

Introductory Economics

Introdução à Economia

Problems

2021/2022

3rd Quarter (P3)

1. Markets, efficiency and the role of the Government

1. Mercados, eficiência e papel do Estado

1.1. The table represents market demand Q for a good at different prices P . The firm's unit cost of production is €60. (Adapted from CORE, The Economy)

Q	100	200	300	400	500	600	700	800	900	1,000
P	€270	€240	€210	€180	€150	€120	€90	€60	€30	€0

a. What is the profit-maximizing output?

At $Q = 400$, profit = $(180 - 60) \times 400 = €48,000$. If you calculate the profit for each point on the demand curve you will see that profit is lower at the other points.

b. The firm will make a loss at all outputs of 800 and above. True or false?

False. The firm will make a loss (negative profit) at all outputs above 800. At exactly 800, the profit is zero.

1.2. Figure 1 illustrates two demand curves, D and D' . Based on this graph, which of the following are correct? (Adapted from CORE, The Economy)

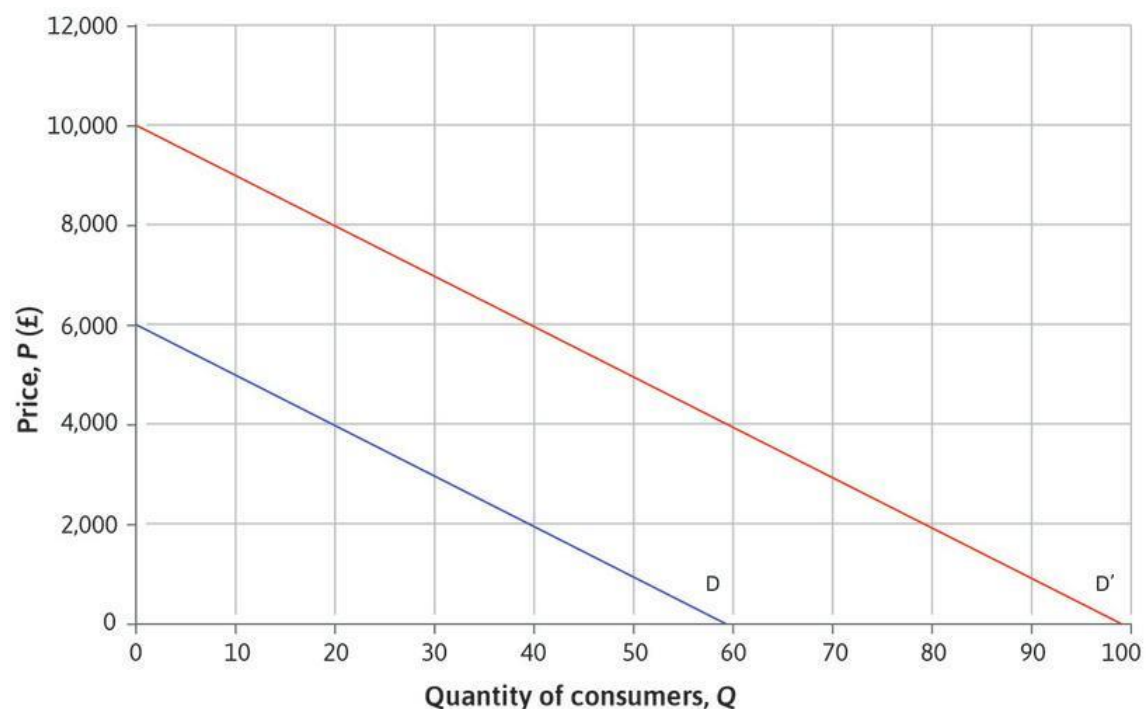


Figure 1

- a. On demand curve D, when the price is £5,000, the firm can sell 15 units of the product.

False. On demand curve D, when the price is £5,000, the firm can sell 10 units.

- b. On demand curve D', the firm can sell 70 units at a price of £3,000.

True.

- c. At price £1,000, the firm can sell 40 more units of the product on D' than on D.

True.

- d. With an output of 30 units, the firm can charge £2,000 more on D' than on D.

False. With an output of 30 units, the firm can charge £4,000 more on D' than on D.

1.3. Figure 2 shows the demand and the supply curves for a book. The curves intersect at $(Q^*, P^*) = (24, 8)$. Which of the following is correct? (Adapted from CORE, The Economy)

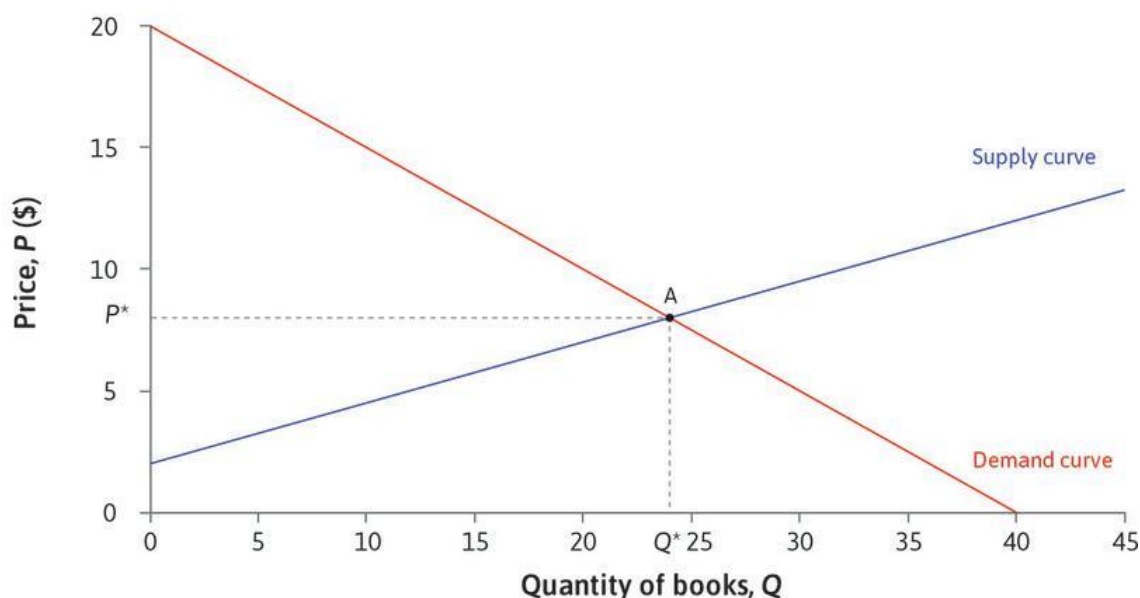


Figure 2

- a. At price \$10, there is an excess demand for the textbook.

False. At \$10 the price is above the equilibrium price of \$8, and there is an excess supply of books.

- b. At \$8, some of the sellers have an incentive to increase their selling price to \$9.

False. At \$8, all buyers with a WTP at \$8 or above can be matched with all sellers with a WTA of \$8 or less. If one of these sellers raised their price to \$9, the buyer could find another seller willing to accept less.

- c. At \$8, the market clears.

True. At \$8, the quantity demanded is equal to the quantity supplied—that is, the market clears.

- d. 40 books will be sold in total.

False. The maximum level of demand is 40, but 16 of these will be unfulfilled as their willingness-to-pay is below the market clearing price of \$8.

1.4. Figure 3 shows the equilibrium of the bread market to be 5,000 loaves per day at price €2. A year later, we find that the market equilibrium price has fallen to €1.50. What can we conclude? (Adapted from CORE, The Economy)

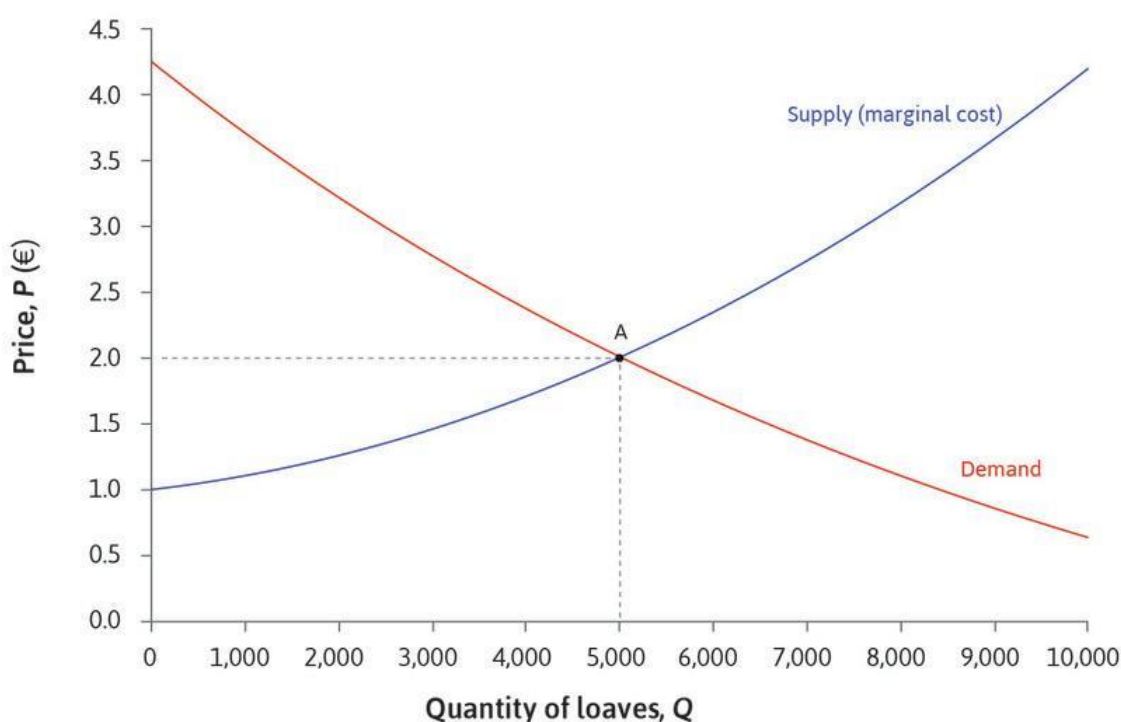


Figure 3

- a. The fall in the price must have been caused by a downward shift in the demand curve.

False. This is not the only possible cause of a fall in price, it can also be an expansion of supply.

- b. The fall in the price must have been caused by a downward shift in the supply curve.

False. This is not the only possible cause of a fall in price, it can also be a contraction of demand.

- c. The fall in price could have been caused by a shift in either curve.

True. A downward shift in either curve would cause the price to fall. If we knew whether output had increased or decreased, we could determine which curve had shifted.

- d. A year later, at a price of €1.50, there will be an excess demand for bread.

False. At the market equilibrium price, there is no excess demand or supply.

1.5. Give examples of negative and positive externalities.

Negative: air pollution from factories, noise and visual pollution from wind turbines, smoking.

Positive: good architecture, education or learning new skills, receiving health care.

1.6. A factory is situated next to a dormitory for nurses who work night shifts. The factory produces 120 humanoid robots a day. The production process is rather noisy, and the nurses often complain that their sleep is disturbed. Based on this information, which of the following statements is correct? (Adapted from CORE, The Economy)

- a. The marginal private cost is the factory's total cost of producing 120 robots a day.

False. The marginal private cost (MPC) is the factory's cost of producing one additional robot, not the total cost.

- b. The marginal social cost is the noise cost incurred by the nurses from production of an additional robot.

False. The marginal social cost (MSC) is the sum of the costs to the factory and the nurses of producing the additional robot, $MSC = MPC + MEC$.

- c. The marginal external cost is the cost to the factory, plus the noise cost incurred by the nurses, when an additional robot is produced.

False. The marginal external cost (MEC) is the noise cost incurred by the nurses when an additional robot is produced.

- d. The total external cost is the total costs per day imposed on the nurses by the factory's production.

True. The total external cost is the sum of the marginal external costs of production of all the robots. This is the total cost imposed on the nurses.

- 1.7. Figure 4 depicts the MPC and MSC of the robot factory production in the previous question. The robot market is competitive, and the market price is \$340. Currently, the factory is producing an output of $Q = 120$, but $Q = 80$ would be Pareto efficient. Which of the statements is correct? (Adapted from CORE, The Economy)

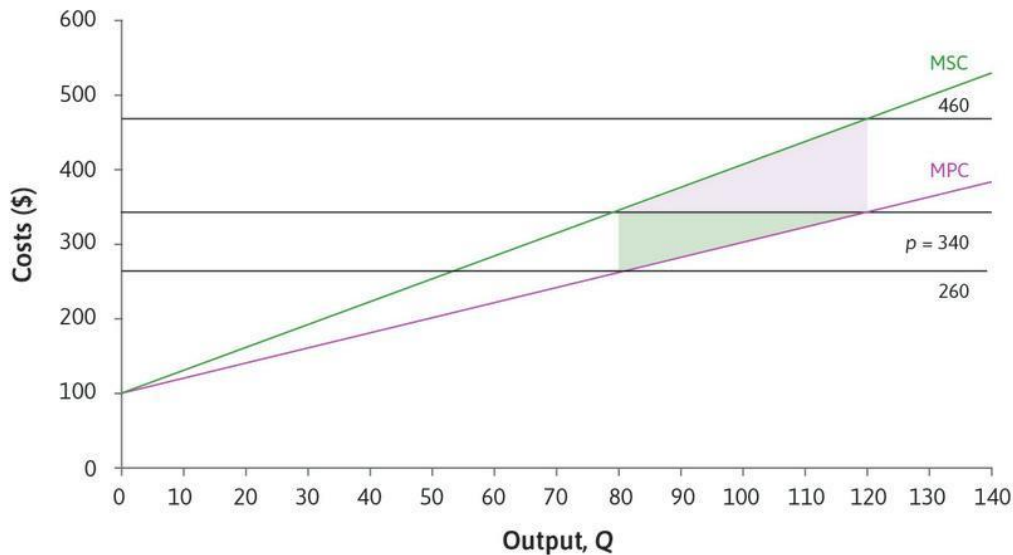


Figure 4

- a. To reduce output to $Q = 80$, the factory's minimum acceptable payment would be \$1,600.

True. The minimum acceptable payment is the loss of surplus, which is the green shaded area:

$$\frac{(340-260) \times 40}{2} = \$1,600.$$

- b. The maximum that the nurses are willing to pay to induce the factory to reduce the output to $Q = 80$ is \$2,400.

False. The maximum that the nurses would pay is the total gain (of reduction in noise cost) associated with the fall in output. This is the total area of the shaded green shape (\$1,600) plus

the shaded purple shape $\frac{(460-340) \times 40}{2} = \$2,400$, which is \$4,000.

- c. The factory would not reduce its output to $Q = 80$ unless it received at least \$4,000.

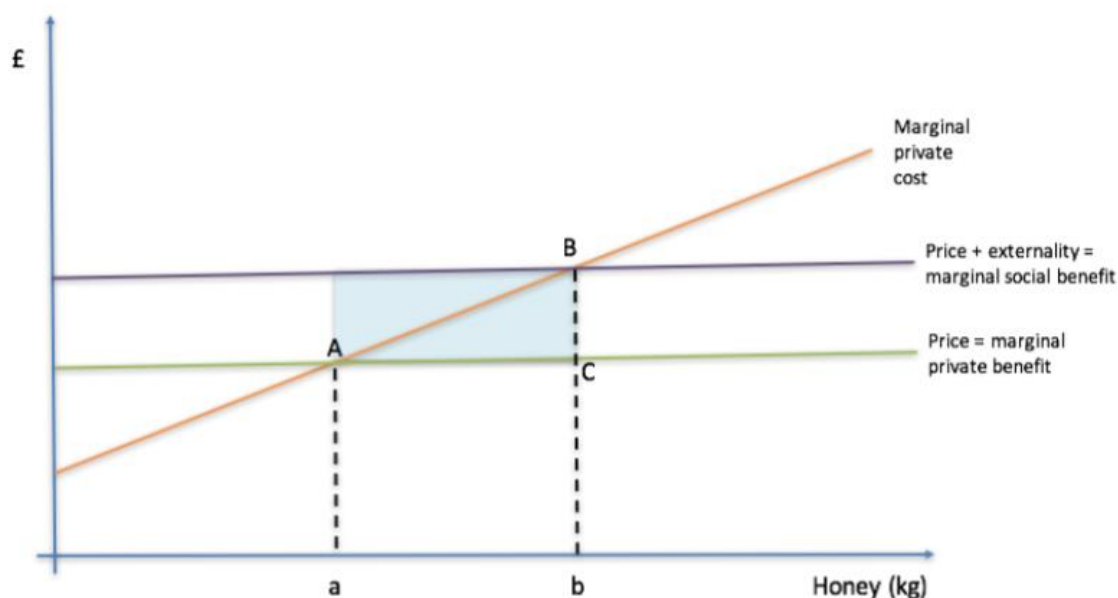
False. \$4,000 is the maximum the nurses would pay (the whole shaded area). The minimum acceptable payment is the green shaded area.

- d. The net social gain from the output reduction to $Q = 80$ depends on the amount paid by the nurses to the factory.

False. The net social gain is the difference between the nurses' reduction in the noise cost and the loss of profit for the factory. This is the purple shaded area. It is not affected by the payment, which only determines the distribution of the net social gain.

1.8. Imagine a beekeeper, who produces honey and sells it at a constant price per kilogram.
(Adapted from CORE, The Economy)

- a. Draw a diagram with the quantity of honey on the horizontal axis, showing the marginal cost of honey production as an upward-sloping line, and the price of honey as a horizontal line. Show the amount of honey that the profit-maximizing beekeeper will produce.



The profit-maximizing quantity produced when beekeepers make their decisions privately is at point A with quantity a, where the price equals the private marginal costs.

- b. For the beekeeper, the marginal private benefit of producing a kilo of honey is equal to the price. But since the bees benefit a neighboring farmer, by helping to pollinate her crops, honey production has a positive external effect. Draw a line on your diagram to represent the marginal social benefit of honey production. Show the quantity of honey that would be Pareto efficient. How does it compare with the quantity chosen by the beekeeper?

As honey production comes with a positive externality to the neighboring farmer, there is an additional benefit from the beekeeper's action to society as a whole. This additional benefit is not taken into account when the beekeepers unilaterally decide about how much honey to produce. Hence the social marginal benefit is above the price the beekeepers receive. The socially optimal outcome would be at point B.

- c. Explain how the farmer and beekeeper could both be made better off through bargaining.

By producing quantity b, the beekeeper incurs an additional private cost equal to the triangle ABC. At the same time, the neighboring farmer has a benefit equal to the blue rectangle. As the rectangle is larger than the triangle, the farmer would in principle be able to compensate the beekeeper by more than the additional cost they face (at least the amount ABC, up until the size of the rectangle) and still benefit from the positive externality.

1.9. Explain what is meant by a good being “excludable”. Explain what is meant by a good being “rival”. Is a sushi box excludable? Is it rival? (Adapted from Mankiw, Principles of Economics)

Excludability: the property of a good whereby a person can be prevented from using it.

Rivalry: the property of a good whereby one person’s use diminishes other people’s use.

Yes, a sushi box (as any other meal) presents both excludability and rivalry.

1.10. Define and give an example of a public good. Can the private market provide this good on its own? Explain. (Adapted from Mankiw, Principles of Economics)

Public goods: goods that are neither excludable nor rival. Examples: fireworks, fundamental knowledge/basic research, lighthouses, street lighting.

Public goods are not normally provided by the private sector because they would be unable to supply them for a profit. If a private firm decides to provide a public good some agents will be better off without being charged for this benefit. Since people are not charged for their use of the public good, they have an incentive to free ride when the good is provided privately. Thus, private decisions about consumption and production of public goods can lead to an inefficient allocation of resources.

1.11. Define and give an example of a common resource. Without government intervention, will people use this good too much or too little? Why? (Adapted from Mankiw, Principles of Economics)

Common resources: goods that are rival but not excludable. They are available free of charge to anyone who wants to use them. Examples: clean air and water, fish, whales, and other wildlife. Because people are not charged for their use of common resources, they tend to use them excessively.

1.12. For each of the following goods or bads, decide whether they have rivalry and whether they are excludable, and explain your answer. If you think the answer depends on factors not specified here, explain how. (Adapted from CORE, The Economy)

a. A free public lecture held at a university lecture theatre.

Since the lecture is open to the public (and is free), it is non-excludable. Assuming the capacity of the lecture theatre is limited, the good is however rival.

b. Noise produced by aircraft around an international airport.

It is impossible to prevent somebody from hearing the noise, hence it is non-excludable. It is also non-rival, because somebody’s ability to hear the noise does not prevent anyone else from hearing it.

- c. A public park.

Assuming access to the park is free, it is non-excludable. The capacity of the park may be limited, in which case it would also be rival.

- d. A forest used by local people to collect firewood.

Assuming free access to the forest, it is non-excludable. Depending on the size of the forest relative to the number of wood collectors, the good may be rival. Even though the amount of firewood is finite, it is possible that there are only a few wood collectors so they will not have to compete for resources.

- e. Seats in a theatre to watch a musical.

Assuming the seats are not given away for free, they are both excludable (who can pay it) and rival (who gets the ticket first).

- f. Bicycles available to the public to hire to travel around a city.

Since the service is not free, it is excludable. It is also rival, in terms of individual bicycles (only one person can use a bicycle at a time). In terms of the service as a whole, it is rival when there is scarcity of bicycles.

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

- a. Some public goods are rival.

False. Public goods are non-rival by definition.

- b. A good cannot be rival and non-excludable.

False. For example, common grazing land is rival but non-excludable. Such goods are called common-pool resources.

- c. If a good is non-rival, then the cost of an additional person consuming it is zero.

True. A good is non-rival if its use by one person does not reduce its availability to others, so it can be made available to another person without cost.