Economics I

Production Analysis. The Costs and Revenues of the Firm

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Course Objectives:

The aim of the first lecture is to explain the behavior and decision-making of the manufacturer. Clarify assumptions of the theory of the firm, explain and characterize the production function and types of production analysis in the short and long term.

Describes and explains the company costs in the short term and in the long term.

Course Objectives:

The second lecture will define the company's revenue, clarify the distinction between total, average and marginal revenue of the company, profit analysis, definition of the distinction between explicit and implicit costs.

Content:

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References and further reading:

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1.

MANUFACTURERS BEHAVIOR AND DECISION MAKING

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1.1 Assumptions of the theory of the company

The company appears in two markets:

a) The goods and services market,

b) The market of production factors.

The company must decide what and how much will be produced (production volume) which determines the price, combination and amount of factors of production.

The main objective of the company is to maximize profit; maximize the surplus of total revenues over total costs.

The firm behavior affects the whole complex of economic and non-economic factors affecting the level of costs and revenues. Among these may be mentioned the following:

- prices of factors of production,
- technology,
- competition ,
- price of manufactured goods,
- the length of time (very short, short, long, very long period),
- a number of specific factors.

2.

PRODUCTION AND COSTS

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2.1 Production analysis in a short period

The amount of costs is influenced by the quantity and price of the used input. Therefore, we start by selecting input.

The volume of the production is the result of a combination of factors of production we have used, so we can write:

$$Q = f(F1, F2, ..., Fn)$$

Production is efficient when:

- quantity resduction of certain PF will lead to a reduction in the volume of production,

- technology is constant,

- manufacturer knows and accepts technology and prices of PF.

Thus defined production function has the following properties:

- expresses the fact that the output can be produced by various combinations of inputs,

- shows the technological limitations of production, it is based on the level of technology,

- does not assume unnecessary and inefficient production processes, which results from an emphasis on maximum output in its definition.

Total, average and marginal physical product

Total product (TP) *represents the volume of production, which is made by a certain amount of the PF).*

TPP = Q

Average physical product (APP) representing the average labor productivity and is used as an indicator of efficiency,

APP = TPP / F = Q / L

Marginal physical product (MPP), which expresses the increase in the volume of total output produced by the last consumed unit of PF (assuming constant amount of other inputs),

MPP = TPP / F = Q / L

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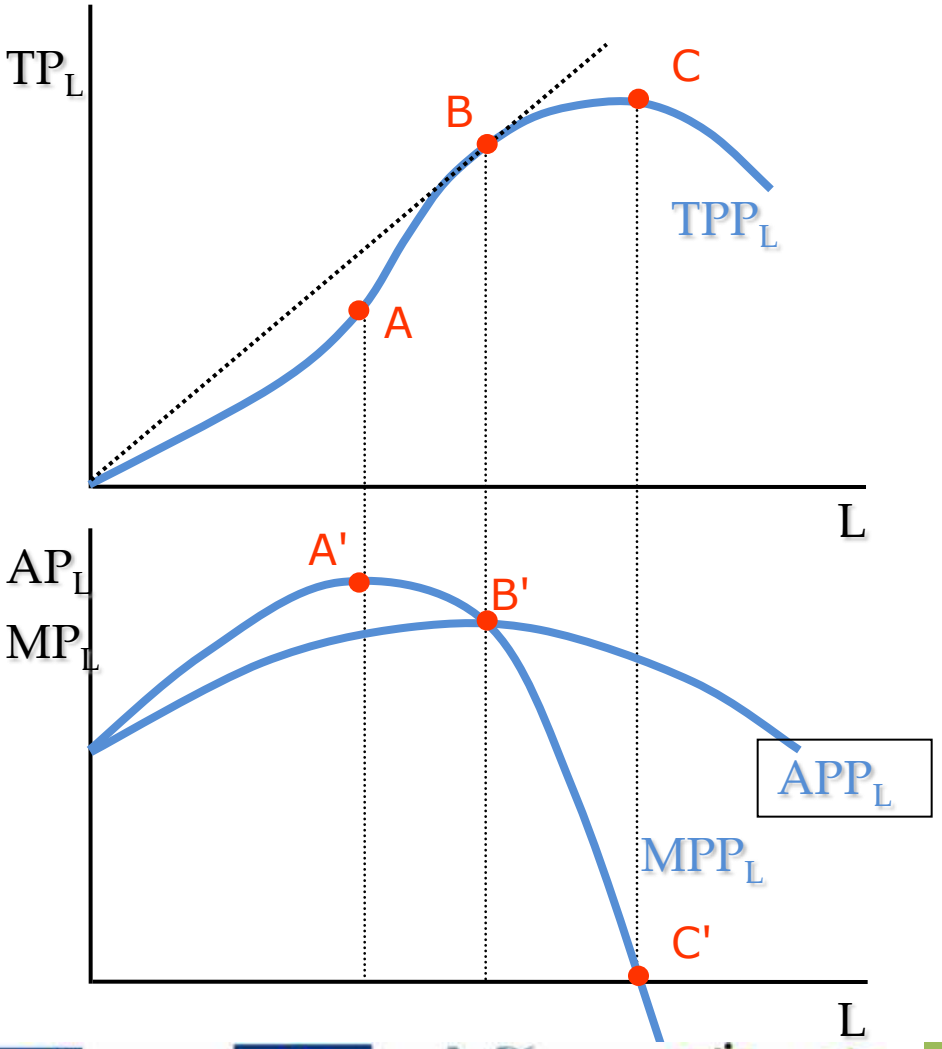
TPP, APP and MPP



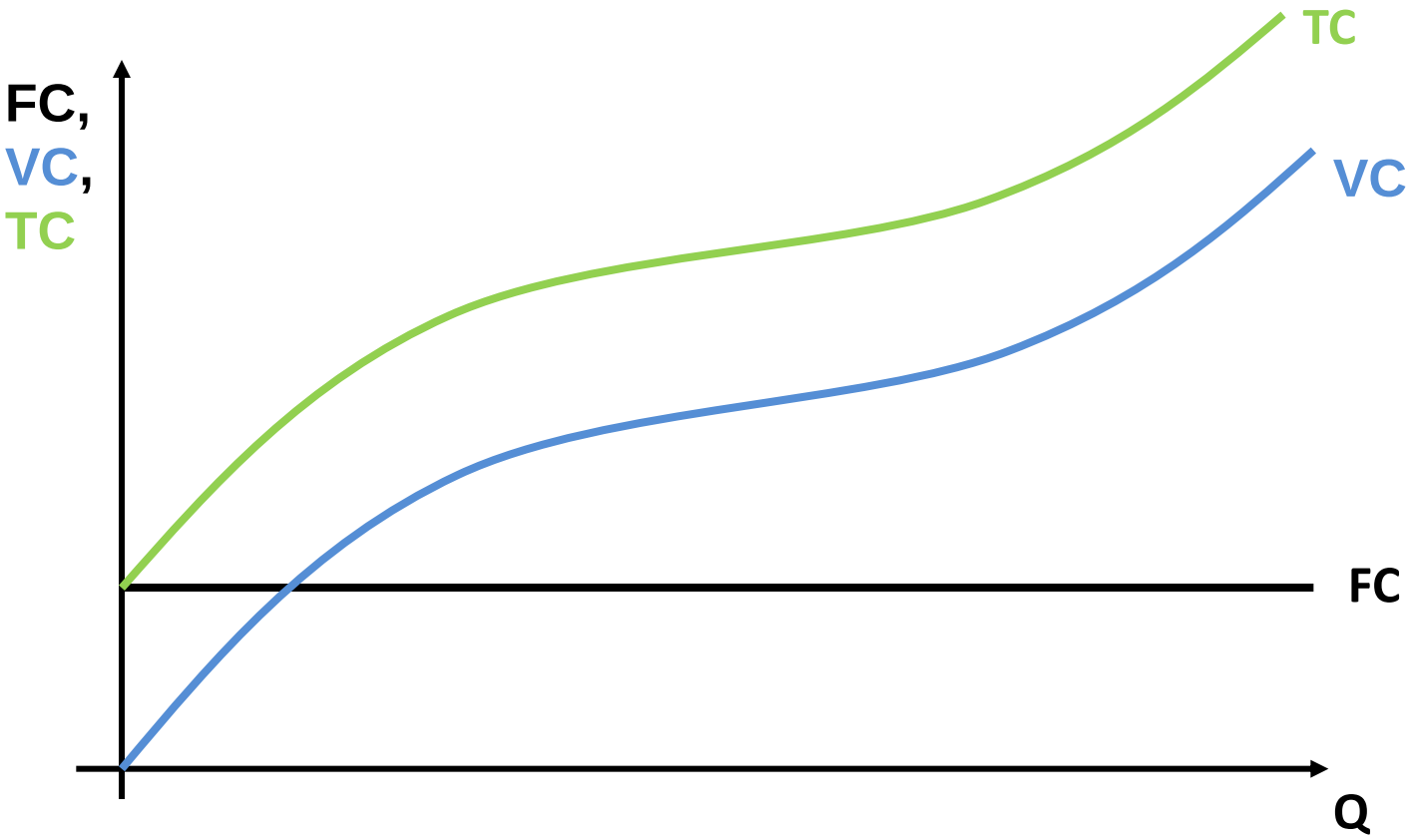
2.2 Costs in the short run

Total cost has two components:

Variable costs (VC) with the growth in production volume are growing (can be measured with a production capacity linearly or nonlinearly). In our case, is thus a the cost of the variable input.

Fixed costs (FC) are costs that do not change with the volume of production. The company must pay them, even if the output is zero. These include maintenance of buildings and equipment.

Total costs



Average and marginal costs

As with physical product, we distinguish average (unit) and marginal costs.

Average costs (AC) are the cost per unit of production.

Therefore: **AC = TC / Q**

Average cost curve has a similar shape to a letter U.

How to explain this? Average costs could be split on the average fixed cost (AFC) and average variable cost (AVC).

This applies : **AC = AFC + AVC**

Mutual relationship curves and average costs

SAC and AVC

- Min. AVC is to the left of min. SAC SAC = AVC + APC

- SAC grow only when growth AVC exceeds the decrease of AFC

-With the growth of Q there is a convergence SAC and AVC curves since AFC fall

MC and AC

- SMC curve intersects the AVC and SAC curves from below, in their minimum

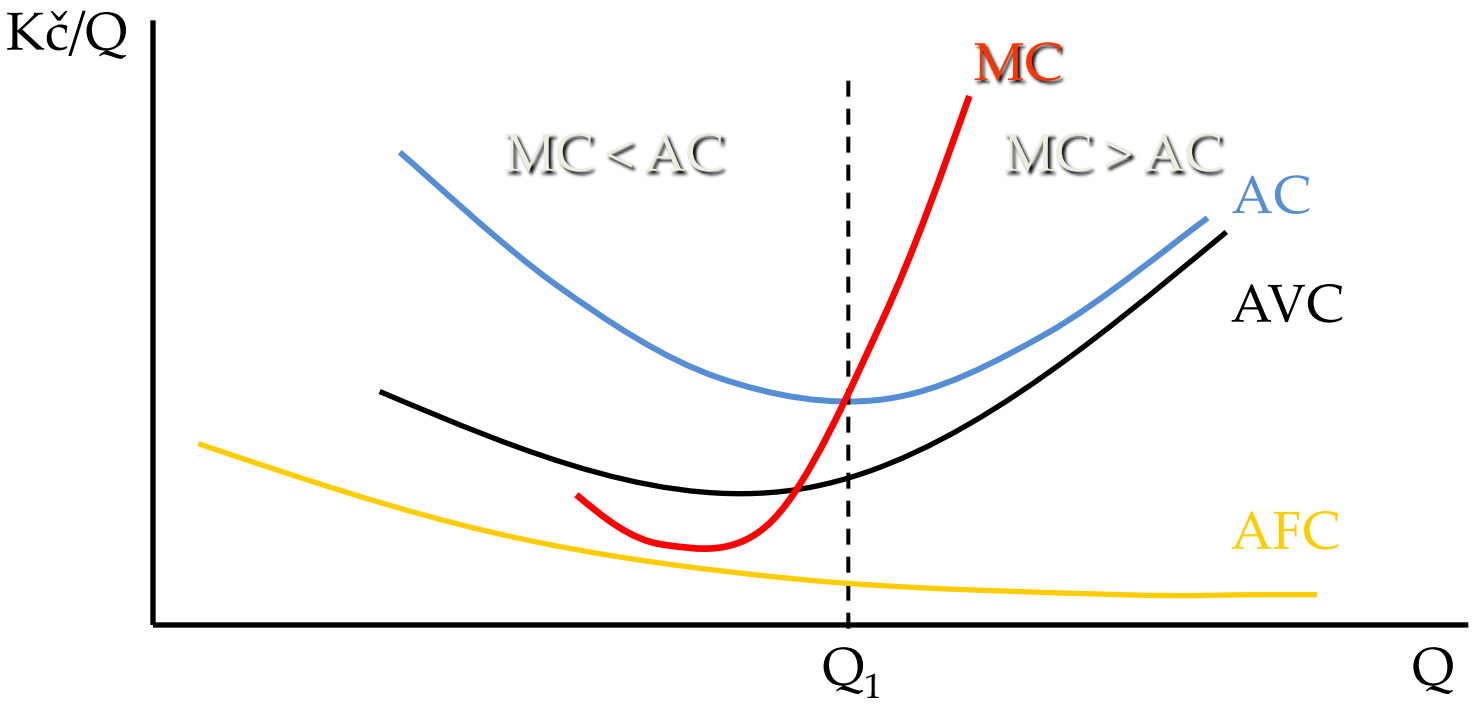
- When Q <Q1 SAC curve is above the curve SMC (SAC> SMC)

- When Q = Q1 SMC curve intersects the curve at its minimum SAC = SMC SAC

- When Q> Q3 SAC curve lies below the curve of SMC (SAC <SMC)

This is so **MC = TC / Q**

MC and AC in SR



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2.3 Production analysis in the long run

Now, we discuss a long period (run) considering a production function with two variable inputs (labor and capital).

We call it the **isoquant.**

Isoquant (sometimes called the indifference curve) represents a combination of factors of production, which use can produce the same volume of production.

Isoquants are an analogy of indifference curves, their basic characteristics only summarize:

• isoquant are declining since higher quantities of both factors of production can produce higher levels of production.

• isoquant are convex to the beginning. If the work is replaced by capital, increases due to the law of diminishing returns the marginal product of labor and declining marginal product of capital. To be made the same volume of production, proportions in which factors of production are replaced must match the overturned ratio of their marginal products.

Therefore: **K / L = MRPL / MPPK ....**

Marginal rate of technical substitution of capital for labor Isocost Tc = PL.L + PK.K

PL / PK and TC is reflected in the shift and spin of Isocost

a) Change TC - shift Isocost with unchanged Direction

b) Change in PL / PK - change of

This ratio is called the marginal rate of technical substitution of capital for labor (MRTS K, L).

Also in this case we use the analogy with indifference analysis: we replace the line budget by the line of the same total costs (**Isocost**).

Points on the line of the same total costs XY show all combinations of available production factors regardëd to the given total costs. Point on the x-axis represents the situation where the company spent costs only on the work, the point on the y-axis situation where only capital is purchased.

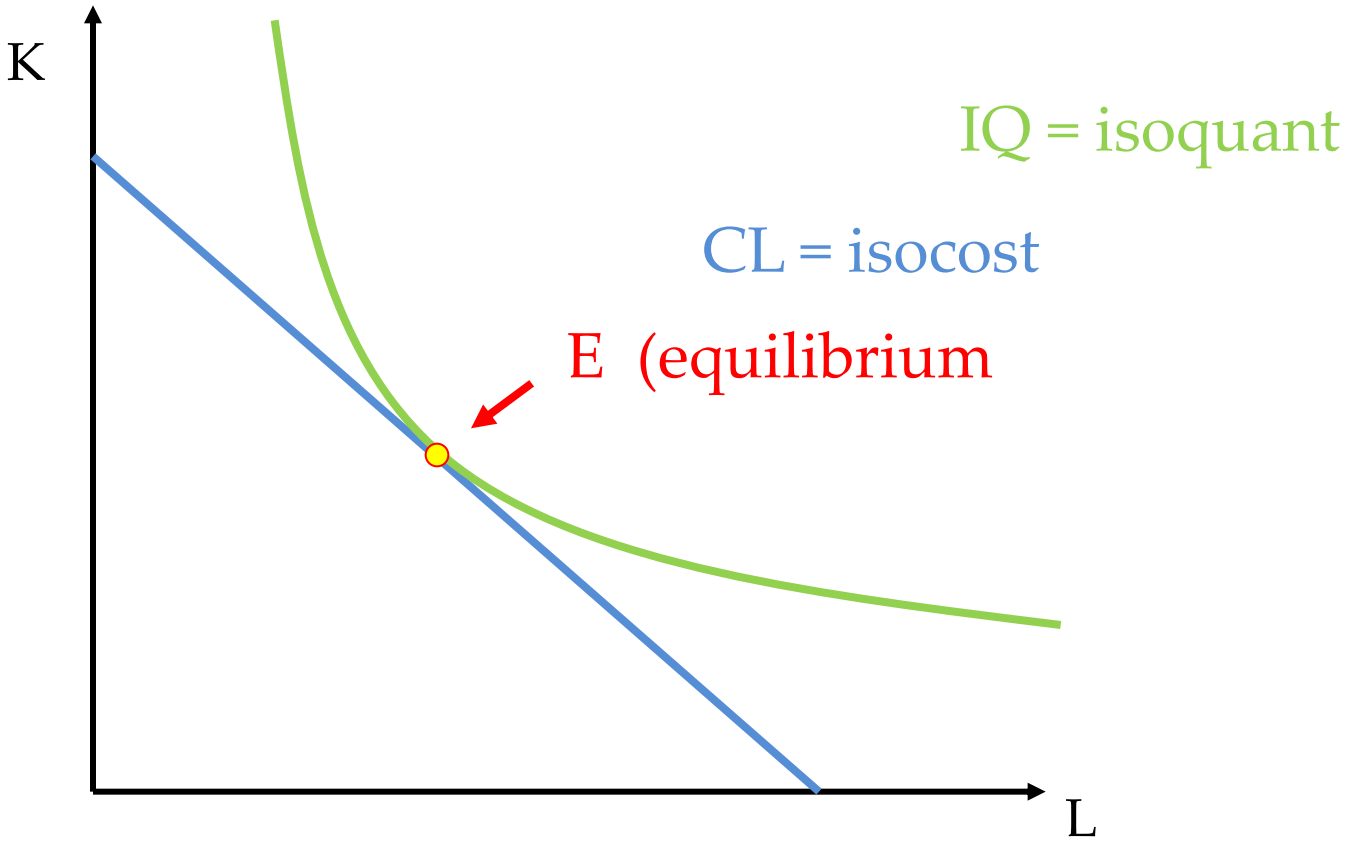
The price system and general equilibrium:

- General equilibrium occurs when consumers and producers face the same prices and they receive them. Firms balance the the relative prices with the ratio of marginal products. Consumers balance relative prices with relative marginal utility of both products. In the equilibrium point, therefore, the following applies:

relative marginal cost = PX / PY = relative marginal utility

MRPT = PX / PY = MRS

Cost optimum - equilibrium



2.4 Costs in the long run

The curve of the total costs in the long term has a similar shape as in the short term.

But in a short period, its shape is determined by the revenues from the variable production factor, in the long run is determined by the returns to scale.

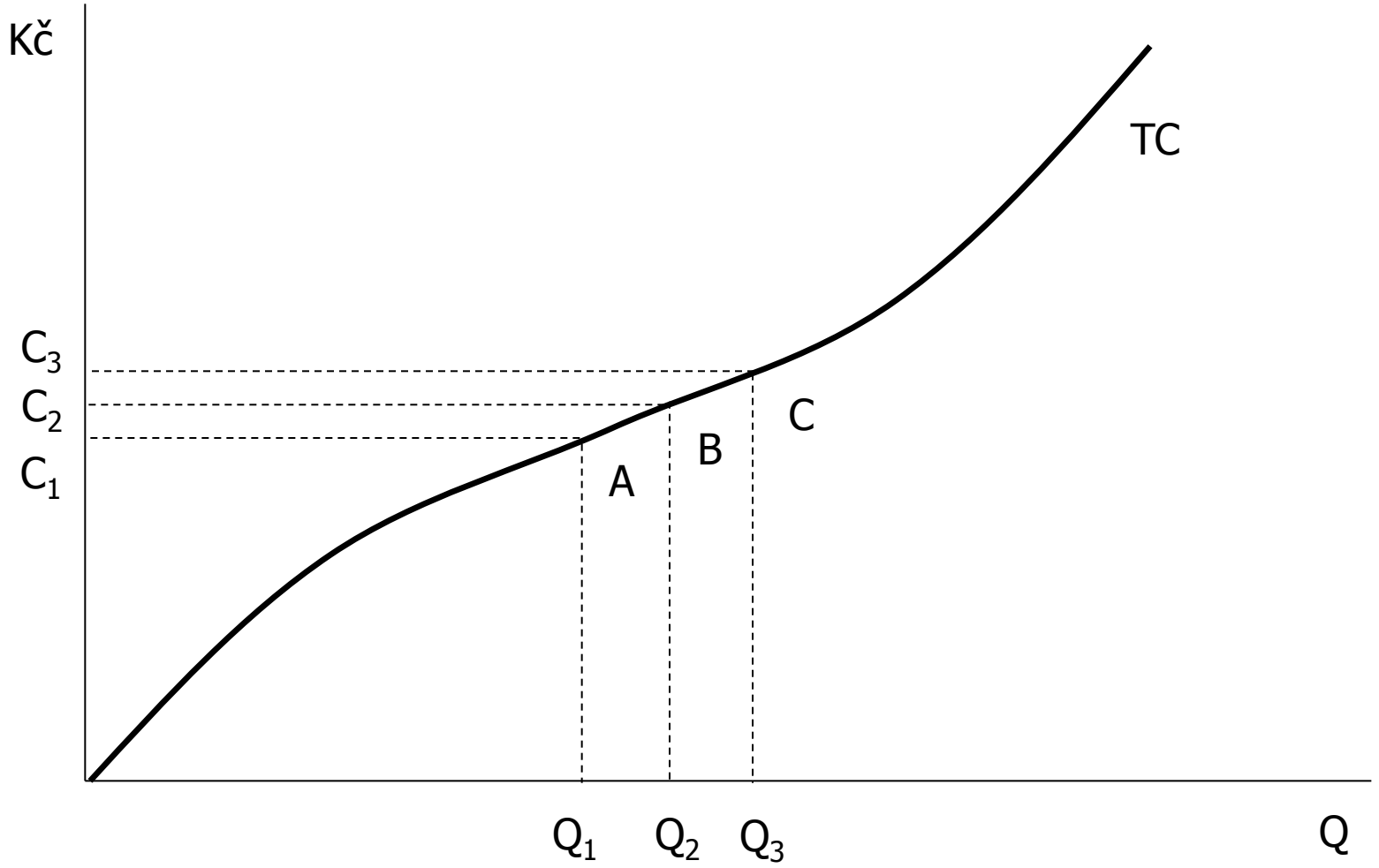
When proportionally equal increments labor and capital costs, there may occur three different trends in the development of revenues:

- constant returns to scale - TC curve will have a growing line shape,

- increasing returns to scale - TC curve will rise with Q grow at a slower pace,

- decreasing returns to scale - TC curve will grow faster than output.

Total cost curve



3.

COMPANY REVENUES

Total revenue

In evaluating its position in the market the company is based on their income, which constantly measured against the costs.

All cash income that the company gains from the sale of goods, the total revenue (TR).

TR = P. Q

Average revenue (AR)

income per unit of production, or:

AR = TR / Q = P AR. Q / Q AR = P

The average income is therefore the price of production. The curve of average income then expresses the relationship between price and volume of produce as well as the demand curve. It follows that the curve of average revenue always coincides with the demand curve for production companies.

Marginal revenue (MR)

is the change in total revenue caused by a change quantity produced by one unit.

Marginal revenue of the company is equal to the product price (MR = P). Marginal revenue curve is therefore a perfectly competitive market with identical demand curve, which the firm could be expected.

MR = dTR / dQ

MR = AR

4.

NET PROFIT

We already know that the profit (π) is the difference between total revenue and total costs. Thus we can write:

$$\pi = TR - TC$$

If we are interested in profit per unit of outputwe find it as the difference between average incomes and average costs, because

$$\pi / Q = TR / Q - TC / Q$$

and hence:

$$\pi / Q = AR - AC$$

The total profit, we can express as follows:

$$\pi = (AR - AC).\ Q$$

In terms of cost concept is distinguished:

- **Accounting (implicit))**
- **Economic (explicit).**

Net economic profit = TR - explicit costs - implicit costs

In contrast, the accounting profit is the difference between total revenue and explicit costs: **Accounting profit = TR - explicit costs**

Asymmetric information

This market failure is caused when one party knows more than the other. Asymmetry of information leads to:

• **moral hazard** - where the principal can not control exactly what Agent performs.

• **adverse selection** - it is a process in which poor quality goods displace normal goods. In a world of perfect information, the buyers are able to immediately recognize good and poor quality and pay less or more.

6.

STATE'S IMPACT ON THE MICROECONOMIC ENTITIES

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Microeconomic policy of the state

- state (government) - one of the economic subjects,
- effort to remedy the consequences of market failure,
- state has the tools whose implementation affects the decisions of firms and households - taxes, fees, subsidies, standards, sanctions, transfers,
- microeconomic policy of the state - affects the formation of equilibrium firms, households.

Market failure and the State:

- state may regulate monopoly (price regulation, goal: eliminate DWL),
- state is trying to eliminate the negative externalities (environmental damage) - standards, the precise definition of property rights (Coase theorem), environmental taxes, penalties, licensing,
- state may provide subsidies to producers of positive externalities,
- problems: how to determine the amount of external marginal cost (EMC) and external marginal utility (EMU),
- state through taxation mechanism ensures the production of public goods,

State failure:

- situations where the state produces inefficiency, benefits from the activities of the state are lower than costs,

- state may also have incomplete information, make wrong decisions, there is a problem in the timing of the implementation of various measures, the state microeconomic policy maybe unsuccessful.

Questions?

Thank you for your attention