-z) \times \Delta Y$.

Clearly, the increase in autonomous taxes or in the tax rate will decrease the value of consumption (and of saving), while an increase of transfers will increase both of them.

9.1.3. The Planned Investment

The next component of demand in the goods market is investment demand. Investment demand is the desire of economic agents to carry out investment, that is, to buy investment goods. This investment demand is also called planned (or desired) investment. This plan becomes an implemented investment if the producers produce investment goods needed by prospective investors, and the economy provides sufficient savings to finance the implementation of the investment (that is, the relevant amount of income is not spent on consumption, but put aside for saving).

What are the determinant factors of investment demand?

Economic agents intend to implement an investment if the resulting expansion in productive capacities brings about increased revenues, therefore they expect profit from the investment. This expectation includes expanding markets, rising consumer demand, favourable market prices by the time the investment is completed and the new productive capacity starts to produce goods. All these depend, of course, on many factors, such as the behaviour of the market agents (consumers, competitors, suppliers), the goverment regulations, including taxes and investment subsidies. Besides, the subjective judgement of investors also plays an important role, some are always more optimistic, others more pessimistic in evaluating the expected profitability of an investment under the same conditions. Altogether, the ***expectations on the profitability*** of the investment crucially

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[28] The consumption function can be written in more detailed form as:

$C(Y^{DI}) = C_0 + \check{C} \times Y^{DI} = C_0 + \check{C} \times [(1-z) \times Y + TR - T_0] = C_0 + \check{C} \times (1-z) \times Y + \check{C} \times (TR - T_0)$, that is,

$$\boldsymbol{C(Y^{DI}) = C_0 + \check{C} \times (TR - T_0) + \check{C} \times (1-z) \times Y}$$

determine investment demand, optimistic expectations will increase it, while pessimistic expectations decrease the demand for investment goods.

The next determinant is the availability of financial resources for the implementation of the investment.

When the investment is financed from loans, the investor has to consider the interest rate payable at the loan, because the profit from the investment should cover this, too. So the higher the ***interest rate*** the less desirable is the investment, because it is more difficult to pay the interest on the loan (together with the principal). When the investor intends to use his/her own capital funds to finance the investment, the interest rates are still important: at high interest rates it may be more profitable to deposit the money in the bank, as the interest received may be higher than the expected return on the investment. Therefore higher interest rates will decrease the investor's desire to make the investment. Summing up, the high interest rates will decrease the demand for investments, and low interest rates will increase it. The impact of the national income, however, is not significant on the level of desired investments.

The investment demand function defines the level of desired investment as:

$I = I_0 - a \times i$, where I is the planned level of investment,

- i is the interest rate in the market of loanable funds, as a percentage value (more precisely the real interest rate),
- I_0 is the so-called autonomous investment (which defines the upper limit on investment demand obtained at *0 %* interest rate asuming constant expectations on the profitability of the investment), and
- a is the coefficient of the sensitivity of investment demand on the interest rate (expressing the additional investment demand obtained at a *1%* decrease of the real interest rate).

The left panel of *Figure 9.3.* depicts the response of investment demand to changes in interest rates and expectations on profitability. The level of desired investment changes in response to changing expectations on profitability, as is shown by the upward or downward shift of the investment curve: the level of planned investment increases with improving expectations at any interest rate, and decreases with deteriorating expectations.

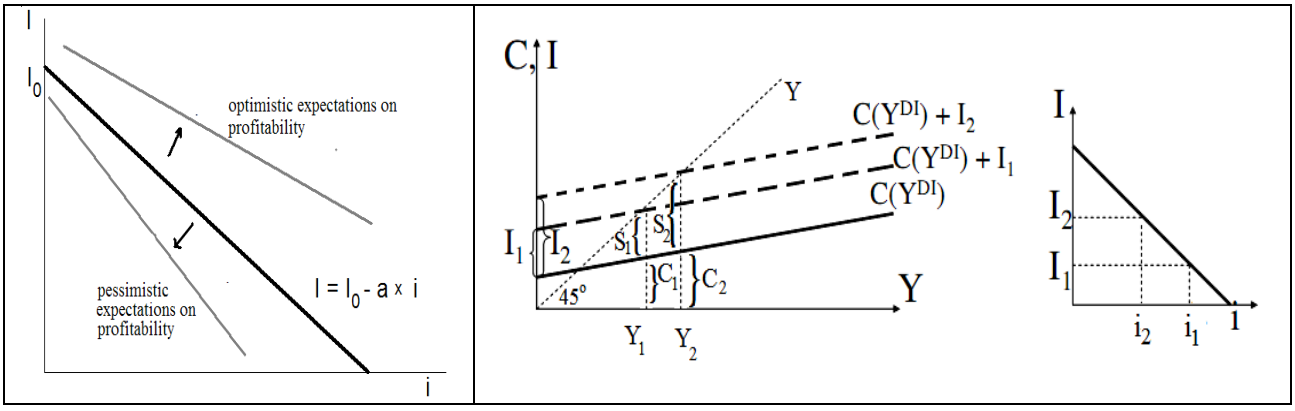


Figure 9.3 ***The Investment Demand Function and Equilibrium Level of Income***
Source: Author's own construction

The relationship between planned investment and planned consumption is shown in the right panel of *Figure 9.3.* We know that national income has to cover household consumption, government expenditure, investment and net exports. Assume for the sake of

simplicity that goverment expenditure G is 0 (that is, collected taxes are spent entirely on transfers), and export is exactly equal to import, so net export is zero $X\text{-}IM=0$. Hence, as the supply of the national exonomy must be equal to demand, the condition $Y = C+I$ must hold. On the other hand, as $TR = T$, the value of disposable income Y^{DT} must be equal to total national income Y, and we know, that this income is spent on consumption and saving, therefore $S=Y–C$. Therefore, the balance in the goods market, that is, the balance of the national income accounts identity holds, if the total savings of the private sector is exactly the same as the level of planned investment at the actual interest rate: $I = S$, or $I = Y\text{-}C$. The right panel of *Figure 9.3* shows the consumption function, which is an increasing function of national income. The investment demand curve shows, that at the high interest rate i_1 the level of planned investment is as low as I_1. The equilibrium of income and expenditure will be attained at a level of Y, for which the savings left after the consumption determined by this income is exactly the same as the low level of planned investment I_1. The line $C(Y^{DI})+I_1$ in the figure shows the sum of consumption and investment demand as a function of income. As the 45° line indicates, the sum of planned consumption and planned investment will be equal to the national income at Y_1 income, that is, consumption associated with this income will leave exactly the same amount for savings (S_1), as is the level of desired investment I_1 . At a lower interest rate (i_2) the level of desired investment rises (I_2), therefore the total aggregate demand $(C(Y^{DI})+I_2)$ also increases. Now with higher investment demand savings should also be higher for equilibrium, which requires a higher level of national income.

9.2. Government Spending, Net Export, Equilibrium in the Goods Market

9.2.1. The Roles of *G, X* and *IM*

Now let's add to the model the impact of government expenditure G and of foreign trade – that is, export X and import IM.

The schedule of ***government expenditure*** will be treated the same way as it was with transfers. Government expenditure does not directly depend on the level of national income Y, because the government makes the decision about it by the law on the state budget, which is usually debated and voted for in the Parliament in the previous year. During the year the government bodies carry out expenditures according to this law, regardless of the actual progress of the *GDP*. As the *GDP* directly determines tax revenues, then with G (and TR) spending as planned, the value of government budget deficit may change. Therefore the value of G in the rest of the text will be treated as an autonomous factor, independent of the actual value of national income.

Looking at ***export*** we can declare, that its value depends not so much on our national income Y, but on the intention and ability of the rest of the world to buy our products and services. Therefore, the value of X may be low even with high levels of Y, if our products are not desirable for foreign countries, or the income of these countries is too low to buy anything from us, and on the contrary, with low Y, the value of the export may be rather high, if the rest of the world is willing to buy our goods.

Theoretically, the value of ***import*** might depend somewhat on the national income, because our country needs a sufficient amount of income to be able to buy goods from abroad, but the demand of domestic agents for foreign goods (*IM)* may modify this: when national income is high, then the income is sufficient to pay for foreign goods, but demand for them is probably low, because high national income means high level of domestic supply of

goods. Due to this double impact of national income, the dependence of import on national income is hardly noticeable, so the rest of the text will handle *IM* as an autonomous factor.

Summarising the above: the demand components G, X and IM will be treated as autonomous factors not dependent on national income Y. As it was explained in section 9.1.2 transfers (*TR*) will be also considered autonomous, while taxes will be divided into an autonomous and an income-related component ($T=T_0+z\times Y$). As a result, the government will influence the position of the private sector by taxes and transfers modifying disposable income, and also by its demand for goods and services defined by government expenditure.

9.2.2. The Equilibrium of the Goods Market in the Four-Sector Model

The equilibrium condition in the goods market of the four-sector model is*:* $Y=C(Y^{DI})+I(i)+X-IM$, i.e. national income is spent on household consumption (dependent on national income), desired investment (dependent on the interest rate), government expenditure (considered autonomous) and net exports, which is the difference of export and import (both of them autonomous). As was explained earlier, household consumption (and saving) depends on national income *Y*, so the question arises: what level of national income *Y* will provide the equilibrium of aggregate demand and supply at a given interest rate *i* defined by the market of loanable funds.

Any level of national income will determine the value of disposable income, and consumption, as a result. The part of national income left after consumption spending will have to finance government expenditure, and net export, and deducting these items, the remainder will have to cover the spending on planned investment: $I=Y-C(Y^{DI})-G-X+IM$. The goods market in the economy is in equilibrium, if the value of investment demand *I(i)* determined by the interest rate (and expectations on profitability) is equal to this value. With rising interest rates the level of planned investment decreases, therefore aggregate demand falls, implying lower national income in equilibrium. In the opposite case – i.e. with decreasing interest rates – the increased level of planned investment raises aggregate demand, and increased national income at equilibrium.

The relationship between the interest rates defined by the market of loanable funds and the associated incomes that maintain the equlibrium in the goods market is defined by the ***IS curve****, that prescribes the condition of equality between investments (I), and savings (S) – that is, the part of income left after consumption (*Hall-Taylor, 1997*.)* This relationship is illustrated in *Figure 9.4.*

An increase in autonomous factors – i.e. government expenditure and net export, as well as autonomous consumption and autonomous investment demand – will increase the equilibrium income at any constant interest rate, shifting the *IS curve* upward, while a decrease in these autonomous factors will shift it downward. The same downward shift will be the result of increasing autonomous taxes or tax rates, while the impact of increasing transfers is just the opposite.

The *IS* curve presented in *Figure 9.4* defines the interest rates and the associated equilibrium incomes. When at the actual national income the prevailing interest rate is too high for equilibrium – the *(Y,i)* pairs lying above the *IS* curve represent such situations, – then the investment demand is too low for the actual income level, and the aggregate demand falls below aggregate supply, so producers find unsold finished goods accumulated in inventories. As a response, firms cut back production, and the value of aggregate supply (*Y)* starts to fall. Thus the decreasing income deccreases the levels of consumption and saving, and this process of adjustment goes on until savings fall back to the low level of planned

investments. This automatic adjustment process eventually establishes the equilbrium of aggregate supply and aggregate demand. The opposite occurs when the actual national income and interest rate represent a point below the *IS* curve. Then the interest is too low for the equilibrium income, the investment demand is too high, and aggregate demand is higher than aggregate supply. This encourages the firms to increase production, which leads to higher outputs, and higher incomes. The increase in income will increase consumption as well as savings, and the higher level of savings will finance the high investment demand.

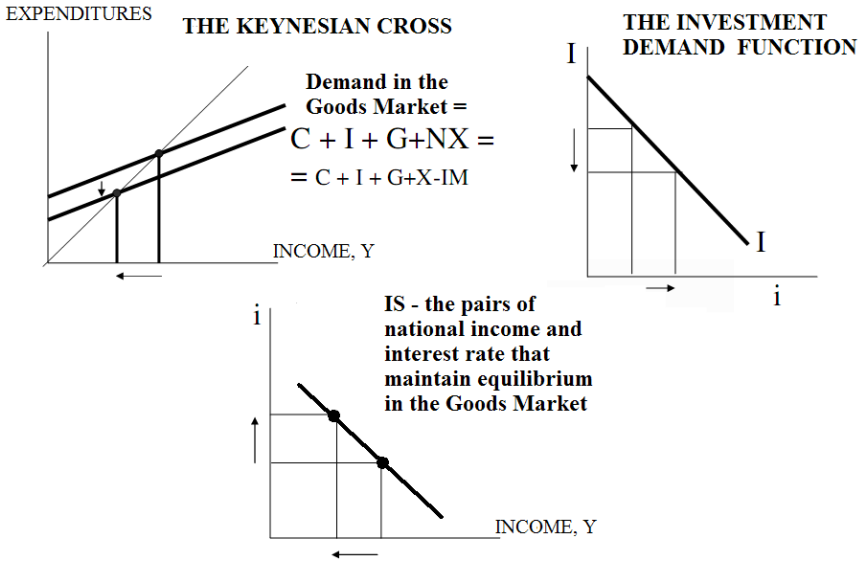


Figure 9.4: ***Balance in the Goods Market, Deriving the IS Curve***
Source: Author's own construction

The position of *IS* is determined by *C, I, G, X* and *IM*, a change in any of them will change the *IS* itself. For example, if government expenditures increase, then the resulting increase in aggregate demand requires higher level of national income to maintain the equality of savings and planned investments at any constant interest rate, therefore the IS curve shifts upward. The impact of an increase in net export, marginal propensity to consume, or transfers will be similar.

9.3. Functions of Money, Commodity Money, Fiat Money

Money in the economy is often used as a medium of exchange of goods, with flows of money and goods going parallel to each other, but in the opposite directions. However, many economic activities occur, in which flows goods and flows of money are separated from each other, taking place at different moments of time. Examples of such situations are the paying of taxes for which individuals are provided with public services, or the purchase of goods on credit, or purchase of a service with pre-payment. Money flows in these examples seem to occur on their own, seemingly unrelated to flows of goods or services, and being controlled by their own rules, though with a strong feedback on the production processes. This explains why it is necessary to analyse monetary processes separately from production processes.

To do that, first we have to define the essential attributes of money. Any instrument may operate as 'money' in the economy, if it is able to perform the functions required of money. The **functions of money** are (Farkasné Fekete- Molnár, 2007):

- **A unit of account (***a means of evaluation):* Money allows the value of goods and services, or assets to be compared to each other (or to its own value, when the money is a valuable commodity in itself). It helps the consumer to compare the value of a kg of bread or a litre of fuel to his/her daily income, or helps the producer to compare the value of his/her product to the values of the productive resources used. Money can fulfill this function without being physically present, it is enough to understand the notion of value that it represents.
- **Medium of exchange:** in this function money is acceptable in exchange of goods or services, thus it is an intermediary in the exchange. An important condition for this function is the universal acceptance of money in exchange of goods, and people do that because they know that accepting money, later they can also use it to pay with for valuable goods.
- **A standard of deferred payments (a means of establishing future claims and payments):** In this function money is paid or accepted without any exchange of goods or services, that is, the transfer of money is separated from the transfer of goods. This happens when some goods are bought on credit, with payment occurring later in time, or when the consumer makes an advance payment well before the actual goods or services are delivered. The money transfers completely independent of transfers of goods also fall into this category (e.g. paying taxes, receiving grants, subsidies).
- **Store of wealth (***accumulating* '*treasures'):* besides being a medium of exchange and a unit of account, money can be used to keep savings, and accumulate wealth. Of all the forms of keeping wealth, money is the most liquid form[29], because the wealth kept in money can any time be easily spent on goods or properties, that is, used for exchange. Besides liquidity money must be able to hold its value for a long time, which, opposite to forms of money earlier in history (e.g. gold coins), is not obvious for our money of banknotes and metal coins, which loses its value during the times of inflation. Therefore to keep its value, the wealth stored in money form is usually deposited in banks, where the deposit interest protects the deposited value against inflation.
- **World money** *(international currency):* In this function money provides all the former four functions not only in national, but in international transactions and contexts. Not all national currencies satisfy the conditions for international money, but the currencies regularly used for international transactions - e.g. the USD, or EUR – do, of course.

The purchasing power of money depends on the actual price level. When the price level rises, the same amount of goods require higher amounts of money to pay for. Therefore economic agents need more money just to make the same purchases as before. When estimating how much money the economic agents need, the purchasing power of money will be the key aspect. With rising price levels the economic agents need increasing amounts of nominal money (to maintain the same purchasing power as before). For this reason the following terms will be defined:

[29] Liquid: it means, in this context, that it can be easily converted to cash, and then exchanged for goods any time, with no significant loss of value. This is usually not true for other forms of storing wealth – e.g. real estate, or other valuable property – because, if real estate is to sell urgently for money, the seller is often forced to accept a price well below its true value.

- **Nominal quantity of money (*M*,** short for *money*)**:** the amount of money, measured in units of the currency of actual purchasing power (e.g. *150000 HUF*).
- **Real money balances (*L*,** short for *liquidity preference*)**:** the purchasing power of the nominal quantity of money (measured in money of constant purchasing power), that is, in terms of quantity of goods and services it can buy. Real money balances are equal to the ratio of the nominal quantity of money to the price level, $L=M/P$. When price level rises the demand for nominal money increases proportionally, so that the demand for real money balances remains unchanged.

The history of development of modern money may be divided to four periods. In the *first period* the functions of money were performed by a commodity that also satisfied a consumer demand in itself (e.g. salt, animal skin, spices), so the same commodity was used either as a commodity on its own, or as money, so this money is called *commodity money*. The *second period* is the era of gold as money – the functions of money were performed at first by noble metals, as gold, silver and copper. Later the gold gained preference over silver, and became the unique media of exchange satisfying all money functions in itself, therefore this period is called the *first stage of the gold standard*. The *third period* is called the *second stage of the gold standard*, where besides money minted in gold, the representatives of gold - paper money, banknotes – were introduced into circulation to substitute gold in its function of medium of exchange, with the promise of redemption in gold. The *fourth period is the stage of fiat money, or deposit money* – in which money cannot be redeemed in gold, it has no intrinsic value, its physical form is a checking account in a bank, that is a promise from the bank to make payments for our transactions. This means, that our income arrives at a checking account in a bank, and at our request the bank will pay our debts (invoices, shopping bills, etc.) in the name of us. Besides checking accounts token coins and banknotes are also used as cash, but they are of secondary importance by now, as the non-cash payments have become increasingly general in contemporary economy. The modern deposit money, the fiat money of no intrinsic value is perfectly suitable to perform all the functions required of money, although the function of storing wealth is interpreted in a slightly modified form: fiat money is capable of storing wealth if deposited in a bank, or traded in the market of loanable funds, while cash stored outside the banking system is unable to preserve its value (Farkasné Fekete - Molnár, 2007).

The properties of fiat money are the following: a fiat money has no intrinsic value, its general form is a checking account, and it is created by the process of *deposit creation,* by way of making loans against deposits. The official currency of a country is the unique medium of exchange by law, and money supply is controlled by the central bank of the country (the National Bank of Hungary, the Federal Reserves of the United States of America, the Bank of England, etc.). The value of fiat money, not backed by a commodity, is determined – compared to the currencies of other countries – by the quantity and quality of output produced by the country, so that people holding the currency of this country can find goods and services that they are willing ande able to exchange for the money. So, in this sense, fiat money is backed somehow by commodities – and it can maintain its purchasing power if the increase in money supply is followed by a similar increase in the total output of the country. However, neither the producers, nor the consumers have any means to check whether the balance between the amount of fiat money supply and the amount of goods and services produced holds, therefore as long as the economic agents trust in money, believing that they are able to buy the valuable goods for their money, they will accept the face value of fiat money. Therefore we may say, that the value of fiat money is guaranteed by the confidence that economic agents feel about it, which fact is well supported by the workings of stock exchanges, where speculative behaviour may significantly devalue a currency.

As a summary we can say, that the purchasing power – or the real value – of fiat money with no intrinsic value will be stable, if the growth of money supply is in balance with the growth of total output (goods and services). When the total output, and real income of an economy increase, then the real money supply should be increased at the same rate, so that the extra output can be exchanged for money in the market. To achieve this, the supply of nominal money will be increased, resulting in higher real money supply if the price level remains the same.

9.4. Money Supply, Creation of Money in Contemporary Economy

After summarising the main properties of money we can describe the quantity of money in circulation by the notion of money supply. **Money supply** *is the quantity of money in circulation in the economy, in the forms of cash (banknotes or coins), and as currency deposited on checking accounts (current accounts) in banks.* Money supply is interpreted as a nominal amount of money (M^S) and its real value, that is, purchasing power is determined by the actual price level (P), and is equal to M^S/P. Money supply is determined by the banking system – that is, the central bank, and the commercial banks regulated by the central bank. The banking system of a central bank and several commercial banks is called **two-tier banking system**. The role of the central bank is to provide banking services for the government and act as the bank of the state, to provide the money supply, **to implement monetary policy by controlling the amount of money in circulation**, and to regulate and supervise the operations of commercial banks. The central bank is independent of the government, although some cooperation is necessary about monetary policy. The commercial banks are profit-oriented monetary institutions, they provide banking services for the private sector (households and firms).

A central bank has four instruments to regulate the operations of commercial banks. The **refinancing interest rate (the base rate**, or prime loan rate of the central bank) defines the interest rate at which the central bank makes a loan for a commercial bank, when a commercial bank wishes to do transactions (offer loans) above its own financial resources. The **reserve ratio** defines the ratio of checking deposits that commercial banks are required to hold on reserve at the central bank- so this ratio of deposits cannot be offered for borrowing. The **rediscount rate** defines the interest rate that the central bank charges when it buys bonds or other securities from commercial banks. The **open market operations** mean that the central bank buys or sells securities (mainly government bonds). When the cental bank purchases securities from commercial banks, the money it pays to the commercial bank is new money injected in circulation, and the process is called creation of central bank money. When the central bank sells securities, the commercial banks buying them will hand over part of their money to the central bank, therefore the money supply available at commercial banks will decrease. The above four instruments are the basis of monetary policy.

The quantity of money in circulation is controlled by the deposit money in banks, on checking accounts. The various deposits held in banks are, however, very different considering their liquidity. The most liquid form of bank deposits is the current account (checking account, or sight deposit), because the owner of this deposit can access the money any time. The savings deposits, and other time-deposits are somewhat less mobile for transactions, because the owner, accessing them before their maturity date may lose the deposit interest. Long-term securities, and deposits made in foreign currency are still less liquid, and accessing them is more complicated. The purpose of holding money in a checking account is to spend it on immediate tansactions, regular expenditures, while the other forms of

deposits serve the purposes of saving. For this reason the money in circulation is classified, and the following **monetary aggregates** are defined:

- **M0** money: cash (banknotes and coins) produced by the central bank, and the reserves of commercial banks deposited in the central bank.
- **M1** (*money in narrow sense, narrow money*): includes the cash currency in *M0* and the deposits in checking accounts, sight deposits, which are perfectly liquid, suitable for immediate everyday payments.
- **M2**: includes *M1*, plus deposits in savings accounts, small denomination time-deposits, short-term deposits, which are less liquid than *M1*, although relatively easily transferred to liquid forms at a small cost.
- **M3**: adds less liquid assets to *M2*, namely the long-term securities of large denominations, international currency deposits, mutual funds shares.

Money *in the narrow sense* is the *M1*–type money, as it is readily available for transactions, while the monetary aggregates *M2*, and *M3* are often called *'quasi-money'*, or *'near money'*. **Money supply and money demand refer to supply and demand of *M1* money**, indicating the quantity of readily available money that can be spent immediately. The money supply function defines the supplied quantity of nominal money as: $M^S = M1$, while the real value, i.e. the purchasing power of this money is **real money supply =** $\boldsymbol{M^S/P} = M1/P$, also called **real money balances.** The purchasing power of nominal money supply depends on the price level. The central bank controls nominal money supply, while the real money supply will be defined by the market, as a function of the actual price level.

The central bank has five main instruments to control the nominal money supply. These are: *the quantity of cash currency (banknotes and coins in M0) and the central bank money introduced into circulation through the banking system; the reserve ratio; the base rate of interest determined by the central bank; the rediscount rate, and the open market operations of the central bank.* These are the *instruments of monetary policy* (Farkasné Fekete - Molnár, 2009). Summing up the above, the money supply is determined by the banking system, and it is not directly related to the real processes in the economy, so it is considered an exogeneous attribute for the economy.

9.5. Factors Determining the Demand for Money, The Money Demand Function, Equilibrium in the Money Market

Money demand *is the intention of economic agents to hold liquid money (M1).* People wish to hold liquid, *M1*-type money for various purposes. The *alternative to this action is to save the money*, that is, to hold the money in *a savings account*, therefore the money demand defines the quantity of money that the economic agents wish to spend immediately.

Money demand will be understood as a demand for real money balances, because the *need for keeping a certain amount of money to spend depends on the purchasing power of money*. Therefore the nominal, face value of the currency is irrelevant, and the basket of goods that the economic actors intend to buy determines the required purchasing power of money. There are three major motives why the economic actors require readily accessible, liquid money, called **motives for holding money**. These are the following:

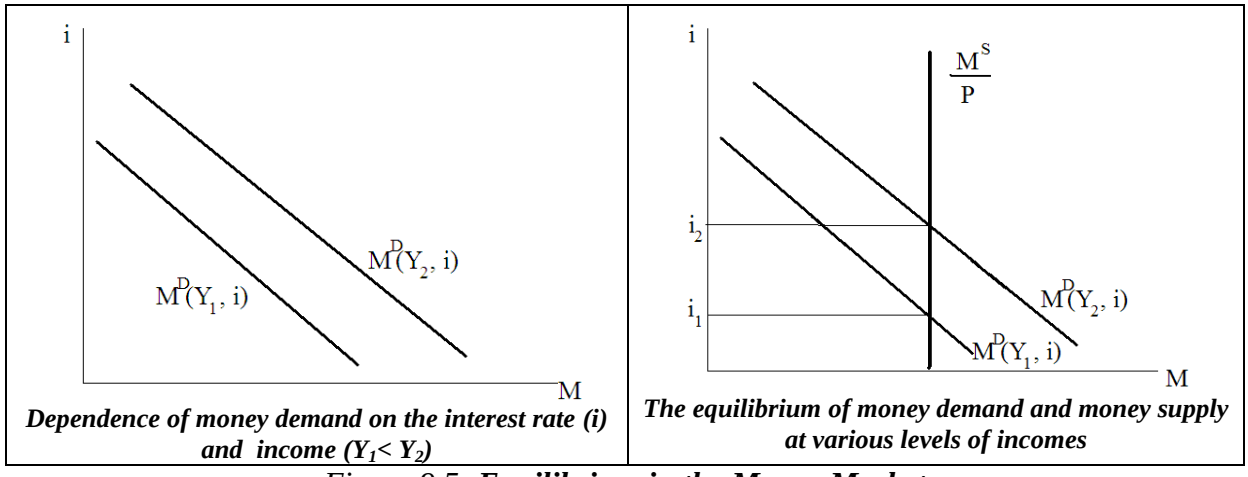
- *Transactions demand* – money needed for everyday transactions, purchases, payments, (i.e. for household consumption, and usual business expenses of firms).
- *Precautionary demand* – money kept for unexpected, unpredictable expenses.
- *Speculative (or 'assets') demand* – people who possess wealth, have to decide about the best form of keeping this wealth, therefore, from time to time they may want to

switch from one form to another, temporarily transforming their wealth to liquid money. (The accumulated wealth may be deposited in savings accounts, or in securities; and speculative money demand means the liquid money when e.g. selling securities for money to buy other forms of wealth instead).

Money demand therefore, is the sum of transactions demand, precautionary demand and speculative demand. What determines the quantities of these?

The key determinant of transactions demand is income. The higher our income the more purchasing power we have, so the more we spend on regular, everyday predictable transactions – therefore transactions demand is positively related to income. The precautionary demand is similar, also increasing with rising incomes – that is, we tend to keep more money for precautionary motives, when our income is high – but as most of this precautionary money is not spent, we may lose the actual deposit interest of savings accounts as the opportunity cost of keeping this unspent money in liquid form. Therefore, when interest rates are high, the precautionary money demand may be somewhat lower. Altogether, the precautionary demand depends positively on income and negatively on the interest rate. The speculative demand, however, does not depend on actual income, because it is about incomes earned and saved previously, that is stored as wealth now. When interest rates are high, then this wealth kept in a savings account, or in securities will not be mobilised, because of the considerable loss of interest associated with it. When interest rates fall, then individuals start to look for more profitable forms of storing wealth, so they are more motivated to mobilise their savings, knowing that the associated costs of losing the interest are not too high. Therefore speculative money demand is negatively related to interest rates.

Thus money demand is defined as the sum of the three motives, being a positive function of income (due to transactionary, and somewhat to precautionary demand), and a negative function of the interest rate (due to speculative, and somewhat to precautionary demand).



Dependence of money demand on the interest rate (i) and income ($Y_1 < Y_2$)

The equilibrium of money demand and money supply at various levels of incomes

Figure 9.5: ***Equilibrium in the Money Market***

Source: Author's own construction

The left panel of *Figure 9.5* shows the money demand function at various levels of income, with money demand *M* on the horizontal axis, the interest rate *i* on the vertical one. The demand for money is a decreasing function of the interest rate, and with rising incomes the money demanded is higher at any interest rate, so the curve shifts upward, to the right. The right panel of the figure shows the balance of money demand and money supply. It is the money supply that determines the actual real money balances available in the money market,

while the interest rate will be determined by the equilibrium of money supply and money demand. The basicequilibrium condition of the money market is: $M^S/P = M^D(Y,i)$.

The equilibrium of money demand and money supply will associate an equilibrium interest rate to any level of income, defining therefore pairs of equilibrium incomes and interest rates. This relationship is summarised in the *LM* curve. As increasing incomes bring about increasing equilibrium interest rates, the LM curve defines the interest rate as an increasing function of the income (see the left panel of *Figure 9.6*).

The LM curve (Liquidity preference - Money) defines all pairs of real incomes and interest rates at which the money market is in equilibrium (Meyer-Solt,1999; Misz-Tömpe, 2007).

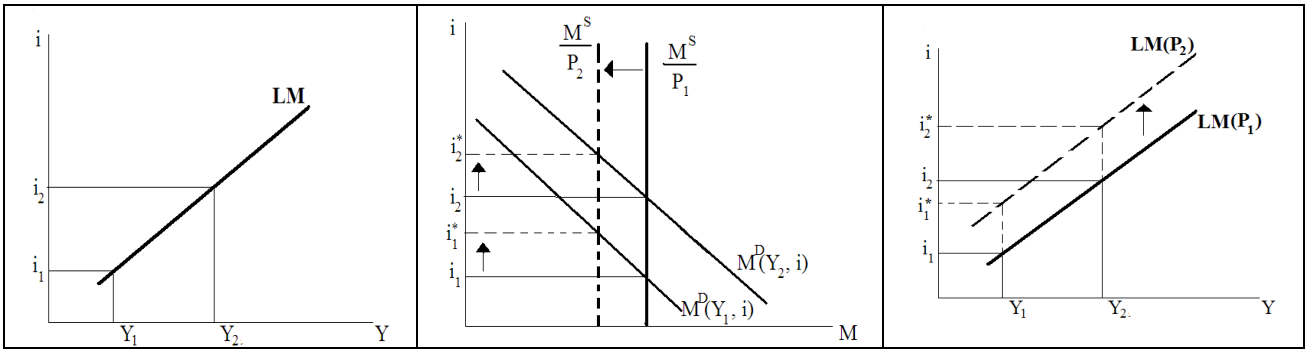


*Figure 9.6**: The LM Curve and the Impact of the Price Level***
Source: Author's own construction

When the situation in the money market differs from the equilibrium position defined by *LM*, for example, the actual interest rate is too high for the actual income level, that is, the point (*Y,i*) lies above the *LM*-curve, then money demand is too low for money supply, so speculative money demand is lower than the money supply available above transactionary and precautionary demand. The excess supply in the money market pushes down the interest rate, and this leads to increasing speculative demand, the money market moves towards equilibrium. The points lying below *LM* indicate too low interest rates, therefore too high speculative demand, compared to the level of transactionary and precautionary demand. The money market experiences excess demand, and this pulls up the interest rate, moving the market towards equilibrium again.

The position of *LM* is defined by the equilibrium of real money supply and real money demand. The real money supply depends on the price level, therefore the position of *LM* also depends on the price level. When the price level grows, the same nominal money supply means decreasing real money supply. Therefore with any constant income level the interest rate must increase to maintain the equilibrium between real money demand and real money supply, therefore the *LM* curve shifts upward *(Figure 9.6,* central and right panels).

9.6. The Keynesian Model of Macroeconomic Equilibrium, the Determination of Aggregate Demand

The equilibrium condition of the goods market is defined by *IS*, i.e. the formula $Y=C(Y^{DI})+ G+ I(i)+X – IM$ that determines the combinations of equlibrium incomes and interest rates. The equilibrium in the money market is defined by *LM*, with the formula $M^S/P = M^D(Y,i)$, which also defines pairs of equilibrium incomes and interest rates. To bring both markets to equilibrium the combination of interest rate and income must be right for both

equlibrium conditions. A given level of income determines the level of consumption, and savings, and together with the autonomous values of government expenditure and net export it will define the level of possible investment. To attain this level of investment, however, a specific interest rate is required. On the other hand, the given level of income determines the equilibrium interest rate in the money market (assuming exogeneous nominal money supply and price level). If this interest rate is higher than the one required for the investments in the goods market, the actual investments will be too low, and the goods market will be in disequilibrium. If the interest rate defined by the money market is too low, then planned investment will be too high for the available savings in the goods market. Therefore there is only one combination of income and interest rate that brings both the goods market and the money market to equilibrium (the intersection of *IS* and *LM* in the left panel of *Figure 9.7*).

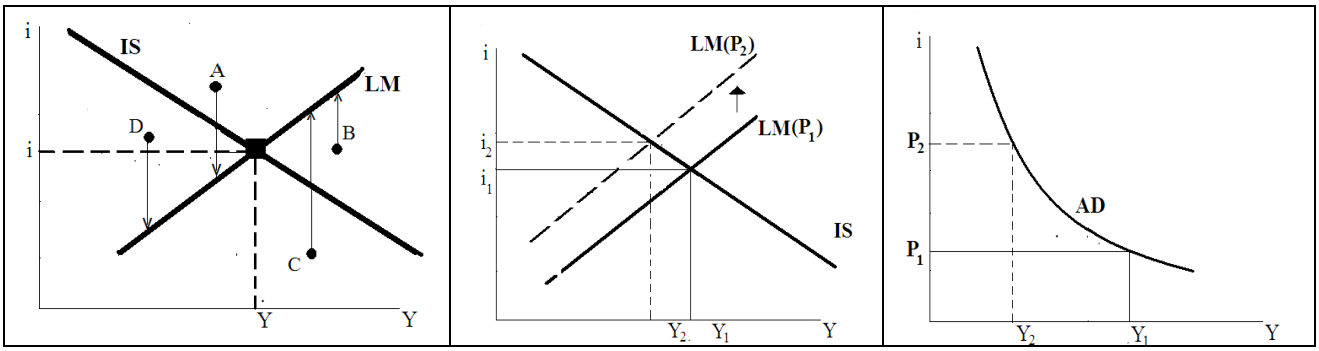


Figure 9.7: ***The IS-LM equilibrium and the Aggregate Demand Curve***
Source: Author's own construction

When the economy is not in the position of *IS-LM* equilibrium, then the income is either too high or too low for the actual interest rate. Points *A, B, C* and *D* in the left panel of *Figure 9.7* show such situations. Point *A* is above *IS* and also above *LM*. This means that at the actual income level the interest rate is too high for both the goods market and the money market. The investment demand in the goods market is below the level of savings. The speculative money demand in the money market is smaller than the money available above the transactions and precautionary demand. In this situation, at first, the interest rate starts to decrease in the money market, and the money market starts to move towards equilibrium. After some time the falling interest rate raises the investment demand, and, as a result, the equilibrium income in the goods market rises. The increasing income increases transactionary and precautionary money demand in the money market, thus the decreasing interest rate and the increasing income brings the system towards the *IS-LM* equilibrium. Similar mechanisms will be experienced in the situations defined by points *B, C* and *D*.

This equilibrium, however, will change together with the price level. When the price level increases, the value of real money supply falls, and the equlibrium interest in the money market will rise at any income *Y*. Therefore the *LM* curve representing the equilibrium of the money market will be shifted upwards, and will intersect the *IS* curve of the goods market at higher interest rates and lower income levels (see the middle panel of *Figure 9.7*). As the interest rate rises, the investment demand falls, therefore, at constant consumption, government spending and net export the national income will decline.

Altogether, as price levels increase, the national income of the simultaneous equilibrium of the goods market and the money market will decrease. This relationship is quantified by the **aggregate demand function AD**, that was already introduced in section 7.2 (see the right panel of *Figure 9.7*).

The position of the *AD* curve depends on the positions of *IS* and *LM*. When, for example, the government expenditure grows and the *IS* curve shifts upwards, then it will

intersect all *LM* curves defined by specific price levels at higher interest rates and higher incomes than before. The higher demand at the goods market will increase national income, and it will increase the transactions demand and precautionary demand in the money markets. This, however, at constant money supply, induces the increase of interest rates and incomes at any price level, and eventually shifts the *AD* curve upwards.

Review Questions

1) What is 'disposable income' and how is it related to consumption?
2) Describe the determinants of investment demand.
3) Describe the components of demand in the goods market.
4) Define the '*IS* curve', give the formula of equilibrium in the goods market.
5) Describe the functions of money, explain the notions of nominal money supply and real money supply (real money balances).
6) Explain the concepts of *M0* and *M1* moneyt.
7) Describe the motives of money demand, explain the determinants of real money demand.
8) What is the '*LM* curve' and how is it related to the price level?
9) Explain the concept of *IS-LM* equilibrium and its relationship to aggregate demand.

Problems and Questions to Develop Competence [30]

1) An economy is described by the following relationships: $Y = C + I + G$, $Y = 5000$, $G = 1000$, $T = 1000$, $C = 250 + 0{,}75 \times (Y - T)$, $I = 1000 - 50 \times i$.

a. Calculate the total savings of the private sectors, the saving of the government and the total savings of the economy.
b. Calculate the equilibrium rate of interest.
c. Assume that the value of *G* rises to *1250*. Calculate again the values of private savings, government saving and total savings.
d. Calculate again the equilibrium interest rate.

2) The following values are given in an economy of four sectors: $Y = 4500$, $W = 2950$, $IM = 560$, $X = 520$, $S_W = 40$, $TR_H = 820$, $T_H = 480$, $C = 3200$, $TR_F = 200$, $T_F = 1300$, and the deficit of the government budget is: *200.*

a. Calculate the disposable income of the private sector.
b. What is the value of investments?
c. What is the value of government expenditure?

3) Assume that the economy has only to agents, firms and households. The consumption function for this economy is: $C(Y) = 30 + 0{,}9 \times Y$. The investment demand function is given as: $I = 170 - 10 \times i$. The money demand function is defined by: $M^D = 0{,}4\ Y - 10 \times i$. The nominal money supply is: $M^S = 600$, and the price level is: $P = 2$

[30] The source for problem 4 is Mankiw (1999)

a. Write the formula for *IS* and for *LM*.
b. Calculate the equilibrium interest rate and income that balances *IS* and *LM*.
c. Give the value of consumption and of investment at the mutual equilibrium of the goods market and the money market.

4) Assume that real money demand is defined by $M^D = 1000 - 100 \times i$, where i is the interest rate in percentage form. Nominal money supply is $M^S = 1000$, the price level is $P=2$.

a. Draw the real money supply and real money demand curves.
b. Calculate the equilibrium rate of interest.
c. How does the equilibrium interest rate change if the price level is constant and the quantity of nominal money supply grows from the initial value of *1000* to *2000*?
d. If the central bank wants to raise the interest rate to *7 %*, how large should nominal money supply be to achieve it?

Chapter 10: The Total Output of the Economy, the Labour Market and the Price Level

10.1. The Macroeconomic Production Function, Total Output and Employment

The first part of the textbook has already introduced the production function of the individual firm, which describes the firm's quantity of output as a function of the employed inputs. The production function of the economy as a whole is interpreted in a similar way, giving the total output of the economy as the function of the total inputs used.

The **macroeconomic production function** *gives the total amount of output produced by the economy (i.e. by economic agents) at the current level of available technology as a function of the amount of inputs, capital and labour* (Meyer-Solt, 1999, Mankiw, 1999). The formula of the production function is: $Q = f(K, L)$, where K is the amount of capital, L is the amount of labour, f is the functional relationship that represents the available technology turning capital K and labour L into output.

This functional relationship is rather difficult to quantify in terms of algebraic relationships. In real-world situations the historical data of input combinations and produced output levels offer a possibility for its statistical estimation. The other difficulty is the aggregation of the inputs K and L: besides the quantity of physical capital its structure, age, level of wear and tear should be considered, and besides the quantity of labour the workers' skills, qualifications, experience, creativity, physical capability and many other properties also affect their productivity. In spite of these difficulties the notion of the macroeconomic production function points out tendencies and rules of the whole production process that are applicable in economic decision-making.

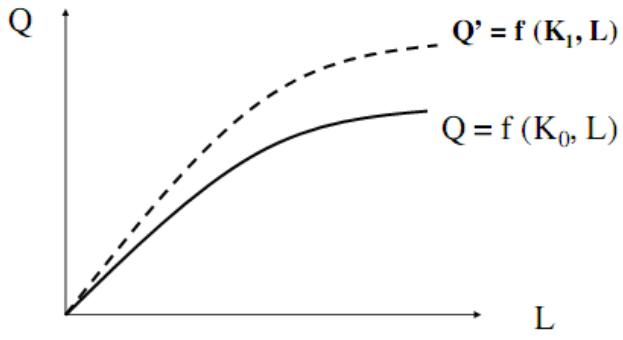


Figure 10.1: ***The Macroeconomic Production Function***
Source: Author's own construction

Similarly to the microeconomic (individual) production function, let's introduce the concept of short-run macroeconomic production function, which relates the level of output to the actual level of labour used, assuming constant level of physical capital K_0 and constant level of technology. Therefore the mathematical formula of the short-run production function is $Q = f(K_0, L)$, or in a shorter form: $Q = f(L)$,with capital being the constant value K_0. The level of technology of an economy, the amount of machinery, altogether the total amount of physical capital cannot be changed easily, as it takes a long time to carry out large investments. Therefore it is only the amount of labour employed that can affect the amount of output produced in the short run. This is illustrated by *Figure 10.1.* The curve Q denotes the

short-run production function at constant K_0 level of capital. If capital is increased from K_0 to K_1 by investment, the production function will shift upwards (denoted by curve *Q'*).

As the total output of the economy is determined by the amount of labour in the short-run, let's analyse how this amount is determined. The amount of labour employed depends on the supplied and demanded quantities in the labour market.

Labour supply*: the actual amount of labour offered for sale by households in the labour market.*

Labour demand: *the amount of labour that firms wish to employ.*

The properties of the labour market will determine the actual amount of labour employed by firms. When the labour market is in equilibrium, this equilibrium defines not only the quantity of labour employed, but its price – the wage -, too. However, in most of the contemporary market economies labour markets are in disequilibrium, usually characterised by excess supply, as is reflected in the high numbers of the unemployed.

10.2. Elements of Labour Supply, the Relation to Real Wage

Labour supply is the amount of labour the households offer for sale to the sector of firms. The total quantity of labour supply in the national economy is determined by the following factors.

The *total population* of the country consists of working-age adults and *people not in working age*: children and old people obviously do not count in labour supply. The *adult, working-age population* is also divided into two groups. One of them is those wanting to work, called the *labour force*, or *active* population. The other group is those adults of working-age, who, in the current stage of their life do not intend to find a job – because they are full-time students, or are at home raising children, or supported by some other family member -, they are adults *not in the labour force* (or the *inactive* population). The labour force consists of those being *employed*, and those although looking for jobs, cannot find any, i.e. they are *unemployed* (Mankiw, 1999). *Table 10.1* summarises these categories[31].

Table 10.1: ***The Structure of Labour Supply***

<table>
<tr><th colspan="3">Total population</th></tr>
<tr><th colspan="2">Working-age population (Adults)</th><th>Population not in working-age (too young or too old)</th></tr>
<tr><th colspan="2">Labour force</th><th>Adults not in labour force</th></tr>
<tr><th>Employed</th><th>Unemployed</th><th></th></tr>
</table>

Source: Author's own construction

There are several statistical indicators to describe the labour supply and the employment situation.

- ***Labour force participation rate*** *= labour force / adult (working-age) population (%).* This rate is also called *activity rate*, and it measures the participation of adult population in labour supply.
- ***Employment rate*** *= number of employed workers / adult (working-age) population (%)*

[31] Note that by some statistical classifications, as by that of the Central Statisctical Bureau (KSH) in Hungary, the labour force is divided into three groups: besides the employed and the unemployed a separate group of self-employed (entrepreneurs, sole proprietors) is also accounted for separately (Misz-Tömpe, 2006).

- ***Unemployment rate*** *= number of unemployed / labour force (%)*

By the data of the Central Statistical Bureau of Hungary (KSH) in *2010* the labour participation rate was *55.4%* in Hungary, the employment rate was *49.2% (3781* thousand persons) and the unemployment rate *11.2%* (*474.8* thousand people) (see table *10.2*).

Involuntary unemployment is unemployment of those who would like to take a job at the current real wage, but cannot find one. *Voluntary unemployment* means, that the unemployed person does not want to take a job at the current low wage rate and waits until a job with higher real wage is offered. Voluntary unemployment is present in all economies, and it makes the supply side of the labour market dynamic, because the members of the labour force who have just returned to the labour market after completing a training for a new qualification are naturally looking for new jobs for higher wages. Those who move from one part of the country to another, also belong to this category, quitting their former job at their own intention.

Table 10.2: ***Employment and Unemployment in Hungary***

	Employed	**Un-employed**	**Labour force**	**Adults not in labour force**	**population of age 15 to 74 ys**	**Labour force particip-ation rate**	**Un-employ-ment rate**	**Employ-ment rate**
year	***1000 persons***					***%***		
1998	3 695.60	314	4 009.60	3 792.70	7 802.30	51.4	7.8	47.4
1999	3 809.30	285.3	4 094.60	3 693.10	7 787.70	52.6	7	48.9
2000	3 856.20	263.7	4 119.90	3 659.60	7 779.50	53	6.4	49.6
2001	3 868.30	234.1	4 102.40	3 670.00	7 772.40	52.8	5.7	49.8
2002	3 870.60	238.8	4 109.40	3 652.80	7 762.20	52.9	5.8	49.9
2003	3 921.90	244.5	4 166.40	3 578.50	7 744.90	53.8	5.9	50.6
2004	3 900.40	252.9	4 153.30	3 567.90	7 721.20	53.8	6.1	50.5
2005	3 901.50	303.9	4 205.40	3 517.10	7 722.50	54.5	7.2	50.5
2006	3 930.10	316.8	4 246.90	3 474.90	7 721.80	55	7.5	50.9
2007	3 926.20	311.9	4 238.10	3 481.30	7 719.40	54.9	7.4	50.9
2008	3 879.40	329.2	4 208.60	3 501.60	7 710.20	54.6	7.8	50.3
2009	3 781.90	420.7	4 202.60	3 487.10	7 689.70	54.7	10	49.2
2010	3 781.20	474.8	4 256.00	3 430.40	7 686.40	55.4	11.2	49.2
2011	3 811.90	467.9	4 279.80	3 395.90	7 675.70	55.8	10.9	49.7

Source: Author's own construction based on data by *KSH* (Central Statistical Bureau of Hungary) (http://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_qlf001.html), accessed: 21st Sept 2012.

Note, that the number of unemployed and the number of the adults not in the labour force are difficult to determine precisely. Many people currently not in the labour force are *discouraged workers*, who had looked for labour without success, and have given up looking, and try to maintain their life in some other way – e.g. being supported by their relatives, or producing vegetables for home consumption, or working illegally, etc. If, however, conditions were changed and they saw some hope of finding a job, they would move back to the labour market and return to the labour force. Others remain outside of the labour force because not seeing any good opportunity for themselves in the labour market, in the present time of their life they choose to pursue other goals of life – studying full-time, or raising children. Therefore many of the people currently not in the labour force are really unemployed, but hidden in unemployment statistics (Mankiw, 1999). Therefore the ***total (potential) labour supply in the economy is*** *equal to the labour force plus some of the adults currently not in the labour force (who could be attracted to the labour market under favourable conditions).*

Unemployment is classified by its reasons, the following categories are defined:

- **Frictional** unemployment arises becaused of continuous voluntary movement of people between jobs. Quitting one job and looking for another one is the worker's own decision, but it takes time to find a new job, so the person is unemployed, although *voluntarily*. This is a natural phenomenon of any healthy economy.
- C**yclical unemployment** arises as a result of the business cycles of the economy, moving between recessions and expansions. In times of expansion the firms produce more output, and they need more workers, so employment rises and unemployment falls. In times of recession these firms will have to cut back production and dismiss some of their workers, therefore unemployment rises.
- **Structural unemployment** refers to mismatches in the structures of labour demand and labour supply. This often occurs, when an economy moves through a period of changing its production structure, and the newly introduced industry cannot find enough workers with the required skills and experience, while, the industry being closed down will dismiss many skilled workers. The situation is similar, when the mismatch occurs geographically, i.e., when large numbers of the labour force live in other parts of the country and a newly developed industry looks for workers far from these areas. In Hungary the georgraphical mobility of the population is very low, and this latter situation presents a serious problem. Another cause of structural unemployment may be the educational system, when training is provided in skills and qualifications which are not needed by the firms.
- **Technical (technological) unemployment** is a specific form of structural unemployment, when the technological modernisation of the economy introduces automation and mechanisation in the production processes, requiring much less labour than the old technologies used to, leaving large numbers of workers unemployed.

Cyclical, structural, and technological unemployment are types of *involuntary unemployment*.

As it was said above, unemployment is present in every economy in all times. When the labour market is in equilibrium, and no involuntary unemployment occurs, voluntary unemployment still exists – that is, there are unemployed workers who do not wish to take jobs at the current real wages. This situation is called *natural unemployment*, and the output level of the economy associated with only natural unemployment is called *potential output.* When in recession, the economy produces less and unemployment is higher that that, while in expansion the output may temporarily be even higher than potential output, because producers will respond to increasing demand by paying above-equilibrium wages to attract naturally unemployed workers to the labour market, and pay overtime to their existing workers (Mankiw, 1999, Misz-Tömpe 2006, Hall-Taylor, 1997). Based on the above we give the precise definitions and key attributes of labour supply and labour demand.

Labour supply (L^S) *is the amount of labour that households offer ('for sale') for the firms. Labour supply is affected by real wage, which is the purchasing power of nominal wage, the price of labour.* The higher the real wage the higher the labour supply, because at high real wages some of the adults not in the labour force, and some of the voluntarily unemployed enter the labour market looking for jobs, and, on the other hand, workers currently in employment are more willing to work overtime. Thus the increase of real wage will increase slightly the labour force, too. When real wage decreases, the labour supply also falls, because the real wage earned by spending the time at work may be too low compared to other alternative uses – e.g. for recreation, travel or housework – of the same time.

Nominal wage (W) *is the sum of money that workers earn in exchange for their work done.*

Real wage (*W/P*) *is the purchasing power of nominal wage, that is, the amount of goods (products or services) that can be purchased for the nominal wage.*

The labour supply function *describes the relationship between real wage and the quantity of supplied labour at that real wage.*

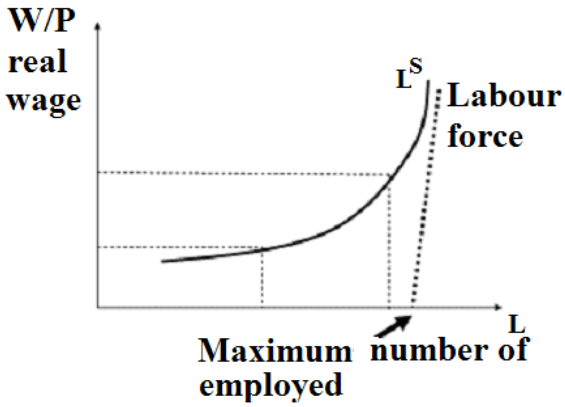


Figure 10.2: ***Labour Supply and Real Wage, the Labour Supply Function***
Source: Author's own construction

10.3. Relationship Between Labour Demand and Real Wage

The demand side of the labour market is represented by the sector of firms, because labour, as a factor of production is required by them for their productive activities.

Labour demand (L^D) *is the amount of labour that firms wish to employ.* To determine the value of labour demand remember the main properties of firm behaviour explained in Chapter 4.

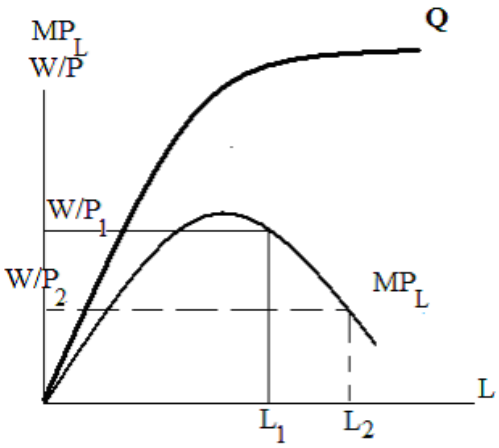


Figure 10.3: ***The Labour Demand Curve Derived from the Marginal Product of Labour***
Source: Author's own construction

A firm will increase the employed level of labour by a unit ΔL, if this yields more in revenue than its cost involved. As the notion of marginal product tells us, the additional labour ΔL will lead to an increase in output equal to $MP_L \times \Delta L$, so a unit of additional labour brings about an increase of output equal to MP_L , which, on the other hand, generates an

additional revenue of $MP_L \times P$. The additional cost of the additional amount of labour is the wage paid to the worker ($W \times \Delta L$), thus for $\Delta L=1$ the additional cost is the nominal wage W. As a consequence, firms will increase the number of labour employed as long as the additional revenue $MP_L \times P$ is at least as large as the additional cost of wage W:

$$MP_L \times P \geq W, \text{ that is, } MP_L \geq W/P.$$

As we see, the firms will increase the amount of labour employed, as long as the marginal product of labour is at least as large as the real wage, therefore the labour demand curve is the same as the curve of the marginal product of labour (*Figure 10.3*).

Obviously, when real wage rises, the demand for labour falls, because the marginal product of labour is higher at lower levels of employment. Similarly, a decrease in real wage leads to increasing demand for labour, because a lower real wage can be overcome by a lower value of marginal product.

The labour demand function *describes the relationship between real wage and the supplied quantity of labour,* as a negative relationship. When real wage is high, the demand for labour is low, and when real wage is low, the demand for labour is high (*Figure 10.4*).

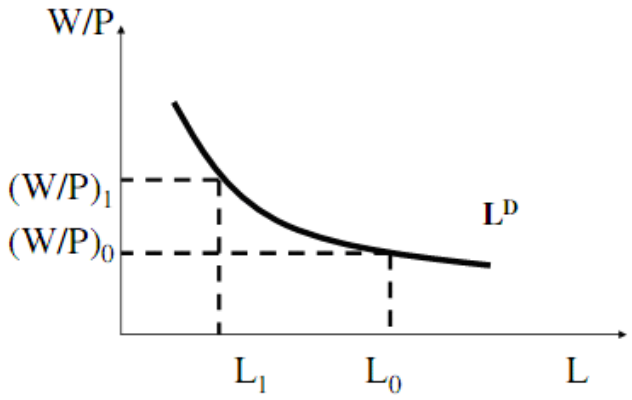


Figure 10.4: ***The Graph of the Labour Demand Function***
Source: Author's own construction

10.4. Equilibrium in the Labour Market, Disequilibrium and Unemployment

The labour market is in equilibrium when the demand for labour is equal to the supply of labour. This means, that at the actual real wage the number of those wanting to take a job is exactly the same as the number of jobs, the demand of firms for labour is exactly the same as the labour offered by households. In this situation no involuntary unemployment occurs, because at the actual real wage everyone finds a job who wants to take one. *The real wage in the equilibrium of the labour market is called* ***equilibrium real wage****, the amount of labour supplied and demanded in equilibrium is called the* ***equilibrium level of employment****.*

It is easy to see that with real wages higher than the equilibrium real wage the firms demand less labour than the equilibrium amount, and although households would like to supply more, the level of employment will be determined by the low demand of firms. In this situation the difference between the supply of the households and the demand of the firms determine the number of (involuntarily) unemployed. In the opposite situation, when real wage is below the equilibrium real wage, the firms require more labour than the equilibrium employment, while households are willing to supply less, and now the low supply will

determine the actual level of employment. The difference of the high demand for and the low supply of labour gives the number of job vacancies now, and there is no involuntary unemployment in the economy. As a conclusion we can state, that whenever real wage differs from the equilibrium real wage (being either higher or lower than that), the number of employed is lower than the equilibrium level of employment. *The highest level of employment is obtained when the real wage is equal to the equilibrium real wage and the labour market is in equilibrium (Figure 10.5).*

For a stable **equilibrium position** in the labour market the real wage should be able to adjust flexibly to supply and demand. As the real wage depends on nominal wage and the price level, and the latter cannot be affected by the labour market, for adjustable real wages the nominal wages must be also adjustable. With flexible nominal wages that can respond to demand and supply, the impact of any change in the price level – that changes the purchasing power of the actual nominal wage - is an immediate adjustment of the nominal wage to hold its real value at the level of equilibrium real wage. Therefore a rise in the price level will be followed by a rise in the nominal wage, and a fall of the price level will lead to a decrease in the nominal wage, so the value of real wage remains constant. As a consequence, the labour market is always in equilibrium, there is no involuntary unemployment, the level of employment is at its maximum. The macroeconomic production function allocates the potential output to this level of employment, while only involuntary unemployment prevails in the economy, which is equal to natural unemployment.

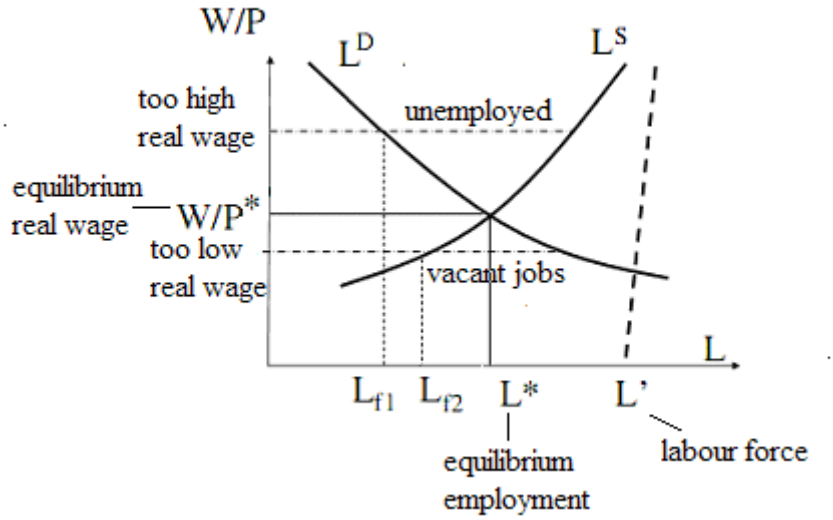


Figure 10.5: ***Eguilibrium in the Labour Market***
Source: Author's own construction

The above situation is not very typical in the real world. The nominal wages are usually constant, regardless of the price level (***sticky nominal wages***), and they tend to increase in the long run. The government intervenes in the level of nominal wages by several instruments, including setting the *minimum wage, the wage rates and wage differences, and sometimes by indexing the wages to compensate workers for inflation*. Unions representing the workers in collective bargaining about wages also contribute to the rigidity of nominal wages. Altogether, the level of the nominal wage tend so be fixed in the short run, and with changing price levels the real wage will change. Therefore, in response to a changing real wage the number of employed workers will also change, being usually lower than the maximum, i.e. equilibrium level. Thus, output is also lower than the potential level of output. When real wages are too high, neither households, nor firms have any power to resolve the

situation – because the high minimum wages are set by organisations whose power is above the private economic agents (the government, or the trade unions), and the result is unemployment. With too low real wages, however, firms may decide on their own to raise nominal wages, attracting the adult population back to the labour market, and moving the employment level closer to its equilibrium level, and output towards potential output (Samuelson-Nordhaus, 1987; Misz-Tömpe,2006).

*Table 10.3**: Employment and Unemployment of the Population Aged 15 to 64 Years, in Countries of Europe***

Country	***Employment rate, %***					***Unemployment rate, %***				
	2007	***2008***	***2009***	***2010***	***2011***	***2007***	***2008***	***2009***	***2010***	***2011***
Austria	71.4	72.1	71.6	71.7	72.1	4.5	3.9	4.9	4.5	4.2
Belgium	62	62.4	61.6	62	61.9	7.5	7	8	8.4	7.2
Bulgaria	61.7	64	62.6	59.7	58.5	6.9	5.7	6.9	10.3	11.3
Czech Republic	66.1	66.6	65.4	65	65.7	5.4	4.4	6.8	7.4	6.8
Denmark	77	77.9	75.3	73.3	73.1	3.8	3.4	6.1	7.6	7.7
Estonia	69.4	69.8	63.5	61	65.1	4.8	5.6	14.1	17.3	12.8
France	64.3	64.8	64	63.8	63.8	8	7.4	9.2	9.4	9.3
Germany	69.0	70.1	70.3	71.1	72.5	8.8	7.6	7.9	7.2	6.0
Greece	61.4	61.9	61.2	59.6	55.6	8.4	7.8	9.6	12.7	17.9
Hungary	**57.3**	**56.7**	**55.4**	**55.4**	**55.8**	**7.4**	**7.9**	**10.1**	**11.2**	**11.0**
Italy	58.7	58.7	57.5	56.9	56.9	6.2	6.8	7.9	8.5	8.5
Latvia	68.3	68.6	60.9	59.3	61.8	6.1	7.7	17.5	19	15.6
Lithuania	64.9	64.3	60.1	57.8	60.7	4.4	5.9	13.9	18	15.6
Luxemburg	64.2	63.4	65.2	65.2	64.6	4.1	5.1	5.2	4.4	4.9
Poland	57	59.2	59.3	59.3	59.7	9.7	7.2	8.3	9.7	9.8
Romania	58.8	59	58.6	58.8	58.5	6.8	6.1	7.2	7.6	7.7
Slovakia	60.7	62.3	60.2	58.8	59	11.2	9.5	12.1	14.4	13.6
Spain	65.6	64.3	59.8	58.6	57.7	8.3	11.4	18.1	20.2	21.8
Sweden	74.2	74.3	72.2	72.7	74.1	6.2	6.3	8.5	8.6	7.7
United Kingdom	71.5	71.5	69.9	69.5	69.5	5.4	5.7	7.7	7.9	8.2

Source: Data published by KSH (http://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_int012.html, and http://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_int013.html), accessed: 21st Sept 2012.

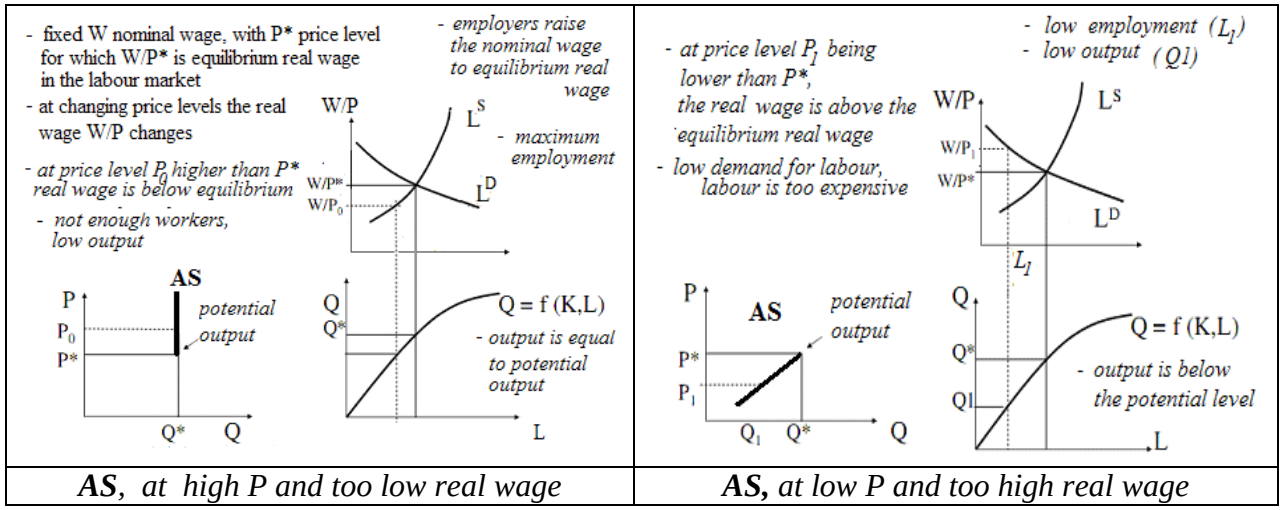
10.5. Determination of Aggregate Supply and its Relation to the Labour Market

The notion of aggregate supply was already briefly introduced in section 7.2. Now we are going to have a closer look to see what determines its value.

Aggregate supply (AS) *describes the relationship of macroeconomic output and the price level, showing the total amount of goods and services produced by the economy at any given price level.* As it was discussed earlier, this level of output is the function of the level of employment in the short run – given by the macroeconomic production function. The level of employment, on the other hand, depends on real wages, and these latter on nominal wages and the price level. Assume now, that the labour market is in equilibrium at the actual price level and nominal wage (that is, the sticky nominal wages are just equal to the level needed to obtain equlibrium real wages at the actual price level).

Assuming also the stickiness of nominal wages – i.e. constant nominal wages –, a rise in the price level will decrease the value of real wage, and as a result, the labour supply will decrease. In such a situation firms may find it reasonable to raise the nominal wage, and they

have the power to do so, because with low nominal wages they experience labour shortage, many jobs remain vacant. In such a situation the firms may consider it reasonable to raise the nominal wage to a level that brings its real value to the level of equilibrium real wage. The result is equilibrium employment, the economy produces its potential output level. The response to further price raises is further raise of the nominal wage to maintain the equilibrium level of real wage and employment, while the total output of the economy remains at its potential level. Therefore the aggregate supply remains the same as the potential output of the economy (*Figure 10.6,* left panel).



***AS**, at high P and too low real wage*	***AS,** at low P and too high real wage*

Figure 10.6: ***Aggregate Supply in Rigid Labour Market with Sticky Nominal Wages***
Source: Author's own construction

When, on the other hand, the economy experiences real wages above the equilibrium real wage, that is, with sticky nominal wages the actual price level is lower than needed to attain the equilibrium real wage, then the economy experiences low labour demand with unemployment, for which the only solution would be to decrease nominal wages. The nominal wages, being sticky, cannot be adjusted downward, therefore the low level of employment and low level of output become the general features of the economy. In this situation a rise in the price level will pull down the real wage level, closer to the equilibrium level of employment. Therefore employment starts to rise, as well as total output, so aggregate supply is an increasing function of the price level (the right panel *of Figure 10.6*).

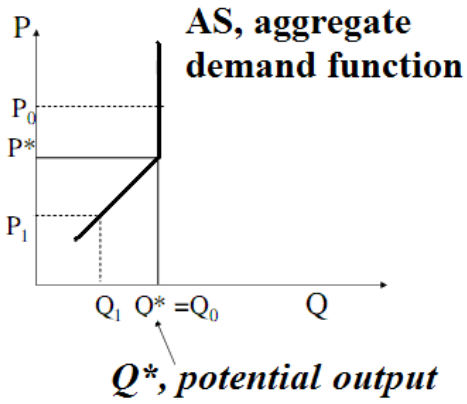


Figure 10.7: ***The Aggregate Supply Function (AS)***
Source: Author's own construction

Summing up: when nominal wages are fixed (sticky), the aggregate supply AS is an increasing function of the price level at price levels lower than the one belonging to the equilibrium wage, and AS is constant, being equal to potential output at price levels above the one belonging to the equilibrium wage (*Figure 10.7*).

This short run concept of aggregate supply is called *Keynesian AS (aggregate supply)* (Misz-Tömpe, 2006).

10.6. The Determination of the Price Level

In the previous sector the short-run aggregate demand and aggregate supply functions were discussed assuming sticky wages. As we showed, both aggregate demand and aggregate supply describe a relationship between the total macroeconomic output and the price level. Aggregate demand describes the income that the economic agents intend to spend at various price levels, while aggregate supply gives the amount of macroeconomic output, or its equivalent value, national income. The economy attains the equilibrium of aggregate supply and aggregate demand when the macroeconomic output and the level of income to spend are equal at a certain price level. Therefore the price level in the economy should adjust in a way to maintain the equilibrium of aggregate demand and aggregate supply.

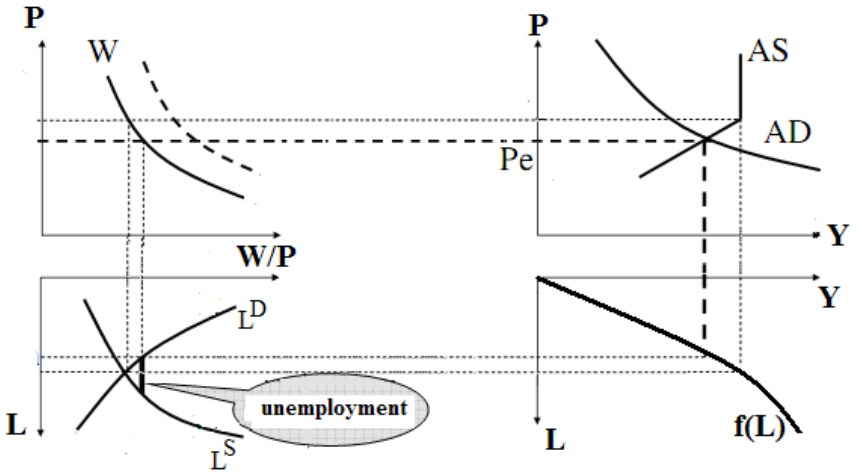


Figure 10.8: ***Equilibrium of AD and AS, and the Price Level***
Source: Author's own construction

The maximum value of total output defined by the function *AS* is potential output, which is attained at the price level that sets equilibrium real wage in the labour market. When the price level is higher than that, the low real wages discourage workers from working, and the firms find it reasonable to raise nominal wages to the level of equilibrium real wage. The equilibrium real wage induces equilibrium employment in the labour market, bringing about, maximum level of employed labour and maximum level of total macroeconomic output. Whether the economy really attains this level of output (and income) also depends on aggregate demand. Generally, the price level that sets equilibrium in the labour market will lead to excess supply in the macroeconomy, with aggregate demand being lower than the potential output of the economy. Therefore the equilibrium of *AD* and *AS* will require a price level P_e which is lower than the price level belonging to the potential output level (*Figure 10.8).* So the P_e price level that obtains the equlibrium of *AD* and *AS* is usually lower than the price level that sets the labour market in equilibrium. Therefore this P_e price level creates a

real wage higher than the equilibrium real wage of the labour market, leading to excess supply in the labour market, with low employment and high unemployment. Low employment means total output and national income lower than the potential level, so the economy performs below its capacity. Therefore macroeconomic equilibrium means equilibrium between macroeconomic demand and supply (*AD-AS*), equilibrium in the goods market and the money market – as all the points of *AD* are *(P,Y)* pairs with with *Y* attaining simultaneous equilibrium of *IS* and *LM,* – but disequilibrium in the labour market with unemployment.

10.7. Inflation – Concept, Measurement, Demand-side and Supply-side Inflation, the Price-Wage Spiral

Inflation *is a persistent increase of the price level, that is, the continuous decrease of the purchasing power of money.* The purchasing power of money is measured as the reciprocal value of the price level. Inflation therefore means, that the amount of nominal money increases without a similar increase of goods produced by the economy. This loss of purchasing power is a typical attribute of fiat money. Inflation occurred several times in the past, and since the beginning of the 19th century prices – and real wages - have multiplied in Europe. The USA faced its first significant inflation – of nearly 100 % - in the civil war of 1861-1865. History tells us, that in times of war the prices increased substantially, followed by decreasing prices in times of peace (Samuelson-Nordhaus, 1987). Such periods of extreme price rises, hyperinflationary periods were the years following the first and second World Wars (hyperinflation ended in Hungary in 1946 with the introduction of the new currency called Forint). Inflation is a general feature of contemporary market economies[32]. ***Deflation*** *means the general decrease of the price level.*

Inflation is measured by the price index. The **rate of inflation** measures the price change expressed as a percentage of the price level of the previous year. The price level – as it was discussed in Chapter 7 – is measured by several methods, the most popular one refers to the basked of consumer goods, and it measures consumer price levels and consumer price index (*CPI*), so *inflation is usually understood as an increase of consumer prices.* However, the notions of producer price levels and producer price index – either industrial, or agricultural – are defined similarly, and the change in the price level may also be measured by the *GDP*-deflator (Misz-Tömpe, 2006).

Inflation, however, does not mean that the price of every good rises at a uniform rate. Some prices may rise more than the level of inflation, while others – e.g. high-tech electronics – might become cheaper than before. Inflation is a weighted average of these price changes, therefore the impacts of inflation are not the same for all members of the population.

Inflation is more painful for those, whose consumer basket contains goods (products or services) affected by above-average price increases. People having deposits in banks at a fixed nominal interest rate are also major losers of inflation, because by the end of the year the purchasing power of their savings plus the interest will be less, than what they had expected at the beginning of the year.

The winners of inflation are people who borrowed money at the beginning of the year at fixed borrowing rates, because by the end of the year the purchasing power of the repayment plus its interest will be less that what was expected at the beginning of the year. Another group of winners are people whose consumer basket contains goods that were

[32] Technically, not all price rises are of inflationary nature. When prices rise because the economy switches to the production of modern, more valuable goods, then rising prices do not mean the devaluation of currency, but simply the reflection of the higher value of goods in the price level.

affected by below-average price rises, or even price cuts (e.g. valuable electronic appliances, luxury goods, etc.), while expenditure on everyday food consumption or fuel and enery represent a smaller share in their total spending. Thus inflation redistributes incomes among the population, and it is hard to predict who will win or lose by this process (Samuelson-Nordhaus, 1987).

Inflation is classified by its major causes. As inflation – i.e. the increase in price level – is the result of disequilibrium of aggregate demand and aggregate supply, its major cause may be either an increase in demand, or a decrease in supply. Therefore **two basic types** of inflation are identified, as

- **Demand-pull inflation**, and
- **Cost -push inflation**.

Demand-pull inflation *is caused by persistent rises in aggregate demand. The reason for it is a change in some factors affecting aggregate demand – either in the goods market, or in the money market.* Such changes include the excess spendings by the government, increasing household consumption, or a growth in investment demand. These may occur because of improved business confidence and more optimistic expectations on profitability, or growth of money supply leading to decreasing interest rates, some spending brought ahead because of expected price rises in the near future, or an increase in disposable incomes caused by a decrease in taxes or an increase in state subsidies. A decrease in the propensity to save has a similar impact, inducing consumers to spend more of their disposable income than before. Eventually the above factors increase aggregate demand, causing an upward shift in the position of the *AS* curve. As a result, the price level will rise, but the equilibrium income of the *AD-AS* system also increases.

Cost-push inflation *is related to the supply side, and is shown by the decrease of aggregate supply. Its main cause is the rising price of some factors of production* – e.g. payroll taxes, or rising nominal wages. Similarly, the cost of capital inputs may also rise, e.g. an imported capital asset – e.g. fuel – may be more expensive than before. The producers can purchase less of the more expensive factors of production, or if they buy still the same amount as before, the price of the output will be raised to cover the rising costs. Therefore aggregate supply decreases, and the aggregate supply curve is shifted upwards. Eventually the price level increases and national income falls (*Figure 10.9*).

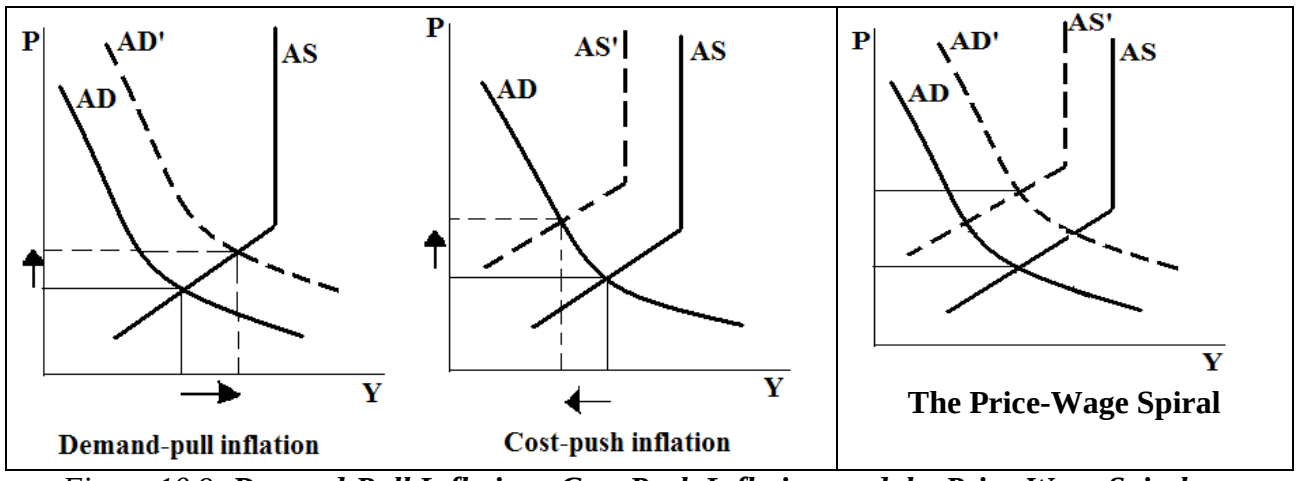


Figure 10.9: ***Demand-Pull Inflation, Cost-Push Inflation, and the Price-Wage Spiral***
Source: Author's own construction

Economic agents naturally try to prepare for inflation and try to minimise its negative impacts. The occurrence of the **price-wage spiral** reflects the impacts of economic agents' inflationary expectations: The agents in the goods market expect rising prices (*inflationary expectations*). To minimise the negative impacts of inflation they try to purchase as much as possible today, before the price increase – and this behaviour increases demand in the goods market, and initiates demand-pull inflation. However, households want to get compensation for the decreasing value of their incomes, therefore workers start to negotiate a nominal wage increase, and probably they achieve it. This, on the other hand, means an increase in the costs of production, leading to cost-push inflation, and decreasing aggregate supply. Eventually both *AD* and *AS* are shifted, resulting in a rise of the equilibrium price level, while the rise in income generated by the growth of *AD* is counteracted by the fall of income generated by the fall in *AS*. Eventually national income remains about the same, while prices have risen considerably. Economic agents feel their expectations fulfilled, and this reinforces their behaviour patterns, so the above process will be repeated again (right panel of *Figure 10.9*).

Inflation is also classified by the size of its rate – distinguishing the strains of low inflation, galloping inflation and hyperinflation (Meyer-Solt, 1997, Misz-Tömpe, 2006):

- **Low inflation** *is the increase of the price level at a rate of a few percents per year;* prices rise at a moderate rate without major shock, the rising prices do not cause difficulties for the economy, the impact of the expected price rise is easy to predict. Inflation in Hungary and in the member states of the EU belongs to this category.
- **Galloping inflation** *is inflation of the double or triple digit range of 20% to100 % or even 200 %.* Although the economy operates more or less in a normal way, money loses its value very fast, so economic agents do not use money for storing their savings, but look for more stable forms of wealth. People try to spend their money quickly before its considerable devaluation, and this results in a fast growth of demand. This situation happened in Hungary in the 1990-ies.
- **Hyperinflation** *is inflation of a weekly or even daily rate of double or triple digits.* This level is too high for the economy to run as normal, as the purchasing power of money decreases to a fraction of its original value during days, or even hours. Such hyperinflationary periods were experienced in Germany in the 1920-ies, and in Hungary before the introduction of the new Forint in 1946.

Table 10.4: ***Price Level Changes in Countries of Europe and USA***

Consumer Price Index (%)	Hungary	Germany	USA	Czech Republic
2006	4.0	1.8	3.2	2.1
2007	7.9	2.3	2.9	3.0
2008	6.0	2.8	3.8	6.3
2009	4.0	0.2	-0.3	0.6
2010	4.9	1.2	1.6	1.5
2011	3.9	2.5	3.1	1.9
2012 (first quarter of year)	5.2	1.9	2.1	3.5

Source: Author's own construction based on the World Economic Outlook, April 2012

Review Questions

1) What is the macroeconomic production function, and its short-run version?
2) Explain the relationship between the macroeconomic production function and the number of labour force.

3) Define the notions of labour demand and labour supply.
4) Explain the terms 'labour force', 'adults not in the labour force', 'unemployed".
5) Explain the meaning of the labour force participation rate, the employment rate and the unemployment rate.
6) How are labour demand and labour supply related to real wage?
7) Explain the meaning of labour market equilibrium, and the employment in labour market disequilibrium situations.
8) How is aggregate supply derived from the labour market and the macroeconomic production function?
9) Explain the equilibrium of *AD* and *AS*, and show the formation of price level in the economy.
10) What does 'inflation' mean, how can we measure it, how is the size of inflation categorised?
11) Explain the notions of demand-pull inflation, supply-push inflation, and the price-wage spiral.

Problems and Questions to Develop Competence

1. An economy is described by the production function: $Y = K^{1/3} \times L^{2/3}$. The economy has *1000* units of capital and a labour force of *1000* persons.

a. Write the labour demand function as the function of real wage and amount of capital. (Help: labour demand is determined by $MP_L = W/P$, and MP_L is the first derivative of the production function by the variable L:
$$MP_L = (2/3) \times K^{1/3} \times L^{-1/3}).$$
b. Assume that the real wage adjusts flexibly to labour supply and labour demand, to obtain labour market equilibrium. Calculate the equilibrium real wage. Calculate the number of employed people and the value of total output. How much wage is paid altogether to the employed population?
c. Now the parliament would like to raise the employees' living standard, so it passes an act, declaring that real wage should be equal at least to *1* unit of output. How does this real wage relate to the equilibrium real wage?

2. The labour demand function of a country is $L^D = 220 - 40\ W/P$. The labour supply function is $L^S = 80\ W/P - 20$. Total population is = *400* persons, of which *150* is not working-age people.

a. Calculate the number of employed at $W/P = 2.5$. Calculate the number of unemployed, and the unemployment rate.
b. Calculate the number of labour force as the sum of the employed and unemployed workers. Calculate the labour force participation rate, and give the number of adults not in the labour force.

3. The labour demand is defined by $L^D = 220 - 40\ W/P$. The labour supply is given by $L^S = 80\ W/P - 20$. Total population is *400*, of which *150* persons are not working-age.

a. At what real wage will the number of employed be the highest? How many people are working at this real wage?
b. The macroeconomic production function is $Y = K \cdot L - L^2$ and $K = 300$ is the amount of capital available for the economy. Calculate total output at equilibrium real wage.

Chapter 11: Instruments of Economic Policy, Foreign Relations of an Economy

11.1. The Justification for Government Intervention, Areas and Roles

In Chapter 6 dealing with public goods and externalities we discussed the inability of contemporary market economies to assure the smooth, harmonious development of the national economy, and it was established that the spontaneous adjustments of the market often lead to equilibria that are not optimal for society as a whole. Therefore government intervention into the operations of markets is justified, by either restricting, or enhancing the activities of the private sector. ***The main areas of goverment intervention are the centralisation and redistribution of incomes, the provision of the institutional framework for markets, and protection of the national economy in the world markets.*** Some elements of intervention serve the purpose of *efficiency*, others that of *fairness*. Government subsidies or tax reductions related to the implementation of energy-efficient technologies are for enhancing efficiency, and examples of fairness-related intervention include the allowances for the handicapped supporting those lacking the ability to earn their own income, or the maternity benefit that acknowledges the social importance of the unpaid work of child-rearing.

The government intervenes into the economy by three main functions (Misz-Tömpe, 2006), stabilisation, a redistribution and allocation.

Stabilisation *means maintaining the institutional framework for the market economy, including the running of government institutions, legal background, enforcement bodies, the mechanisms of economic control and regulation.* The government also keeps a close watch on the main economic processes (inflation and economic growth) trying to guide them to favourable directions.

Redistribution *covers the tasks related to income centralisation and redistribution. A part of the incomes are centralised in the form of taxes, and the collected tax revenues are partly re-paid as transfers to various groups of the private sectors, and partly used to maintain the government institutions (state organisations, police, national defence).*

Allocation *means the allocation of productive resources to activities that serve best the public interest. The society, the citizens of the country often require goods and services that the markets cannot provide, therefore the government has to take care of their provision.* These activities usually require large capital investments, with doubtful, or very slow financial returns – e.g. the construction of highways and motorways, the establishment of a public transport network -, or they have no measurable financial gains (e.g. public education and public health care services), but are essential for the well-being of the society.

11.2. Basic Concepts and Instruments of Fiscal and Monetary Policy

The ways, specific objectives and instruments for implementing the above functions are defined by the economic policy of the government.

Economic policy *comprises of the views and approaches, decisions and actions the government applies to intervene into the national economy to attain its political and socio-economic objectives.* Economic policy defines the goals of the government and the instruments to to attain them. *Its general goal is the enhancement of the economic well-being*

of the country, and this general objective is divided into specific objectives to be directly implemented. These specific objectives are: *to maintain economic stability* (including the stability of price level, employment, and balance of payments), *to enhance economic growth*, *to support the structural reorganisation of the economy*, and *to influence the redistribution of incomes*.

The above objectives are not independent, and a move into the direction of one often makes the other more difficult to attain. Therefore economic policy has to be very careful in avoiding conflicting objectives, and this may necessitate the ranking of particular objectives by their importance. *Growth-oriented economic policy* gives the priority to objectives enhancing economic growth, while *anti-inflationary economic policy* prefers measures and actions that slow down the increase of prices (Misz-Tömpe, 2006).

The typical instruments of attaining policy objectives are categorised as below:

Demand side instruments: *instruments of economic policy that affect aggregate demand, affecting either the goods market (the position of the IS curve) or the money market (the position of the LM curve).*

Supply side instruments: *policy instruments affecting the total output of the economy, i.e. aggregate supply, therefore they may affect the labour market (by payroll taxes and other labour-related measures), or the macroeconomic production function (by taxes and subsidies influencing factor prices and technological developments).*

Monetary policy is a demand side policy influencing the money market (i.e the position of the *LM* curve). **Monetary policy** *affects the quantity of money in circulation, by controlling the interest rates, the reserve ratio or the foreign exchange rate*.

Fiscal policy *deals with the government budget, that is, the government revenues (taxes) and the government spending (goverment expenditures and transfers).* Fiscal policy instruments include supply side instruments and demand side instruments affecting the goods market (the *IS* curve) (Meyer-Solt, 1997; Misz-Tömpe, 2006). These approaches are summarised in *Figure 11.1*.

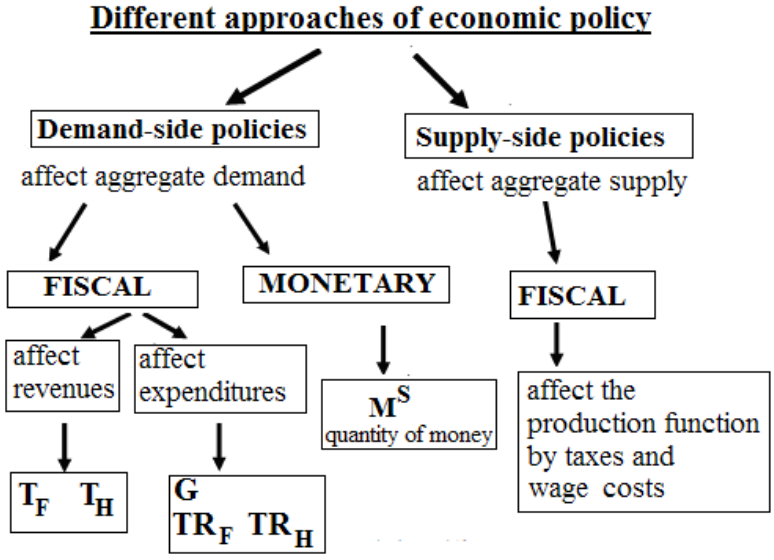


Figure 11.1: ***Economic Policy Approaches***
Source: Author's own construction by Meyer-Solt (1997).

Both fiscal and monetary policy may be expansionary and contractionary. The purpose of expansionary fiscal policy is to increase aggregate demand, and its typical tools are increasing government expenditure, increasing transfers or decreasing taxes. Contractionary fiscal policy is typically attained by the opposite changes of the above budgetary items. Fiscal

policy actions will result in the shift of the *IS-curve* (upwards for expansionary policy and downwards for contractionary policy), and a similar shift of the aggregate demand curve *AD.* Expansionary monetary policy increases aggregate demand by increasing the money supply in circulation. Contractionary monetary policy will decrease the money supply. Monetary policy affects the position of the *LM-curve*, expansionary measures setting higher interest rates, and contractionary measures lower ones for any level income. *Figure 11.2* shows some examples of fiscal and monetary instruments.

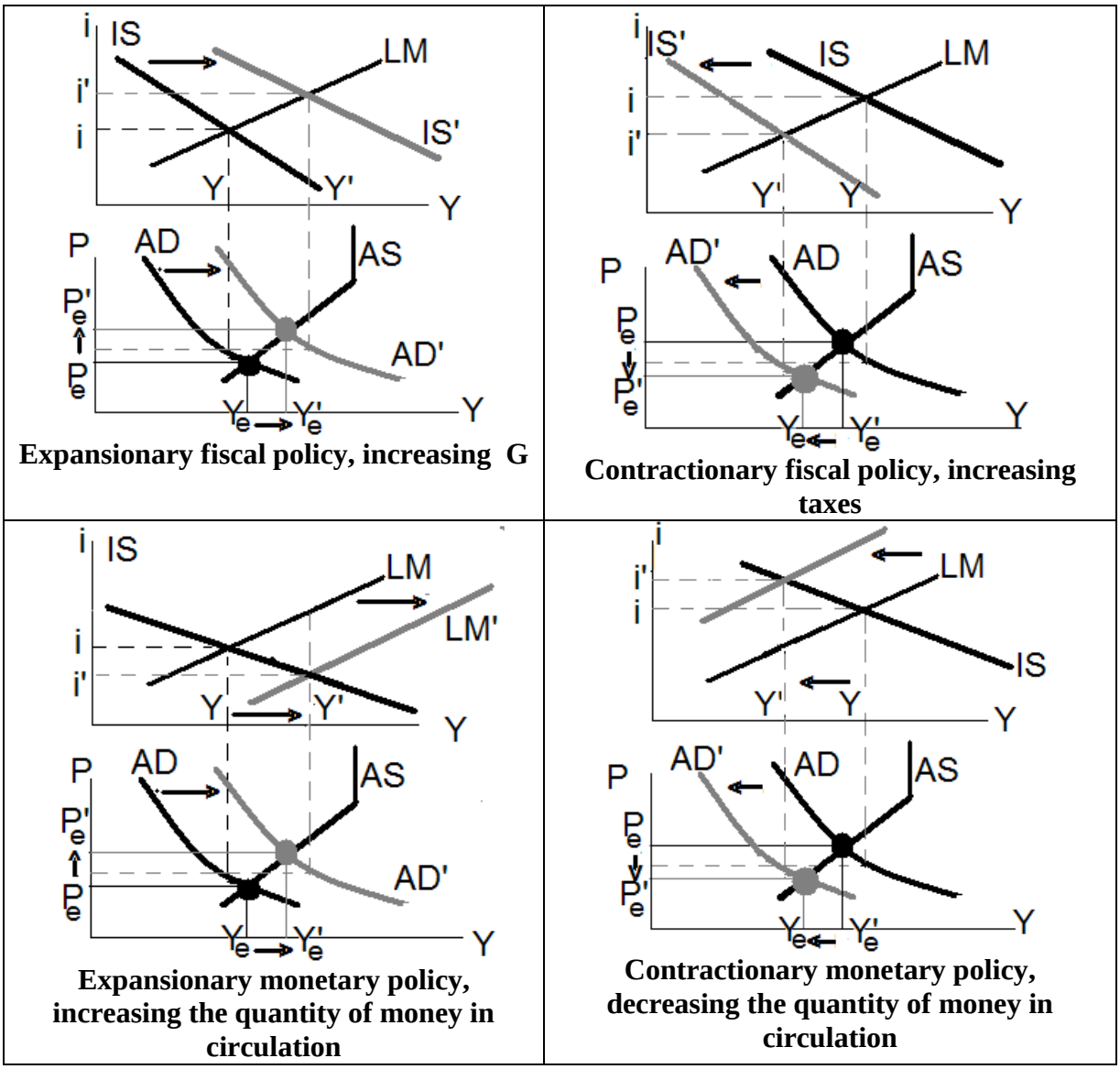


Figure 11.2: ***Fiscal and Monetary Policy in the IS-LM Model***
Source: Author's own construction

When the main priority of government policy is the enhancement of economic growth, then it tries to shift the *AD curve* to the left applying demand side instruments. This can be done by applying either monetary or fiscal measures. However, it must take into account the various impacts of the chosen measure on the other indicators of the economy, which may be very different.

An **example of expansionary fiscal policy:** An increase of the value *G* will require higher national income at any rate of interest (and planned level of investment) to hold the balance in the goods market, therefore *IS* will shift upwards. The higher income increases

money demand in the money market, and initiates a movement upwards, along the *LM* curve. Thus the new simultaneous equilibrium of *IS-LM* raises the incomes and interest rates at any *P* price level compared to the initial situation. Consequently, *AD* shifts upwards (the aggregate demand increases) and in response to that *AS* (the aggregate supply) starts to grow. The higher aggreagate demand and aggregate supply sets a higher income and higher price level (top left panel of *Figure 11.2*).

An **example of contractionary fiscal policy:** An increase in taxes *(T)* decreases disposable income and the households' consumption demand. Then at any interest rate (and investment demand) less income is needed for maintaining the equilibrium in the goods market, therefore *IS* shifts downwards. The decreasing income decreases the demand in the money market, resulting in a movement downward along *LM*. The new equilibrium of *IS* and *LM* will define lower interest rates and incomes at any price level *P* than before. Therefore *AD* shifts downward (aggregate demand decreases), and *AS* (aggregate demand) responds to it by decrease. The lower levels of aggregate demand and aggregate supply leads to lower national income, and lower price level (top right panel of *Figure 11.2*).

An **example of expansionary monetary policy:** An increase of the nominal money supply (by e.g. decreasing the refinancing interest rate or the reserve ratio) leads to the increase of real money supply M^S/P. Therefore, at any level of income and price level *P* the same money demand will face larger money supply, leading to a decrease in the interest rate, so any national income will be paired to a lower interest rate, and *LM* shifts downward (to the right). The lower interest rates will increase investment desire in the goods market, therefore demand is growing in the goods market, so the result is a downward movement along the *IS* curve towards lower interest rates and higher incomes. The new equilibrium of *IS* and *LM* will set lower interest rates and higher incomes at any price level *P*, than before. As a consequence, the *AD* will shift upward, and *AS* (aggregate demand) grows. The equilibrium of aggregate demand and aggregate supply leads to higher national income and a higher price level (bottom left panel of *Figure 11.2*).

An **example of contractionary monetary policy:** A decrease in the nominal money supply (by e.g. an increase of the refinancing interest rate or the reserve ratio) leads to the fall of real money supply M^S/P. Then, at any level of income and price level *P* the same money demand is compared to a smaller money supply than before, leading to a rise of the interest rate, so at any national income a higher interest rate evolves, and *LM* shifts upward (to the left). The higher interest rates decrease investment desire in the goods market, therefore demand is falling in the goods market, moving upward along *IS*, towards higher interest rates and lower incomes. The new equilibrium of *IS* and *LM* will set higher interest rates and lower incomes at any price level *P*, than before. Consequently, the *AD* will shift downward, and *AS* (aggregate demand) start to fall. The equilibrium of aggregate demand and aggregate supply leads to lower national income and a lower price level (bottom right panel of *Figure 11.2*).

The ***Government (State) budget*** *is a balance containing the government's revenues and spendings. The revenue side contains taxes collected from households and firms, the expenditure side contains transfers (grants, subsidies), and government expenditure, and government saving.* ***The budget is balanced*** *when the revenues and expenditures of the government are equal, no savings or deficit exist (i.e. the tax receipts are exactly equal to the sum of government expenditure and transfers).* It is very rare in the real world. ***The government runs a budget surplus*** *when the revenues of the budget (i.e. taxes) are higher than the sum of government expenditures and transfers, the value of government saving is positive.* There are not more than one or two countries in the world that run budget surpluses. ***The government runs a budget deficit*** *when the sum of government expenditures and*

transfers is higher than the tax revenues of the government, the value of government saving is negative.

Most of the countries of the world – and of the developed world – belongs to the third category. The size of the deficit is usually measured as a percentage of the annual value of *GDP,* the accession criteria of the Eurozone specify an upper threshold value of *3 %* for this figure (Misz-Tömpe, 2006).

11.3. The Foreign Balance of Payments, Government Deficit and Debt

An open economy is connected to the world economy by many channels. Some of the external linkages belong to the goods markets, by foreign trade relationships. The components of foreign trade are the export and import of goods and services. Other linkages connect the country to international money markets, by international capital flows, and by the changing exchange rate of the national currency. The international movements of labour and migration represent another important area of integration into the world economy. A country is considered to be an open economy when the sum of its export and import is high compared to its *GDP* – in Hungary, for example, both export and import are around *80%* of the annual GDP, while in the USA both are around *15- 20%*.

The total outcome of the above transactions is summarised in the foreign balance of payments. The ***foreign balance of payments*** *accounts for all the economic transactions of the resident economic agents of a country with the rest of the world during a specific time period* (Misz-Tömpe, 2006). This balance contains all the foreign currency inflows to, and the outflows from the county.

	DEBITS *(PAYMENTS)*	**CREDITS *(RECEIPTS)***
I. Current Account		
Merchandise trade balance	Merchandise import	Merchandise export
Services	Services received	Services sold
Factor incomes	Outflows	Inflows
Unilateral transfers	Outflows	Inflows
IIa. Capital Account		
Unilateral capital asset flows		
IIb. Financial Account	Capital outflows	Capital inflows
Flow of financial assets	(Export of capital)	(Import of capital)
III. Change in central bank's official foreign currency reserves	Increase in foreign currency reserves when the net balance of I. and II. is positive	Decrease in foreign currency reserves when the net balance of I. and II. is negative

Table 11.1: ***The Structure of the Balance of Payments***
Source: Author's own construction based on Misz-Tömpe (2006) .

Since 1997 Hungary has used the structure of foreing balance of payments defined by IMF in 1993. This structure contains two main components. The **current account** summarises the current payments and receipts, that is, international flows related to merchandise trade, trade in services, factor payments (incomes of labour and capital), and unilateral transfers. The **capital and financial account** contains the international inflows and outflows of capital investments (i.e. transactions of capital assets and property), accounting separately for *unilateral capital flows* (e.g, investment grants and international debt relief) and

international *financial asset flows* (foreign direct investments, portfolio investments and international loans) (Samuelson, 1987; Misz-Tömpe, 2006). The third component of the balance of payments is the **change in central bank's official foreign currency reserves**, which refers to the corrections needed by the central bank when the net balance of the current account and the capital account differ from zero. This component will therefore establish the balance of expenditures and revenues (*table 11.1*). Therefore: *the net balance of the current account + the net balance of the capital account + the change in the official central bank reserves = 0.* The difference of export and import is called **foreign trade balance**. **The overall balance of payments** is equal to the net balance of the current account plus the net balance of the capital account.

When the balance of payments is in deficit – i.e. payments are higher than receipts -, then the central bank's official foreign currency reserves must be decreased to cover the deficit. If the reserves are not enough for this, then the country must borrow foreign currency. The loan, on the other hand, incurs in the future years interest payments, and loan repayment in foreign currency. The obligation of interest payment will increase the payment side of the current account, and the repayment of the principal will do the same with the capital and financial account – increasing the deficit of the balance of payments in the future years. If the country does not succeed in decreasing its international payments or increasing its international receipts, the same process will be repeated year by year, new loans will be taken to finance the deficit, and the interest payment and loan repayment obligations will worsen the position of the foreign balance of payments. The process leads the country to a *debt trap*, and eventually to *insolvency or bankruptcy*. The way out of this situation is a considerable cut of expenditures – e.g of imports – and a significant increase of revenues – e.g. of export -, but to achieve this the first thing is to improve the macroeconomic performance of the country.

To measure the ***level of indebtedness,*** the total debts of the country are compared to another economic indicator. Thus the total debt value per capita, or the ratio of total debt to national wealth are often mentioned to describe the level of indebtedness, but the indicator really used to measure indebtedness in international economic assessments is the *ratio of total debt to annual GDP*. The total debt of Hungary was *80% of its annual GDP* in 2011, according to the website of the Central Statistical Bureau of Hungary (KSH, *www.ksh.hu*). The value of debt, however, is considerably affected by the exchange rate of the national currency, because annual GDP is measured in national currency, and foreign debt is usually recorded in some foreign currency. The obligation of **debt service** for the indebted countries consists of *interest payments on the loan*, and the *repayment of the principal* itself. The **debt service ratio** *compares the value of debt service to the total receipts of the current account.* The debt service obligation is a payment required in foreign currency, and therefore it should be paid from the foreign currency inflows (receipts) of the current account.

Let's summarise the indicators used to measure the indebtedness of a country:

- *Level of indebtedness = total value of debts / annual GDP.*
- *Debt service = annual repayment of the principal + interest payment on the loan.*
- *Debt service ratio = debt service / total receipts in the current account.*

11.4. Understanding and Measuring Economic Growth, Possibilities for Promoting Growth

Assessing the issue of economic growth, the social, political, and cultural conditions of a country and the long-run trends of production must be considered together to identify its preconditions and rules.

Economic growth *is an increase of the capacity of an economy to produce goods and services to satisfy the consumption demand of its population.* It is important to remember that economic growth should happen according to the requirements of *sustainable growth*, i.e., the country should use its productive resources in a way, that does not diminish the consumption and growth opportunities for future generations. All this, however, refers primarily to quantitative growth, and is far from being equal to the development of a country and to the improving quality of life of its population.

Development *is a broader concept than growth, because besides the increased capacity to produce consumption goods it includes the opportunity to improve health care and education services, the level of infrastructure, cultural enrichment and extension of freedom widely available for the population.*

There are many countries in the world with relatively low annual growth rates of *GDP*, but with reasonably good quality of life – while the in other extreme there are a few countries with very high growth rates, suffering from severe social inequalities.

The *usual measure of economic growth is the annual change of the real GDP expressed as a percentage of the real GDP of the previous year (*Misz-Tömpe, 2006*).*

When aggregate supply was discussed, it was already shown that the national output is determined by the macroeconomic production function, and the employed amounts of labour and capital. Therefore the *determinant factors of economic growth* are the quantites of labour and capital, their qualities, and other factors affecting their productivity. These are the following: the *growth rate of the labour force, the growth rate of labour productivity, the growth rate of capital assets, and technological development*. **Technological development** *includes the invention of new products and new production processes, as well as their implementation, leading to increased output with the original level of input use (*Misz-Tömpe, 2006*).* Most of the growth theories explain the growth of output by the above factors. One of the most widely accepted theories of economic growth is the *Solow growth model*, which describes the level of output and national income by the formula $Y=A\times f(K,L)$ (Meyer-Solt, 1997, Samuelson-Nordhaus, 1987), with K and L denoting the amounts of capital and labour, respectively, the function f describing the technology level, and A being a coefficient of technological development. The model explains economic growth by the growth of labour (L), the growth in labour productivity, i.e. output per unit of labour (Y/L), the growth of the capital stock per labour (K/L), and the impact of innovation and technological development (A) that can multiply the impact of the former factors.

However, economic growth measured as the growth of total *GDP* neglects the fact, that the increasing *GDP* does not always mean the expansion of consumption opportunities for the population, because the total growth of the population itself might be faster than the growth of *GDP*, and this will result in decreasing *GDP per capita* values. Therefore a more realistic indicator of economic growth is the *annual growth rate of the per capita GDP*, that is, the *annual change of GDP per capita, measured as a percentage of the GDP per capita of the previous year*. Using Y_t to denote the annual *GDP* of the actual year, and N_t the actual number of the population, then $y_t=Y_t/N_t$ measures the annual *GDP* per capita in the actual year. The growth rate of this indicator is*:* $g_t\ (\%) = 100\times (y_t - y_{t-1}) / y_{t-1}$, where y_t is the annual *GDP* per capita for the actual year, and y_{t-1} is the same indicator for the previous year. It must be remembered, that such comparisons are meaningful only with real GDP values, using prices of a selected base year, otherwise the indicator might show nominal growth caused by price rises without any growth of output.

The indicator of economic growth measured by the growth rate of *GDP* per capita often shows a distorted picture of the well-being of a nation (Soubbotina, 2004). Neither the value of the *GDP* per capita, nor its growth rate reflects the following problems (Sen, 2003):

- The value of *GDP* per capita is an average figure, which may include severe inequalities. A small percentage of the population may have extremely high incomes, while huge masses of people live in the deepest poverty and misery.
- The value of *GDP* includes many activities, that, although they increase *GDP*, do not improve the well-being of the society, but cause harm and damage: car crashes, road accidents increase the income of car repair mechanics, the rehabilitation of an area after an environmental disaster increases the incomes of those involved in it, the high number of hospital patients and the high costs of treatment also increase the *GDP*, although all these are associated with poor quality of life for the people.
- *GDP* cannot measure precisely the values produced in the economy: it neglects the incomes earned by illegal economic activities, and the value of unpaid housework.
- *GDP* does not take into account the change in the environment, the damages and losses of natural resources caused by pollution.
- *GDP* cannot measure whether the same income was earned by little or much work, therefore the value of leisure time, as a component of well-being is neglected.
- High quality of life is not equal to high income. The high income groups of welfare societies often spend their incomes on unhealthy consumption (alcohol, smoking, too much food, purchase of needless products), while the struggle for high income creates stress and typical diseases of rich civilised societies.

Therefore, to describe the quality of life of a country other indicators have to be used. The science of economics produced several new indicators in the past decades, to amend the deficiencies of *GDP* as a welfare indicator. Nordhaus and Tobin (1972) introduced *MEW (Measure of Economic Welfare*), as an attempt of solving the above problems of *GDP*. This indicator was improved by Samuelson and Nordhaus (1993, 2004) defining another indicator called *NEW (Net Economic Welfare*). The above two indicators were further improved to include a refined evaluation of the state of the environment, defining *ISEW (Index of Sustainable Economic Welfare* , Daly, 2001). Another indicator focusing on the state of the environment is the *Ecological Footprint* (Daly, 2001). The scope of the present text does not allow the detailed discussion of these indicators, the interested reader can find it in the referred literature.

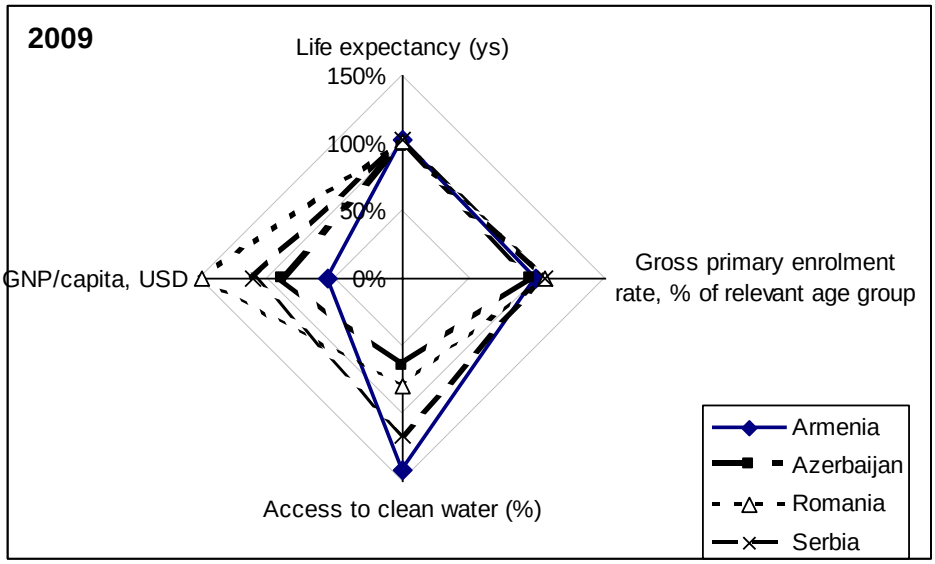
A generally used indicator for measuring the quality of life is *HDI (Human Development Index*), established by the *United Nations Development Programme (UNDP*) in 1990. The purpose of its creation was to create a development indicator that includes the health status and educational level of the population as well as their income situation (*GDP*). The health status is measured by the average life expectancy of the population at birth, the educational level is measured by the average school years accomplished by the adult population (Todaro, 2000; HDR 2011). *HDI* is an index number between *0* and *1*, the values close to *0* indicate low level of development, the values close to *1* refer to high level of development. The *HDI* value of Hungary in *2007* was *0.879*, which placed the country *43*rd in the *UNDP* ranking assessing the development level of 197 countries, while the value for Hungary decreased to *0.816* in *2011*, but still enough for the *38*th place in the *UNDP* ranking *(table 11.2*).

Table 11.2: ***HDI and Its Components, 2011***

Country	HDI value (rank)	Life expectancy, years	Average school years accomplished	GNI/capita USD, in purchasing power parity
Norway	***0.943 (1.)***	81.1	12.6	47557
USA	***0.910 (4.)***	80.7	12.4	43017
Slovenia	***0.884 (21.)***	79.3	11.6	24914
United Arab Emirates	***0.846 (30.)***	76.5	9.3	59993
Hungary	***0.816 (38.)***	74.4	11.1	16581

Source: Author's own construction based on data of *HDR (2011)*

The World Bank introduced a multidimensional indicator of development called *Development Diamond (Figure 11.3*), that use four indicators – life expectancy at birth, educational level (gross primary enrolment rate) of the population, access to clean water, and *GNI (*or *GNP)* per capita – to describe the level of development of a country (*Soubbotina, 2004*).



The value of 100% measures the average value of the respective indicators for the four countries

Figure 11.3: ***The Development Diamond for Countries in Asia and Central Europe***
Source: Author's own construction based on data of http://data.un.org (accessed: 21st Sept 2012)

In spite of the existence of the above indicators, international assessments still use the per capita values of *GDP* or *GNI*. The *United Nations* and its organisations classify countries by *HDI* defining the following categories: very high level of human development: values above *0.79* ; high human development: values from *0.69* to *0.78;*, medium level of human development: from *0.52* to *0.69* ; low level of human development: below *0.52* (HDR,2011).

11.5. Business Cycles

The above sections gave a brief overview of the notions of growth and development. In reality it is very rare that the real GDP per capita of a country would grow at the same rate for several decades. Everyday experience tells us, that shorter or longer periods of fast growth of GDP per capita are followed by slower growth, then growth may stop completely in times

of crises, or even turn to decline, then the whole process starts anew. Such cyclical fluctuations of economic performance are called *business cycles*.

***Expansion** is a period of rapid economic growth, reflected in the increasing value of output (GDP), **recession** is a period of economic slowdown, reflected in decline of the GDP. Phases of* expansion and recession follow each other periodically, while the economic performance, i.e. total output grows continuously in the long run. This repeated regular pattern of upward or downward swings around a long-term trend is called cyclical behaviour, so the periodical repetition of expansion and recession is called *business cycle*. The fluctuations are characterised by two properties: *the length, and the magnitude of the phases; the **business cycle** itself is the period between two successive phases of expansions (or recessions).*

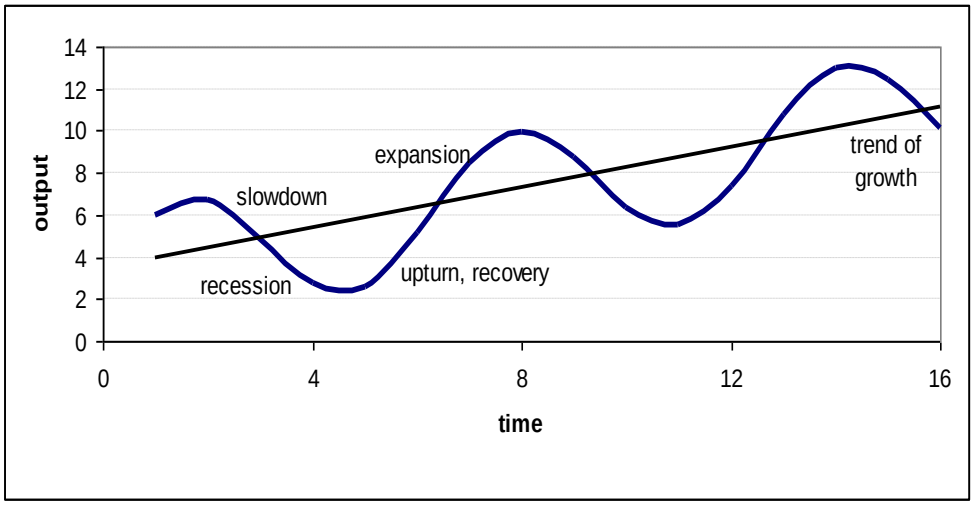


*Figure 11.4:**The Business Cycle***
Source: Author's own construction based on Meyer-Solt (1997)

Figure 11.4 illustrates the phases of the business cycle. The line with positive slope illustrates *the trend of long-term growth of the output*, the waving curve illustrates the actual pattern of output. The part of the curve increasing above the trend line is called *expansion*, which, reaching the peak, turns to *slowdown*, a decreasing period above the trend line. The decline continues below the trend line, and it is called *recession*. Reaching the trough (the deepest point of recession), the curve turns back to increase, starting the phase of *upturn or recovery*. The phase of recovery ends when output reaches the level of long-term trend, and then the process continues with expansion again (Meyer-Solt, 1997). In a somewhat simplified classification the term of recession is often used for the successive phases of slowdown and recession, and the successive phases of recovery and expansion are called expansion (Samuelson-Nordhaus, 1987).

Business cycles are classified by several aspects. A classification is made by **the area of the economy** where the fluctuations are experienced, describing financial cycles, agricultural cycles, investment cycles and general economic cycles. **According to the length of the cycle** *seasonal fluctuations, classical business cycles, Kuznets-cycles, Kondratyev-cycles and super- long cycles are known*:

- ***Seasonal fluctuations*** are cycles of a length less than one year, typically occurring in the area of finance.
- ***The classical business cycles*** are of a few years length, like the hog-cycle known in agricultural production, or the *Kitchin-cycle* of *3-5* years length (occurring in

the financial and banking sector, and in the inventories), and the *8-10* year long *Juglar-cycle*.

- ***Kuznets-cycles*** are of the length of *15-20* years, experienced in fixed capital formation, in the buildings and construction industry and in ship-building.
- ***Kondratyev-cycles*** last for *40-60* years, experienced in the total output level of the national economy, and empirically visible in economic history, although their theoretical explanation is still insufficient.
- **Super-long cycles** are the cycles of more than *100* (or even *150-200*) year length, found in agricultural production, and also in the process of scientific and technological development.

The explanation for the emergence of classical business cycles is the disequilibrium of aggregate demand and aggregate supply (Samuelson-Nordhaus, 1987). When either a supply-side disturbance or a demand-side one occurs, the equilibrium turns to disequilibrium and this leads to a cyclical fluctuation (Meyer-Solt, 1997). Due to an external shock *aggregate demand suddenly increases*, therefore output inventories suddenly decrease. As a response, producers start to *increase production*, employing more factors of production than before, providing more income to the owners of these productive resources. increasing the flow of income. The *increased income* will further increase aggregate demand. As production increases, *employment will also increase* (unemployment falls), and *investments will also grow*. These processes increase production still further, so a *cumulative process* is started, an *expansion* is experienced in the economy. Eventually the process will stop, because reaching the level of *full employment* the number of workers cannot be increased any more (this is called the **peak of the cycle**).

Therefore *the growth of production starts to slow down, as well as the growth of incomes.* In response to that, *consumption will not grow any further*, *output inventories start to accumulate, and producers start to decrease investments. Producers start to decrease their output, as well as the number of employed workers,* which leads to rising unemployment. Consequently incomes also decrease, which *further decreases consumption*, and that again leads to *decreasing production, investment and employment*, starting again a *cumulative process of recession*, or crisis in the economy. During this process sooner or later output inventories clear up, and production must be re-started, therefore *replacement investments* have to be done (this is called the ***trough of the cycle).*** The re-starting of production leads to a slow increase of employment and incomes, and that *initiates the process of recovery* (upturn).

The temporal relationships of the components of the cycle are described below:

- *The following components change together with production* (i.e. increase in expansion and decrease in recession): investments, employment, intended inventories, price level.
- *The following components change opposite to production* (decrease in expansion and increase in recession): not intended inventories, unemployment.
- Investments and aggregate demand change *before the change in production*.
- Inventories and employment change *after the change in production*.

Cyclical behaviour may be induced by external and internal causes (Meyer-Solt, 1997; Samuelson-Nordhaus, 1987). **External causes** include social and political events, as wars, revolutions, or changes in the natural environment, as natural disasters, or exhaustion of some natural resources, while the most typical **internal cause** is the change in investments**.**

Economists disagree about the need and possibility of intervention in the business cycle. Unpredictable, irregular shock-like fluctuations are harmful for the economy, because the uncertain economic environment makes business decisions very hard, eventually leading

to slower economic growth. Other economists say, that a certain level of fluctuation is necessary in the economy, and trying to prevent it will cause a disturbance in the nature of economic processes, which is more harmful than beneficial.

The actual economic policy usually tries to diminish these fluctuations, thus the government often intervenes in the economy. The chapter on economic policy explained the instruments available for intervention, including fiscal and monetary policy, and other tools. A crucial requirement for the success of intervention is the ability to predict the cyclical pattern in advance. The most popular method for such predictions is the analysis of economic time series that change before the change in production. The other option is the regular surveying of economic agents, and computing business confidence indices. However, the discussion of these tools go beyond the scope of the present textbook.

Review Questions

1) Describe the main tasks and functions of the state in the national economy, explain the concept of economic policy, and list the main policy approaches. Explain the meaning of fiscal and monetary policy.
2) Explain the structure of the government budget, and the meaning of budget surplus and budget deficit.
3) Describe the structure of the foreign balance of payments.
4) What indicators are used to measure the level of indebtedness of a country? What is the debt service ratio, and how can a country find itself in a debt trap?
5) What does the notion of economic growth mean, how can we measure it? What is development and how does it differ from growth?
6) What indicators are used to measure the welfare of a country, the quality of life of its inhabitants?
7) Describe the properties of business cycles, and classify them by their length.
8) Describe the process of the business cycle, explain its phases.

Problems and Questions to Develop Competence

1. Illustrate by the IS-LM model the impacts of the following events on the values of the interest rate, national income, consumption and investment:
   a. The central bank increases the money supply.
   b. The government increases its expenditures.
   c. The government raises taxes.
   d. The government increases its expenditure and the taxes by the same amount.

2. Assume that the government intends to increase investments, while keeping the level of output the same. Show in the IS-LM model the possible measures of monetary and fiscal policy that attain this aim.

3. Look for historical examples when the government decreased taxes and, as a result, run a high budget deficit.

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Glossary

Accounting costs: *the annual costs of production that are legally allowed to account for in a profit-and-loss account. These include all the explicit costs and the accountable part of the implicit cost. Currently the only accountable implicit cost is depreciation.*

Accounting profit: *the difference of total sales revenoue and accounting costs.*

Activity rate *= number of the labour force /the number of the working-age population (%), it measures the proportion of adult propulation that is included in the labour supply.*

Aggregate demand: *the quantity of goods, that the economic agents (households, firms, and the government) desire to purchase at given prices. The* ***aggregate demand curve (AD)*** *is the aggregate demand plotted as the function of the price level.*

Aggregate supply: *the total quantity of output that the economic agents intend to produce and sell at given prices, productive capacities and costs. The* ***aggregate supply curve (AS)*** *is the aggregate supply plotted as a function of the price level.*

Average Cost (AC): *total cost per unit of output, AC=TC/Q.*

Average fixed costs (AFC): *total fixed cost per unit of output, AFC=FC/Q.*

Average Product: The average product of labour, AP_L *shows the average amount of output produced by each unit of labour:* $AP_L = Q/L$. ***The average product of capital,*** AP_K *shows the average amount of output produced by each unit of capital:* $AP_K = Q/K$.

Average total costs (ATC): *ATC =TC/Q, the same as AC, average cost..*

Average Variable Cost (AVC): *total variable cost per unit of output, AVC=VC/Q.*

Balanced budget of the government: *the revenues and expenditures of the government are equal, no savings or deficit exist (i.e. the tax receipts are exactly equal to the sum of government expenditure and transfers).*

Basic questions of economics: *what to produce, how to produce, for whom to produce?*

Bond: *a (long-term) debt security that promises to pay fixed yield to maturity, making pre-defined payments periodically for a specified period of time.*

Budget constraint (budget line): *the set of all bundles of two goods that the consumer is able to purchase at given prices and income, assuming all the income is spent on these goods* ***The formula for the budget constraint is****:* $I = p_x \times x + p_y \times y$, *where I denotes the consumer's income, x and y the amounts of the two purchased goods,* p_x *is the unit price of product x,,* p_y *is the unit price of y.*

Budget deficit of the government: *the sum of government expenditures and transfers is higher than the tax revenues of the government, the value of government saving is negative.*

Budget surplus of the government*: the revenues of the government (i.e. taxes) are higher than the sum of government expenditures and transfers, the value of government saving is positive.*

Bureaucratic (centralised) coordination: *the economy is directed by central plans and decisions, some economic agents are subordinate to others, the government directs the organisation of the economy by commands and prohibitions.*

Business cycle*: the periodic fluctuation of national output around its long-term trend, with phases of expansion and recession following each other; characterised by the length and the magnitude of the phases; the cycle itself is the period between two successive phases of expansions (or recessions).*

Capital accumulation: *the set of goods to be used for expanding productive resources. Capital accumulation is divided into two categories: investment goods and inventories.*

Ceteris paribus*: 'assuming all else unchanged' (Latin).*

Common stock: *represents a share of ownership in a corporation, with no maturity date, a claim on the earnings and assets of the corporation*

Consumer Price Index (CPI): *a price index, for which the basket of goods used in the calculation contains all the goods (products and services) that the people of the country purchase in the given year.*

Consumption (C): *the part of the income which the members of society spend on goods (products and services) to satisfy their wants.*

Consumption Function: *it is described as a linear function of the disposable income, by the formula:* $C(Y) = C_0 + \check{C} \times Y^{DI}$, *where* C_0 *is called* ***autonomous consumption****, and,* $\check{C} \times Y^{DI}$ *is* ***consumption induced by increasing incomes****, and* $\check{C}$ *is the* ***marginal propensity to consume*** *that shows the proportion of additional disposable income that is spent on consumption.*

Cost-push inflation*: a type of inflation that is related to the supply side, and is shown by the decrease of aggregate supply. Its main cause is the rising price of some factors of production*

Costs of production: *the money value of the resources utilised in the production process, equal to the sum of fixed and variable costs,* ***TC=FC+VC.***

Cross-price elasticity of demand: *shows the percentage change of the demand for a commodity in response to a one percent change in the price of some other related commodity.*

Current account: *contains the current revenues and expenditures in the foreign balance of payments, consisting international flows of merchadise trade, trade in services, factor incomes and unilateral transfers..*

Debt service ratio: *the value of debt service compared to the receipts of the current account.*

Debt service: *interest payments on the loan, and the repayment of the principal itself.*

Deflation: *the decrease of the price level.*

Demand function: *it measures the demanded quantity of a product as a function of price, ceteris paribus, assuming that other factors remain constant. The* ***demand curve*** *is the graphical representation of the demand function, in the coordinate system of price and demanded quantity.*

Demand side instruments: *instruments of economic policy that affect aggregate demand, affecting either the goods market (the position of the IS curve) or the money market (the LM curve).*

Demand: *the buyers' willingness and ability to purchase the goods, it shows the quantities of a particular good that the buyer is able and willing to buy at various prices.*

Demand-pull inflation: *caused by persistent rises in aggregate demand; the reason for it is a change in some factors affecting aggregate demand – either in the goods market, or in the money market.*

Derived demand: *it is a property of the demand for factors of production, the firm demands a quantity of some input if and only if consumers demand the output those resources are used to produce, so that the costs of the demanded resource and the revenues received by selling the output make profit for the producer*

Development: *a broader concept than growth, besides the increased capacity to produce consumption goods it also includes the opportunity to improve health care and education services, the level of infrastructure, cultural enrichment and extension of freedom widely available for the population.*

Differential land rent: *is the land rent that is defined by the quality differences of various lands. This land rent is further classified, defining fertility-related differential rent (because more fertile lands produce higher yields with the same costs) intensity-related differential rent (as additional resources will yield higher outputs in more fertile lands), and location-related differential rent (because location closer to markets decrease the costs of purchasing inputs and of selling the output).*

Disposable income*: the disposable income of the private sector is equal to the total macroeconomic income minus taxes plus transfers ,* $Y^{DI} = Y - NT_{H+F} = Y - T_{H+F} + TR_{H+F}$.

Economic costs of production: *are equal to accounting costs plus the opportunity costs..*

Economic growth *is an increase of the capacity of an economy to produce goods and services to satisfy the consumption demand of its population; it is measured by the annual growth of GDP as a percentage of GDP in the previous year.*

Economic processes: *movements of goods and money related to the production and consumption of goods, as well as the generation and distribution of incomes, during a year.*

Economic profit *is the total sales revenues minus economic costs, that is equal to the accounting profit minus opportunity costs (or normal profit).*

Economy*: the complexity of interactions and processes related to the production, distribution, exchange and consumption of material goods and services.*

Employment rate *= number of people employed/ number of adult (working age) population (%)*

Engel curve: *represents the relationship between the consumer's income and the consumed amount of a particular commodity assuming constant prices.*

Equilibrium real wage, equilibrium employment: *the real wage at which the labour market is in equilibrium is the equilibrium real wage, and the level of employment is the equilibrium employment.*

Expansion: *the period of rapid economic growth, reflected in the increasing value of output (GDP).*

Explicit costs: *costs associated to the current production, paid in cash or by bank transfer (they are actually the out-of-pocket costs, and comprise most of the operating costs of the production cycle).*

Externalities, or external economic impacts: *an economic agent influences the situation of another one incurring costs or bestowing benefits without market transactions between them. Negative externalities impose additional costs on, positive externalities bestow additional benefits to the individual or group, who is external to the transaction. Production externalities occur, when the external impact is caused by a production process, consumption externalities occur, when the external impact is caused by the consumption of a product or a service..*

Factor market (input market): *the market of factors of production, productive resource.*

Factors of production, productive resources: *resources available for production, namely labour, natural resources (as land, or minerals), capital resources, enterpreneurial skills and information.*

Firms (the business sector): *produce the output (products or services) of the economy to sell it in the market, and purchase factors of production from households paying the price of these factors, which provides the households' income.*

Fiscal policy: *the policy of the government that is concerned with government revenues (taxes) and government expenditures (purchases and transfers), affecting aggregate demand by altering the balance between government expenditure and taxation.*

Fixed costs (FC)*: the costs of resources that the firm cannot change in the short run, so these are the costs that do not depend on the level of the output in the short run, being fixed regardless of the quantity produced.*

Foreign balance of payments: *accounts for the economic transactions of the resident economic agents of a country with the rest of the world during a specific time period.*

Functional distribution of factor incomes (*also called Pareto's marginal productivity theory of income distribution): $Q = MP_L \times L + MP_K \times K + MP_A \times A + MP_E \times E$, where Q is the quantiy of output, L, K, A and E are the amounts of labour, capital, natural resources and entrepreneurial skills, respectively, and the various values of MP are the marginal products of the respective factors of production. Measuring it in the money value of the output: $p \times Q = p \times MP_L \times L + p \times MP_K \times K + p \times MP_A \times A + p \times MP_E \times E$, the share of factors in the value of the output reflects the ratios of their marginal products)*

Future value (FV): *of a cash flow received today is calculated using the formula for compound interest. The future value of a present cash amount C in t years time, at annual rate of interest r is calculated by the following formula:* $\boldsymbol{FV_t = C \times (1+r)^t}$.

GDP- deflator: *the ratio of nominal output (nominal GDP) and real output (real GDP).*

Gossen's 1st law: *As the consumption of a good is increased (ceteris paribus), then the increase in total utility attained by the additional units consumed will decline (the law of diminishing marginal utility).*

Gossen's 2nd law: *A consumer will spend his/her income in an optimal way achieving maximum satisfaction when the marginal utility of the last unit of income spent on each good is exactly the same (this is called the equimarginal principle);* $MU_x / p_x = MU_y / p_y$.

Government (State) budget: *a balance containing the government's revenues and expenditures, the revenue side contains taxes collected from households and firms, the expenditure side contains transfers (grants, subsidies), government expenditure, and government saving.*

Government, (the sector of the state): *consists of bodies and institutions of the central goverment, the institutions of local governments, municipalities, the bodies of social security, and the organisations and bodies handling the financial funds and wealth of the state. It collects taxes from the private sector and uses them to maintain its own institutional system, provide public goods and services, support the needy and handicapped, and implement its economic policy to provide favourable environment for the economic processes*

Gross Domestic Product (GDP): *The total value of domestically produced goods and services for final consumption in a year, in other words, the GDP is the total gross income without double counting, earned domestically during a year, or the sum of all value added within the country, that is equal to the value of Gross Output minus the value of Intermediate Goods.*

Gross National Disposable Income (GNDI): *the total annual income that the residents of a country can spend on their own purposes. It is calculated from GNI by adding the international transfers incoming from abroad, and deducting the international transfers outflowing from the country.*

Gross National Income (GNI): *the total annual primary income of all residents of a nation. It is calculated from GDP, adding the primary incomes (labour and capital earnings) of the residents of the country earned abroad, and deducting the primary incomes of foreign residents earned in the country.*

Gross output (GO): *the sum of the values of all outputs produced by the economic agents within the country.*

Gross profit: *the difference between the total sales revenue and the exlpicit costs, that includes accounting profit plus the accountable implicit costs (that is, depreciations).*

Households (the sector of households)*: consists of individuals, that is, the citizens of the country, as economic agents that consume the goods spending their incomes. The main function of households is consumption, and they collect income needed for consumption as employed workers earning wages, or collecting payments by selling their other productive resources to the producers of the economy.*

ICC (Income-Consumption Curve): *the curve representing the consumer's optimal commodity bundles at varying incomes and constant prices.*

Immediate 'run'*: the time period during which the producer is unable to change any of the inputs. Thus, in response to a change in market demand, no change in the supplied quantity is possible, and only the market price can adjust..*

Imperfect competition: *in which the demand curves faced by single firms are not horizontal, so that the firms have some control over the price of their products*

Implicit costs ('hidden costs'): *costs of resources that are incurred in the actual production cycle (production year), without generating cash payments or invoices to be paid, but which the firm must take into account to assess the exact performance of the business.*

Income elasticity of demand: *shows the percentage change of the demand for a commodity in response to a one percent change in the consumer's income.*

Income processes*: the processes of earning (generating) incomes and spending of incomes, that is, money flows.*

Indifference curve: *containss the consumer's bundles (commodity combinations) in the consumption space that represent the same level of utility to the consumer.*

Indifference map: *contains all combinations of two goods and the relevant indifference curves.*

Individual demand curve (function): *it shows the quantities the individual buyer is able and willing to buy at different prices.*

Inflation: *a persistent increase of the price level, that is, the continuous decrease of the purchasing power of money.*

Inflexion point *of the production function: The output level, at which the growth rate of the short-run production function turns from increase to decrease.*

Intermediary goods (producer goods): *the goods produced to be sold to producers for further processing.*

Inventory investment (accumulation of inventories): *the quantity of goods that the firms hold in storage including materials and supplies (inputs) needed for the production process, and finished products waiting to be sold.*

Investment demand function (desired/planned investment): *describes the schedule of investment demand, $I = I_0 - a \times i$, where 'I' is the desired investment, 'i' is the % value of the (real) interest rate in the money market, 'I_0' is autonomous investment, and 'a' is the sensitivity coefficient of the investment to changes in the interest rate.*

Investment: *consists of goods purchased by individuals to add to their capital stock, more precisely* ***business fixed investment*** *is the purchase of capital assets for replacing used equipment to maintain productive capacity, or installing new equipment to expand productive capacity. The replacement of used fixed capital is called* ***replacement investment****, its role is to compensate for the the depreciated capital assets, therefore it does not expand productive capacities, but maintains their current level.* ***New capital investment*** *is the expansion of productive capacities by installing new fixed capital (e.g. equipment), increasing the total amount of fixed real capital.* ***Net investment*** *is total investment minus depreciation of capital, that is, the new capital investment. Gross investment is the sum of replacement investment and new capital investment.*

IS-curve: *gives the relationship between the interest rates defined by the market of loanable funds and the associated incomes that maintain the equlibrium in the goods market, requiring equality between investments (I), and savings (S).*

*I****soquant:*** *a curve connecting all combinations of capital (K) and labour (L) that can be used to produce a given level of output.*

Keynesian absolute income hypothesis: *current consumption is determined by the disposable income of the current year.*

Labour demand (L^D): *the amount of labour that firms wish to employ.* ***The labour demand function*** *describes the relationship between real wage and the supplied quantity of labour.*

Labour supply (L^S): *the actual amount of labour offered for sale by households to firms, which is affected by the real wage (the purchasing power of the nominal wage). The* ***labour supply function*** *describes the relationship between real wage and the supplied quantity of labour.*

Law of demand: *when the price of a good increases, the quantity demanded will decrease, and when the price decreases, the quantity demanded will increase, ceteris paribus (assuming other things influencing the demand remain constant).*

Law of supply: *when the price of a commodity increases, then the amount offered for sale also increases, while with decreasing price the amount for sale also decreases, assuming other factors held constant.*

LM-curve (Liquidity - Money): *the pairs of real incomes and interest rates that maintain the equilibrium in the money market.*

Long run: *the time period during which the producer is able to change all of the inputs, so in response to a change in demand the supplied quantity is adjusted.*

Macroeconomic income (Y, yield): *the value of realised (sold) total output, that is distributed among the owners of resources used in the production of the output. It is divided to two main parts:* ***labour income and capital income.***

Macroeconomic production function: *gives the total amount of output produced by the economy (i.e. the economic agents) at the current level of available technology as a function of the amount of inputs, capital and labour: Q = f (K , L), where K is the amount of capital, L is the amount of labour, f is the*

functional relationship that represents the available technology turning capital K and labour L into output.

Marginal cost (MC): *the change in total costs divided by the (very small) change in output, that is, the change in costs brought about by producing an additional small unit of output: MC = ΔTC/ΔQ =ΔVC/ΔQ*

Marginal Private Benefit (MPB): *the sum of all marginal revenues and marginal utilities that are bestowed on economic agents as a result of their own economic activities, as measured by the market.*

Marginal Private Cost (MPC): *the sum of all marginal costs that are imposed on economic agents as a result of their own economic activities, as measured by the market.*

Marginal product of labour ***(MP_L):*** *it shows the change in total output when an additional (small) unit of labour is used in production: $MP_L = \Delta Q/\Delta L$ (if $\Delta L \rightarrow 0$).* ***The marginal product of capital (MP_K)*** *shows the change in total output when an additional (small) unit of capital is used in production: $MP_K = \Delta Q/\Delta K$ (if $\Delta K \rightarrow 0$).*

Marginal Rate of Substitution (MRS): *measures the amount of commodity y that the consumer is willing to give up for an infinitely small additional unit of commodity x, assuming that the utility of the new bundle remains the same as that of the initial bundle:* ***$MRS = | \lim \Delta y / \Delta x | = - dy / dx$.***

Marginal Rate of Technical Substitution (MRTS):) *shows the increase of one input necessary to produce the same level of output, while the other input is decreased by an infinitely small quantity:* ***$MRTS = \lim \left| \Delta L/\Delta K \right| = \lim (-\Delta L/\Delta K)$.***

Marginal revenue *(MR): the additional revenue that a firm takes in when it increases its output sold by one additional (infinitely small) unit: $MR = \Delta TR/\Delta Q$.*

Marginal Social Benefit (MSB): *The total utility to society of producing and consuming an additional unit of a good or service. Marginal social benefit, therefore, is equal to the sum of marginal private benefits – that is, marginal revenues and utilities measured by the market – and the marginal utilities and revenues that are bestowed on others not involved in the transaction (production or consumption).*

Marginal Social Cost (MSC): *The total cost to society of producing an additional unit of a good or service. MSC is equal to the sum of the marginal private costs of producing the product – that is, the marginal costs measured by the market - and the correctly measured damage costs of production imposed on others outside the transaction.*

Marginal Utility (MU): *the change in utility experienced by consuming an infinitely small additional unit of the commodity, $MU_x = \Delta TU_x / \Delta x$ ($\Delta x \rightarrow 0$), (ceteris paribus, assuming no change in the consumprion of other goods).*

Market efficiency: *the allocation of factors of production is efficient, if the marginal private benefit attained by producing and consuming the good produced by the last unit of the factor is equal to the marginal private cost of using this factor: MPB = MPC.*

Market equilibrium*: There is only one price, at which the demanded quantity is equal to the supplied quantity, and this price is called* ***equilibrium price (market clearing price).*** *The quantity demanded, and supplied at this price is the* ***equilibrium quantity****.*

Market: *the mechanism where buyers and sellers meet to carry out transactions, therefore it consists of interactions of sellers and buyers, and its key elements are: demand, supply, price and income.*

Mixed economic coordination. *In mixed economies the elements of both market and command economies are present, although the elements of the market play the key role, and government intervention is done mainly in the market.*

Mixed goods*: they are either rival in consumption but their benefits are non-excludable, or they are non-rival in consumption, but their benefits are excludable (one property of public goods holds, the other not).*

Monetary aggregates*:.* ***M0****: cash (banknotes and coins) produced by the central bank, and the reserves of commercial banks deposited a the central bank.* ***M1*** *(money in narrow sense, narrow money): includes the cash currency in M0 and the deposits in checking accounts, sight deposits, which are perfectly liquid, suitable for immediate everyday payments.* ***M2****: includes M1, plus deposits in savings accounts, small denomination time-deposits, short-term deposits, which are less liquid than M1, although relatively easily transferred to liquid forms at a small cost.* ***M3****: adds less liquid assets to M2, namely the long-term securities of large denominations, international currency deposits, mutual funds shares.*

Monetary policy: *the economic policy that controls the quantity of money in circulation. The main instruments of monetary policy are the control over cash, (currency as banknotes and coins:M0), the central bank money supplied through the banking system, the reserve rate, the base rate defined by the central bank, and the open market operations of the central bank.*

Money demand: *the intention of economic agents to hold liquid money (M1).*

Money supply: *the quantity of money in circulation in the economy, in the forms of cash (banknotes or coins), and as currency deposited on checking accounts (current accounts) in banks.*

Money, its functions*: a unit of account (a means of evaluation, allowing the value of goods and services, or assets to be compared to each other), medium of exchange (acceptable in exchange of goods or services), a standard of deferred payments (means of establishing future claims and payments, i.e.the transfer of money is separated in time of the transfer of goods) , store of wealth (it can be used to keep savings, and accumulate wealth, usually deposited in banks), international money (fulfilling the former four functions in international transactions and contexts).*

Monopolistic competition: *is a market structure with many firms in the supply side of the market; their products are not homogeneous but differentiated, therefore the firms have price-setting power, while no barriers exist to prevent entry to or exit from the market.*

Monopoly: *a market structure composed of only one firm that produces the total market supply.*

Monopsony: *is demand-side monopoly, that is, the total market demand is represented by one single consumer – the government, for example, or a trader acting as the exclusive buyer of some commodity.*

Motives for holding money: *transactions demand (money needed for everyday transactions, purchases, payments); precautionary demand (money kept for unexpected, unpredictable expenses); and speculative (or 'assets') demand (people who possess wealth switch from one form of wealth to another, temporarily transforming their wealth to liquid money).*

Narrow money: *M1-money readily available for everyday transactions.*

National income accounts identity*: $Y = C + G + I + X\text{-}IM$.*

Natural monopoly (or natural oligopoly*): a market structure in which one firm (or a few firms) can produce an additional unit of output at lower costs than a firm newly entering the market.*

Net domestic product (NDP): *is the total net income earned domestically during a year, which is equal to GDP minus the annual capital depreciation of fixed capital assets.*

Net National Disposable Income (NNDI): *the value of GNDI minus capital depreciation.*

Net National Income (NNI): *Gross national income (GNI) minus capital depreciation.*

Net Present Value (NPV): *the difference between the present value of the capital asset and the cost of its acquisition.*

Nominal output: *the value of total output of the macroeconomy measured at current prices.*

Nominal quantity of money (M): *the quantity of money measured in units of the currency of actual purchasing power.*

Nominal wage (W): *the sum of money that workers earn in exchange for their work done.*

Normal profit: *the typical profit, or income attainable in a given economy or industry by any economic agent having the same capital assets.*

Oligopolistic market structure: *made up of a few rather large firms in the supply side of the market, the activities and supply decisions of each affecting the market positions of the others.*

Operating costs: *the costs that occur in the actual production cycle and are expected to be paid back (returned) completely by the sale of the product.*

Opportunity cost: *the opportunity cost of using a resource is the value of the next best alternative forgone when using the resource for the best option. Thus, as the choosen activity is the best alternative, the opportunity cost is the forgone benefit of the second best alternative.*

Pareto-efficient combinations: *combinations of two goods, in which an increase in the production of one of the goods will lead to a decrease in the other good. (see also: production possibility frontier).*

PCC *(Price-Consumption Curve): A curve representing the consumer's optimal commodity bundles chosen at changing prices of one commodity while the consumer's income and price of the other commodity are kept constant.*

Perfectly competitive market: *is a market structure, in which there are many producers and consumers, each being relatively very small compared to the market, the product is homogeneous (virtually identical), entry to the market is free, the market agents are price takers, and the flow of information is free.*

Potential output: *the level of macroeconomic output that is attainable at the current level of resource endowment with their most efficient use at full capacity (therefore no unemployment and no unused capacities exist in the economy).*

Present value (PV): *of a cash flow to be received in the future, in t years time, is calculated by the method of discounting. The present value of a cash amount of C due in t years time, at an annual interest rate of r is given by the following formula: $PV_t = C / (1+r)^t$.*

Price elasticity of demand: *shows the percentage change of the demand for a commodity in response to a one percent change in its price.*

Price elasticity of supply: *it shows the percentage change in the supplied quantity of a commodity in response to a one percent change in its price.*

Price index: *the ratio of the current price level to the price level of the previous year, measured as a fraction, or as a percentage value.*

Price level (P): *the average of prices of goods weighted by the quantity of these goods.*

Principle of diminishing returns: *when additional units of a variable input are added to the former units – keeping the other inputs constant –the marginal product of the variable input declines.*

Private goods: *goods that are consumed individually, and if a unit of them has been consumed by someone, then noone can also consume the same unit; therefore they are* ***rival*** *in consumption, and consumers can consume them if they pay the price, the* ***nonpayers are excludable*** *from consumption.*

Product market (output market): *The market for consumer goods that satisfy the wants of households.*

Production function: *a technological relationship that defines the maximum possible output that is produced using specific combinations of inputs at a given technological level of development.*

Production possibility frontier: *a curve showing the combinations of the maximum output of too goods that can be produced by fully using the available resources in an efficient way.*

Profit maximising level of output for a firm in a perfectly competitive market: *The the largest quantity of output for which the marginal cost does not exceed the market price of the product ($p \geq MC$).*

Profit-maximising level of production for a monopoly: *the largest output for which the marginal revenue of the firm is at least as high as its marginal cost, that is, the inequality $MR \geq MC$ holds.*

Promissory note: *legal promise in written form of paying a specified sum of money to a specified payee at a specified time in the future.*

Public goods: *they are consumed collectively, they are provided for all members of a community, noone can be excluded from their consumption, and the consumption by one person does not decrease the consumption possibilites for others, i.e. they are non-rival.*

Purchasing power of money: *defined as the reciprocal value of the price level, defining the amount of goods that one unit of money can buy.*

Rate of inflation: *the amount of price change expressed as the percentage of the price level of the previous year.*

Rate of Substitution (RS): *measures the amount of commodity y that the consumer is willing to give up for an additional unit of commodity x, assuming that the utility of the new bundle remains the same as that of the initial bundle:* $\boldsymbol{RS = |\Delta y / \Delta x| = - \Delta y / \Delta x}$.

Rate of Technical Substitution (RTS): *measures the absolute value of the ratio of the change in labour to change in capital used in production, so that output remain the same:* $\boldsymbol{RTS = \left|\Delta L/\Delta K\right| = - \Delta L/\Delta K}$.

Real income: *the amount of goods (products and services) that can be bought for a given amount of money (the nominal income).*

Real money balances: *the purchasing power of the nominal quantity of money (measured in money of constant purchasing parity), that is equal to the ratio of the nominal quantity of money to the price level (M/P).*

Real output: *the value of total output of the macroeconomy measured at constant prices (base-year prices), therefore neglecting the impact of price changes (inflation) on the value of output.*

Real processes: *the processes of producing goods (production process), distribution of goods (distribution process), and utilisation or consumption of goods (consumption process).*

Real wage (W/P): *the purchasing power of the nominal wage, that is, the amount of goods (products and services) that can be purchased for the nominal wage.*

Recession: *the period of economic slowdown, reflected in the decline of output (GDP).*

Rent (pure rent): *the return to a factor of production that is in fixed supply.*

Reservation price: *the maximum price an individual buyer is willing to pay for one unit of the product.*

Rest of the world (the sector of foreign economic agents): *all individuals, bodies, organisations who are not permanent residents of our country, and whose activities have not been integrated into the national economy.*

Returns to scale (economies of scale): *measures the relationship of an increased output to the value of the initial output when all the inputs are increased at the same rate. Increasing returns to scale occur when $f(\alpha \times K, \alpha \times L) > \alpha \times f(K,L)$. Constant returns to scale occur, when $f(\alpha \times K, \alpha \times L) = \alpha \times f(K,L)$, decreasing returns to scale occur, when $f(\alpha \times K, \alpha \times L) < \alpha \times f(K,L)$.*

Saturation point: *reaching a level of consumption, the additional unit will not yield any satisfaction, the consumer feels satiated, the value of marginal utility becomes zero.*

Savings (S): *the part of income not spent on consumption.*

Scarcity: *The availability of resources is limited, while human needs to utilise these resources are unlimited.*

Sectors (spheres) of the economy: *homogeneous groups (aggregates) of economic actors, that is: firms, households, the state (government) and the rest of the world (foreigners).*

Security: *(also called a financial instrument,) a tradable claim on the issuer's future income or property that is subject to ownership.*

Short run: *the time period, during which the producer is able to change at least one input, but not all of them, so in response to a change in demand the supplied quantity may somewhat adjust.*

Short-run production function: *gives the amount of output as the function of the amount of one input factor, assuming that the other inputs are constant.*

SNA (System of National Accounts*): it was constructed by the UNO in 1953 to account for the macroeconomic performance of nations. In 1993 the system was amended and today this is the only internationally acknowledged system in use to measure macroeconomic performance of countries.*

Socially efficient resource allocation: *The allocation (use) of a factor of production is optimal for the society if the marginal social benefit attained by producing and consuming the good that was produced by the last unit of the factor is equal to the marginal social cost of using this factor: MSB = MSC.*

Spontaneous market coordination: *occurs when market actors are independent, equal in their market relationships, noone has significant power over the others.*

Supply function: *it measures the supplied amount of a commodity as a function of its price, ceteris paribus, that is, assuming all other factors held constant. The* ***supply curve*** *shows the graphical representation of the supply function, in the coordinate system of price and quantity offered for sale.*

Supply side instruments: *policy instruments affecting the total output of the economy, i.e. aggregate supply, therefore they may affect the labour market (by payroll taxes and other labour-related measures), or the macroeconomic production function (by taxes and subsidies influencing factor prices and technological developments).*

Supply: *the seller's willingness and ability to sell, showing the quantities the seller is able and willing to sell at different prices.*

Technical maximum*: the level of output at which the production function reaches its maximum value, and the marginal product becomes zero (technically, no higher level of output is attainable).*

Technical optimum: *the point of the production function, at which the value of the average product is the highest.*

Total (potential) labour supply: *is equal to the labour force plus some of the adult population currently not in the labour force, who could be attracted to the labour market under favourable conditions.*

Total output *(Q): is all the goods (products and services) turned out by the economy.*

Total Revenue (TR): *the quantity of products sold, multiplied by the sales price.*

Total Utility, Utility Function *(TU_x): measures the total utility obtained by consuming a certain amount of commodity* ***x****.*

Two-tier banking system: *a banking system of one central bank and several commercial banks.*

Unemployment rate *= the number of unemployed per the number of the labour force (%).*

Utility (U): *the useful properties of a commodity, or, in other words, the satisfaction that the consumption of the commodity yields for the consumer.*

Variable costs (VC): *are the costs of the resources that the firm will change together with the level of output.*

Wants (needs): *a subjective feeling of deficiency, experienced by the individual or the community.*