Theme **1:** Bases of Demand and Supply Analyses

Purpose of the lecture**:** definition of the concepts of supply and demand, finding market equilibrium, consumer and producer gains.

Keywords**:** demand, supply, volume of demand, volume of supply, price and non-price factors, equilibrium, gain.

Lecture questions**:** /s. 22 - 36/4/

1. Supply and demand
2. Market equilibrium
3. Benefit to consumers and producers

1.1. Supply and demand

It is assumed that there are many buyers in the market, none of whom can control the price of a good. *Demand* is the relationship between the price of a good and the quantity of it that buyers are willing and able to purchase, i.e . it is of the form

$$Q = Q^D(p),$$

where *p is* the price of the commodity, *Q is the* value of demand, $Q^D(p)$ is the demand function. The concept of "demand" combines the desire and opportunity to purchase a given commodity. People's desires are, in general, boundless, while opportunities are limited. The *law of demand* states that the higher the price of a commodity, the lower the value of demand for it, i.e. the dependence $Q = Q^D(p)$ *is* inverse.

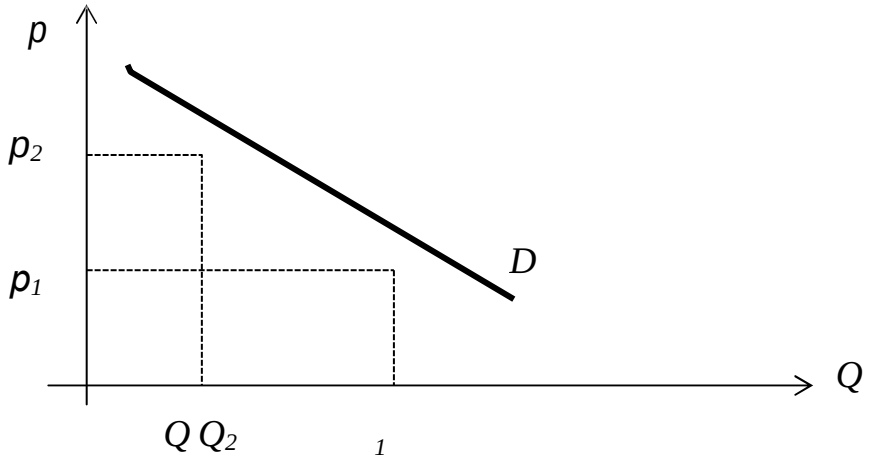


Figure 1.1. Demand curve

This means that the graph of the demand function has a negative slope (Fig. 1.1). It is called the demand curve *D*. The inverse relationship of the demand function is expressed by the fact that if the price rises from p_1 to p_2 , the magnitude of demand falls from Q_1 to Q_2 . In addition to the price of a good, there are other factors that influence buyers' decisions. They are called *non-price factors*.

An increase in the income of buyers usually leads to an increase in demand. Such goods are called *normal goods*. There are also so-called *low-quality* goods, the consumption of which decreases with increasing income. For example, cheap types of sausages, clothes made of synthetic materials.

Changes in the prices of related goods. If an increase in the price of one good leads to an increase in demand for another good, they are called *fungible goods*. For example, coffee and tea. And if an increase in the price of one good leads to a decrease in demand for another good, they are *complementary* goods. Examples are petrol and cars, coffee and sugar. Consumers' preferences and tastes significantly influence demand.

A change in the price *p* leads to a shift along the demand curve *D*, while a change in other non-price factors shifts the demand curve *D* itself (Figure 1.2).

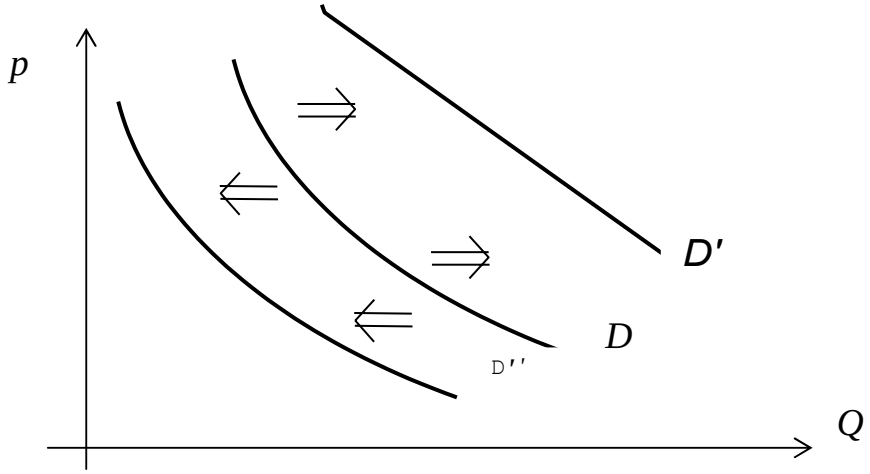


Figure 1.2. Influence of non-price factors on demand

A market is considered to have many sellers, none of whom can independently influence the price of a good. *Supply is* the relationship between the price of a good and the quantity that sellers are willing and able to sell. It can be represented as $Q = Q^S(p)$, where *p is* the price of the good, *Q is the quantity of* supply, $Q^S(p)$ is the supply function. The concepts of "supply" and "magnitude of supply" should not be confused.

According to the *law of supply*, the higher the price of a good, the greater the value of its supply, i.e. the dependence $Q = Q^S(p)$ *is* direct. Therefore, the graph of the supply function $Q^S(p)$ has a positive slope (Fig. 1.3). This graph is called the supply curve *S*. If the price increases from p_1 to p_2, then the volume of supply increases from Q_1 to Q_2.

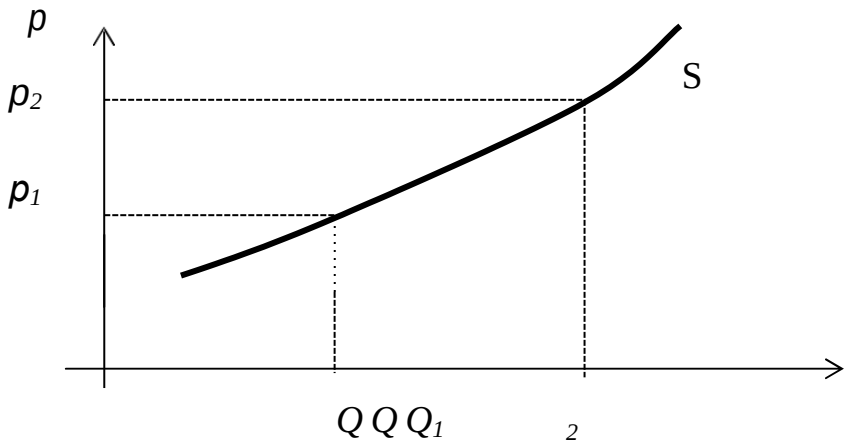


Figure 1.3. Supply curve

Supply is also affected by *non-price factors* such as changes in technology, changes in resource prices. When the price of a commodity *p* changes, there will be a shift along the supply curve *S*, and when non-price factors change, the supply curve *S* itself will shift.

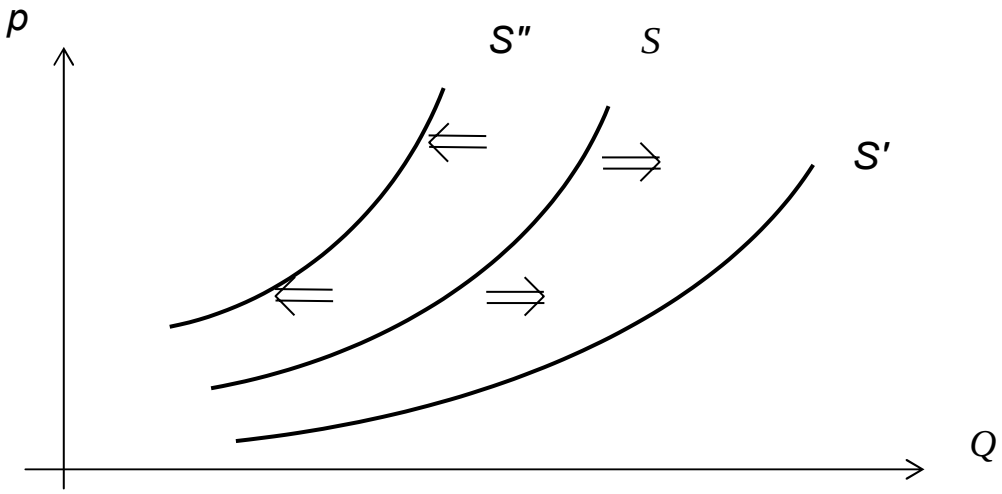


Figure 1.4. Influence of non-price factors on supply

1.2. Market equilibrium

Let's combine the demand curve *D* and the supply curve *S of* some commodity on one graph (Fig. 1.5). Since the slope of one curve is negative and the slope of the other is positive, they intersect at one point *e*. It determines the price p_e and the quantity of the good Q_e .

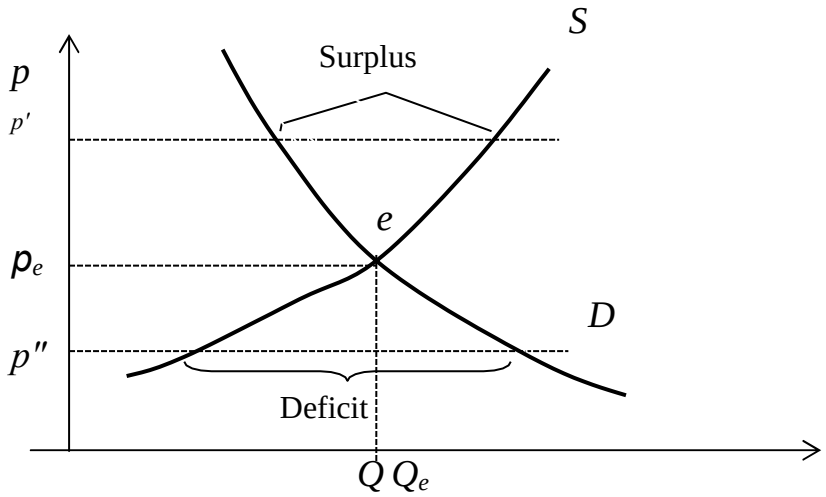


Fig. 1.5 Supply and demand curves

Suppose that at some point in time the price of a good on the market turned out to be equal to *p′*, i.e. higher than p_e . At this price *p′ , the* value of demand $Q^D(p')$ will be less than the value of supply $Q^S(p')$. Sellers want to sell more goods than the quantity that buyers want to buy. There is a surplus of goods in the market. Sellers who cannot sell their goods at the price *p′* will start lowering the price. At a lower price, the volume of demand will increase and the surplus of goods in the market will decrease. The downward trend in price will continue until it falls to the value p_e . At the price p_e , the volume of demand $Q^D(p_e)$ equals the volume of supply $Q^S(p)$.

Similarly, if the price *p″ is* lower than p_e , then the volume of demand $Q^D(p'')$ *will* be greater than the volume of supply $Q^S(p'')$, and there will be a shortage of the good in the market. A part of buyers, who could not buy the goods at the price *p″,* will agree to buy them at a slightly higher price.

at a higher price. Seeing this, sellers will start to raise the price. The shortage will be reduced. The process will continue until the price *rises* to the level of p_e .

Consequently, the intersection at point *e* of the demand curves *D* and *S* determines the equilibrium at the

the market of this commodity. Moreover, this equilibrium is stable. If for any reason

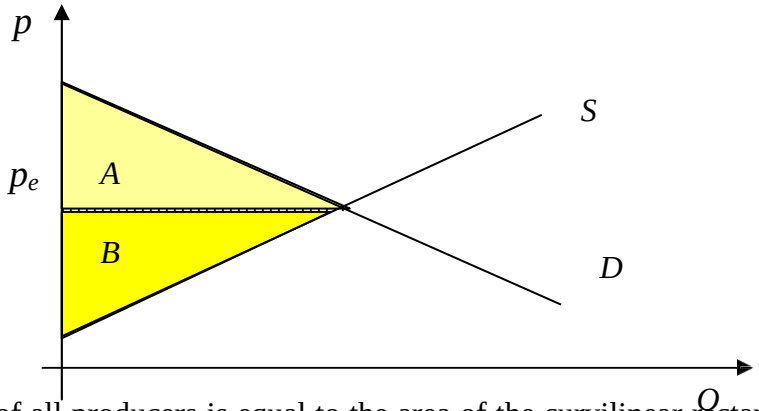
market price p deviates from the equilibrium price p_e , then the interaction of supply and demand brings it back to the level of p_e .

1.3. Benefit to consumers and producers

The market demand curve D defines the wants and possibilities of all consumers. They differ from each other. Some consumers agree to buy a certain amount of goods at a given price, while others can a f f o r d to buy less or not at all at that price.

In fact, consumers do not buy the good at the maximum price they agree to pay, but at the equilibrium price p_e , which has been established in the market. So, they remain in a win-win situation. What is the total gain of all consumers? The total gain of consumers is equal to the area of the curvilinear rectangle bounded from above by the demand curve *D, from* below by the horizontal line at the level of the equilibrium price p_e .

And what is the gain to producers equal to? The supply curve shows the minimum price at which producers agree to sell a given volume of a good. Some producers will sell smaller quantities and some will stop production altogether. However, in a competitive market, producers sell their goods at the equilibrium price. The difference p_e - p determines the producers' gain from selling a unit of the good.



The total gain of all producers is equal to the area of the curvilinear rectangle bounded from below by the supply curve *S*, from above by the horizontal line at the level of the equilibrium price p_e .

Self-check questions**:**

1. Formulate the law of demand. Why does the demand curve have a negative slope? What are the determinants of demand? Explain the difference between a change in demand and a change in the magnitude of demand. Give examples.
2. Formulate the law of supply. Why does the supply curve have a positive slope? What are the determinants of supply? Explain the difference between a change in supply and a change in the magnitude of supply. Give examples.
3. How are equilibrium price and equilibrium sales determined?
4. What is consumer (producer) surplus?

Recommended reading**:**

1. Pindyck R., Rubinfeld D. Microeconomics. - Moscow: Delo, 2001.
2. Hyman D.N. Modern Microeconomics: Analyses and Applications. T. 1,2. - M.: Finance and Statistics, 1992.
3. Simkina L., Korneichuk B. Microeconomics. - S.-P.: Peter, 2002.
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Theme **2:** THEORY OF ELASTICITY OF DEMAND AND PROPOSITION

Purpose of the lecture**:** definition of the concept of elasticity, calculation of supply and demand e l a s t i c i t y coefficients, establishing the relationship between price elasticity and total income.

Keywords**:** price elasticity, income elasticity, cross elasticity, aggregate income, tax burden.

Lecture questions**:** /p. 46 - 57/4/

1. Types of elasticities, methods of their calculation and classification.
2. Price elasticity of demand and total revenue.
3. The role of elasticity in the allocation of tax between sellers and buyers.

2.1. Types of elasticities**,** methods of their calculation and classification

The shape of the demand curve determines the amount of change in demand when the price changes. The flatter the demand curve, the more sensitive the demand to changes in the price of goods. A quantitative characteristic of the sensitivity of demand to price changes could be the slope of the demand curve, i.e. the ratio $\frac{\Delta Q}{\Delta p}$ or in the limit the derivative of $\frac{dQ}{dp}$.

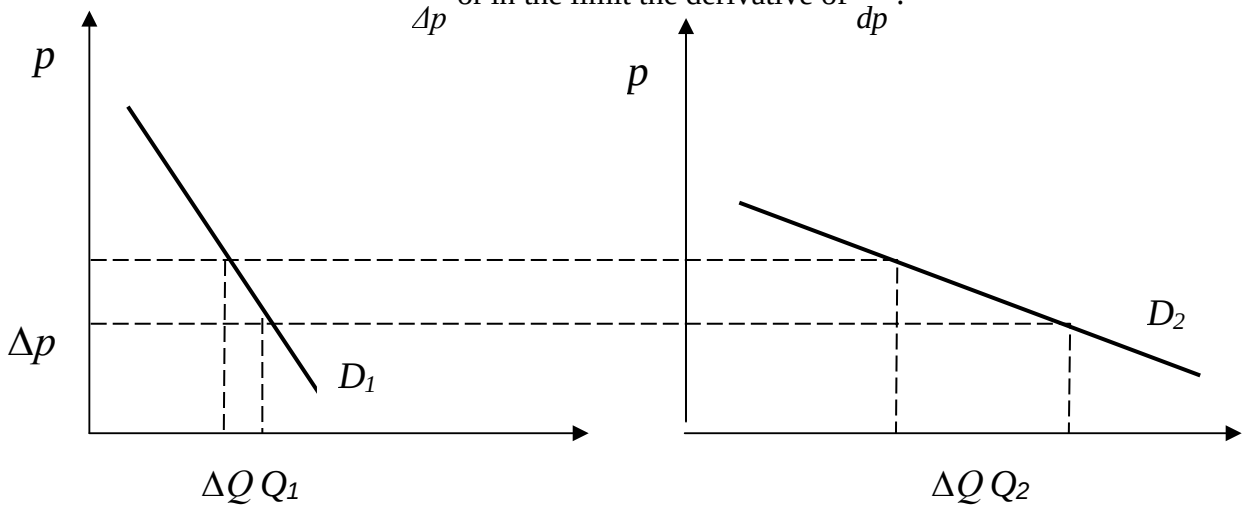


Figure 2.1. Steep and sloping demand curves

The *price elasticity of demand* is the percentage change in the value of demand per 1 per cent change in price:

$$E_p(D) = \frac{\frac{\Delta Q}{Q} \cdot 100\%}{\frac{\Delta p}{p} \cdot 100\%}.$$

This quantity is dimensionless and does not depend on the dimensions *p* and Q. For calculations it is convenient to rewrite it differently:

$$E_p(D) = \frac{p}{Q} \cdot \frac{\Delta Q}{\Delta p}. \qquad (2.1)$$

According to the method of calculation formula (2.1) determine the *point elasticity*. At relatively large Δp, ΔQ use *arc elasticity*, replacing in formula (2.1) p and Q by the mean values $\bar{p} = \frac{1}{2}(p + p')$ and $\bar{Q} = \frac{1}{2}(Q + Q')$ respectively:

$$E_p(D) = \frac{p + p'}{Q + Q'} \cdot \frac{\Delta Q}{\Delta p}. \qquad (2.2)$$

The price elasticity of demand does not take positive values, because by to the law of demand Δp and ΔQ have opposite signs. The following cases are possible.

1) $E_p(D) = 0$ - perfectly inelastic demand. A change in price does not lead to a change in the volume of demand. Example - a medicine for diabetes mellitus.

2) $-1 < E_p(D) < 0$ *is* inelastic demand. A 1 per cent increase in price reduces the volume of demand by less than 1 per cent. Example: bread, basic necessities.

3) $E_p(D) = -1$ - demand with unit elasticity. When the price increases by 1 per cent, the volume of demand also decreases by 1 per cent.

4) $-\infty < E_p(D) = < -1$ *is* elastic demand. A 1 per cent increase in price leads to a decrease in the magnitude of demand by more than 1 per cent.

5) $E_p(D) = -\infty$ is perfectly elastic demand. For example, there is a perfect substitute for a given good.

One of the non-price factors of demand is the income of consumers. The *income elasticity of demand is* the percentage change in demand per 1 per cent change in income:

$$E_I(D) = \frac{\frac{\Delta Q}{Q} \cdot 100\%}{\frac{\Delta I}{I} \cdot 100\%} = \frac{I}{Q} \cdot \frac{\Delta Q}{\Delta I},$$

where *I is the* income of consumers, *Q* is the value of demand. In the limit at infinitesimal changes in income ΔI elasticity can be represented by the derivative of the

$$E_I(D) = \frac{I}{Q} \cdot \frac{dQ}{dI}.$$

Unlike the price elasticity of demand, the income elasticity of demand can take any value.

1) $E_I(D) > 0$ - *normal* goods. The higher the income of consumers. the more they buy such goods, e.g. clothes, fruit, entertainment.

2) $E_I(D) = 0$ - essential goods, such as salt, matches. Their consumption practically does not depend on consumers' income.

3) $E_I(D) < 0$ - so-called *low-quality* goods. As incomes grow, buyers reduce consumption of this good and switch to consumption of higher quality and more expensive goods.

Demand is also affected by the prices of other goods. Let p_x, p_γ prices of goods *X, Y* respectively, Q_x *is the* value of demand for commodity *X*.

Cross elasticity of demand for commodity *X* over the price of commodity *Y* is the percentage change in the value of demand for commodity *X* per 1 per cent change in the price p_γ of commodity *Y:*

$$E_{py}(D_y) = \frac{\Delta Q_x / Q_x \cdot 100\%}{\Delta p_\gamma / p_\gamma \cdot 100\%} = \frac{py}{Qx} \cdot \frac{Qx}{\Delta py}$$

Cross elasticity demand can take following values depending on what *Y* is in relation to commodity *X*,.

1) $E_{py}(D_x) > 0$ - good *Y* is a substitute for good *X*, e.g. tea and coffee.

2) $E_{py}(D_x) < 0$ -good *Y* is a complementary good for good *X*, like petrol and cars.

3) $E_{py}(D_x) = 0$ - consumption of good *X* does not depend on the price of good *Y*.

Price elasticity of supply is the percentage change in the value of supply per 1 per cent change in the price of a good:

$$E_p(S) = \frac{(\Delta Q / Q) \cdot 100\%}{(\Delta p / p) \cdot 100\%} = \frac{p}{Q} \cdot \frac{\Delta Q}{\Delta p}$$

The classification of the values of the price elasticity of supply is the same as for demand.

2.2. Price elasticity and total revenue

Let *p* be the market price, *Q* be the volume of sales of a good at that price, and the total or aggregate income of sellers $TR = p \cdot Q$. Is it profitable to increase the price?

Depending on the price elasticity of demand, the following cases are possible.

1) If demand is elastic, then $E_p(D) < -1$, so that when price increases, i.e. $\Delta p > 0$ change in total income ΔTR is negative, and when the price decreases change in total income ΔTR will be positive.

2) If demand is inelastic, then $-1 < E_p(D) < 0$, in which case an increase in price, i.e.. $\Delta p > 0$, leads to an increase in total income, ΔTR positively, while a decrease in price, i.e. $\Delta p < 0$, entails a decrease in total income, ΔTR *is* negative.

3) If we are dealing with demand with unit elasticity, $E_p(D) = -1$, then at small changes in price $\Delta TR = 0$, i.e. total income does not change.

Thus, price *p* and total income *TR* change in one direction when demand is inelastic and in opposite directions when demand is elastic.

Let us first consider a *linear* demand function. Its graph is a straight line (Fig. 2.2). The slope of the demand curve in the linear case is constant, and the elasticity is equal to the ratio of *AC* and *CB* with the sign "minus":

$$E_p(D) = -\frac{AC}{CB}. \qquad (2.3)$$

Equality (2.3) shows that the elasticity of demand is equal to -1 in the middle of the segment *AB*, is equal to *0* at point A and equal to -∞ at point *B*.

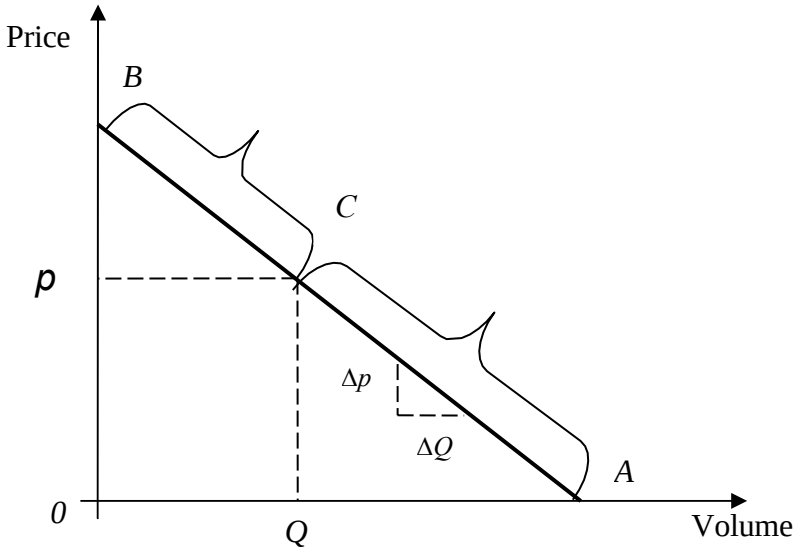


Figure 2.2. Linear demand function

For a non-linear demand function the relation (2.3) is also true, i.e. the price elasticity at point *C* on the demand curve is equal to the ratio with a minus sign, in which this point *C* divides the segment of the tangent to the demand curve, enclosed between the horizontal and vertical axes.

2.3. The role of elasticity in the allocation of the tax between sellers and the customers

There are market forms of taxation. Here we will assume that the tax is imposed on each unit of goods sold on the market. There is a distinction between the scope of the tax, established by law, and the economic scope of the tax.

Tax on sellers. For each unit of a good sold, the seller must pay a tax of *t* monetary units. The supply curve S shows the minimum price at which producers agree to sell a given volume of goods. And since they must pay *t* tenge or dollars to the government after the tax is imposed, they will now only agree to sell the same volume of goods at a price that is *t* units higher than the minimum price they originally agreed to. This means that the supply curve rises upwards by *t units* (Fig. 2.3).

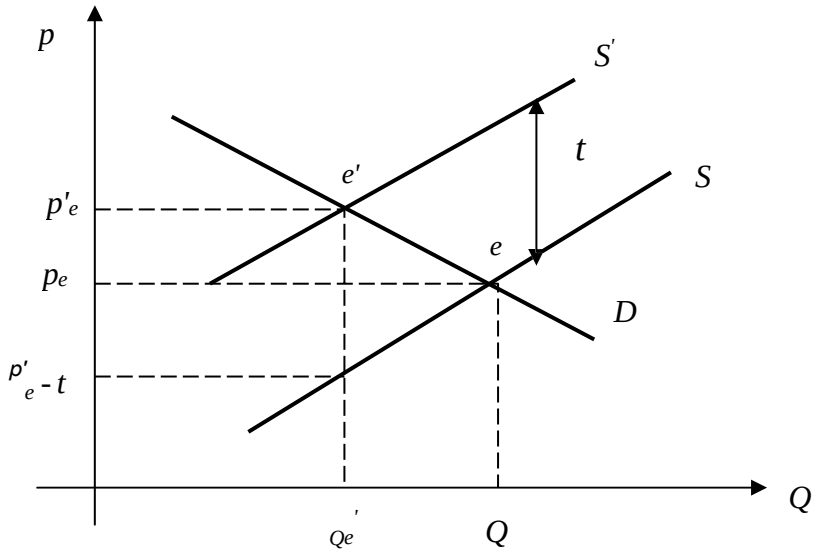


Figure 2.3. Introduction of a tax on sellers

Let us compare the new equilibrium *e'* with the original *e*. Compared to the previous price p_e , the buyer pays the price p' , and the seller is left with p' -t after paying the tax. In other words, this means that the part of the tax equal to $p - p'_e$ is paid by the buyer and the rest equal to $p_e - (p' - t)$ *is* paid by the seller.

Tax on buyers. The government levies a tax of *t* on each unit of
of the goods purchased by the buyer.

The demand curve *D* shows the maximum price that buyers are willing to pay to buy this volume of goods. If they still have to pay tax, they will only agree to buy this volume of goods at a price that is *t* units less than the previous price, i.e. the demand curve will shift down by *t* units. (Figure 2.4).

In the new equilibrium, after the tax is imposed, sellers will receive p' units and buyers of the total along with the tax will pay $p' + t$ units. So, the tax t_e distributed as follows : $(p'_e + t) - p_e$ is paid by customers and $p_e - p'_e$ is paid by customers.
sellers.

Thus, regardless of who the tax is imposed on by law, it is actually allocated between sellers and buyers.

And who will pay most of the tax: sellers or buyers? This depends on the relationship between the elasticities of supply and demand.

The more elastic the supply, the more gentle the curves *S* and *S*′ in Figure 2.3 will be, and the closer the values of p'_e - *t* and p_e . and hence the less of the tax sellers will have to pay.

Conversely, the less elastic supply is, the steeper the *S* and
S′ , and the lower will be the value $_e$ + *t* received by the seller. Hence, most of the
of *p*′
the tax is paid by the sellers.

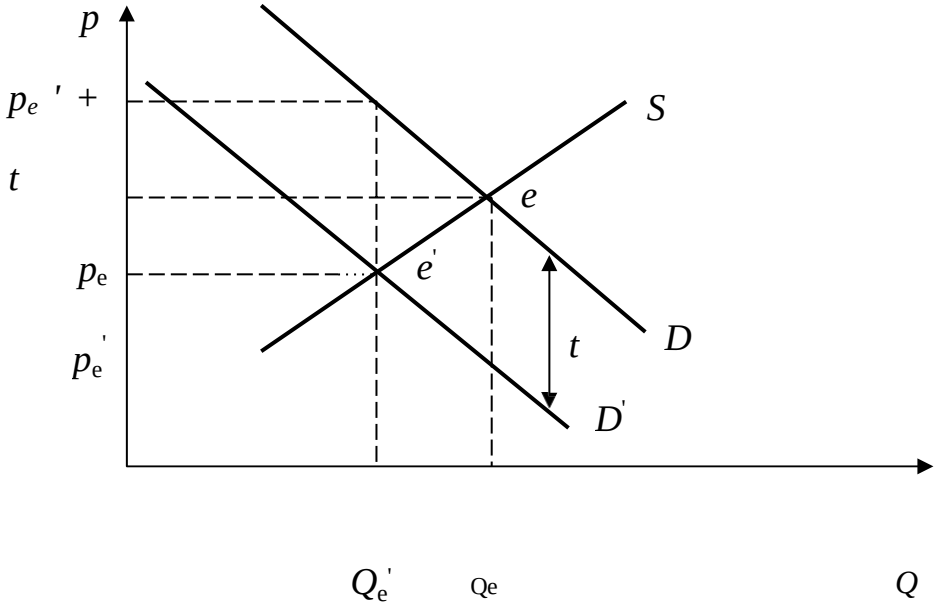


Figure 2.4. Introduction of a buyers' tax

Similarly, the more elastic demand is, the more gentle the demand curves *D* and *D*′ in Fig. 2.4, the less price buyers will pay. Accordingly, they will bear a smaller share of the tax.

And the less elastic demand is, the steeper the curves *D* and *D*′ in Fig. 2.2, and the larger will be the value of p'_e + *t*. So, more and more of the tax will be paid by buyers.

Conclusion: the higher the elasticity of demand and lower the elasticity of supply, the greater the portion of the tax burden borne by sellers, and conversely, the less elastic demand and more elastic supply, the greater the portion of the tax paid by buyers.

Self-check questions**:**

1. What characterises elasticity? What price intervals correspond to elastic demand and inelastic demand?
2. Name three types of elasticity for demand. Define them.
3. On what factors does the value of elasticity depend?
4. Why would the cross elasticity of demand among different types of washing machines be greater than between washing machines and other durable goods?

Recommended reading**:**

1. Pindyck R., Rubinfeld D. Microeconomics. - Moscow: Delo, 2001.
2. Hyman D.N. Modern Microeconomics: Analyses and Applications. T. 1,2. - M.: Finance and Statistics, 1992.
3. Simkina L., Korneichuk B. Microeconomics. - S.-P.: Peter, 2002.
4. Mukhamediev B.M. Microeconomics. - Almaty: Kazak University, 2007.

Theme **3:** THEORY OF CONSUMER SELECTION

Objective of the lecture**:** definition of concept utility, budgetary the consumer's equilibrium, the essence of the income effect and the substitution effect.

Keywords**:** utility, budget constraint, consumer equilibrium, income effect, substitution effect.

Lecture questions**:** /p. 64 - 84/4/

1. Utility. Marginal utility.
2. Consumer preferences and indifference curves.
3. Budgetary constraint of the consumer.
4. Consumer equilibrium.
5. The income-consumption curve and the Engel curve.
6. The price-consumption curve and deriving the individual demand curve.
7. The income effect and the substitution effect.

The study of consumer behaviour is based on three main points: 1) analysing consumer preferences; 2) analysing the consumer's budget constraint and 3) Analysing consumer equilibrium or consumer optimum.

3.1. Utility**.** Marginal utility

Measuring the magnitude of needs is a very complex problem, since each person has his or her own hierarchy of tastes, requests and preferences, which is generated by his or her biological, social and spiritual needs. But in our analysis we will try to assess the needs of individuals from the point of view of the utility theory.

Utility is the ability of a good to satisfy a need, i.e., to bring benefit, pleasure, enjoyment, value.

In modern microeconomics, it is simplistically assumed that consumer behaviour is determined by his desire to maximise the utility from the consumption of a certain set of goods. The total satisfaction received by a person from the consumption of a good is called *total (total) utility and is* denoted by *U (utility).*

The use of an additional good causes an increase in aggregate utility. The increase in aggregate utility obtained in this case is called marginal *utility MU (marginal utility).*

Thus, *the marginal utility of a* good is the increase in utility caused by the consumption of an additional unit of that good. For commodity *X, the marginal utility by* definition is equal to

$$MU_x = \frac{\textit{change in total utility}}{\textit{change in consumption of product X}} = \frac{\Delta U_x}{\Delta x}.$$

The marginal utility $MU_{y\ of}$ commodity *Y is* determined in a similar manner.

The total utility of a consumed good is equal to the sum of the marginal utility of all consumed units of this good. For the utility function *U (x,y) the hypothesis of decreasing marginal utility is* considered to be true: each next unit of a good increases the total utility, but by a smaller amount than the previous unit. This means that the marginal utility of a good decreases as its consumption increases (Fig. 3.1).

As consumption of a good increases, total utility increases, but this occurs up to some level of consumption beyond which the good can become a
"anti-benefit". On the graph, when consumption of a good increases, the curve of total utility is increasing, while for the "anti-benefit" it is decreasing (dotted line). For example, excessive consumption of cakes will harm a person's health.

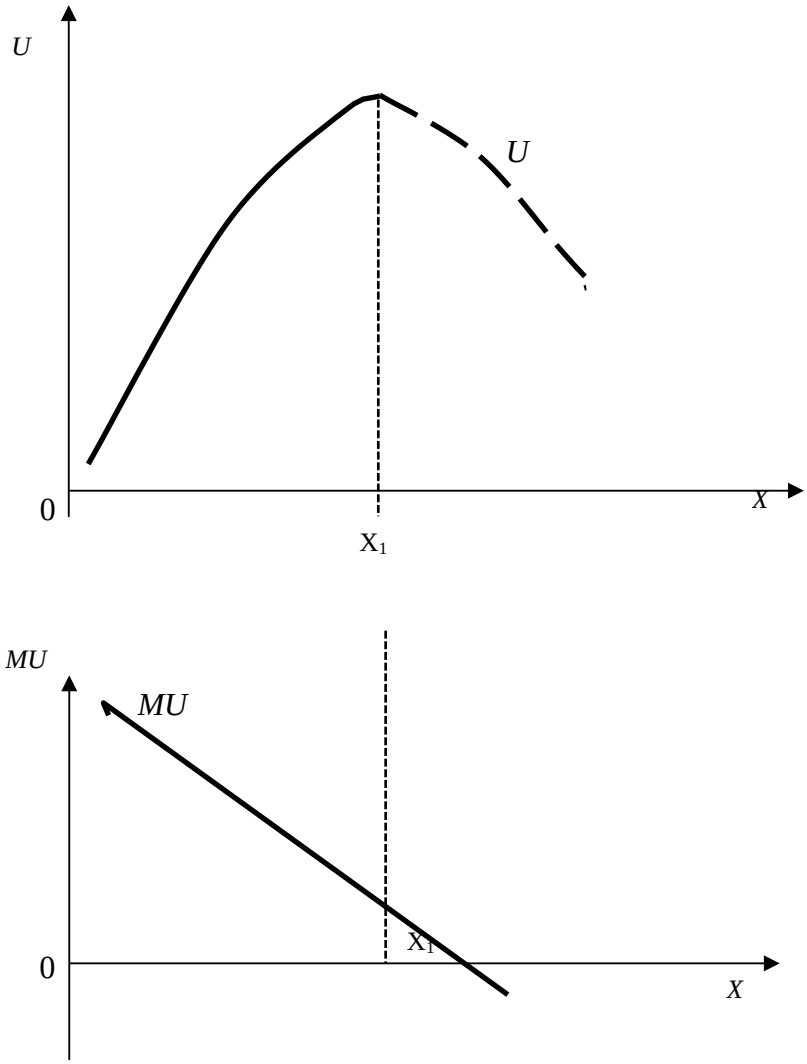


Figure 3.1. Total and marginal utility curves

Consumers always try to maximise the total utility from consuming a set of goods on a limited budget.

3.2. Preferences and indifference curves

A consumer in the market is faced with a choice of many different goods and services. However, in order to understand the essence of the choice problem, let us assume that there are only two goods.

The quantities of goods *X* and *Y* will be denoted here by *x* and *y*, respectively. In the plane, each set *(x;y)* defines a point (Fig. 4.1). For example, if *X* are oranges and *Y* are cakes, then the set *a* = (3;2) contains 3 oranges and 2 cakes.

Let's make some assumptions about consumer behaviour.

1. For any two sets of goods the consumer can definitely say that one of them is preferable to the other, or both sets are equivalent for him, i.e. for sets *a* and *c* one of the following three relations is true: "*a is* preferable to *c*", or "*c is* preferable to *a"*, or "a is equivalent to *c"*.

Violation of this axiom would mean that consumer behaviour is unpredictable.

2. If "a is preferable to c" and "c is preferable to c", then it follows that "a is preferable to c."

If this condition is not fulfilled, then *a* situation is possible where "*a is* preferable to *c*", "*c is* preferable to c", "*c is* preferable to *a"*. A consumer with such preferences will always want something else. His behaviour is irrational.

3. If there are two different sets of goods $a = (x_a ; y_a)$ *and* $c = (x ; y_{ев})$, *with* $x_a \geq x_в$, $y_a \geq y_в$, *then "set a is preferable to set c",* i.e. a set with larger quantities of goods included in it is preferable.

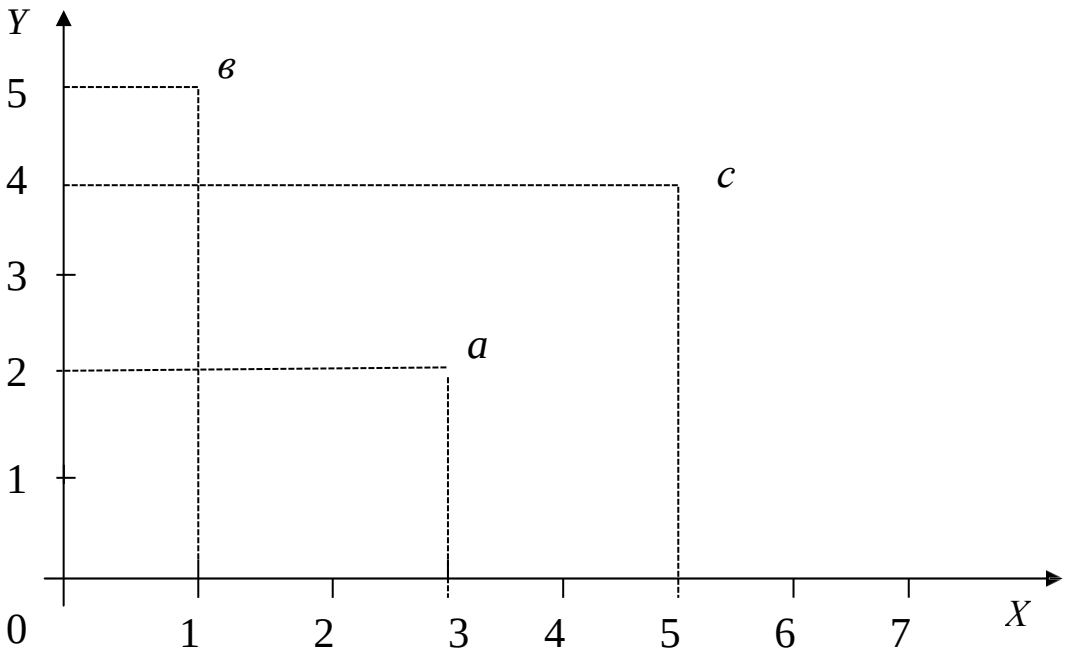


Figure 3.2. Sets of goods

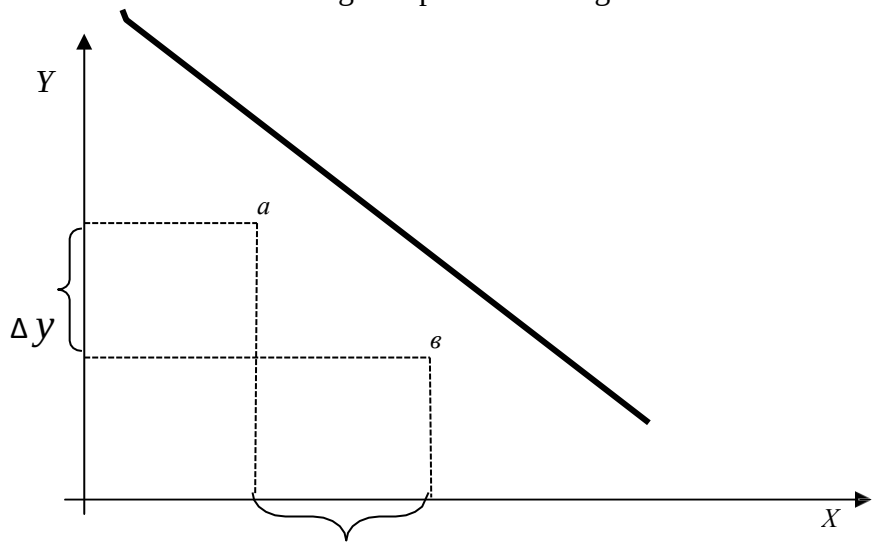
So, sets to the right or above are known to be more favoured, and sets to the left or below are less favoured.

The indifference curve is the line on which all possible sets of goods that are equivalent to each other are located.

The indifference curve has a *negative slope* when the unsaturation condition is fulfilled.

When moving along the indifference curve, the degree of consumer satisfaction remains unchanged. The slope of the indifference curve determines the ratio in which the consumer can exchange one good for another without gaining or losing anything in terms of his preferences (Fig. 3.3).

The marginal rate of substitution MRS of commodity *Y* for commodity *X* is the quantity of commodity *Y that* the consumer would give up in order to get an additional unit of commodity *X*, i.e., *MRS.*



Δx

Figure 3.3. Marginal replacement rate

$$MRS = -\frac{\Delta y}{\Delta x}.$$

As we move to the right along the indifference curve, the marginal rate of substitution *MRS* decreases because for each successive unit of good *X*, *the* consumer agrees to give less of good *Y* than for the previous unit of good *X*. In mathematical terms, a decreasing *MRS* means a convexity of the indifference curve.

MRS can be defined differently as: $MRS_{xy} = \frac{MUx}{MUy}$, i.e., the marginal rate of substitution of good *Y* for good *X* shows how much of good *X is* needed to compensate the consumer for giving up a unit of good *Y*.

The totality of the consumer's indifference curves is called his indifference curve map. It fully describes his preferences. The consumer tends to reach the highest possible indifference curve (more distant from the origin).

3.3. Budgetary constraint

The natural desire of an individual to consume a set of goods containing the largest number of selected goods is limited by his income. The consumer must weigh his needs against market prices and available budget.

Let *x*, *y* - quantities, p_x , p_y prices of goods *X*, *Y* respectively, and *I* - consumer's income for some period. The condition of equality of consumer's expenditures to his income is expressed by the equation

$$p_x x + p_y y = I. \qquad (3.1)$$

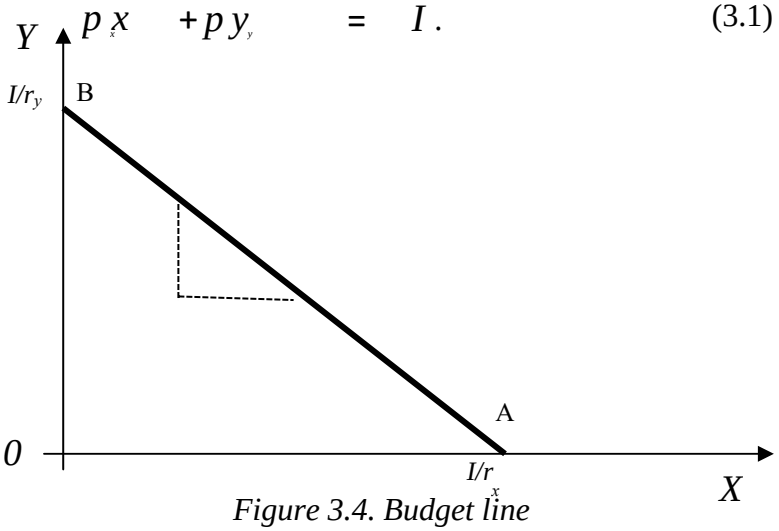


Figure 3.4. Budget line

It defines a straight line on the plane called the *budget line* (Figure 3.4). The budget line shows the potential of a consumer to purchase different combinations of two goods given a limited income and price level in the market.

The budget line intersects the *OX* axis at I/p_x , and the *OY* axis at I/p_y . To determine the slope of the budget line, it is enough to solve equation (3.1) with respect to *y*, i.e.

$$y = -\frac{px}{py}x + \frac{I}{py}.$$

Then k = - p_x / p_y its angular coefficient, i.e. the slope of the budget line.

Let us highlight the following properties of the budget line:

1. The point of intersection of the budget line with the *X* axis (point A in Fig. 3.4) shows the maximum possible consumption of product X. The point of intersection of the budget line with the *Y* axis (point B in Fig. 3.4) shows the maximum possible consumption of product Y.

2. The slope of the budget line to the horizontal axis is determined by the ratio of product prices.

3. When the consumer's income increases, the budget line shifts parallel to itself from the origin (to the right), when income decreases - to the origin (to the left).

4. If the price of good X increases, the budget line will rotate clockwise around the point where it intersects the *Y* axis (point B). At the same time, less of commodity X will be purchased. Similarly, when the price of good Y increases.

5. When the price of good X decreases, the budget line will turn anti-clockwise around point B. At the same time, more of good X will be purchased. Similarly, when the price of commodity Y decreases.

3.4. Consumer equilibrium

The previous analysis has shown that an individual seeks to consume the set of goods X and Y that will give him the greatest satisfaction. But he cannot buy any number of goods X and Y because his purchasing power is limited by his income. Let us try to find the optimum point of the consumer, in which his desires coincide with his income.

In one diagram, let us depict the consumer's budget line and his map of indifference curves (Fig. 3.5).

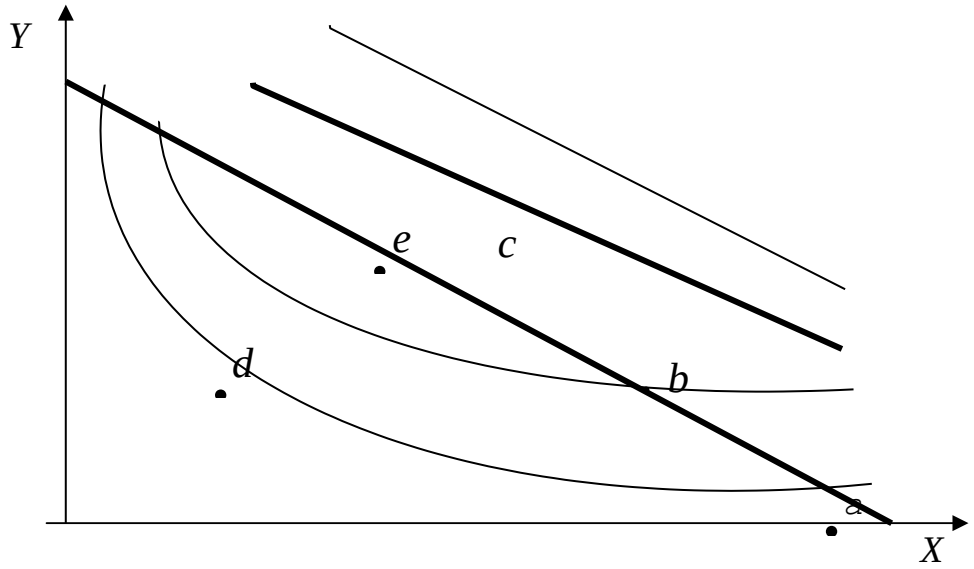


Figure 3.5. Consumer equilibrium

The equilibrium (optimal) set of products is the set on the budget line that provides the consumer with maximum utility.

Let us formulate some equivalent consumer equilibrium conditions:

1. $MRS = \frac{p_x}{p_y}$.

2. $\frac{MU_x}{p_x} = \frac{MU_y}{p_y}$.

3. At the equilibrium point, the budget line touches some indifference curve.

3.5. **Income-consumption** curve and Engel curve

Let us analyse the change in the consumer's equilibrium states when the level of his income changes. Suppose that the individual's income increases. Each new value of income corresponds to a more distant position of the budget line from the origin.

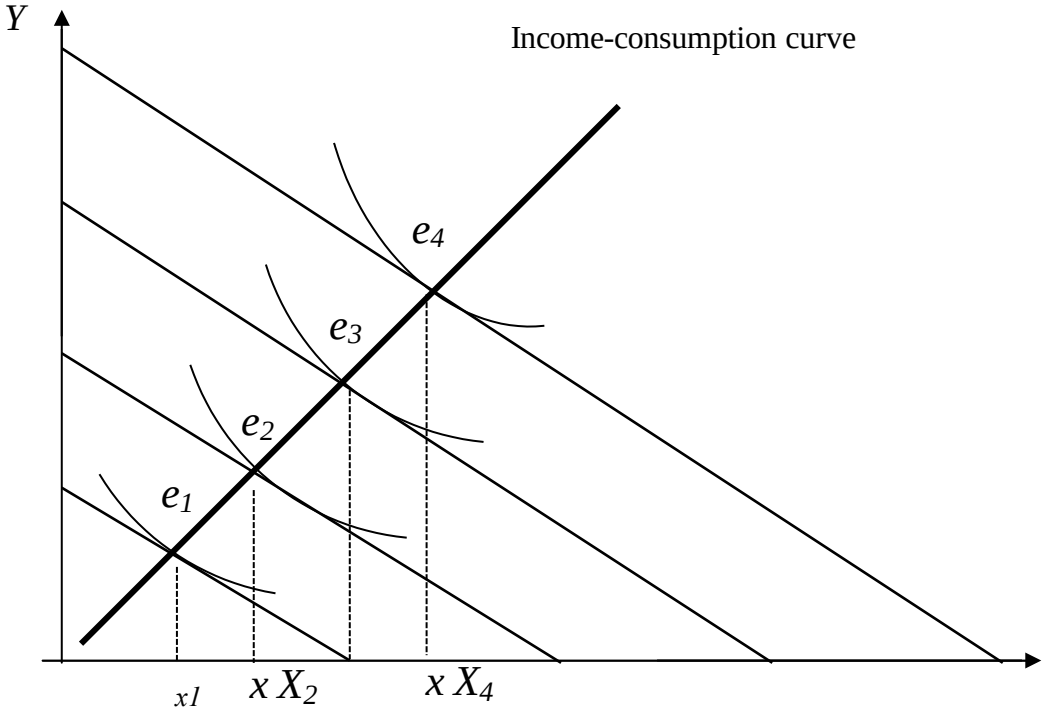


Fig. 3.6. Income-consumption curve

Connecting the equilibrium points *e* , *e* , e_{1234} with , ea smooth line, we obtain the curve *"income-consumption"*. As can be seen, a higher value of income corresponds to a larger volume of consumption of good *X:* $x_1 < x < x_{23} < x_4$.

The income-consumption curve contains all the equilibrium points on the consumer's indifference curve map corresponding to different levels of his income.

Using the income-consumption curve it is easy to construct an *Engel curve* showing the relationship between a consumer's income and the quantity of good *X* purchased.

If with the growth of income the volume of purchase of goods decreases, such goods are called *low-quality*. This does not mean that the goods are spoilt, unusable. It is just that with increasing income consumers prefer to buy more qualitative and expensive goods.

3.6. **Price-consumption curve** and derivation of **the** individual demand curve

Now consider the consumer's reaction to a change in the price of good *X*.

When the price p_x of good *X* increases, the budget line rotates clockwise relative to the point of its intersection with the vertical *Y* axis.

The price-consumption curve connects all equilibrium points on the map of indifference curves corresponding to different prices for commodity *X* (upper diagram in Fig. 3.7). The equilibrium consumption volumes x_1 , x_2 , x_3 for prices p_1 , p_2 , p_3 in the bottom diagram in Fig. 3.7 determine the points *a* , *a* , a_{123} , through which the demand curve of this consumer passes.

Thus, we can see how the interaction of consumer desires and capabilities results in an individual demand for good *X*.

The market demand curve is obtained by horizontally summing the individual demand curves.

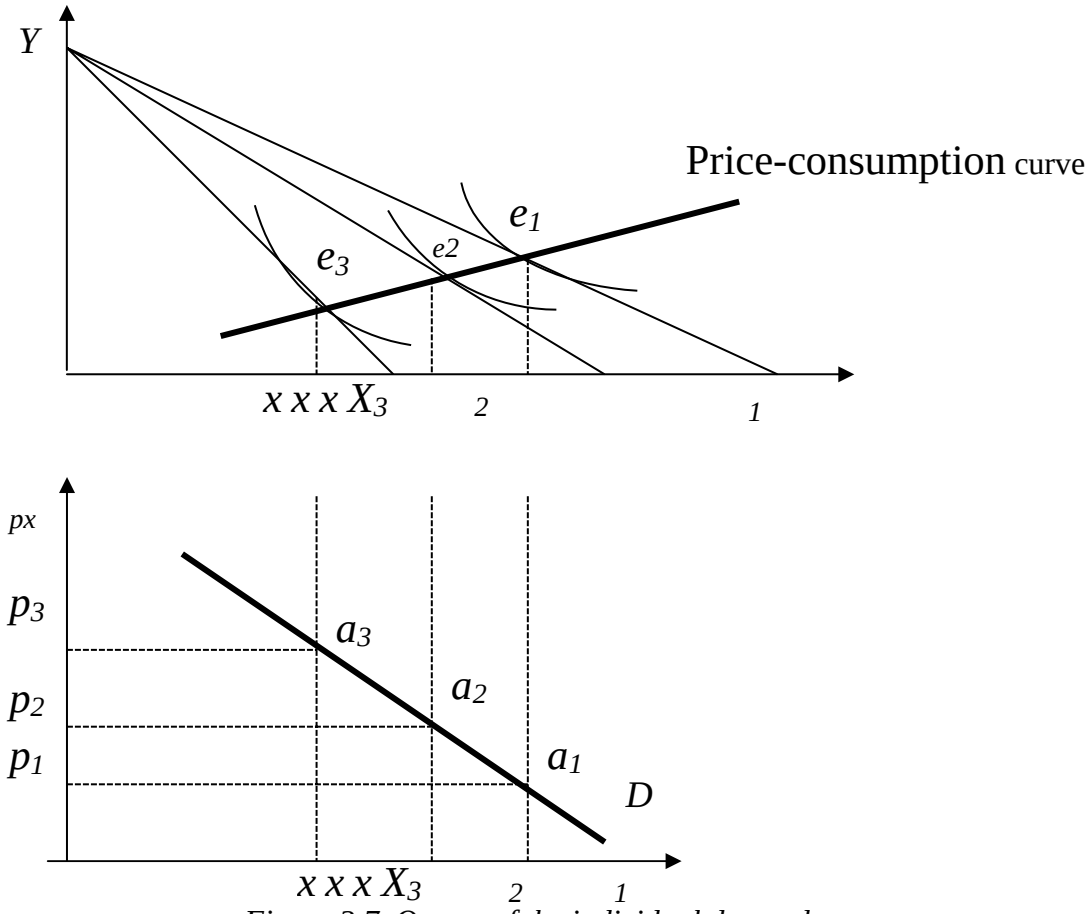


Figure 3.7. Output of the individual demand curve

3.5 The substitution effect and income effect

An increase in the price of good *X* has two consequences. On the one hand, the relative price of this good increases. In order to buy its additional unit, the consumer has to give up more other goods (good *Y*) than before. On the other hand, buying a certain amount of good *X*, the consumer can buy a smaller amount of other goods, i.e. his real income is reduced.

The substitution effect is the change in consumption of a good due to a change in prices, provided that the consumer's income is adjusted to keep him at the same level of welfare. The consumer's welfare level remains unchanged means that he stays on the same indifference curve. His degree of satisfaction does not change.

The income effect is the change in consumption of a good at new prices due to the failure of the consumer's income to adjust to keep his welfare unchanged.

Self-check questions**:**

1. What are the components of rational consumer choice?
2. How is consumer equilibrium achieved?
3. Which principle is satisfied by the utility function?
4. Can marginal utility increase?
5. What do the law of diminishing marginal utility and the law of demand have in common?
6. If aggregate utility and marginal utility cannot be measured, explain how and why these concepts are used in consumption theory.
7. Why can't the slope of the budget line be positive?
8. What does the income-consumption curve show? How is it constructed?
9. What does the Engel curve show? How is it constructed?
10. Explain the relationship between the price-consumption curve and the demand curve.
11. How do the income effect and the substitution effect manifest themselves in consumer behaviour?
12. Are the substitution and income effects always the same direction? In what cases are they differently directed?

Recommended reading**:**

1. Pindyck R., Rubinfeld D. Microeconomics. - Moscow: Delo, 2001.
2. Hyman D.N. Modern Microeconomics: Analyses and Applications. T. 1,2. - M.: Finance and Statistics, 1992.
3. Simkina L., Korneichuk B. Microeconomics. - S.-P.: Peter, 2002.
4. Mukhamediev B.M. Microeconomics. - Almaty: Kazak University, 2007.

Theme **4:** THEORY OF PRODUCTION

Purpose of the lecture**: to** define the production function and its properties, isoquant, technological substitution.

Keywords Words**:** production function, isoquant, average product, marginal product, rate of technological substitution.

Lecture questions**:** /p. 112 - 120/4/

1. Production function. Isoquants. Cobb-Douglas function.
2. Average product and marginal product of a factor of production (labour, capital). Return on a factor of production. The law of diminishing returns of a factor of production.
3. Economies of scale.
4. Technological substitution rate.

4.1. Production function**.** Isoquants**.** Cobb-Douglas function

The subject of research in economics is the relationship between the inputs of labour and capital required t o produce goods and services, regardless of the physical or chemical characteristics of the processes used.

Suppose that a firm produces a homogeneous product. For a given technology, the production possibilities are given by the *production function*

$$Q = F(L,K),$$

where L - labour inputs, K - capital inputs, Q - maximum output at given labour and capital inputs. The type of functional dependence F *is* determined by the technology used. The production function can be represented in the form of a table.

An isoquant is a curve on which there are all possible combinations of factors of production that provide the same volume of output. It should be noted that isoquant has a negative slope, because if the input of one factor decreases, it is necessary to increase the input of another factor to keep the output unchanged.

The isoquants cannot intersect, because at the point of their intersection different outputs would have to be produced. It is possible to represent the production function also in the form of formulas. Cobb-Douglas function:

$$Q = AK^{\alpha} L^{\beta},$$

where A, **,** β are positive numbers.

4.2. Average product and marginal product of a factor of production**. The** return on a factor of production**. The** law of diminishing returns of a factor of production**.**

The following quantities characterising the production process are used to analyse the behaviour of the firm. *Average product of labour* $AP_L = Q/L$ - output of the firm per 1 unit of labour. Similarly, the *average product of capital* $AP_K = Q/K$ *is* determined.

The marginal product of labour $MP_L = \Delta Q/\Delta L$ is the additional output per 1 additional unit of labour.

Similarly, the *marginal product of capital is* determined $MP_K = \frac{\Delta Q}{\Delta K}$.

It is convenient to calculate the marginal product of a factor of production through derivatives when the production function is given analytically.

If each next unit of labour brought into production provides an increase in output greater than the previous unit of labour, there is an *increasing return on labour.*

If each successive unit of labour brought into production increases output by the same amount, then there is a *constant return on labour*.

Finally, there is a *diminishing return to labour* if each successive unit of labour brought into production provides a smaller increase in output than the previous unit of labour.

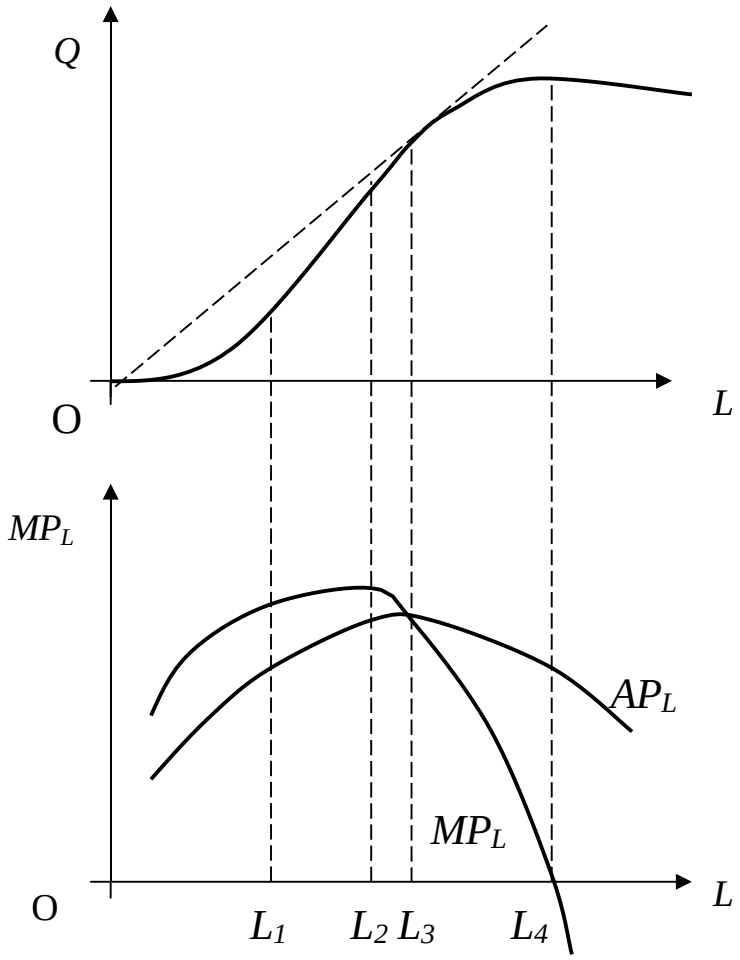


Figure 4.1. Output, average and marginal products of labour

In all three cases considered, of course, capital *K* and technology are assumed to be unchanged. Similarly, these concepts are defined for capital and any other factor of production.

Usually, when production starts to develop, there is an increasing return of a factor of production, which is then replaced by a constant and decreasing return of that factor of production.

In Fig. 4.1 for labour inputs from *0* to L_1 there is an increasing return, from L_1 to L_2 there is a constant return and for labour inputs above L_2 there is a decreasing return on labour. Starting from the volume of labour input L_4 there is a decline in production. For example, workers in one shop begin to interfere with each other.

The law of *diminishing returns of a factor of production* states that starting from a certain level of utilisation of a factor of production, other things being equal, its marginal product decreases. Otherwise, it would be profitable to concentrate production at one enterprise.

4.3. Economies of scale

Does output increase by a factor of two for a similar increase in factor inputs? There are *increasing economies of scale* if a *λ-fold increase in factor inputs* results in a more than λ-fold increase in output, i.e., *λ-fold increase in output.*

$$F(\lambda L, \lambda K) > \lambda F(L,K).$$

main cause increase output products is the advantages of specialisation.

Declining economies of scale are observed when an increasefactor inputs by a factor of λ leads to an increase in output by less than a factor *of* λ, i.e.

$$F(\lambda L, \lambda K) < \lambda F(L,K).$$

This is because a very large firm becomes unwieldy, making it difficult to get raw materials and deliver finished products to markets.

When $F(\lambda L,\lambda K) = \lambda F(L,K)$, there is a *constant scale effect*.

It is easy to determine the scale effect for the Cobb-Douglas function. Let us write $F(\lambda L, \lambda K) = A(\lambda K)^{\alpha}(\lambda L)^{\beta} = {}^{\lambda\alpha+\beta} F(L,K)$.

If $\alpha + \beta > 1$, the scale effect is increasing, if $\alpha + \beta = =1$, the scale effect is constant, and if $\alpha + \beta < 1$, the scale effect is decreasing.

4.4. Interchangeability of factors of production

At different points of one isoquant, the value of o u t p u t is the same, but the sets of factors used are different. This means that one factor can be replaced by another factor in a certain ratio, keeping the output unchanged (Figure 4.2).

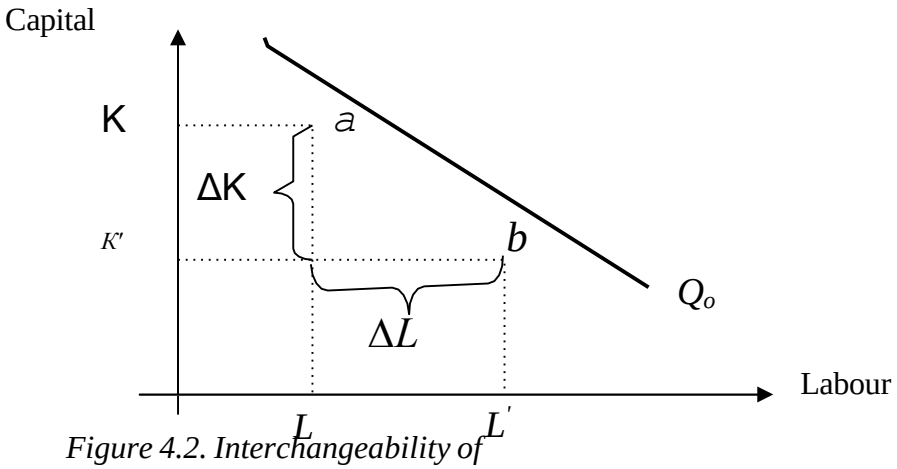


Figure 4.2. Interchangeability of resources

When moving along the isoquant from point *a* to point *b*, capital and labour inputs change by ΔK and ΔL, respectively. The value $MRTS = -\Delta K/\Delta L$. is called the *marginal rate of technological substitution*. It is equal to the additional value of capital inputs to free a unit of labour, assuming that output remains constant. In the limit

$MRTS = -\frac{dK}{dL}$, i.e. slope isoquant is equal to marginal norm technological *of MRTS* substitution taken with a minus sign.

The following formula for the marginal rate of technological substitution can be written down

$$MRTS = \frac{MPL}{MPK}.$$

Self-check questions**:**

1. What does the production function characterise?
2. What determines the possibility of substituting some production factors for others?
3. When does the value of output reach its maximum?
4. What is the slope of the isoquant? Why?
5. Is there a difference between diminishing returns to labour and diminishing returns to scale?

6. Draw an analogy between an isoquant map and an indifference curve map.

Recommended reading**:**

1. Pindyck R., Rubinfeld D. Microeconomics. - Moscow: Delo, 2001.
2. Hyman D.N. Modern Microeconomics: Analyses and Applications. T. 1,2. - M.: Finance and Statistics, 1992.
3. Simkina L., Korneichuk B. Microeconomics. - S.-P.: Peter, 2002.
4. Mukhamediev B.M. Microeconomics. - Almaty: Kazak University, 2007.

Topic **5:** Production costs

Purpose of the lecture**:** definition of the concepts of production costs in the short and long run, finding the producer's equilibrium.

Keywords Words**:** short-term period, long-term period, production costs, isocost, producer's equilibrium.

Lecture questions**:** /p. 128 - 141/4/

1. Types of costs.
2. costs production в short-term period (aggregate, average, marginal).
3. costs production в long-term period. Isocosta и equilibrium of the manufacturer.

5.1. Types of costs

A distinction is made between accounting costs and economic costs. Accounting costs do not include the opportunity cost of the factors of production owned by the owners of the enterprise.

The opportunity cost of a resource is the income that could be obtained in another best use of the resource. *Economic costs are* equal to the sum of the revenues that can be obtained in the most favourable way of using all resources expended. The difference between economic and accounting costs is called *imputed costs*.

In making the decision, the firm must, of course, consider economic costs. The firm may decide, depending on the economic environment, to expand or reduce production. To do so, it must change the costs of the factors of production.

The period of time during which only one factor of production is variable is called *short-run,* and the period during which all factors of production are variable is called *long-run*. Usually in the short r u n , t h e variable factor is labour.

5.2. Costs of production in the short run

Total costs *TC* depend on output *Q, i.*e. TC = *TC(Q).* Some of them cannot be changed in the short run due to changes in output. For example, rent for premises, property tax, insurance payments. Therefore, total costs can be represented as the sum of fixed costs *FC, which are* independent of *Q,* and variable costs, which are dependent on *Q*:

$$TC = FC + VC.$$

Let's determine the *average total cost* $AC = \frac{TC}{Q}$, *average fixed costs* $AFC = \frac{FC}{Q}$, *average variable costs* $AVC = \frac{VC}{Q}$. These are the costs attributable to the average per unit of output.

The marginal cost (total) *MC* is the additional total cost of increasing output by one unit, i.e. $MC = \frac{\Delta TC}{\Delta Q}$, where ΔQ is the increase in output, and $\Delta TC = TC(Q + \Delta Q) - TC(Q)$.

In the limit at $\Delta Q \longrightarrow 0$ *we* obtain $MC = TC'$ - the derivative of the function $TC = TC(Q)$.

Average and marginal costs have a determinant role in a firm's decision on output.

(1) The marginal cost curve *MC* intersects the average cost curve *AC* at its minimum point.

(2) Where the *MC* curve is above the *AC* curve, average *AC* costs increase.

(3) Where the *MC* curve is below the *AC* curve, the average cost of *AC* decreases.

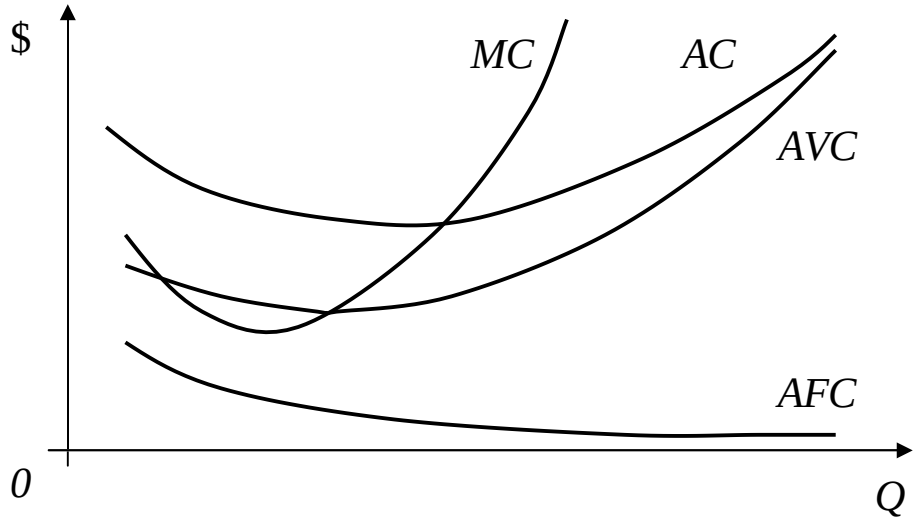


Figure 5.1. Costs in the short run

The typical location of the average cost curves *AC*, average variable cost *AVC*, marginal cost *MC* and average fixed cost *AFC* in the short run is shown in Figure 5.1.

5.3. Costs of production in the long run**.** Isocosta and producer's equilibrium

A firm in the long run can vary the costs of all factors of production and hence choose the combination of them that yields the lowest cost of producing a given volume of output.

The isocost is the line on which all sets of factors of production of the same value are located. Its equation is: $p_L \cdot L + p_K \cdot K = TC_o$, where TC_0 is a fixed level of total costs. Such an equation defines a straight line (Fig. 5.2).

The isocost has a negative slope. Therefore, changes ΔL, ΔK *at* which points *a, b are* on the same isocost have different signs. The slope of the isocost (in absolute value) is equal to $-\Delta K / \Delta L$.

Isocost shifts. For *TC* level$_1$ total costs we will have isocosta $pL \cdot L + {}_{pK} \cdot K = \text{TC1}$, which is parallel to the isocosta

$${}_{pL} L + {}_{pK} \quad K = \text{TC0},$$

and is further away from the origin when $TC_1 > TC_0$ and closer when $TC_1 < TC_0$.

When ${}_{pL} \uparrow p'_L$ will turn clockwise, at ${}_{pK} \uparrow p'_K$ - against the move clockwise.

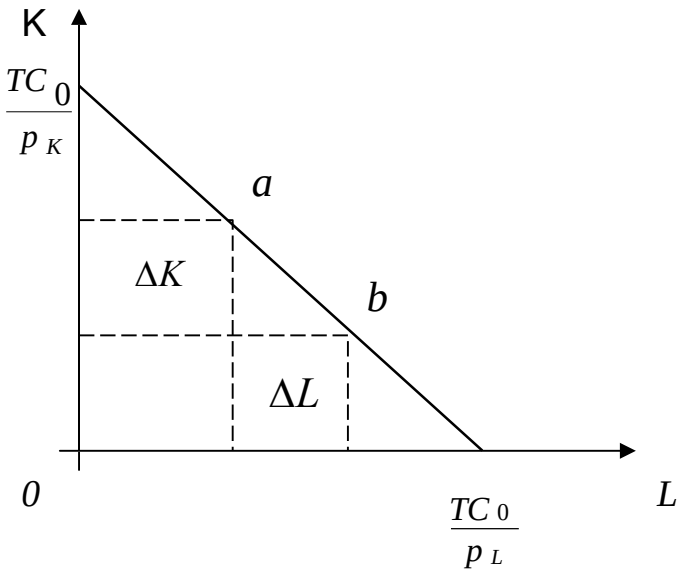


Figure 5.2 Isocosta

The firm must produce Q_0 units of output at the lowest cost:
$TC = p_L \cdot L + p_K \cdot K \rightarrow min,\ F(L,K) = Q_0$.
Let's consider this problem graphically.

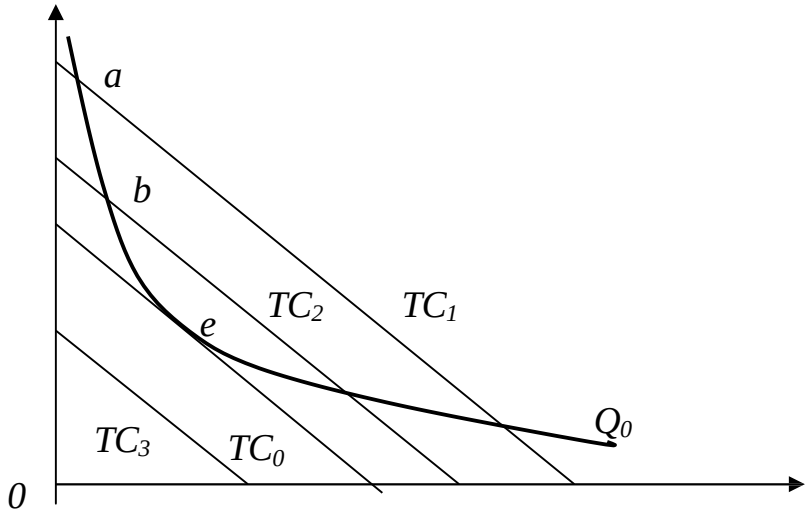


Figure 5.3. Selection of the optimal combination of factors of production

Determining the optimal set of factors of production is very similar to consumer choice. However, there the budget constraint was fixed and utility was maximised. At the point where *the* isocost and the isoquant touch, their slopes must coincide, i.e. the equilibrium condition is fulfilled:

$$\frac{MP_L}{pL} = \frac{MP_K}{pK}.$$

Thus, for a well-functioning firm, its total costs *TC* are determined by the volume of production, i.e. *TC = = TC(Q).*

Self-check questions**:**

1. What are costs and profits from an economist's and accountant's point of view?
2. What do economic costs include? Is economic profit related to costs?

3. Costs of production: fixed, variable, total. Their characterisation, graphic representation, role and importance for the entrepreneur.
4. Explain the appearance of the curves *AC, AVC, AFC, MC*.
5. Marginal cost and marginal revenue: their logical and economic relationship and significance.

Recommended reading**:**

1. Pindyck R., Rubinfeld D. Microeconomics. - Moscow: Delo, 2001.
2. Hyman D.N. Modern Microeconomics: Analyses and Applications. T. 1,2. - M.: Finance and Statistics, 1992.
3. Simkina L., Korneichuk B. Microeconomics. - S.-P.: Peter, 2002.
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Topic **6:** PROPOSAL IN CONDITIONS OF PERFECT CONCURRENCE

Purpose of the lecture**: to** determine the characteristic features of the market of perfect competition, the conditions of equilibrium of a competitive firm in the short and long term.

Keywords Words**:** Perfect competition, revenue, cost, profit maximisation, closure decision, equilibrium.

Lecture questions**:** /p. 150 - 166/4/

1. Characteristics (conditions) of a perfectly competitive market.
2. Equilibrium of a competitive firm in the short run. The decision to stop or continue production. Supply curve of a firm in the short run.
3. The equilibrium of a competitive firm in the long run.

6.1. Characteristics of the market of perfect competition

Under conditions of perfect competition, sellers and buyers accept the prevailing market price as set from the outside (they act as price-takers); they do not take into account the reactions of other sellers and buyers to their actions; firms know exactly their revenue and cost functions, as well as the prices of resources; consumers are well informed about prices and quality of goods; there are no legislative, technological, financial and other barriers to entry and exit from the industry; products are absolutely identical, which makes their advertising useless and inappropriate

Obviously, these attributes hardly occur in real life in pure form. They are some abstract conditions necessary for comparing and analysing the market situation. With a certain degree of assumption absolutely competitive markets can be called the markets of agricultural products and securities.

6.2. Equilibrium of a competitive firm in the short run

In a perfectly competitive market, a firm accepts the equilibrium price as a given price. This means that the price *p at* which a competitive firm sells its output does not depend on the volume *Q of* its production. Therefore, unlike the market demand curve, the demand curve for the competitive firm's output is a horizontal line (Figure 6.1).

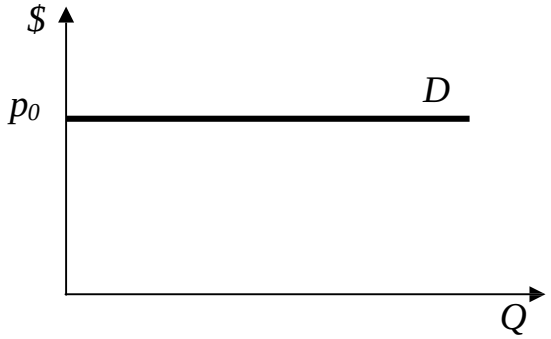

Figure 6.1. Demand curve for the products of a competitive firm

Demand for the output of a competitive firm is perfectly elastic: even a small increase in price will lead to a complete disappearance of demand for its o u t p u t , since no buyer will be willing to pay more for a good than he would pay for the exact same good to another seller. Reducing the price below the market level p_0 will lead to a loss of profit for the firm itself, since it can realise its entire output at the established price p_0 .

Since, under perfect competition, an individual firm does not have the ability to set its own price for a good, the total (gross) *TR* income of the individual

of the firm is equal to the product of the price established on the market and the quantity of goods sold: *TR = pQ*.

Economic profit is obtainedby deductingall economic costs of *TC* from gross income: *P = TR - TC.*

Average revenue is the revenue per unit of output *(average revenue).*

products: $AR = \frac{TR}{Q}$.

The marginal revenue is the income received from the sales of an additional unit of goods, i.e. $MR = \frac{\Delta TR}{\Delta Q}$.

For competitive firm *p,* price is independent of output *Q*. Therefore, marginal revenue *MR = p,* and average revenue *AR = p*.

The MR and *AR* curves coincide with the demand curve of firm *D.*

To determine the value of maximum profit, it is necessary to construct the curves of total income and total costs, as well as the curves of marginal income, average and marginal costs (Fig. 6.2).

The firm seeks to maximise the difference between total revenue *TR* and total costs *TC* (Figure 6.2a). In the initial stages of production (up to Q_1), *TCs* exceed *TR*. The firm incurs losses. Then income starts to cover total costs gradually and at point *A the* break-even point or self-sufficiency is reached (*TR = TC*).

By increasing output, the firm makes a profit in the interval between the output levels Q_1 and Q_3 (*TR > TC*). Only in this interval is the firm's activity economically justified. Further continuation of production will lead to the fact that the increase in total costs will exceed the growth rate of income and at point *B the* firm's profit will be equal to zero, and output above the volume Q_3 will lead to losses (*TR < TC*).

The firm's profit maximises at point *E* when output Q_2 , because at this point the vertical distance between the *TR* and *TC* curves is maximised.

Let us analyse this situation with the help of marginal revenue and marginal cost curves (Fig. 6.2b). Production of an additional unit of output simultaneously increases total costs *TC* by the value of marginal costs *MC* and increases total income *TR* by the value of marginal revenue *MR.* In this case, the value of *MC is* constantly changing, and *MR is* constant and equal to the price of goods (*MR = p*).

As long as marginal revenue exceeds marginal cost (*MR > MC*) for each additional unit of a good, the firm has a positive marginal profit, i.e. it earns more revenue from producing additional output than it spends. Total profit increases as long as *MR > MC.* As output increases further, marginal costs begin to exceed marginal revenue, i.e. an additional unit of output will reduce total profit.

Thus, the firm maximises profit when marginal revenue and marginal cost *MR = MC are* equal (point *E* at output Q_2 in Fig. 6.2b).

Since the competitive firm takes the market price as given, for it the marginal revenue is equal to the commodity price and the condition of profit maximisation (or loss minimisation) of the competitive firm is written in the form:

$$MR = MC = p. \qquad (6.1)$$

To find out the volume of maximum aggregate profit from point *E* - the point of intersection of *MR* and *MC* (Fig. 6.2b), let us draw a perpendicular to the curve *AC* (since profit is the excess of income over costs). We multiply the resulting height of *EC* by the size of optimal output $0Q_2$, corresponding to the distance *CH. Thus,* the maximum aggregate output of the firm is equal to the area of the rectangle *FECH.*

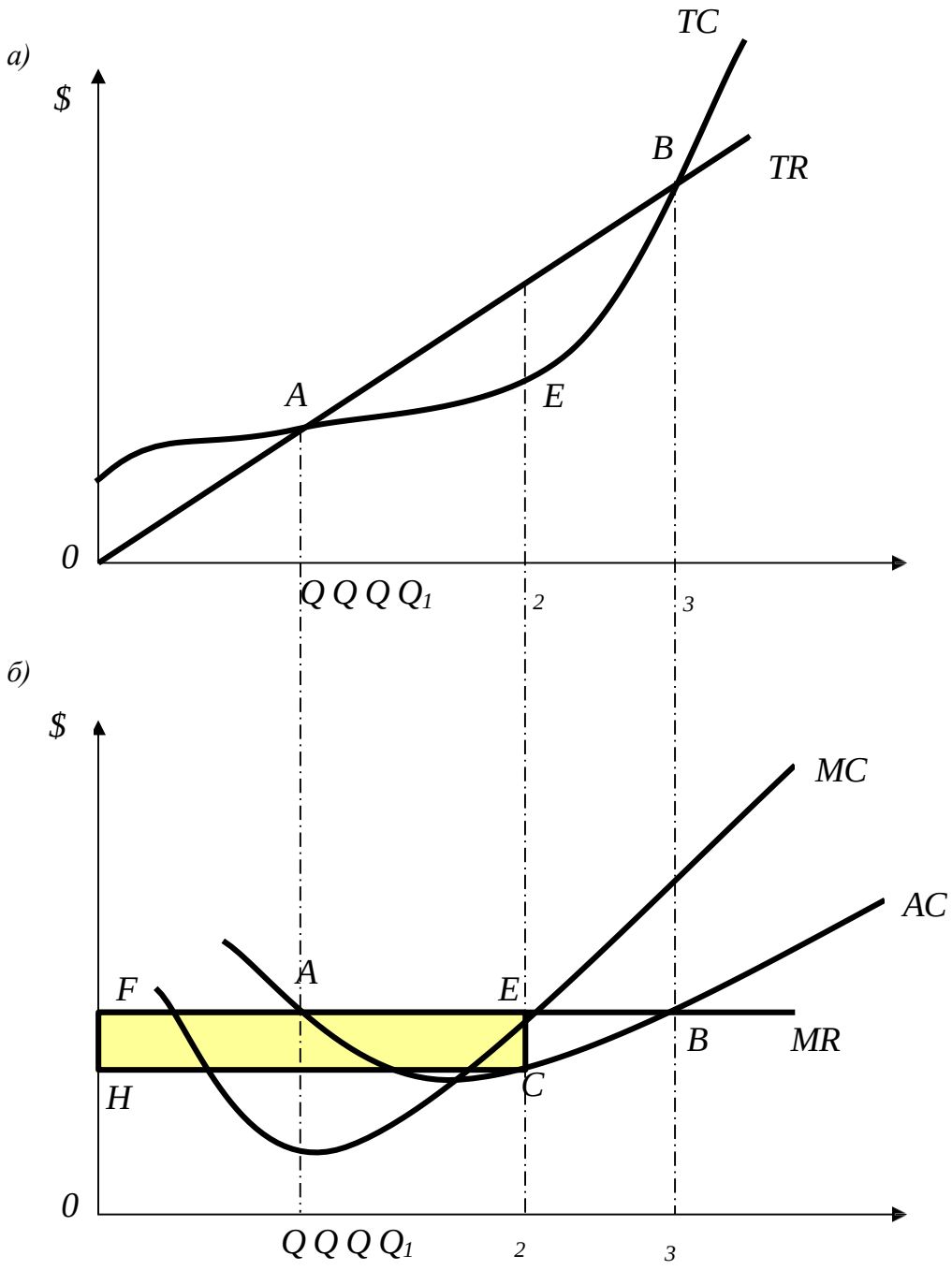

Figure 6.2. Profit maximisation by a competitive firm (a) through total revenue and total costs b) through marginal revenue and marginal cost

A firm's decision to continue or cease production in the short run. The market price p is determined by the interaction of market demand D and market supply S. Unlike the demand curve for the product of an individual competitive firm, the demand curve for the product of an industry (market) in the short-run period has a negative slope (Fig. 6.3). This is explained by the fact that all firms in the industry producing a certain product will be able to increase their sales volume only by simultaneously setting a lower price.

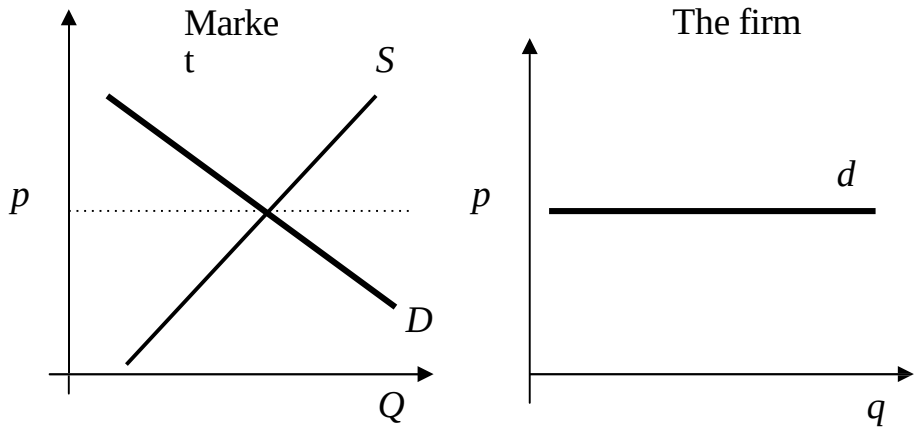

Figure 6.3. Equilibrium price and demand curve for industry and firm products

Depending on the level of equilibrium price *p*, different situations can arise for a competitive firm.

1) *The price is above the minimum of average costs.*

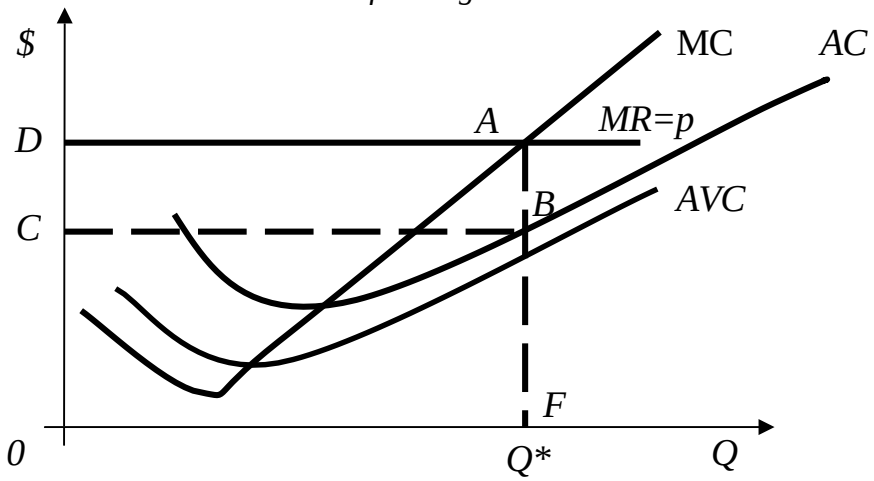

Figure 6.4. Profit of the firm

The condition of maximum profit of the firm is *MC = p.* At optimal output *Q = Q*, the* area of the quadrilateral *AF0D is* equal to total income, and the area of the quadrilateral *BF0C is* equal to *AC· Q*,* i.e. total costs of production. Their difference is equal to the area of *ABCD, i.e.* profit. In this case it is positive. Deviation of *Q* from *Q** reduces the firm's profit.

2) *The price is below average costs but above the minimum of average variable costs.*

Area *FQ*OD is* revenue *P-Q**, area *BQ*OC* is total costs *AC-Q**. Area *BFDC* is the firm's loss because it does not recover its total costs *(p < min AC).* Should the firm cease production?

In the short run, a firm may operate at a loss, expecting to make a profit in the future if price increases. The difference *AC - AVC = AFC* is average fixed costs. The area *BHSC* is the full fixed costs. If the firm stops production, it will incur a loss equal to the area *BQ*OC*. And by continuing production, the firm incurs a loss equal to the area *BFDC,* which is less than *BQ*OC.*

Thus, the loss from closing the plant would be greater than if production were to continue, since each unit of output generates revenue that covers variable costs and at least some of the fixed costs.

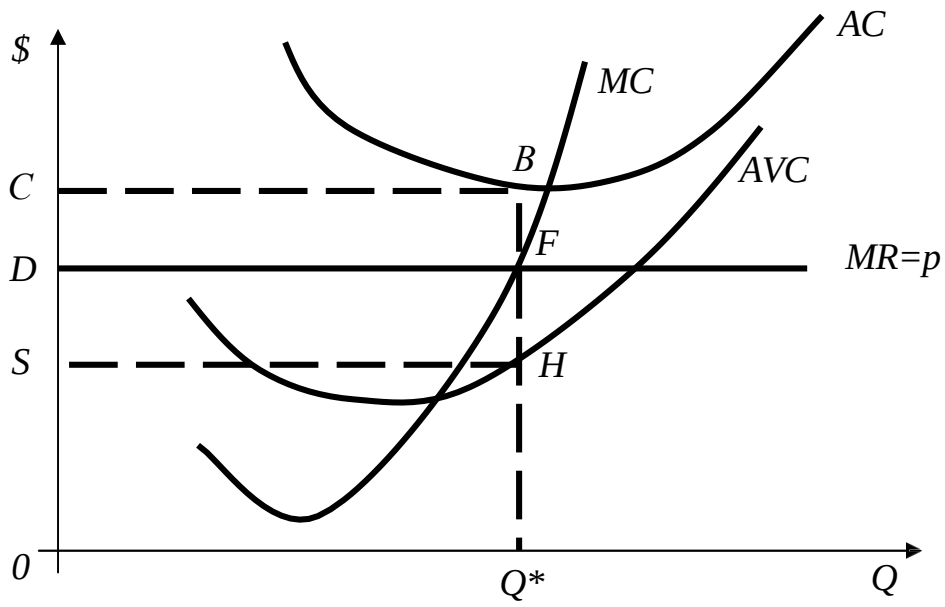

Figure 6.5. Losses of the firm

3) *The price* is *below the minimum average variable costs.*

Area *ABCD* equals fixed costs, area *BFHC* is the excess of variable costs over revenue, i.e. in this case the firm's revenue *OHFQ** does not even cover variable costs *OHFQ*. The* fixed price is below the minimum of average variable costs *(p < min AVC).* Continued production is pointless for the firm and it ceases to operate.

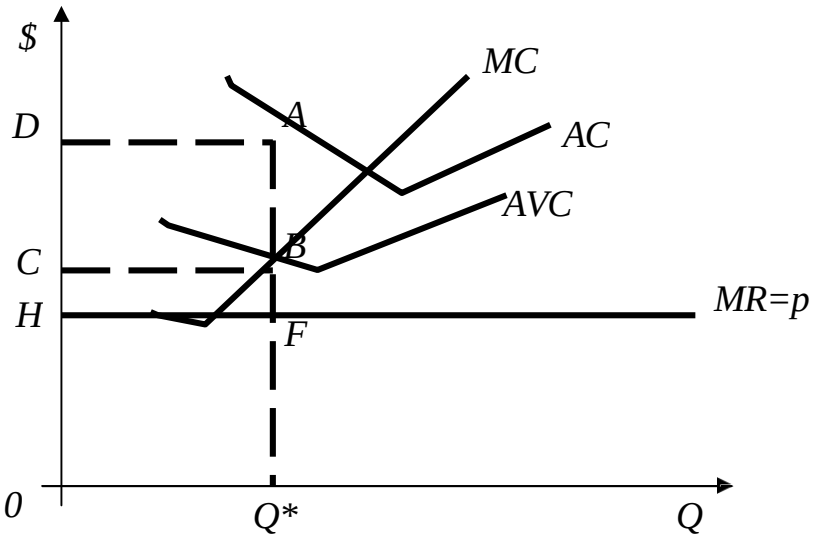

Figure 6.6. Termination of production

For a perfectly competitive firm in the short run, there is a direct relationship between output and market price. At the prevailing market price and cost level, the firm sets the output that allows it to either maximise profits or minimise losses.

By definition, a supply curve shows the relationship between price and the quantity of a good that a firm is willing and able to sell.

For *p < minAVC,* supply is *0.* Since the marginal cost of the firm, which determines the output of additional units of output, increases as *Q increases,* the supply curve is upward-sloping.

Thus, the law of supply is due to the law of diminishing marginal productivity.

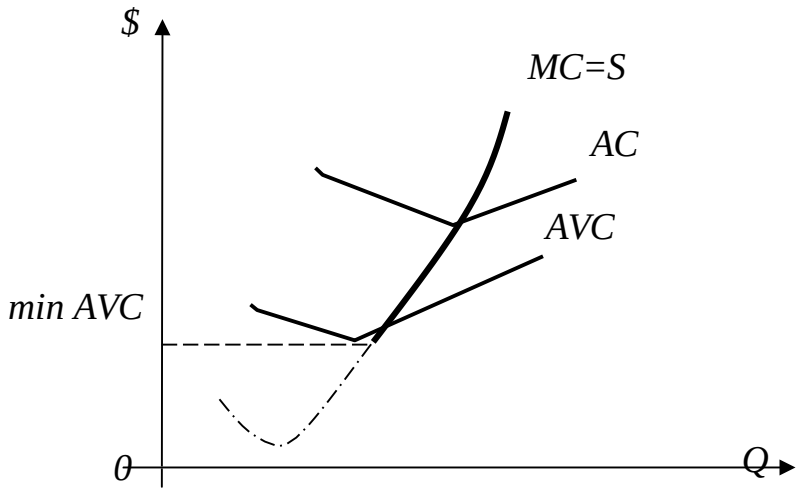

Fig.6.7. Supply curve of a firm

Graphically, the *supply curve of a* competitive firm in the short run is the portion of the increasing branch of the marginal cost curve *MC* above the minimum point of the average variable cost curve *AVC.*

6.3. Equilibrium of a competitive firm in the long run

In the long run, a firm is able to change all factors of production, change its business profile, exit or enter an industry.

If in the short run an individual firm makes a positive profit, then, since perfect competition is characterised by full information and freedom of entry-exit, the profit made attracts other firms into the industry. The entry of new producers will shift the supply curve to the right and lower the equilibrium price.

As a result of an increase in aggregate industry output, the equilibrium market price falls to a level at which a typical firm in the industry earns zero economic profit (Figure 9.8). The disappearance of positive profits (even the emergence of losses if supply increases strongly) causes individual firms to leave the industry, which leads to a reduction in industry output and a shift of the supply curve to the left. The market price rises, the remaining firms have positive profits, and the process starts again.

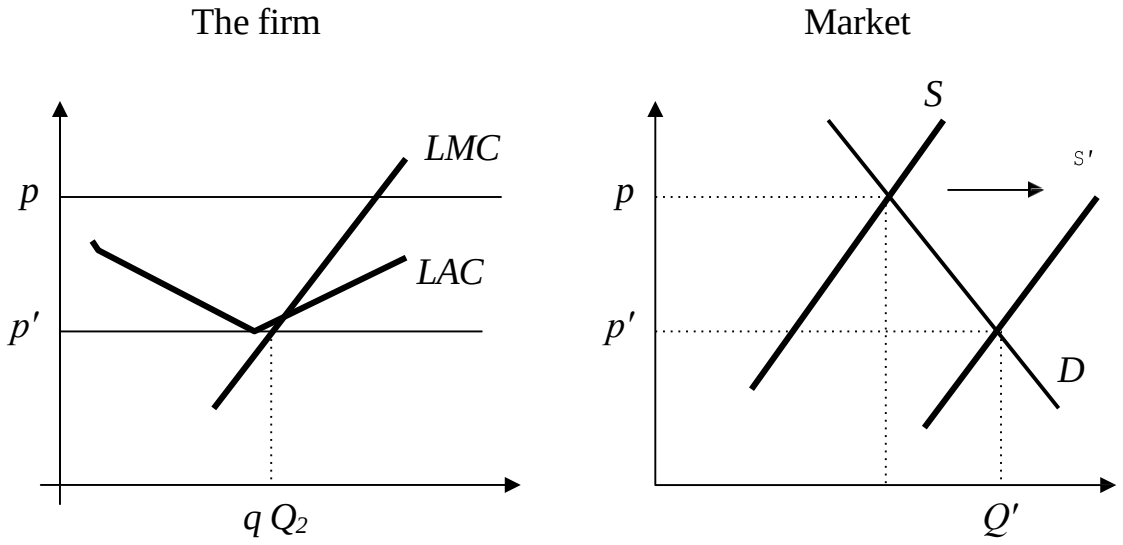

Figure 6.8. Equilibrium in the long run

At zero economic profit, when $p = LMC = min\ LAC\ of$ a typical firm, there is no incentive for competing producers to enter or exit the industry. Therefore, this situation in the long run can be considered as *equilibrium*. In this case, aggregate market supply equals aggregate market demand.

Thus, in competitive markets there is a constant disturbance and automatic restoration of the equilibrium state, which is only observed when all firms functioning in the industry earn zero economic profit and none of them has incentives to change their position.

Self-check questions**:**

1. Give the definition of economic profit, gross, average and marginal revenue.
2. Formulate the profit maximisation condition.
3. Why equality marginal income и marginal costs is essential for profit maximisation in all market structures?
4. Why price can be substituted for marginal revenue in the rule $MR = MC$, when the industry is purely competitive?
5. Explain, why curve demand curve for product competitive firm - a horizontal line?
6. Explain why a competitive firm is a "price taker" rather than a "price maker"?

Recommended reading**:**

1. Pindyck R., Rubinfeld D. Microeconomics. - Moscow: Delo, 2001.
2. Hyman D.N. Modern Microeconomics: Analyses and Applications. T. 1,2. - M.: Finance and Statistics, 1992.
3. Simkina L., Korneichuk B. Microeconomics. - S.-P.: Peter, 2002.
4. Mukhamediev B.M. Microeconomics. - Almaty: Kazak University, 2007.

Theme **7:** MONOPOLY

Objective of the lecture**:** To identify characteristic features monopolistic market, conditions for maximising the monopolist's income and profit, goals and methods of price discrimination.

Keywords Words**:** Monopoly, income, maximisation profit maximisation, price discrimination.

Lecture questions**:** /p. 177 - 187/4/

1. The conditions of a monopoly market.
2. Elasticity, monopoly revenue and demand.
3. Profit maximisation of the monopolist.
4. Behaviour monopolist behaviourв short-term и long-term periods. Public costs of monopoly. Natural monopolies.
5. Price discrimination and market segmentation.

7.1. Monopoly market conditions

A monopoly is a market structure in which a single seller is the supplier to the market of a good that has no close substitutes, while it can influence the price of its good, entry to the market is closed, and buyers accept the price as a given.

A necessary condition for the existence of monopoly is the existence of *barriers* to entry into the industry. Types of barriers: exclusive rights (patents), ownership of the supply of a commodity (the only deposit in the region), natural monopoly (economies of scale).

A firm has monopoly or market power (force) if it can influence the price of its good by changing the volume of its supply. Unlike a competitive firm, the demand curve for a firm's good with market power is sloped. For a monopoly, the demand curve for the monopolist's good coincides with the market demand curve *D*.

The monopolist can set his own price, but he cannot set the price as high as he wants, because sometimes the amount of demand is too small.

7.2. Elasticity**,** monopoly revenue and demand

Keeping in mind that total income $TR = p \cdot Q$, we write:

$$MR = \frac{d(TR)}{dQ} = p + Q\frac{dp}{dQ} = p\left(1 + \frac{Q}{p}\cdot\frac{dp}{dQ}\right) = p\left(1 + \frac{1}{\frac{p}{Q}\cdot\frac{dQ}{dp}}\right)$$

magnitude $\frac{p}{Q}\cdot\frac{dQ}{dp}$ is the price elasticity of demand, i.e. E_p. Hence,

$$MR = p\left(1 + \frac{1}{E_p}\right). \qquad (7.1)$$

Since the price elasticity of demand E_p is always negative, $MR < p$, i.e. the monopolist's marginal revenue curve *MR is* located below the market demand curve *D* (Fig.7.1).

Further, we note that if demand is inelastic, i.e. $-1 < E_p < 0$, then it follows from formula 7.1 that $MR < 0$. So, by reducing the output *Q, the* monopolist will increase his income *TR*.

Therefore, the monopolist always produces in the area of elastic demand where marginal revenue is positive.

Let us substitute the expression for marginal revenue *MR* from (7.1) into the profit maximisation condition *MR = MC*.

$$p\left(1+\frac{1}{E_p}\right)=MC\ .$$

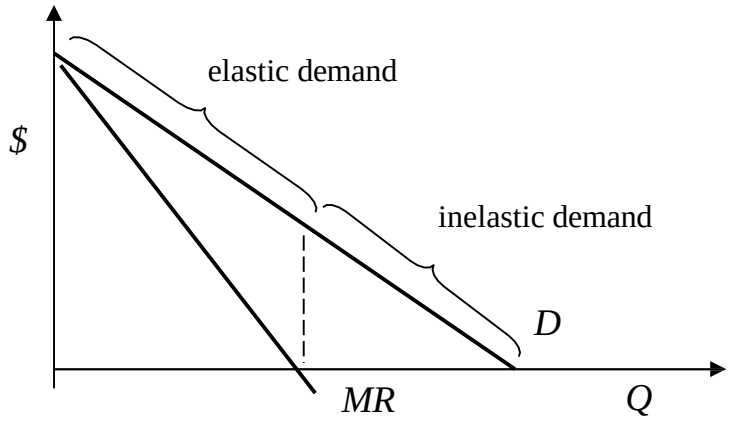

Figure 7.1. Elastic and inelastic demand

From here we find the monopolist's price that maximises his profit:

$$p_m=\frac{MC}{1+\frac{1}{E_p}}\ . \qquad (7.2)$$

For elastic demand, $E_p < -1$, and the expression $1+1/E_p$ in the denominator is positive and less than one. So, unlike a competitive firm, the monopolist sets the price above marginal cost: $p_м > MC$.

The higher the price elasticity of demand, the closer the monopolist's price $p_м$ will be to *MC's* marginal cost.

7.3. Profit maximisation of a monopolist

The firm's profit $\Pi = TR - TC$ is a function of output Q. In order for it to reach the maximum, its derivative must be zero:

$$\Pi' = TR' - TC' = 0.$$

Since $TR' = MR$, $TC' = MC$, hence the monopolist's profit maximisation condition is obtained:

$$MR = MC. \qquad (7.3)$$

So, the optimal output Q^* must be such that the marginal revenue of the firm is equal to its marginal cost. At the point Q^* *the MR* and *MC* curves must intersect. Moreover, at a production volume $Q<Q^*$ marginal revenue *MR* exceeds marginal cost *MC*, i.e. $P' = MR - MC > 0$, and as Q increases to Q^* profit *P increases*. And when the output $Q > Q^*$ marginal revenue *MR is* lower than marginal cost. So, $P' = MR - MC < 0$, and when Q decreases to Q^* *P's* profit also increases.

7.4. Monopolist behaviour

For a competitive firm there is a supply curve. But for a monopoly, it turns out, there is no supply curve, because the monopolist does not react to price changes by adjusting the optimal output under it, but chooses the optimal combination of price p and output Q, which are related to each other by the law of demand.

Depending on the nature of changes in market demand, the monopolist may adopt more of the price of the good and less of the output and vice versa.

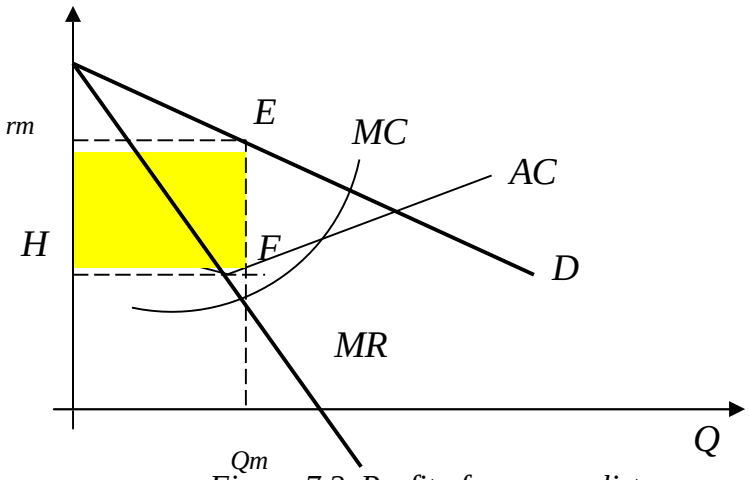

Figure 7.2. Profit of a monopolist

If the monopolist's price $_{rm\ is}$ higher than his average cost *AC*, he makes a positive economic profit (Figure 7.2). This is the area of the rectangle $_{rm}$ *EFH*. But if demand falls, the curves *D* and *MR* fall downwards and profits become negative. The firm will incur a loss.

In the long term, it has to stop production. And in the short term, it must weigh all circumstances and future projections. If the firm exits the market, it may not be able to return.

Any firm, not necessarily a monopolist, that can influence the price of its product has some monopoly power. Its measure is the Lerner index

$$I = \frac{p - MC}{p}. \qquad (7.4)$$

For a competitive firm it is zero, since its optimal output is determined by the condition $p = MC$. And for a monopoly, if in (7.4) the price p replace by the price p_m from (7.2), then $I = \frac{1}{E_p}$.

The more elastic the demand, the less monopoly power a firm has. A competitive market has been shown to maximise society's gain.

Let us compare it with a monopoly (Fig. 7.3). If a competitive market is monopolised, output will decrease from Q_c to $Q_м$, and price will rise from $_{rs}$ to p_m . In this case, the loss of consumer gain will be *A+B* and the additional gain of producers is *A-C*. Total losses of society due to market monopolisation:

$$(A + C) - (A - C) = C + C.$$

Thus, compared to perfect competition, the monopolist produces less, but sets the price higher, and society loses out. Why, then, does society need monopoly?

The point is that small firms in conditions of tough competition cannot spend money on R&D. Scientific and technological progress is ensured thanks to developments in large monopolistic firms, such as *IBM and Microsoft*. Innovations, in particular, reduce production costs.

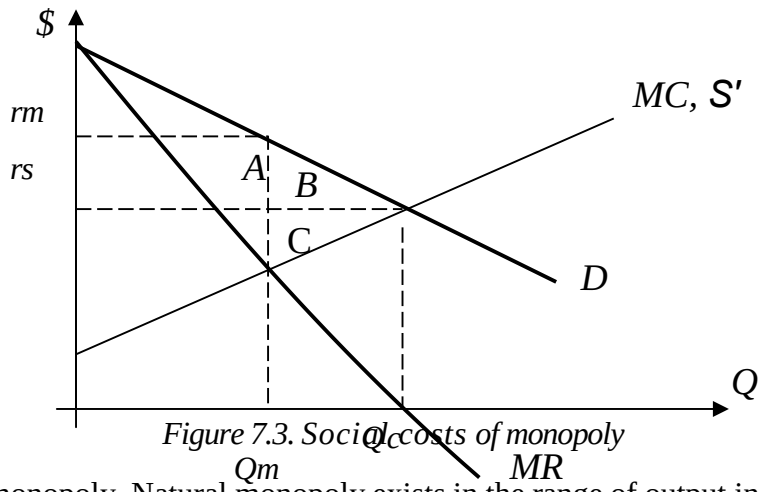

Figure 7.3. Social costs of monopoly

Natural monopoly**.** Natural monopoly exists in the range of output in which economies of scale are strong.

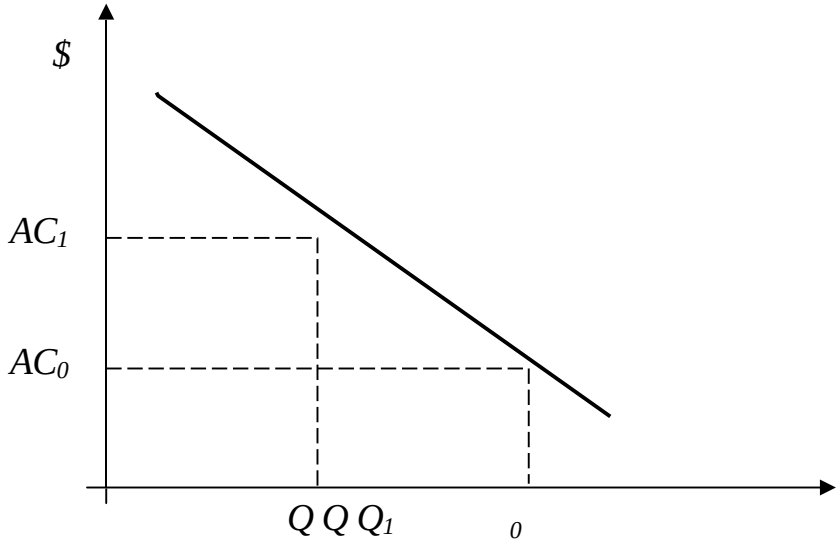

Figure 7.4. Economies of scale

The average cost curve has a negative slope (Fig. 7.4). Usually, natural monopolists are firms that provide public utilities to the population.

It is impractical to divide such firms into smaller ones. For example, if a natural monopoly producing Q_0 output with average cost AC_0 is split into two identical firms with output $Q_1 = Q_0 /2$, each will have average costs $AC_1 > AC_0$. Then the total total costs of both new firms will be:

$$TC_1 + TC_2 = 2\text{-}TC_1 = 2\text{-}AC_1 \text{-}Q_1 > 2 \text{-}AC \text{-}Q_{01} = AC_0 \text{-}Q_0 = TC_0 .$$

If no antitrust regulation is implemented, a natural monopoly will choose its optimal output and price from the condition *MR = MC in* order to make a small profit.

The state can intervene and set a minimum output Q_L . If Q_L is chosen too large, as in Fig. 7.5 the firm's profit will be negative because $P_L < AC(Q_L)$. In such a situation, it may stop production. Therefore, the choice of the firm's prescribed output should leave the firm with the possibility of some positive profit necessary to develop production.

However, it should be borne in mind that no one but the firm itself knows better production and its associated costs. Therefore, taking into account the possibility of intervention

States, it may overstate its costs in order to earn higher actual profits.

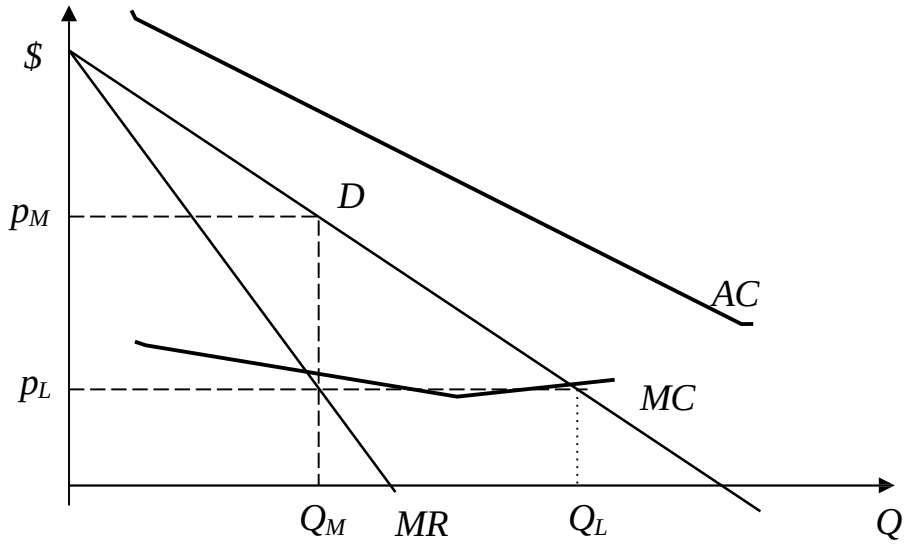

Figure 7.5. Regulation of natural monopoly

7.5. Price discrimination and market segmentation

Price discrimination occurs when the same good or service is sold at different prices to different customers. To exercise price discrimination, a firm must have the ability to determine how much a buyer can pay, and buyers must not be able to pass on the purchased good or service to other buyers.

Price discrimination is implemented in practice b y diversifying prices: by consumer income, by product category, by volume of consumption, by time of sale.

Perfect price discrimination means selling each unit of a good or service at the maximum price at which a customer is willing to buy it.

For example, it can be carried out by doctors, lawyers. In this case, the entire consumer gain is captured. Suppose that Q units of the product have already been sold. According to the market demand curve *D, the* firm will be able to sell another ΔQ units of the product at the price p (Fig. 7.6).

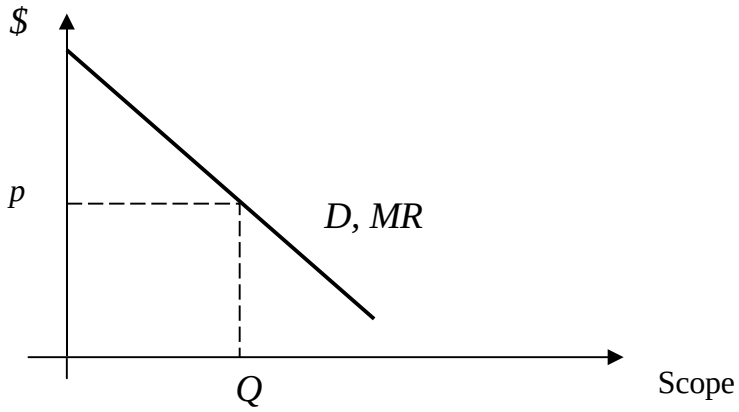

Figure 7.6. Marginal income and market demand

The marginal revenue will be $MR \approx \dfrac{P\,\Delta Q}{\Delta Q} = p$.

Hence, the marginal revenue curve *MR* under perfect price discrimination coincides with the market demand curve *D*.

It is profitable for a monopolist to increase output until the equality *MR is* fulfilled *= MC*. So, the price of the last unit sold is equal to marginal cost, and the firm using perfect price discrimination produces as much output as if it were a competitive firm.

And how does the average income curve behave? Each successive unit of a good is sold at a lower price than the previous one. Therefore, the *AR* curve must be decreasing. For this purpose, the marginal income curve *MR* must be located below the average income curve, with both curves crossing the vertical axis at the same point (Fig. 7.7).

The area of the shaded rectangle is equal to the firm's economic profit. Perfect price discrimination is impossible to implement if the firm cannot know exactly the capabilities and desires of each consumer.

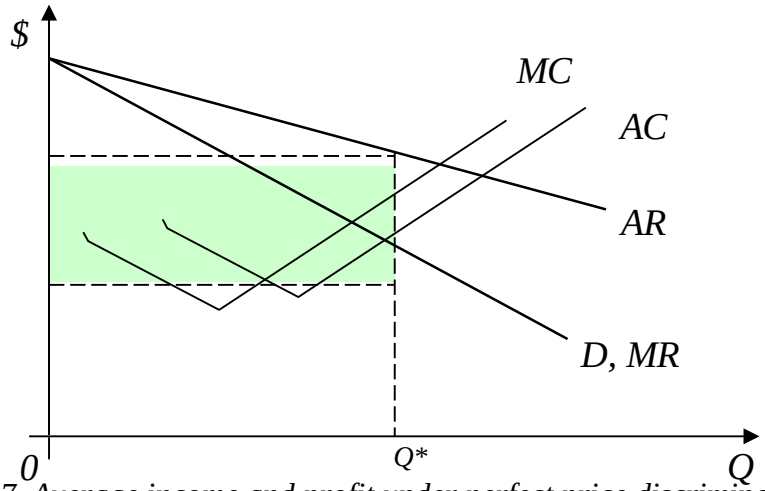

Figure 7.7. Average income and profit under perfect price discrimination

It is usually more acceptable to *segment the market* - dividing customers into several groups based on some characteristic (age, geography, etc.) and assigning to each of them a different price for the same product. For example, setting different prices for entrance tickets to a museum for schoolchildren, adults and pensioners.

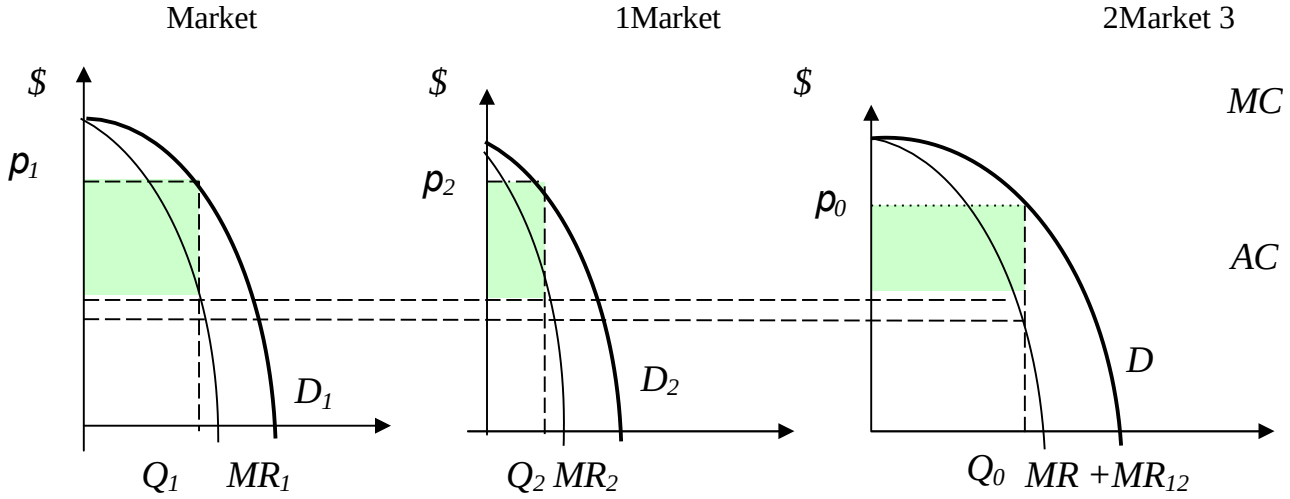

Figure 7.8. Market segmentation

In Fig. 7.8 the m a r k e t i s divided into two segments: market 1 and market 2. Horizontal summation of the demand curves D_1 and D_2 gives the market demand curve *D*.

The condition $MR_1 + MR_2 = MC$ (intersection of the corresponding curves) determines the optimal total sales $Q_0 = Q_1 + Q_2$ on both markets. The values Q_1 and Q_2 are found from the condition $MR_1 = MC$ and $MR_2 = MC$. Then the prices p_1 and p_2 on the first and second markets are determined accordingly.

And the price p_0 is the price of a monopolist without market segmentation. If the total profit on market segments (shaded areas) is significantly higher than the profit without segmentation, then it makes sense for the firm to segment the market.

Self-check questions**:**

1. Under what circumstances can a monopoly arise?
2. How does the price at which a monopoly maximises profit relate to output?
3. How is long-run equilibrium achieved under monopoly conditions?
4. At under what circumstances circumstances monopoly will engage in price discrimination?
5. Why do monopolies use price discrimination?
6. Give examples of market segmentation.
7. In your opinion, what are the disadvantages and advantages of a monopoly market?

Recommended reading**:**

1. Pindyck R., Rubinfeld D. Microeconomics. - Moscow: Delo, 2001.
2. Hyman D.N. Modern Microeconomics: Analyses and Applications. T. 1,2. - M.: Finance and Statistics, 1992.
3. Simkina L., Korneichuk B. Microeconomics. - S.-P.: Peter, 2002.
4. Mukhamediev B.M. Microeconomics. - Almaty: Kazak University, 2007.

8. MONOPOLISTIC COMPETITION

Objective of the lecture**:** To identify characteristic features market monopolistic competition, conditions of profit maximisation in the short and long term

Keywords**:** monopolistic competition, product differentiation, profit maximisation.

Lecture questions**:** /p. 200 - 203/4/

1. Characteristic features of the market of monopolistic competition.
2. Determinants of price and output in the short run.
3. The equilibrium of a monopolistically competitive firm in the long run.

8.1. Characteristics of the market of monopolistic competition

There are markets in which sellers can influence prices but act independently. For example, the shoe market, the men's suit market, the perfume market.

A market structure in which sellers influence the price of their goods but do not take into account the actions of other sellers, entry into the market is free, and buyers accept the price of the goods as a given price is called *monopolistic competition*.

In a market of monopolistic competition, products are heterogeneous, there are too many sellers for them to keep the other sellers at bay, and each is small compared to the market.

Since entry into the monopolistic competition market is free, the length of the period matters.

8.2. Determinations of price and output in the short run

In the short run, the number of sellers in the market is fixed. Each of them has a certain demand for their products and acts as a monopolist (Fig. 8.1).

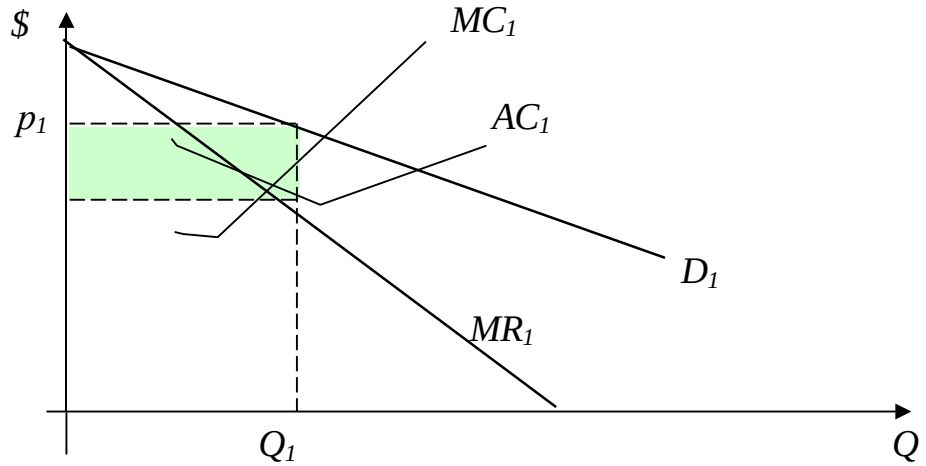

Figure 8.1. Monopolistically competitive firm in the short run

Here D_1 is the demand curve for a given firm's output, p_1 and Q_1 *are the optimal* price and output, MC_1 , AC_1 and *MR* are the marginal, average cost and marginal revenue curves respectively. The darkened rectangle is the firm's profit.

8.3. Equilibrium of a monopolistically competitive firm in the long run periods

The fundamental difference from monopoly is evident in the long run. Let us retain for it the notations introduced for the short-term period.

In the situation in Figure 8.1, a typical firm makes a positive profit. This attracts other firms to the industry, since entry is free.

Often consumers of a given firm switch to the products of new firms, and the demand curve for its product goes down.

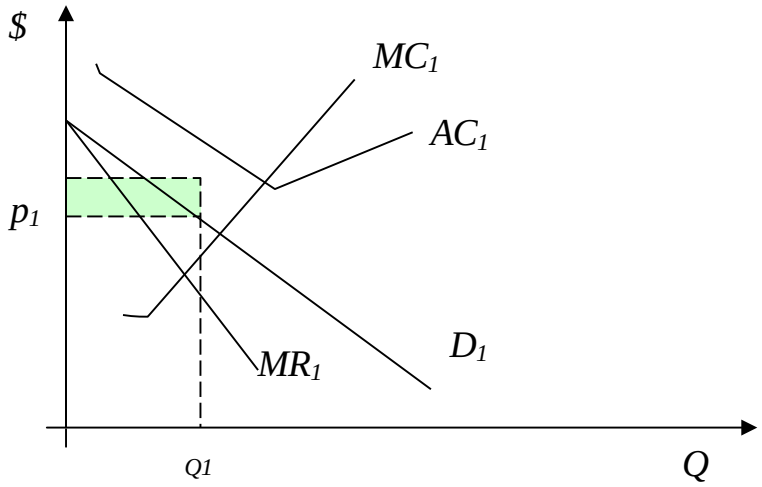

Figure 8.2. Losses of a monopolistically competitive firm

If too many new firms enter the industry, the demand for that firm's product may decrease so much that it will suffer losses. Such firms will start to leave the industry, and the demand curves for the products of the remaining firms will shift upwards as buyers of the products of the closed firms move in (Figure 8.2).

Thus, if the demand curve of firm D_1 is lower than its average cost curve AC_1 , then the firm incurs a loss at any level of output Q. And if the demand curve of D_1 intersects the average cost curve AC_1 , it makes a positive profit at some output Q.

Equilibrium in a monopolistically competitive market will be established when the long-run average cost curve AC_1 of a typical firm touches the demand curve D_1 for its products (Fig. 8.3).

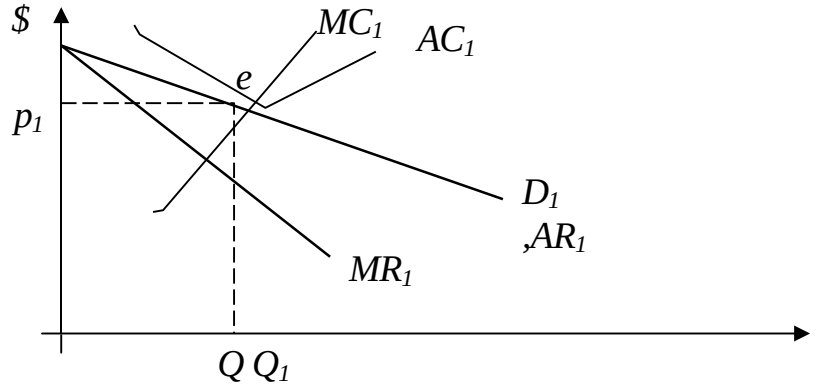

Figure 8.3. Equilibrium of the firm in the long-run period

At the tangent point *e, the* firm will make zero profit. Any shift along the demand curve D_1 will only reduce it. If all firms in the industry are in this situation, the market will be in long-run equilibrium.

The question arises about the fulfilment of the maximum profit condition: do the curves MR_1 and MC_1 intersect at $Q = Q_1$? Let us show that the condition $MR_1 = MC_1$ is fulfilled at the optimal output Q_1 .

Indeed, at the point of tangency *e, the* slope of the average cost curve AC_1 is equal to the slope of the demand curve D_1 , i.e., the average income AR_1 . This means that the derivatives must be equal to each other:

$$AR'_1 = AC'_1 \text{ or } \frac{TR1'}{Q_1} = \frac{TC'}{Q_1}$$

where TR_1 is the total revenue, TC_1 is the total costs of the firm under consideration. Let us perform the transformations:

$$\frac{TR'_1 \cdot Q_1 - TR_1}{Q_1^2} = \frac{TC'_1 \cdot Q_1 - TC_1}{Q_1^2}$$

Since at the point of tangency *e it* is true that $TR_1 = AR_1 \cdot Q_1 = AC_1 \cdot Q_1 = TC_1$, then from the previous equality we obtain $TR'_1 = TC'_1$, i.e. $MR_1 = MC_1$. So, the condition of maximum profit is fulfilled.

Self-check questions**:**

1. Give examples of monopolistically competitive markets.
2. Which are, in your opinion in your opinionin your opinion, shortcomings и advantages of a monopolistically competitive market?
3. Can whether firm on monopolistically competitive market make a positive profit in the long run?

OLIGOPOLY

Objectiveof the lecture**:** To identify characteristic features oligopoly market, analyse the main models of oligopoly.

Keywords**:** oligopoly, price wars, strategic behaviour, collusion, cartel, duopoly.

Lecture questions**:** /p. 203 - 207/4/

1. Characteristics of an oligopolistic market.
2. Price wars. Strategic behaviour and game theory (prisoners' dilemma).
3. Collusion and cartels.
4. Other models of oligopoly.
5. Duopoly: Cournot's model, Bertrand's model.

9.1. Characteristics of an oligopolistic market

A market structure in which sellers can influence the price of their goods, take into account the reaction of other sellers to their actions, market entry is open or closed, and buyers accept the price as a given is called an *oligopoly*.

In an oligopoly, there are a small number (2 to 15) of large firms whose output is sufficient to meet consumer demand for the product. The product itself can be either standardised (steel, aluminium, cement, etc.) or differentiated (cars, cigarettes, alcoholic beverages, household appliances, etc.). Products are usually manufactured using advanced technology and at minimal cost. Entry barriers are economies of scale, patent protection, ownership of the source of raw materials or know-how.

Since the entire market is divided between a limited number of large producers, their pricing and production policies depend not so much on intrafirm decisions as on the decisions and actions of competitors. A key feature of oligopoly is the *strategic behaviour of* market actors, i.e. a situation in which the actions of one firm directly influence the actions of other firms. Each of the sellers can influence the price of its goods, but necessarily takes into account the reaction of the others.

In an oligopolistic market, there should not be many sellers and each of them should account for a significant share of the market. An example is the market for cars of a certain class.

9.2. Price wars**.** Strategic behaviour and game theory

A price war is a cycle of successive price reductions by rival firms. Usually such a price policy is pursued by large firms seeking to drive their competitors out of the market. Weaker firms cannot lower their prices and are forced to leave the industry. But a real war can start among producers of equal potential, in which buyers will be the winners (because the price of goods will be significantly reduced), and both competitors will be the losers, because they will deprive each other of profits.

The rivals will successively lower prices until the price falls to the level of average costs. Equilibrium will occur when neither firm can no longer benefit from the lower price. In the equilibrium state, both sellers will set the same price $p = min\ AC = MC$. In this case, economic profit will be zero and aggregate output will be the same as in perfect competition.

The pricing strategy of oligopolistic firms in practice is investigated with the help of *game theory (a* classic example of game theory *is the prisoners' dilemma).*

9.3. Collusion and cartels

Oligopolists realise the futility of launching a price war and seek to increase their profits through mergers, acquisitions and collusion.

An association of firms that are tied together to limit output and raise the market price of a good is called a *cartel*.

In many countries, the creation of cartels is prohibited by law. A cartel whose aim is to maximise total profits behaves like a monopolist.

Since less output is produced under monopoly conditions than under perfect competition, the cartel sets quotas for its members (Figure 9.1). This is one of the reasons that make a cartel unsustainable, even if it is legal. Exceeding the quota q_1 , set for a firm to the optimal volume q^* , increases its profits at the cartel price p^*. However, if other cartel members do the same, an increase in supply in the market will lower the equilibrium price and reduce the profits of all cartel members.

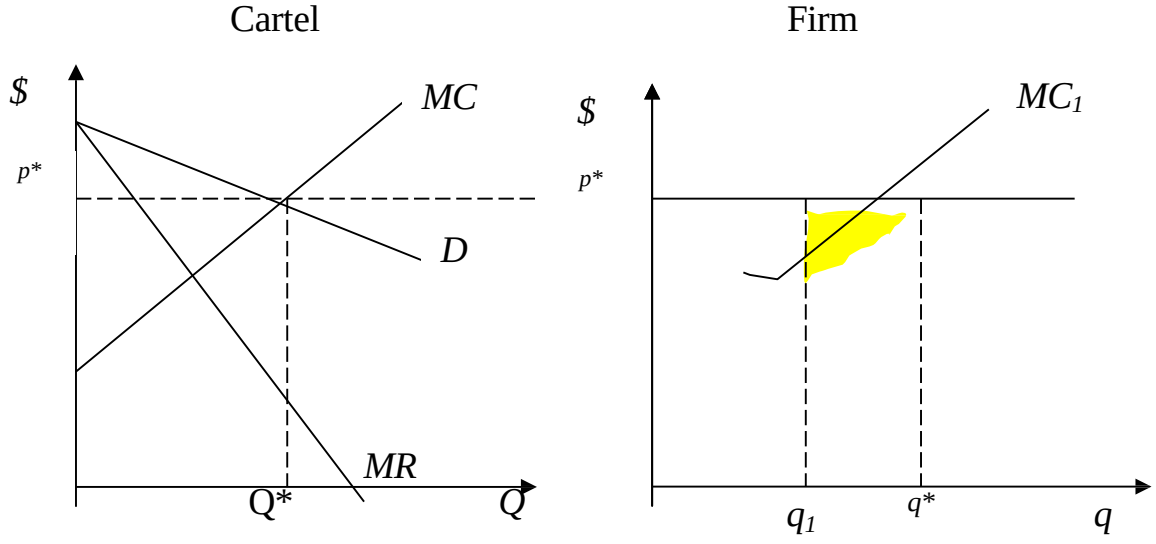

Figure 9.1. Cartel and firm

Another reason is the entry into the industry of other firms attracted by high profits. This is possible if the cartel does not have the ability to restrict entry into the industry.

9.4. Other models of oligopoly

In addition to collusion, oligopolistic firms can co-operate effectively under the following models: price leadership, broken demand curve and pricing that restricts entry into the industry.

Price leadership. Firms may voluntarily recognise the leadership of one large producer and pursue the same pricing and production policies as it.

In this case, the leading firm sets the output volume and price that provide it with the maximum profit, and weak firms accept the leader's price as a given, because they are convinced that the leading firm has more information about market demand and its price will maximise their profit.

A broken demand curve. Prices in oligopolistic markets tend to be rigid, unchanging. This is because if one firm decides to raise the price of its goods, it is unlikely that any of its competitors will follow suit. But if the price is lowered, all rival firms will be forced to lower their prices to avoid losing customers. Above the point of the initial price, the demand for the firm's products will be highly elastic, as its customers will prefer to switch to firms that have not raised their prices, and below this point - not elastic, as competitors will also lower their prices and each will remain with its customers. A sharp change in elasticity yields a broken demand curve (Figure 9.2).

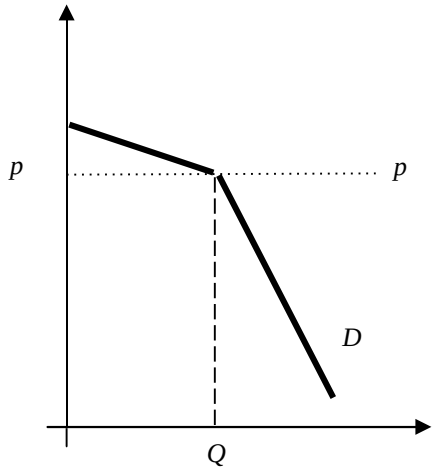

Figure 9.2. Broken demand curve

Pricing that restricts entry into an industry. Oligopolistic firms may deliberately underprice their products, thereby reducing their profits, so that new potential producers are discouraged from starting their business. The point is that new firms incur higher costs when entering an industry than firms that have been in the industry for a long time. "Old" firms set prices at *min LAC* , where *LAC* is the long-run average cost of a typical oligopoly firm, thus making zero economic profit. It turns out that they sacrifice current profits to obtain future super-profits.

9.5. Duopoly**:** Cournot model**,** Bertrand model

An oligopoly in which there are only two sellers is called a *duopoly*. Suppose there are firms *A* and *B* in a duopoly and they produce a homogeneous product.

If firm *B* fixes its output at $Q_B = 400$, the curve $D^A\ (400)$, obtained by shifting the market demand curve *D to the* left by 400 units, will set the *residual demand* for firm *A's output* (Figure 9.3). In general, $D^A\ (Q_B)$ -

the residual demand curve for firm *A's* output if firm *B* produces Q_B units of production.

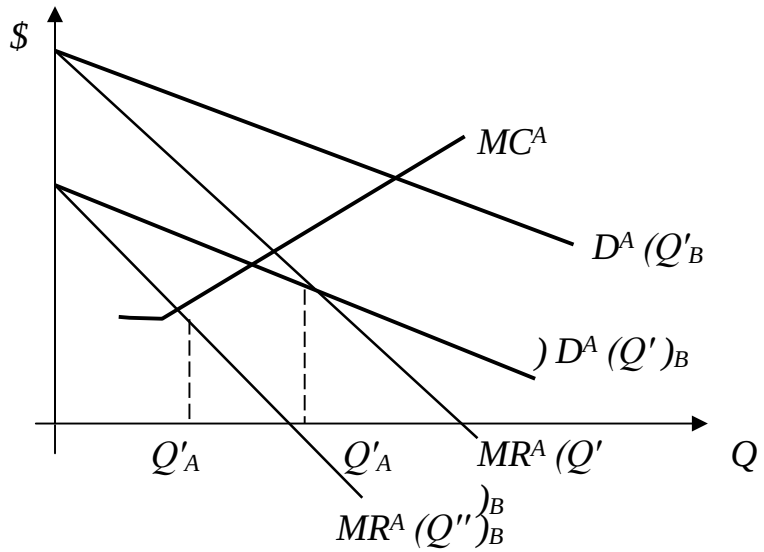

Figure 9.3. Optimal choice of firm A depending on the choice of firm B

Figure 9.4 shows the two residual demand curves $D^A\ (Q'_B)$ and $D^A\ (Q''_B)$ and their corresponding marginal income curves $MR\ (Q'^A_B)$ and $MR^A\ (Q''_B)$ for $Q'_B < Q''_B$.

As can be seen, from $Q'_B < Q''_B$ follows $Q'_A > Q''_A$. Hence, the dependence of $Q_A = f^A\ (Q_B)$ of the optimal choice of firm *A* on the fixed output Q_B of firm *B is* inverse This dependence $Q_A = f^A\ (Q_B)$ is called the *response function of* firm *A. The* response function of firm *B* is defined similarly:

$$Q_B = f^B\ (Q)_A.$$

In the diagram Q_A Q_B set the response curves (Fig.9.4).

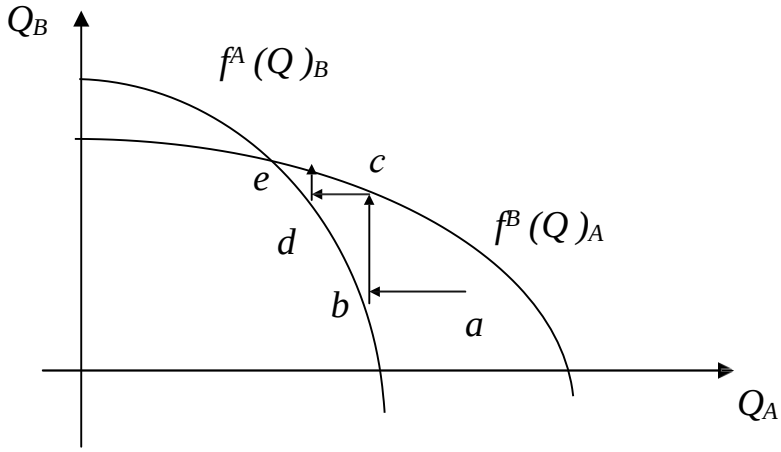

Figure 9.4. Response curves

If initial output determines point *a*, then firm *A*, with firm *B's* output unchanged, should so change its output Q_A , as to move to point *b* on its response curve and thereby maximise its profit.

In turn, it is reasonable for firm *B* to change its output Q_B , to move to point *c* on the response curve of firm *B*. Such a move will move the duopoly state off the response curve of firm *A*. It will then be forced to change its output Q_A again and move the states to a point on its response curve, and so on.

A market is in *Nash equilibrium* if no firm is willing to change its behaviour provided that the other firms keep their behaviour unchanged.

If firms compete with each other by changing output, this state is also called *Cournot equilibrium*.

At the point *e where the* response curves intersect, a Cournot equilibrium is reached, as it is not profitable for any firm to exit.

In the Bertrand model of oligopoly, firms interact with each other by setting the prices of their goods rather than output.

Self-check questions**:**

1. Give examples of oligopolistic markets.
2. How does the interaction of firms in an oligopoly affect price and output setting?
3. What conditions affect the functioning of the market under oligopoly conditions?

Recommended reading**:**

1. Pindyck R., Rubinfeld D. Microeconomics. - Moscow: Delo, 2001.
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11. MARKET FAILURE

Purpose of the lecture**: to** examine the causes of market failure and the need for government intervention in the economy.

Keywords**:** market power, asymmetric information, externalities, public goods, stowaways.

Lecture questions**: /s**. 313, 403/5/, /c. 235 - 238/4/

1. Market power.
2. Incomplete (asymmetric) information.
3. External effects (externalities)
4. Public goods. The problem of "hares".

The modern economic system is unthinkable without government intervention, because in its "pure" form it is untenable (inefficient) for four main reasons:

1) market power;
2) incomplete (asymmetric) information;
3) external effects;
4) public goods.

11.1. Market power

Market power is the ability of a seller or buyer to control the price of a good and the volume of its sales. From the previous analysis we know that if a producer has monopoly power, he will choose the amount of output at which his profit will be maximised when his marginal revenue and marginal cost are equal. In this case, the price of goods will be higher and the quantity offered will be lower than in a competitive market.

Without government intervention aimed at regulating monopoly markets, some part of consumers will be deprived of the opportunity to use the products and services of monopolists. First of all, this applies to the products of natural monopolies: electricity, water and gas supply, railway and air transport, notary services, etc.

11.2. Incomplete **(**asymmetric**)** information

Incomplete (asymmetric) information - a situation in which some of the parties to a transaction have more complete information about the characteristics of a good or service than others.

Generally, sellers are better informed about the quality of the product being sold than buyers, and workers are better informed about their strengths and weaknesses than employers.

In some markets, distorted (asymmetric) information has a great impact on transactions. First of all, this applies to the markets of used cars, secondary housing, construction and repair services, etc. The distorted (asymmetric) information in some markets has a great impact on transactions.

Therefore, *reputation* is important when making a purchase decision
a salesman or an employee.

The state, for its part, seeks to oblige sellers to standardise their goods, to post full information about them, to check the quality of products and the legality of transactions.

11.3. External effects **(**externalities**)**

Externalities (externalities) are impacts on third parties (who are neither buyers nor sellers of a given good) that are not reflected in the prices of goods and services.

A distinction is made between positive and negative externalities.

A positive externality occurs when the activities of some market participants benefit others.

Negative externalities arise when the actions of some market participants cause harm to others.

In this case, the government seeks to control negative externalities through taxes and fines, and encourage positive ones through subsidies and grants.

11.4. Public goods**. The** problem of "hares"**.**

Public goods - goods that are consumed collectively by all consumers, regardless of everyone's willingness, ability and readiness to pay for this consumption.

All goods that a consumer receives can be divided into private and public goods. A good is called *private* if consumed by one person, it cannot be consumed by another person. For example, an apple, a glass of juice, clothes, a tourist trip.

A good is called *public* if, once consumed by one person, it is also available for consumption by others. Examples are street lighting and safety, clean air, national defence, lighthouse light.

Public goods have two characteristic features: non-competitiveness and non-excludability.

A good is called *non-competitive* if, having been provided to one person, it can be provided to other persons without additional costs. At any given level of its production, the marginal cost of additional consumption is zero. For example, a radio signal. Each owner of a radio receiver can tune it to the frequency of a given radio station and this does not increase the cost of creating a radio transmission and transmitting the signal.

A good is called *non-excludable* if no one can be excluded from its consumption. Consumers who are unwilling or unable to pay for the use of a given good cannot be prevented from consuming it, as there are no effective ways of restricting or excluding them from using public goods.

The market alone does not produce public goods. For example, all citizens want good roads in their city. Private firms will repair them if the citizens pay for the work. In order to raise the necessary amount of money, a fundraiser can be organised. But there will be a problem of "hares". There will always be people who will say that they are satisfied with the existing roads and refuse to pay. But if, in the end, the roads are repaired, they will enjoy driving on them. This is the failure of the market. Therefore, financing of public goods is to a greater extent assumed by the state.

Let's take a closer look at how the demand and supply of a public good are formed.

The marginal utility MB of a public good is the most that a consumer is willing to pay to obtain an additional unit of that good. The marginal public utility *MSB of a public good* is the sum of the marginal utility of that good for all consumers:

$$MSB = \sum_{i} MBi .$$

The marginal utility of MB_i individuals decreases as the volume of consumption of the good increases. Figure 11.1 shows the situation for three individuals. Given a volume of consumption of a public good Q_0 , the first of them is willing to pay p_1 dollars more for one more unit of the good, the second - p_2 , the third - p_3 .

Together, they agree to pay $p_1 + p_2 + p_3$ dollars for a one unit increase in consumption of the public good. Hence, the *MSB* curve is obtained by summing vertically the *MB* curves$_i$.

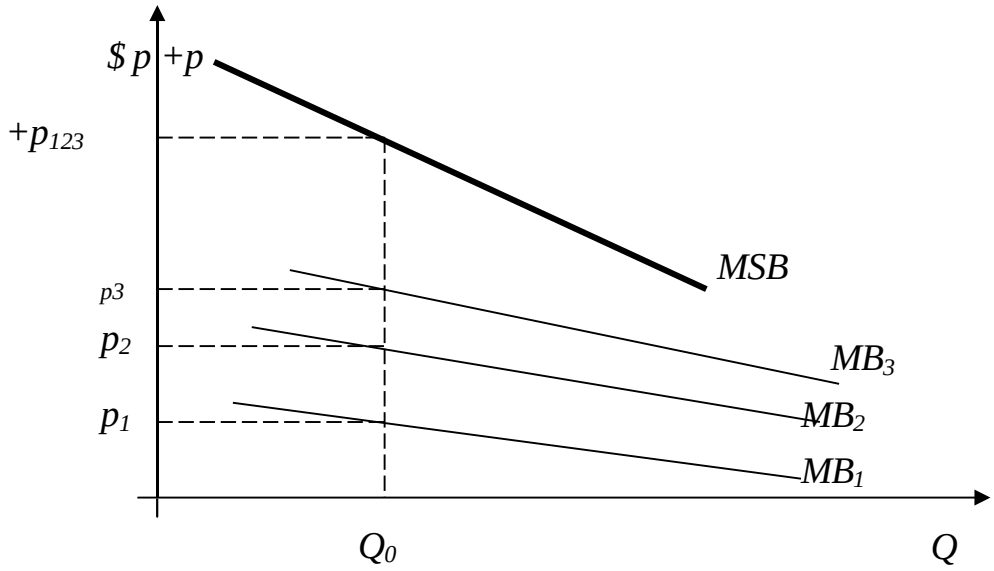

Fig.11.1 Demand for public good

Each *MB* curve$_i$ specifies the demand of the i-th individual for the public good, and the curve *The MSB* is society's demand curve for that good.

Thus, the demand curve for a public good is the sum of individual demand curves *vertically*. Recall that for a private good, the summation of individual demand curves is horizontal.

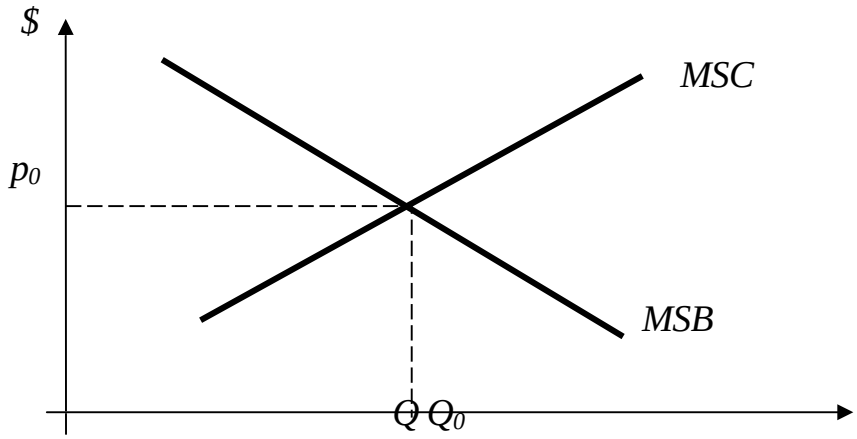

Fig.11.2: Equilibrium of demand and supply of a public good

Like a private good, a public good requires a certain cost to create. The marginal public cost *MSC* refers to the additional cost of increasing the volume of a public good by one unit.

It is reasonable to increase the consumption of a public good as long as each next unit of it yields more additional public utility than the additional public cost required to create it. The equilibrium will be reached when *MSB = MSC.*

For example, residents of a town want to build a dam to protect themselves from flooding. The amount of donations they agree to make depends on the expected size of this structure. Equilibrium will be reached when marginal social utility equals marginal social cost.

Self-check questions**:**

1. How does a pure public good differ from pure private goods?
2. What are the attributes of a public good?
3. Give examples of public goods.
4. From what sources are public goods financed? Why are purely market mechanisms ineffective in creating public goods?
5. What are externalities? How do they affect the price of goods offered on the market?
6. Give examples of positive and negative externalities.

Recommended reading**:**

1. Pindyck R., Rubinfeld D. Microeconomics. - Moscow: Delo, 2001.
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