

Chapter 11 Costs, economies of scale, revenue and profit

Answers to Knowledge checks

- 11.1** The long run is the period in which a firm is able to vary the quantity of all of its factor inputs.
- 11.2** The law of diminishing returns is a short-run concept because it relies on the assumption that the quantity of capital is fixed. This assumption will not hold in the long run.
- 11.3** Business rates would be a fixed cost for an ice cream factory, but overtime pay is variable, as it varies with the level of production.
- 11.4** Average (total) cost is fixed cost (£4,000) plus total variable cost (£2,500) divided by the number of units produced. This is $6,500/50 = £130$.
- 11.5** The marginal cost curve always passes through the minimum point of the average cost curve.
- 11.6** Economies of scale occur for a firm when an increase in the scale of production leads to lower long-run average cost. However, this will not always be the case. For example, an expanding firm may find that its management team cannot cope with a larger and more complex organisation.
- 11.7** There are many factors that can lead to economies of scale, such as the technology of an industry, management and marketing, and finance procurement. A large diversified firm may also benefit from facing lower risk.
- 11.8** Average revenue and price are the same when a firm sells all its output at the same price. If price is increased when demand is elastic, total revenue will fall.
- 11.9** The economist sees opportunity cost as being an important ingredient of the costs faced by a firm, so includes this element when considering costs. An accountant will only include explicit (observable) components of costs.

Answers to Exercises and Case studies

Exercise 11.1

As I do not know where you live, I cannot comment in detail on how you will have responded to this question. However, I can make some educated guesses.

Of course, it is possible that there is a large-scale enterprise located in your town or city. Perhaps there is a car factory or a chemical plant operated by a multinational corporation that operates on a global scale. Notice that such large manufacturing enterprises do tend to concentrate their production in certain locations. As the discussion proceeds, you will realise that this is because of the costs they face, which means that production on a relative large scale is more efficient than in small establishments.

Even if there are no large manufacturing firms in your vicinity, there will be firms that do operate on a national (or global scale). For example, there may be local branches of banks, accountants, supermarkets and so on — not to mention the rail network, National Express buses and the Post Office. You may also have branches of McDonald's or Burger King.

There will also be smaller-scale local economic enterprises that may serve much smaller geographic markets. This is likely to include hairdressers, bakeries, restaurants, gymnasiums or taxi firms that are not part of a national chain.

As a further exercise, you might like to think about the characteristics that these small-scale enterprises have in common that might prevent them growing into global businesses.

Exercise 11.2

- a** Short-run total cost (STC) is $STFC + STVC = 300 + 140 = 440$
 Short-run average total cost ($SATC$) is $STC/\text{output} = 440/40 = 11$
 Short-run average variable cost ($SAVC$) is $140/40 = 3.5$
 Short-run average fixed cost ($SAFC$) is $300/40 = 7.5$
- b** $STC = 300 + 200 = 500$
 $SATC = 500/50 = 10$
 $SAVC = 200 / 50 = 4$
 $SAFC = 300 / 50 = 6$
 $SMC = (\text{change in } STC)/\text{change in output} = (500 - 440)/(50 - 40) = 6$
- c** If $STC = 660$ and $STVC = 300$, then $STVC = 660 - 300 = 360$

Exercise 11.3

- a** As a firm becomes established in a market, and learns the best way of utilising its factors of production, it becomes able to produce at lower average cost for any given level of output. This learning-by-doing effect would cause a movement downwards *of* the long-run average cost curve.
- b** If a firm observes that average cost falls as it expands its scale of production, it is moving *along* its cost curve.
- c** Similarly, as a firm grows and encounters diseconomies of scale because of the difficulties of managing a larger enterprise, it is moving *along* its long-run average cost curve.
- d** If average cost falls for any given level of output — perhaps because of the adoption of new computers — this is a movement *of* the long-run average cost curve.

Exercise 11.4

Different firms face different market conditions and technical characteristics. You need to think about these characteristics of firms and whether the possible causes of economies of scale would be relevant to them.

Exercise 11.5

- a** The calculations may be found in Table A11.1. Average cost is column (2) divided by column (1). Marginal cost is the change in total cost as output increases. (Strictly speaking, marginal cost is the change in cost divided by the change in output, but in this example the change in output is 1.)

Table A11.1 Output and long-run cost

(1) Output ('000 units/week)	(2) Total cost (£'000)	(3) Average cost (£'000)	(4) Marginal cost (£'000)
0	0		32
1	32	32.0	16
2	48	24.0	34
3	82	27.3	58
4	140	35.0	88
5	228	45.6	124
6	352	58.7	

b See Figure A11.1.

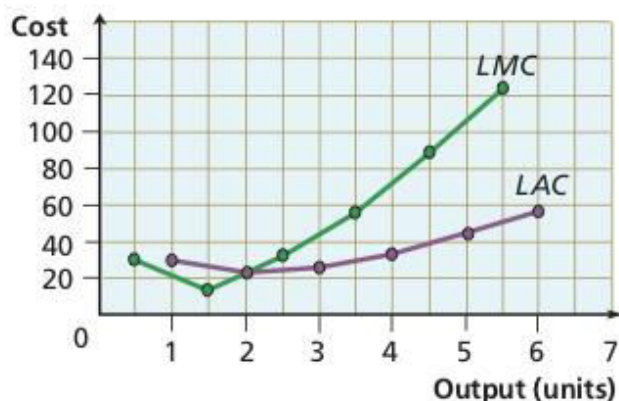


Figure A11.1 Average and marginal cost

- c Long-run average cost is at a minimum at output level 2 (thousand) units.
- d This is also 2 (thousand) units — since marginal cost always equals average cost at the minimum point of average cost.
- e Up to 2 (thousand) units — this is the range over which average cost falls as output rises.
- f Above 2 (thousand) units, as long-run average cost now rises as output rises.

Exercise 11.6

- a To calculate the level of profit at any output level, you need first to calculate total cost and total revenue. Total cost (TC) is average cost (AC) multiplied by the quantity sold, and total revenue (TR) is the price (i.e. average revenue) also multiplied by quantity sold. Profit is then $TR - TC$. Table A11.2 shows the calculations.

Table A11.2 A firm's revenue, costs and profit

Price (£) (AR)	Quantity sold	Average cost (£) (AC)	Total revenue (TR)	Total cost (TC)	Profit
35	200	24	7,000	4,800	2,200
30	300	18	9,000	5,400	3,600
25	400	18	10,000	7,200	2,800
20	500	20	10,000	10,000	0
15	600	25	9,000	15,000	-6,000

- b The firm makes abnormal profit at quantities 200, 300 and 400.
- c The firm makes normal profit at quantity 500.
- d The firm makes a loss at quantity 600.

Case study 11.1

Economies and diseconomies of scale

- a** Table A11.3 shows long-run average cost at each level of output. Figure A11.2 plots these on a graph.

Table A11.3 Long-run average cost for a firm

Output	Total cost	Long-run average cost
100	6,000	60
200	8,000	40
300	9,000	30
400	10,000	25
500	15,000	30
600	24,000	40
700	42,000	60

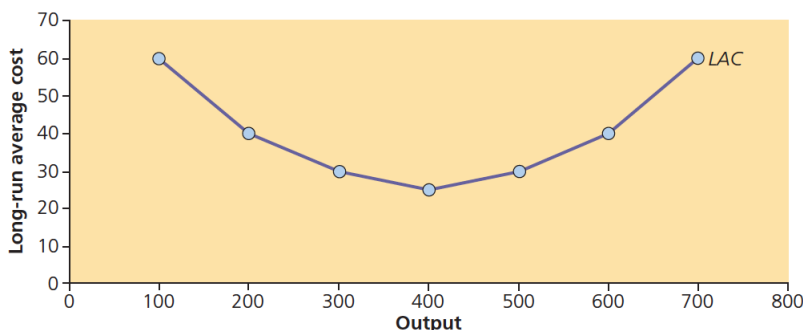


Figure A11.2 Long-run average cost

- b** The minimum efficient scale is at 400 units, which is the point at which the *LAC* curve stops falling (in this case, it is at the minimum point of *LAC*).
- c** The firm experiences economies of scale up to the minimum efficient scale (400 units).
- d** The firm experiences diseconomies of scale when it produces output beyond the minimum efficient scale (above 400 units).
- e** The pattern here is that the firm experiences economies of scale at relatively low levels of output. This could be due to any of the factors that can cause *LAC* to fall as output increases. However, once the firm goes beyond the minimum efficient scale, *LAC* begins to rise again, so the firm experiences diseconomies of scale. You need to discuss which factors can lead to the curve taking on this shape.

Answers to end-of-chapter questions

A Multiple-choice questions

- 1** c. The time period when all factors of production can be varied
- 2** d. The decrease in productivity of one factor of production as others remain fixed
- 3** a. Developing economies of scale
- 4** a. Rent of the production factory
- 5** d. £1,000 per month

B Knowledge and understanding questions

- 6** Diseconomies of scale are an increase in the marginal cost of production as a business increases its scale of operation. This will increase the average cost of production and may force the business to increase its prices.

An explanation of how diseconomies of scale may affect the operation of a business	up to 2 marks
A diagram showing diseconomies of scale	up to 2 marks

- 7** The minimum efficient scale is the level of output at which long-run average cost stops falling as output increases. This is the lowest point on the long-run average cost curve.

An explanation of the minimum efficient scale	up to 2 marks
A diagram showing the minimum efficient scale	up to 2 marks

- 8** Normal profits are the returns needed for a firm to stay in a market in the long run. Accounting profits are the profits made by a business based on explicit costs incurred but excluding opportunity cost. Differences may include:
- Accounting profits do not include opportunity cost, whereas normal profits do include opportunity cost
 - Accounting profit is total revenue – total (explicit) costs, whereas normal profit includes the returns needed for all the factors of production, including the owner's capital

Explanation of a difference between accounting and normal profits	4 marks
Identification of a difference between accounting and normal profits	3 marks
Knowledge of accounting AND normal profits	2 marks
Knowledge of accounting OR normal profits	1 mark

- 9** Supernormal profits are those earned above normal profits.

A full explanation	2 marks
A vague or partial explanation	1 mark

C Stimulus response question

- 10 a** As the scale of Zhang's business increases with the addition of a new shop the average cost of production may decrease.

Economies of scale may include:

- Marketing economies of scale
- Managerial economies of scale
- Financial economies of scale
- Technical economies of scale
- Risk-bearing economies of scale
- Procurement economies of scale

An explanation of how Zhang may benefit from economies of scale	up to 2 marks
A diagram showing economies of scale	up to 2 marks

b

AO1 Knowledge	1 mark
AO2 Application	1 mark
AO3 Analysis	3 marks
AO4 Evaluation	3 marks

Knowledge (1 mark) is likely to include:

- Diseconomies of scale

Application (1 mark) is likely to include:

Application of diseconomies of scale to Zhang and his corner shop, for example:

- Communication issues between the two shops
- Transportation issues between the two shops
- Supervision issues between the two shops

Analysis (3 marks) is likely to include:

Analysis of the effect of diseconomies of scale to Zhang, for example:

- An increase in average total costs as the scale of production increases

Evaluation (3 marks) is likely to include:

Evaluation that Zhang may experience diseconomies of scale, for example:

- Depends upon the distance between the shops
- Depends upon the quality of staff/manager that he is able to employ

A judgement of the causes of diseconomies of scale that Zhang may experience from the operation of both shops