



**DEG**  
DEPARTAMENTO  
DE ENGENHARIA E GESTÃO  
TÉCNICO LISBOA

# **Introdução à Economia/Introductory Economics**

## **Exercícios**

**2021/2022, P2**

**2. PIB e crescimento económico, inovação e progresso  
tecnológico/GDP and economic growth, innovation and  
technological progress**

**2.1.** Which of the following statements is correct regarding measuring GDP? (Adapted from CORE, The Economy)

- a. GDP can be measured either as the total spending on domestically produced goods and services, or the total value added in domestic production, or the sum of all incomes received from domestic production.

True.

- b. Information about exports but not imports is necessary to calculate GDP.

False. Foreign demand for domestic production (exports) is a positive contribution to GDP whilst home demand for foreign production (imports) must be subtracted to calculate GDP. Hence information about both is necessary.

- c. Government production is not included in the GDP.

False. Government and public services, for example, primary school education, are included.

- d. The value added of government production is computed using the price that public goods and services are sold at in the market.

False. Public services, such as primary school education, are not sold in the market. Hence it is assumed that the value added is equal to the amount it costs the government to produce.

**2.2.** Which of the following would increase GDP? (Adapted from CORE, The Economy)

- a. A decline in imports, holding all other components of GDP constant.

True.

- b. An increase in remittances paid to domestic residents by relatives living abroad.

False. This will increase domestic income because domestic residents are richer, but it does not imply an increase in domestic production.

- c. An increase in government spending.

True.

- d. A decline in exports.

False. A decline in exports implies reduced expenditure by foreigners on domestic production so it reduces GDP.

**2.3.** Explain why an economy's income must equal its expenditure. (Adapted from Mankiw, Principles of Economics).

Households buy goods and services from firms, and firms use their revenue from sales to pay wages to workers, rent to landowners, and profit to firm owners. GDP equals the total amount spent by households in the market for goods and services. It also equals the total wages, rent, profits paid by firms in the markets for the factors of production. Because all expenditure in the economy ends up as someone's income, GDP is the same regardless of how it is computed.

**2.4.** A farmer sells wheat to a baker for €2. The baker uses the wheat to make bread, which is sold for €3. What is the total contribution of these transactions to GDP? (Adapted from Mankiw, Principles of Economics)

The total contribution of these transactions to GDP is €3. GDP includes only the value of final goods. The reason is that the value of intermediate goods is already included in the prices of the final goods. Adding the market value of the wheat to the market value of the bread would be double counting.

**2.5.** Why is it desirable for a country to have a large GDP? Give an example of something that would raise GDP and yet be undesirable. (Adapted from Mankiw, Principles of Economics)

It is desirable for a country to have a large GDP because people could enjoy more goods and services. Thus, it's preferable for countries to have higher than lower incomes. However, GDP is not a perfect measure of well-being. For instance, it excludes the value of leisure and the value of a clean environment.

Examples of something that can raise GDP and be undesirable:

- 1) The discovery and exploration of oil deposits. GDP increases due to the increase in oil production, but air pollution/carbon emissions would also increase, thus decreasing environmental welfare.
- 2) Floods and earthquakes. GDP raises due to the increase in expenditures regarding cleanup, repair, and rebuilding, but welfare decreases.

**2.6.** What does the level of a nation's GDP measure? What does the growth rate of GDP measure? Would you rather live in a nation with a high level of GDP and a low growth rate, or in a nation with a low level of GDP and a high growth rate? (Adapted from Mankiw, Principles of Economics)

The level of GDP measures the total production of goods and services in the economy. It is also a measurement of the income earned in the economy. The GDP growth measures how fast the economy is growing. For example, the growth rate of GDP is the percent change in the GDP from one period to the next.

It is preferable to live in a country with a high level of GDP and a low growth rate because the income level is higher (you can enjoy more goods and services) even though the economy is not growing at a fast pace. Moreover, a high GDP will also translate to a high standard of living (though not always).

**2.7.** Technological progress increases your hourly productivity. This means that by working the same number of hours you could thus produce and consume more, or you can produce and consume the same amount of goods while working fewer hours and enjoying more free time. The economist Olivier Blanchard argues that the difference in output per capita between the US and France is partially due to the fact that relative to those in the US, the French have used some of the increase in productivity to enjoy more free time rather than raise consumption. (Adapted from CORE, The Economy)

- a. Think about two countries, one that has lower GDP per capita due to fewer hours worked, and another that has higher GDP per capita due to more hours worked (such as France and the US). Assuming that overall life satisfaction consists only of free time and consumption, in which country would you expect overall life satisfaction to be higher, and why? Clearly state any assumptions you make about the preferences of residents in each country.

Using France and the US as an example, our answer depends on the assumptions we make about the relative preferences over free time and GDP per capita, and whether these preferences differ across countries. More work and less free time may sound like a poor deal, but life satisfaction in the US would not necessarily be worse if its residents place a higher weight on consumption than French residents, and if US residents have chosen freely to work. By contrast, the French may feel just as happy by using technological change to deliver more leisure if they place a higher weight on free time than consumption.

In general, the sources from which we draw life satisfaction vary from person to person. For example, income and leisure are important, but other factors like community or civil engagement also matter. Furthermore, it is clear that citizens of different countries place different weights on each of these conditions. Therefore, it is impossible to provide a clear-cut answer.

- b. Considering only working hours and GDP per capita, which country (France or the US) would you prefer to live in, and why? How would your answer change if you considered other factors as well?

The answer depends on the student's preferences over working hours and GDP per capita, as well as preferences over specific aspects of each country, such as the weather, sense of community, and availability of particular cultural or leisure activities. The comparison to one's friend/neighbor as a benchmark for social class or the accumulation of material goods may also affect the trade-off between free time and consumption, i.e., the utility of a consumer may also be affected by the conspicuous consumption of others.

2.8. The following Figure shows an economy's production function before and after technological progress. Based on this information, which of the following statements is correct? (Adapted from CORE, The Economy)

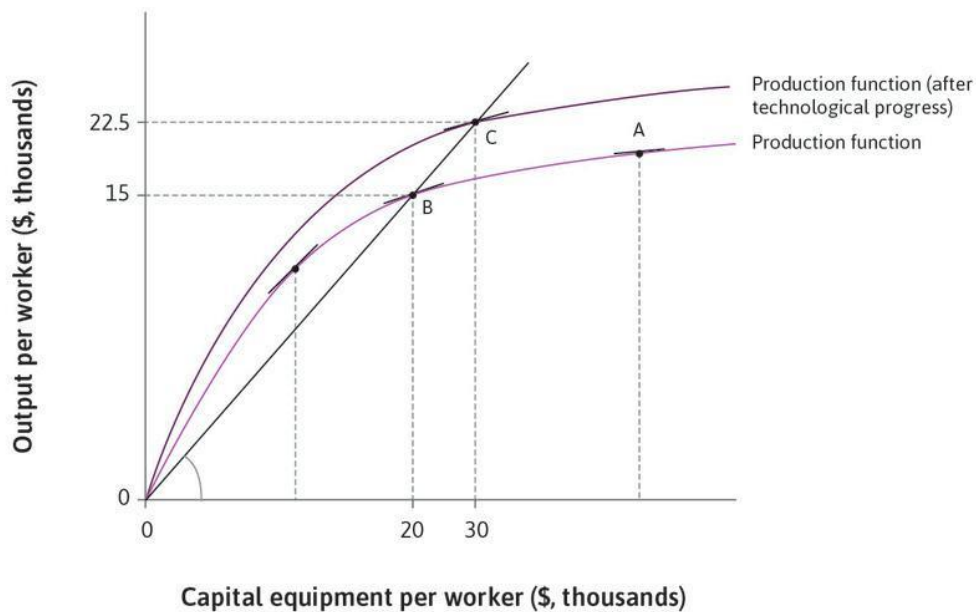


Figure 1

a. The average product of capital at B is  $20,000 / 15,000 = 1.33$ .

False. The average product of capital at B is  $15,000 / 20,000 = 0.75$ .

b. The marginal product of capital at C is  $(22,500 - 15,000) / (30,000 - 20,000) = 0.75$ .

False. The marginal product of capital at C is the slope of the production function at C.

c. The concavity of the production function indicates a diminishing marginal product of capital.

True. This means that the slope gets flatter as it moves to the right.

d. As a result of a technological progress, the marginal product of capital rises but the average product of capital remains constant, for a given level of capital per worker.

False. On the diagram, C and B have the same average product of capital. These are not at the same level of capital per worker, however. At a given level of capital per worker, both average and marginal products of capital rise with technological progress.

2.9. Which of the following statements regarding innovation is correct? (Adapted from CORE, The Economy)

a. An innovation is the development of new methods of production and new products. The spread of these is not innovation.

False. The spreading of invention, known as diffusion, is also part of innovation.

- b. A product innovation is when a firm produces a good or service at a lower cost than its competitors.

False. This is process innovation.

- c. A process innovation is when a firm produces a new good at a cost that will attract buyers.

False. This is product innovation.

- d. Innovation comprises both invention and diffusion.

True. This is the definition of innovation.