

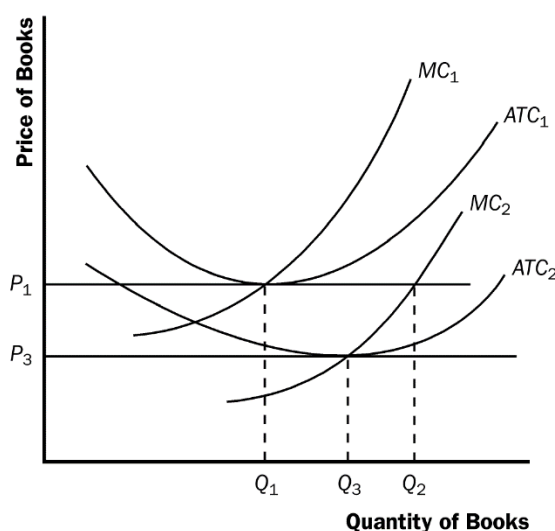
Question 1

Suppose the book printing industry is competitive and begins in long run equilibrium.

- Draw a diagram describing the typical firm in the industry.
- Hi-tech Printing Company invents a new process that significantly reduces the cost of printing books. What happens to Hi-tech's profits and the price of books in the short run when Hi-tech's patent prevents other firms from using the new technology?
- What happens in the long run when the patent expires, and other firms are free to use the technology?

Solution

- The figure shows the typical firm in the industry, with average total cost ATC_1 , marginal cost MC_1 , and price P_1 .



- The new process reduces Hi-Tech's marginal cost to MC_2 and its average total cost to ATC_2 , but the price remains at P_1 since other firms cannot use the new process. Thus Hi-Tech earns positive profits.
- When the patent expires and other firms are free to use the technology, all firms' average total cost curves decline to ATC_2 , so the market price falls to P_3 and firms earn no profits.

Question 2

Suppose that the European Union textile industry is competitive, and there is no international trade in textiles. In long run equilibrium, the price per unit of cloth is €30.

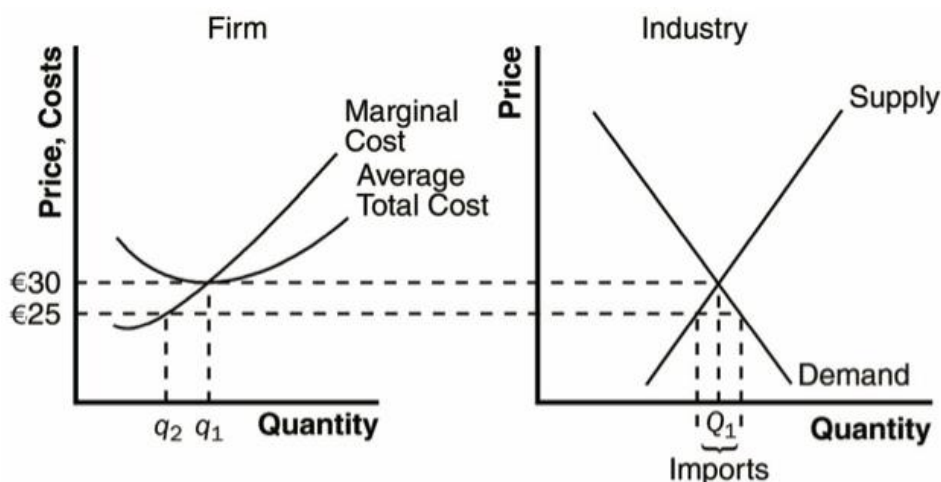
- Describe the equilibrium using graphs for the entire market and for an individual producer.

Now suppose that textile producers in non-EU countries are willing to sell large quantities of cloth in the EU for only €25 per unit.

- Assuming that EU textile producers have large fixed costs, what is the short run effect of these imports on the quantity produced by an individual producer? What is the short run effect on profits? Illustrate your answer with a graph.
- What is the long run effect on the number of EU firms in the industry?

Solution

- a) The Figure illustrates the situation in the EU textile industry. With no international trade, the market is in long run equilibrium. Supply intersects demand at quantity Q_1 and price €30, with a typical firm producing output q_1 .



- b) The effect of imports at €25 is that the market supply curve follows the old supply curve up to a price of €25, then becomes horizontal at that price. As a result, demand exceeds domestic supply, so the country imports textiles from other countries. The typical domestic firm now reduces its output from q_1 to q_2 , incurring losses, since the large fixed costs imply that average total cost will be much higher than the price.
- c) In the long run, domestic firms will be unable to compete with foreign firms because their costs are too high. All the domestic firms will exit the industry and other countries will supply enough to satisfy the entire domestic demand.

Question 3

- a) The following table contains information about the costs for Ernst's Golf Ball Manufacturing. All data are per hour. Calculate total revenue, marginal revenue and marginal cost if $P = £3$.

Q	TC (£)
0	1
1	2
2	4
3	7
4	11
5	16

- b) If the price is £3 per golf ball, what is Ernst's optimal level of production? What criteria did you use to determine the optimal level of production?

- c) Is £3 per golf ball a long-run equilibrium price in the market for golf balls? Explain. What adjustment will take place in the market for golf balls and what will happen to the price in the long run?
- d) Suppose the price of golf balls falls to £2. Fill out the remaining three columns of the table above. What is the profit-maximizing level of output when the price is £2 per golf ball? How much profit does Ernst's Golf Ball Manufacturing earn when the price of golf balls is £2?
- e) Is £2 per golf ball a long-run equilibrium price in the market for golf balls? Explain. Why would Ernst continue to produce at this level of profit?
- f) Describe the slope of the short-run supply curve for the market for golf balls. Describe the slope of the long-run supply curve in the market for golf balls.

Solution

a)

Q	TR, P = €3	TC	Profit	MR	MC
0	€0	€1	-€1		
1	3	2	1	€3	€1
2	6	4	2	3	2
3	9	7	2	3	3
4	12	11	1	3	4
5	15	16	-1	3	5

b) Optimal production is either two or three golf balls per hour. This level of production maximizes profit (at €2) and it is the level of output where $MC = MR$ (at €3).

c) No, because Ernst is earning positive economic profits of €2. These profits will attract new firms to enter the market for golf balls, the market supply will increase, and the price will fall until economic profits are zero.

d) Optimal production is either one or two golf balls per hour. Zero economic profit is earned by Ernst.

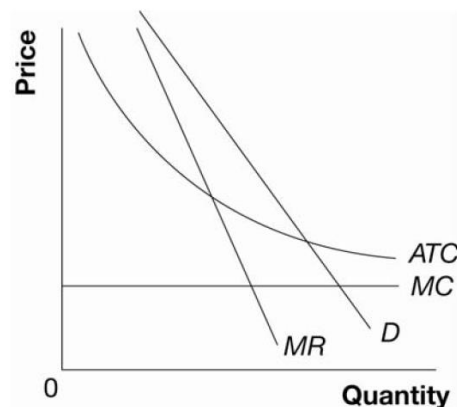
Q	TR, P = €3	TC	Profit	MR	MC	TR, P = €2	Profit	MR
0	€0	€1	-€1			€0	-€1	
1	3	2	1	€3	€1	2	0	€2
2	6	4	2	3	2	4	0	2
3	9	7	2	3	3	6	-1	2
4	12	11	1	3	4	8	-3	2
5	15	16	-1	3	5	10	-6	2

e) Yes. Economic profits are zero and firms neither enter nor exit the industry. Zero economic profits means that Ernst doesn't earn anything beyond his opportunity costs of production but his revenues do cover the cost of his inputs and the value of his time and money.

f) The slope of the short-run supply curve is positive because when $P = £2$, quantity supplied is one or two units per firm and when $P = £3$, quantity supplied is two or three units per firm. In the long run, supply is horizontal (perfectly elastic) at $P = £2$ because any price above £2 causes firms to enter and drives the price back to £2.

Question 4

- a) What type of market is represented in the graph below: perfect competition, monopoly, or natural monopoly? Explain.

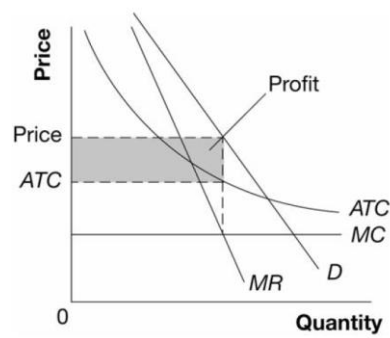


- b) Show the profit or loss generated by this firm in a graph assuming that the firm maximises profit.
- c) Suppose government regulators force this firm to set the price equal to its marginal cost in order to improve efficiency in this market. Show the profit or loss generated by this firm.
- d) In the long run, will forcing this firm to charge a price equal to its marginal cost improve efficiency? Explain.

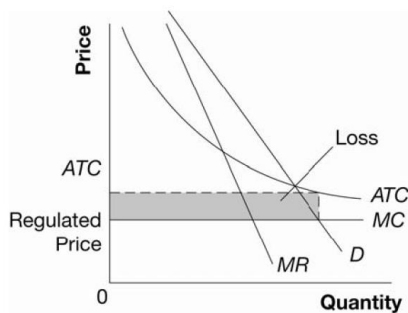
Solution

- a) Natural monopoly because ATC is still declining at the quantity that could satisfy the entire market.

b)



c)



- d) No. Since marginal cost must be below average total cost if average total cost is declining, this firm will generate losses if forced to charge a price equal to marginal cost. It will simply exit the market, which eliminates all surplus associated with this market.

Question 5

A publisher faces the following demand schedule for the next novel from one of its popular authors:

Price £	Quantity
100	0
90	100,000
80	200,000
70	300,000
60	400,000
50	500,000
40	600,000
30	700,000
20	800,000
10	900,000
0	1,000,000

The author is paid £2 million to write the book, and the marginal cost of publishing the book is a constant £10 per book.

- Compute total revenue, total cost, and profit at each quantity. What quantity would a profit maximising publisher choose? What price would it charge?
- Compute marginal revenue. (Recall that $MR = \Delta TR / \Delta Q$.) How does marginal revenue compare to the price? Explain.
- Graph the marginal-revenue, marginal-cost, and demand curves. At what quantity do the marginal-revenue and marginal-cost curves cross? What does this signify?
- In your graph, shade in the deadweight loss. Explain in words what this means.
- If the author were paid £3 million instead of £2 million to write the book, how would this affect the publisher's decision regarding what price to charge? Explain.
- Suppose the publisher was not profit-maximizing but was instead concerned with maximizing economic efficiency. What price would it charge for the book? How much profit would it make at this price?

Solution

The following table shows revenue, costs, and profits:

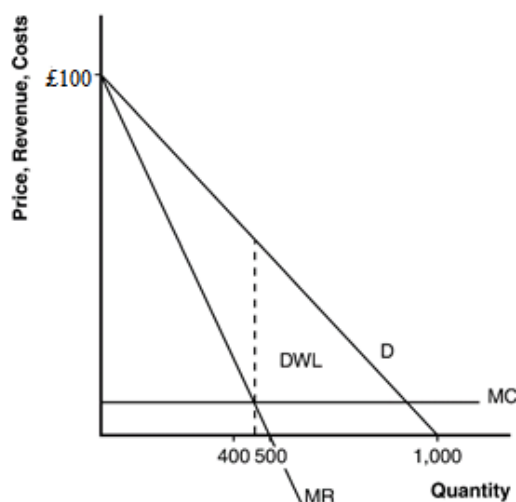
Total Revenue (TR) = Price*Quantity; Marginal Revenue=(TR₂ – TR₁)/(Q₂-Q₁)

Total cost = Total Fixed Cost + Total Variable Cost. Total Fixed Cost=£2 million; Average Variable Cost = £10 per book. For example, total cost for 100,000 books is 2,000,000+10*100,000 = 3,000,000.

Price £ P	Quantity Q	Total Revenue	Marginal Revenue MR	Total Cost TC	Profit
100	0	0	----	£2,000,000	£-2,000,000
90	100,000	9,000,000	£90	3,000,000	6,000,000
80	200,000	16,000,000	70	4,000,000	12,000,000
70	300,000	21,000,000	50	5,000,000	16,000,000
60	400,000	24,000,000	30	6,000,000	18,000,000
50	500,000	25,000,000	10	7,000,000	18,000,000
40	600,000	24,000,000	-10	8,000,000	16,000,000
30	700,000	21,000,000	-30	9,000,000	12,000,000
20	800,000	16,000,000	-50	10,000,000	6,000,000
10	900,000	9,000,000	-70	11,000,000	-2,000,000
0	1,000,000	0	-90	12,000,000	-12,000,000

- A profit-maximizing publisher would choose a quantity of 400,000 at a price of £60 or a quantity of 500,000 at a price of £50; both combinations would lead to profits of £18 million. However, MR equals MC at 500,000.

- b. Marginal revenue is less than price. Price falls when quantity rises because the demand curve slopes downward, but marginal revenue falls even more than price because the firm loses revenue on all the units of the good sold when it lowers the price.
- c. The figure below shows the marginal-revenue, marginal-cost, and demand curves. The marginal-revenue and marginal-cost curves cross between quantities of 400,000 and 500,000. This signifies that the firm maximizes profits in that region.



- d. The area of deadweight loss is marked “DWL” in the figure. Deadweight loss means that the total surplus in the economy is less than it would be if the market were competitive, because the monopolist produces less than the socially efficient level of output.
- e. If the author were paid £3 million instead of £2 million, the publisher would not change the price, because there would be no change in marginal cost or marginal revenue. The only thing that would be affected would be the firm’s profit, which would fall.
- f. To maximise economic efficiency, the publisher would set the price at £10 per book, because that is the marginal cost of the book. At that price, the publisher would have negative profits equal to the amount paid to the author.