Edexcel

A Level

Economics

(Code: WEC11 01)

Unit 03-Section 2

Revenue, costs and profits

TOTAL, AVERAGE AND MARGINAL REVENUES

A firm's revenues are its receipts of money from the sale of goods and services over a period of time, such as a week or a year. There are three types of revenue: total, average and marginal revenue.

• Total revenue (TR) is the total amount of money received from the sale of any given level of output. It is the total quantity (Q) sold multiplied by the average price (P) received (TR=Q x P). For example, if a company sold 100 machines at an average price of $1 million each over a year, then its total revenue would be $100 million.

• Average revenue (AR) is the average amount received per unit sold. It can be calculated by dividing total revenue by the quantity sold.

$$\frac{TR}{Q}$$

• Marginal revenue (MR) is the additional amount received from selling an extra unit of output. It is the difference between total revenue at different levels of output.

$MR = TR_X - TR_{X-1}$

It is therefore equal to the change in total revenue (ΔTR where Δ means 'change in') divided by the change in total output.

$$MR = \frac{\Delta TR}{\Delta Q}$$

Sales	Average revenue $	Total revenue $	Marginal revenue $
1	5	5	5
2	5	10	5
3	5	15	5
4	5	20	5
5	5	25	

▲ Table 1 Total, average and marginal revenue

REVENUE CURVES

Different revenue curves can be drawn based on different assumptions about average revenue. For example, if a firm receives the same price for each good sold at $5, the total revenue increases as total sales increase. The average and marginal revenue curves are identical, showing the relationship between average price and quantity sold. Marginal revenue equals average revenue, which is equal to demand.

FIGURE 1

Total revenue when price is constant

The total revenue curve is upward sloping as sales increase.

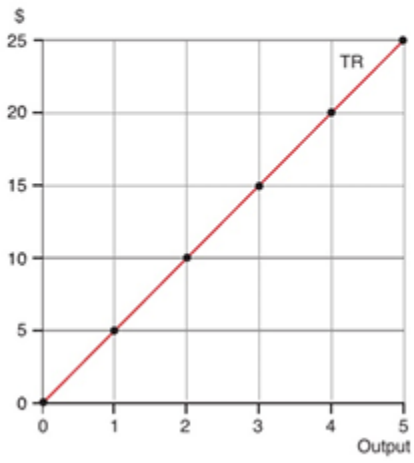


FIGURE 2

Average and marginal revenue when price is constant

Average and marginal revenue are constant when sales increase.

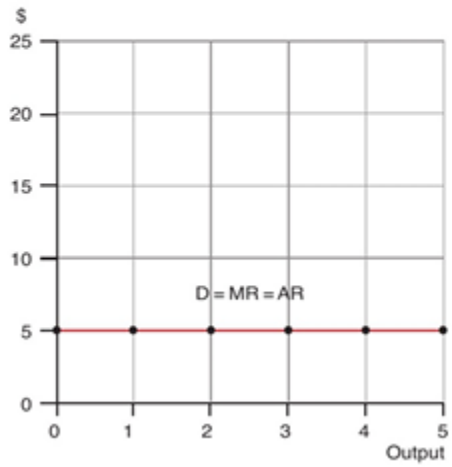


Table 2 shows a situation where a firm has to lower its price in order to achieve higher sales. So the average revenue, or average price, is falling as sales get larger. Table 2 shows that when sales reach six units, total revenue begins to fall. The loss in

revenue from having to accept a lower price more than outweighs the increase in revenue from extra sales. As a result, marginal revenue becomes negative. Each extra unit sold brings in negative extra revenue, i.e. less revenue than the previous unit sold.

Figures 3 and 4 show the total, average and marginal revenue curves derived from the data in Table 2.

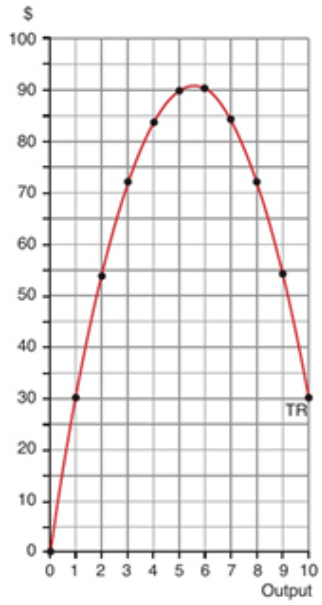
Sales	Average revenue $	Total revenue $	Marginal revenue $
1	30	30	
2	27	54	24
3	24	72	18
4	21	84	12
5	18	90	6
6	15	90	0
7	12	84	−6
8	9	72	−12
9	6	54	−18
10	3	30	−24

▲ Table 2 Total, average and marginal revenue

FIGURE 3

Total revenue when price is falling

The total revenue curve shows that total revenue at first increases and then falls as sales increase and price falls.



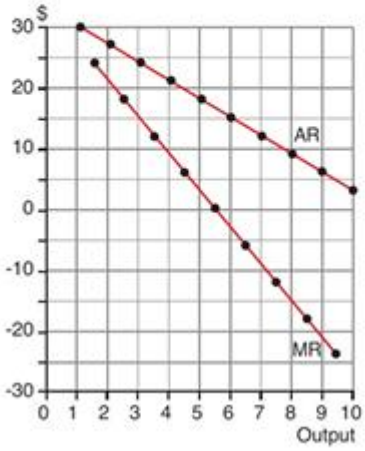
Revenue and price elasticity

Price elasticity of demand for a good is perfectly elastic when the price received remains the same, meaning there is no change in quantity demanded. However, when the price falls and sales increase, the price elasticity of demand changes along the average revenue curve. At sales levels up to six units, demand is price elastic, as reductions in price increase total revenue. At sales levels above six units, demand is price inelastic, as reductions in price result in less total revenue. The average revenue curve is also the demand curve for the good, with the top half showing price elasticity and the bottom half showing it is price inelastic.

FIGURE 4

Average and marginal revenue when price is falling

The average and marginal revenue fall as sales increase. The average revenue curve is also the demand curve for the good because it shows the average price received at each level of sales.



SUBJECT VOCABULARY

average revenue the average amount received per unit sold. It is equal to total revenue divided by quantity sold

marginal revenue the addition to total revenue from the sale of an extra unit

total revenue the total money received from the sale of any given quantity of output

5 Costs

THE SHORT RUN AND LONG RUN

Economists make a distinction between the short run and the long run. In the short run, producers have the problem that at least one of their factor inputs is fixed in supply (it cannot change in the short-run). For instance, the owner of a factory might want to expand and increase production. The workers can work longer hours by working overtime or by having different shifts, and more raw materials can be purchased. Labour and raw materials are variable inputs.

In the long run, existing technologies do not change. In the **very long run,** the state of technology can change. For instance, a bank would be able to move from a paper-based system with cheques and bank statements to a completely electronic, paperless system with telephone, mobile or internet banking.

THE SHORT RUN: DIMINISHING RETURNS

In the short run, at least one factor must be fixed. Assume for example that a firm uses only two **factors of production**: capital, in the form of buildings and machines, which is fixed, and labour, which can be varied. What will happen to output as more and more labour is used?

To begin with, output per worker is likely to rise. A factory designed for 500 workers, for instance, is unlikely to be very productive if only one worker is employed. But there will come a point when output per worker will start to fall. There is a best (or optimum) level of production which is most efficient. Eventually, if enough workers are employed, total output will fall. Imagine 10,000 workers trying to work in a factory designed for 500. The workers will get in each other's way so there will be less output than if a smaller number of workers were employed. This is known as the **law of diminishing returns or the law of diminishing marginal productivity.**

THE LAW OF DIMINISHING RETURNS

The law of diminishing returns can be explained more formally using the concepts of total product, average product and marginal product.

• **Total product** is the quantity of output produced by a given number of inputs over a period of time. It is expressed in physical terms and not money terms. (Indeed, economists often refer to total physical product, average physical product and marginal physical product to emphasise this point.) For example, the total product of 1000 workers in the car industry over a year might be 30,000 cars.

• **Average product** is the quantity of output per unit of input. In the above example, output per worker would be 30 cars per year (the total product divided by the quantity of inputs, i.e. 30,000 divided by 1000 workers).

• **Marginal product** is how much output increases when an extra unit of input is added. If the addition of an extra car worker raised output to 30,004 cars in our example, then the marginal product would be four cars.

Now consider Table 1. In this example capital is fixed at 10 units while labour is a variable input.

• If no workers are employed, total output will be zero.

The first worker produces 20 units of output. So the marginal product of the first worker is 20 units. • The second worker produces an extra 34 units of output. So the marginal product of the second worker is 34 units. Total output with two workers is 54 units (20 units plus 34 units). Average output is 54 divided by 2, or 27 units per worker.

• The third worker produces an extra 46 units of output. So total output with three workers is 100 units (20 plus 34 plus 46). Average output is 100 divided by 3, or approximately 33 units per worker. Initially, marginal product rises,

but the fifth worker produces less than the fourth. Diminishing marginal returns therefore set in between the fourth and fifth workers. Average product rises too at first and then falls, but the turning point is later than for marginal product. Diminishing average returns set in between five and six workers.

Capital	Labour	Units: Physical product as labour is varied — Total product	Average product	Marginal product
0	0	0	0	
10	1	20	20	20
10	2	54	27	34
10	3	100	33	46
10	4	151	38	51
10	5	197	39	46
10	6	230	38	33
10	7	251	36	21
10	8	234	29	−17

1. Rounded to the nearest whole number.

▲ Table 1 Total, average and marginal products[1]

RETURNS TO SCALE

The law of diminishing returns explains how cost curves behave in the short run when at least one factor of production is fixed in supply. In the long run, firms can vary all their factor inputs. What would happen to the output of a firm if, for instance, it increased all its inputs by the same proportion? There are only three possibilities.

- Increasing returns to scale occur when an equal percentage increase in inputs leads to a more than proportional increase in output. For example, if a firm increases its land, labour, and capital inputs by 200 percent, its output increases 300 percent, indicating that the firm is operating under conditions of increasing returns to scale.

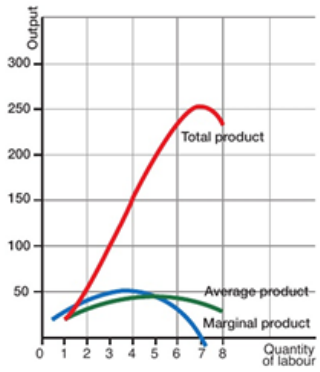
		Units of capital		
		1	2	3
Units of all other factors of production	1	20	35	45
	2	30	50	65
	3	35	63	80

▲ Table 2 Increasing returns to scale

FIGURE 1

Total, average and marginal product

The curves are derived from the data in Table 1. Note that diminishing marginal returns set in before diminishing average returns. Note too that the marginal product curve cuts the average product curve at its highest point, while the total product curve falls when the marginal product curve cuts the horizontal axis.



- Constant returns to scale occur if an equal percentage increase in inputs to production leads to the same percentage increase in output. For example, if a firm increases its inputs by 100 per cent and this results in a 100 per cent increase in output, then constant returns to scale occur.
- Decreasing returns to scale occur if an equal percentage increase in inputs to production leads to a less than proportional increase in output. For example, decreasing returns to scale occur if a firm increases its inputs by 100 per cent but its output increases by less than 100 per cent.

THE ECONOMIC DEFINITION OF COST

Economists use the word 'cost' in a very specific sense. The economic cost of production for a firm is the opportunity cost of production. It is the value that For instance, a street trader has some very obvious costs, such as the cost of buying stock to sell and the petrol to get her to and from the street where she sells her stock. Money will be paid for these and this will be an accurate reflection of opportunity cost.

Labour A street trader working on her own may calculate that she has made $50 'profit' on a day's trading. However, this may not include the value of her own time. If she could have earned $40 working in another job for the day, then her economic profit is only $10. Hence, the opportunity cost of her labour must be included as an economic cost of production.

Financial capital An entrepreneur may start a company with his own money investing, say, $50,000. The economic cost of production must include the opportunity cost of that start-up capital. If he could have earned 10 per cent per year in an alternative investment, then the economic cost (the opportunity cost) is $5000 per year.

Depreciation The physical capital of a company will deteriorate over time. Machines wear out, buildings need repairs, etc. Also, some capital will become obsolete before the end of its physical life. The economic cost of depreciation is the difference between the purchase price and the resale value of a good.

Goodwill A firm trading over a number of years may acquire a good reputation. It may produce branded goods which become well-known brand names. The goodwill of these brands has an opportunity cost. They could be sold to a rival company. Therefore the interest not received on the potential sale value of these must be included as an economic cost.

FIXED AND VARIABLE COSTS

Economists distinguish between two types of cost: fixed and variable cost.

A **fixed cost** (also called an **indirect or overhead cost)** is a cost which does not vary directly with output. As production levels change, the value of a fixed cost will remain constant. For instance, a company may rent premises. The rent on the premises will remain the same whether the company produces nothing or produces at full capacity.

A **variable cost (or direct or prime cost)** is a cost which varies directly with output. As production increases, so does variable cost. For instance, a steel maker will use iron ore. To produce more steel, more iron ore will be needed, so the cost of iron ore is a variable cost. Raw materials for production are the clearest example of variable costs for most firms.

It is not always easy to categorise a cost as either fixed or variable. Many costs are **semi-variable costs.** Labour is a good example.

TOTAL COST, AVERAGE COST AND MARGINAL COST

The total cost of production (TC) represents the cost of producing a given output level. Increased production likely leads to higher total costs, as it requires more raw materials, workers, and factor inputs.

This is illustrated in Table 3. At an output level

of one unit per week, the total cost of production is $400. If output is two units per week, total costs rise to $500.

The total cost of production is made up of two components:

- **total variable cost (TVC)** which varies with output
- **total fixed cost (TFC**) which remains constant whatever the level of output.

(1) Output (per week)	(2) Total variable cost ($)	(3) Total fixed cost ($)	(4) Total cost (columns 2+3) ($)
0	0	200	200
1	200	200	400
2	300	200	500
3	600	200	800
4	1200	200	1400
5	2000	200	2200

▲ Table 3 Total costs of production

(1) Output (per week)	(2) Total cost ($)	(3) Marginal cost (per unit of output) ($)
1	400	100
2	500	300
3	800	600
4	1400	800
5	2200	

▲ Table 5 Marginal costs of production

The **average cost** of production is the total cost divided by the level of output. For instance, if a firm makes 100 items at a total cost of $1000, then the average cost per item is $10. If a firm makes 15 items at a cost of $30, then the average cost of production is $2. Mathematically:

$$AC = \frac{TC}{Q}$$

where AC is average cost, TC is total cost and Q is quantity or the level of output.

Average cost, like total cost, is made up of two components:

- **average variable cost** (AVC) is total variable cost divided by the level of output
- **average fixed cost** (AFC) is total fixed cost divided by the level of output.

(1) Output (per week)	(2) Average variable cost ($)	(3) Average fixed cost ($)	(4) Average total cost (columns 2+3) ($)
1	200	200	400
2	150	100	250
3	200	67	267
4	300	50	350
5	400	40	440

1. Rounded to the nearest dollar.

▲ Table 4 Average costs of production[1]

Marginal cost is the cost of producing an extra unit of output. For instance, if it costs $100 to produce 10 items and $105 to produce 11 items, then the marginal cost of the eleventh item is $5. If it costs $4 to produce two items but $10 to produce three items, then the marginal cost of the third item is $6. Mathematically, marginal cost (MC) is calculated by dividing the change in total cost (ATC) by the change in total output (AQ).

$$MC = \frac{\Delta TC}{\Delta Q}$$

DIMINISHING RETURNS AND SHORT-RUN COSTS

In the short run, a firm employs a factor input that cannot be varied, such as machines or office space. If output increases, diminishing marginal returns and diminishing average returns will set in. This concept is expressed in terms of physical inputs and output, but can also be expressed in terms of costs. For example, a firm with five workers producing 200 units of output would have a marginal cost of $1.

SHORT-RUN COST CURVES

The cost schedules in Table 7 can be plotted on a graph (Figure 2) to produce cost curves.

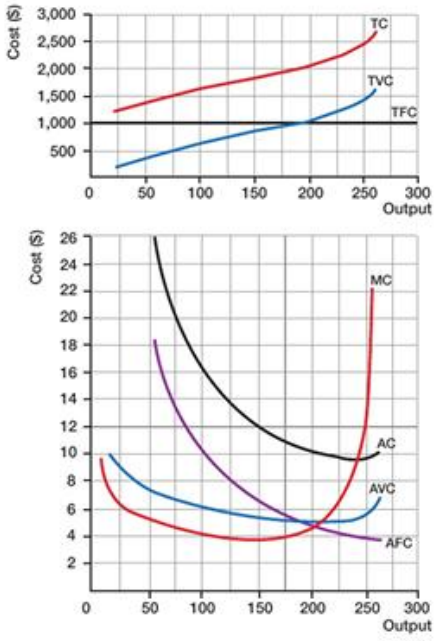
Total cost curves The total fixed cost (TFC) curve is a horizontal straight line, showing that TFC is constant whatever the level of output. The total cost (TC) and total variable cost (TVC) curves are parallel because the vertical distance between the two (the difference between TC and TVC) is the constant total fixed cost. The shape of the TC and TVC curves is caused by the change from increasing returns to diminishing returns.

Average cost curves The average fixed cost (AFC) curve falls as output increases because fixed costs represent an ever-decreasing proportion of total cost as output increases. The average cost (AC) curve and average variable cost (AVC) curve fall at first and then rise. They rise because diminishing average returns set in. The vertical distance between the AC and AVC curves is the value of average fixed cost. This must be true because average cost minus average variable cost is equal to average fixed cost.

Marginal cost curve The marginal cost (MC) curve at first falls and then rises as diminishing marginal returns set in.

FIGURE 2

The shape of short-run cost curves
The shape of the average and marginal cost curves is determined by the law of diminishing returns. The curves are drawn from the data in Table 7. Assuming constant factor prices, diminishing marginal returns set in at an output level of 145 when the marginal cost curve is at its lowest point. Diminishing average returns set in at the lowest point of the average variable cost curve at an output of 210 units.



POINTS TO NOTE

U-shaped AC and MC curves The MC and AC curves in Figure 2 are 'U-shaped'. This is a characteristic not just of the sample figures in Table 7, but of all short- run MC and AC curves. They are U-shaped because of the law of diminishing returns. The lowest point on the MC and the AVC curves shows the point where diminishing marginal returns and diminishing average returns set in respectively.

Product and cost curves The marginal and average cost curves shown in Figure 1 are mirror images of the marginal and average product curves that could be drawn from the same data in Table 7. Marginal and average physical product rise when marginal and average cost fall, and vice versa. This is what should be expected.

When marginal physical product is falling, the extra cost of producing a unit of output must rise for the same reason. However, the cost and product curves will only be mirror images of each other if there are constant factor costs per unit.

MC curve cuts AC curves at their lowest points In Figure 2, the marginal cost curve cuts the average total cost curve and average variable cost curve at their lowest points.

When average cost is neither rising nor falling, marginal

cost must be the same as average cost. Hence we know that:

- The average cost curve is above the marginal cost curve when average cost is falling.
- The average cost curve is below the marginal cost curve when average cost is rising.
- Average cost and marginal cost are equal for all levels of output when average cost is constant; if the average cost curve is U-shaped, this means that marginal cost will be equal to and will cut the average cost curve at its lowest point.

The same chain of reasoning applies to the relationship between the average variable cost curve and the marginal cost curve.

SUBJECT VOCABULARY

Δ means 'change in'

average cost (AC) the average cost of production per unit, calculated by dividing the total cost by the quantity produced. It is equal to average variable cost + average fixed cost

average fixed cost (AFC) total fixed cost divided by the number of units produced

average product (AP) the quantity of output per unit of factor input. It is the total product divided by the level of output

average variable cost (AVC) total variable cost divided by the number of units produced

economic cost the opportunity cost of an input to the production process

factors of production the inputs to the production process: land, labour, capital and enterprise or entrepreneurship

fixed cost (FC) or indirect or overhead costs costs which do not vary as the level of production increases or decreases

imputed cost an economic cost which a firm does not pay for with money to another firm but is the opportunity cost of factors of production which the firm itself owns

law of diminishing returns or marginal productivity if increasing quantities of a variable input are combined with a fixed input, eventually the marginal product and then the average product of that variable input will decline. Diminishing returns are said to exist when this decline occurs

long run the period of time when all factor inputs can be varied, but the state of technology remains constant

marginal cost (MC) the cost of producing an extra unit of output

marginal product (MP) the addition to output produced by an extra unit of input. It is the change in total output divided by the change in the level of inputs

returns to scale the change in percentage output resulting from a percentage change in all the factors of production. There are increasing returns to scale if the percentage increase in output is greater than the percentage increase in factors employed, constant returns to scale if it is the same and decreasing returns to scale if it is less

semi-variable cost a cost which contains within it a fixed cost element and a variable cost element

short run the period of time when at least one factor input to the production process cannot be varied

total cost (TC) the cost of producing any given level of output. It is equal to total variable cost + total fixed cost

total fixed cost (TFC) the value of the cost of production which does not vary however many units are produced

total product (TP) the quantity of output measured in physical units produced by a given number of inputs over a period of time

total variable cost (TVC) the overall cost of those factors of production that vary directly with the amount produced

variable cost (VC) or direct or prime costs costs which vary directly in proportion to the level of output of a firm

very long run the period of time when the state of technology may change

6 Economics and dis economics scale

ECONOMIES OF SCALE AND LONG-RUN AVERAGE COST

Economies of scale are then said to exist. For instance, a firm's output increases from 10 million units to 40 million units. However, total costs of production only increase from $10 million to $20 million. The average cost of production consequently falls from $1 per unit ($10 million ÷ 10 million) to 50c per unit ($20 million + 40 million).

Empirically (i.e. from studying real examples of the costs of firms), economists have found that firms do experience economies of scale. As firms expand in size and output, their long-run average costs tend to fall. At some point, which varies from industry to industry, long-run average costs become constant. However, some firms become too large and their average costs begin to rise. They are then said to experience **diseconomies of scale.**

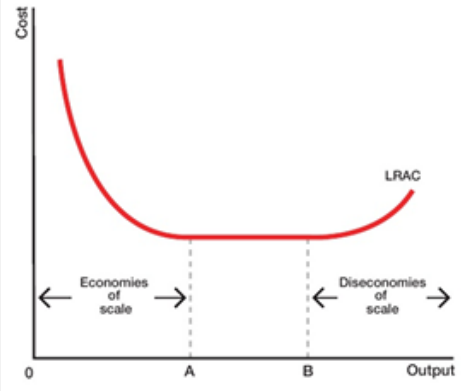
FIGURE 1

Economies of scale

The long-run average cost (LRAC) curve is U-shaped because of how long run average costs behave:

- at first they fall over the output range OA showing economies of scale
- then they are constant over the output range AB
- then they rise when output exceeds OB showing diseconomies of scale.

Over the output range AB, the minimum cost level of production, the firm is said to be at its optimum level of production.



MINIMUM EFFICIENT SCALE

Productive efficiency is said to exist when production takes place at the lowest average cost. If the long-run average cost curve is U-shaped, then this will occur at the bottom of the curve when constant returns to scale exist. The output range over which average costs. are at a minimum is said to be the optimal level of production. In Figure 1 the **optimal level of production** occurs over the range AB.

The output level at which lowest cost production starts is called the **minimum efficient scale (MES)** of production. In Figure 1, the MES is at point A. If a firm is producing to the left of the MES, then long- run average costs will be higher. To the right, they will either be the same (if there are constant returns) or will be increasing (if there are diseconomies of scale).

SOURCES OF INTERNAL ECONOMIES OF SCALE

Internal economies of scale occur for a number of reasons.

Financial economies Small firms often find it difficult and expensive to raise finance for new investment. When loans are given, small firms are charged at relatively high rates of interest because banks know that small firms are far more at risk from bankruptcy than large firms.

Technical economies - Economies of scale can exist because of increasing returns to scale. These economies are known as technical economies. They arise from what happens in the production process.

Managerial economies Specialisation is an important source of greater efficiency. In a small firm, the owner might be part time salesman, accountant, receptionist and manager. Employing specialist staff is likely to lead to greater efficiency and therefore lower average costs. The reason why small firms don't employ specialist staff is because staff often represent an indivisibility.

Marketing economies The cost of a sales force selling 40 different styles of product is very much the same as one selling 35 different styles of product. A 30-second TV commercial for a product which has sales of $10 million per annum costs the same as a 30-second TV commercial for one which has sales of only $5 million per annum. Since the cost of the advertising campaign is the same, the higher the sales, the lower will be the unit costs. Large firms are also able to enjoy lower average costs from their marketing operations.

Purchasing economies The larger the firm, the more likely it is to be able to buy raw materials in bulk. Bulk buying often enables these firms to receive discounts. The firms can purchase their factor inputs at lower prices and therefore this lowers their average costs.

Risk bearing economies The larger the firm, the more likely it is to produce a diversified range of products and/or sell in different markets around the world. If some of these products fail and make losses, other products are likely to be successful and make a profit. This spreads the risk of products failing across many products and so the firm will still be successful even if some products fail and average costs will be lower.

INTERNAL DISECONOMIES OF SCALE

Diseconomies of scale arise mainly due to management problems. As a firm grows in size it becomes more and more difficult for management to keep control of the activities of the organisation. There is a variety of ways of dealing with this problem. Some companies choose to centralise operations with a small team controlling all activities.

There are two main sources of diseconomies of scale:

• Communication problems happen when large businesses find it difficult to maintain effective communication between different departments, divisions or even between head office and the other companies it owns. If

information is not received accurately then instructions are not carried out correctly and the firm will be less efficient and average costs start to increase.

• Coordination problems mean that large firms may find it difficult to ensure each department works effectively with other departments, leading to inefficiency.

MOVEMENTS ALONG AND SHIFTS IN THE LONG-RUN AVERAGE COST CURVE

The long run average cost curve (LRAC) represents the minimum level of average costs achievable at any output level. Points below the LRAC are unachievable, and a firm's efficiency may decrease if it produces above the LRAC boundary. Movement along the LRAC curve indicates an increase in output and cost decrease.

External economies of scale The economies of scale discussed so far in this chapter have been internal economies of scale. Internal economies arise because of the growth in output of the firm. External economies of scale arise when there is a growth in the size of the industry in which the firm operates.

There are several sources of external economies of scale.

• The growth of a particular industry in an area

might lead to the construction of a better local road network, which in turn reduces costs to individual firms.

• Skilled labour might be available in the area. Firms might experience lower training costs because other firms are training workers whom it can then recruit.

• Sharing knowledge means firms benefit from being in the same area and help each other.

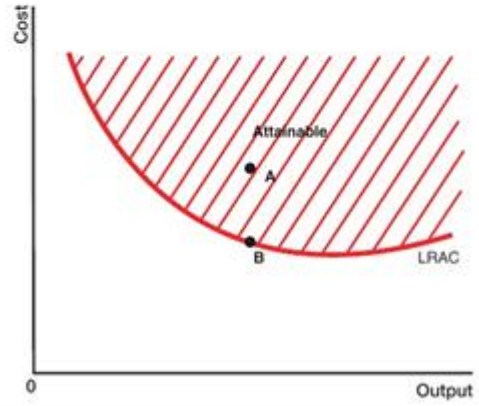
• Vocational colleges may be set up in the area and that can provide easy access to training and education for workers. This will increase the efficiency of the workers and reduce average costs of firms in that industry.

Technology The LRAC curve is drawn on the assumption that the state of technology remains constant. The introduction of new technology which is more efficient than the old technology will reduce average costs and push the LRAC curve downwards.

FIGURE 2

The LRAC as a boundary

The LRAC curve is a boundary between levels of costs which are achievable and those which are unachievable. If a firm is producing on the LRAC curve, then it is producing at long-run minimum cost for any given level of output, such as at point B. If long-run production is inefficient, cost will be within the LRAC boundary such as at point A.



External diseconomies of scale These will shift the long-run average cost curve of individual firms in the industry upwards. They occur when an industry expands. Individual firms are then forced to compete with each other and the prices of factor inputs such as wages and raw materials are increased due to a shortage in supply relative to demand.

THE RELATIONSHIP BETWEEN THE SHORT-RUN AVERAGE COST CURVE AND THE LONG-RUN AVERAGE COST CURVE

In the short run, fixed factors cause short-run average costs to fall and then rise due to diminishing returns. In the long run, all factors are variable, and long-run average costs change due to economies and diseconomies of scale. A company can choose a production scale for maximum profits.

FIGURE 4

The long-run average cost curve envelope
The long-run average cost curve contains within it all the associated short-run average cost curves because long-run average cost is either equal to or below the relevant short-run average cost.

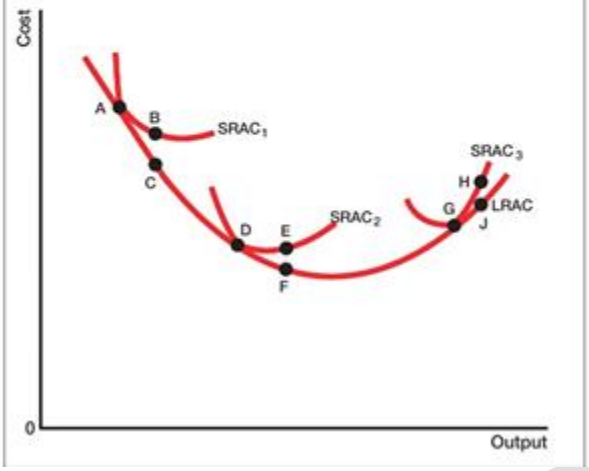
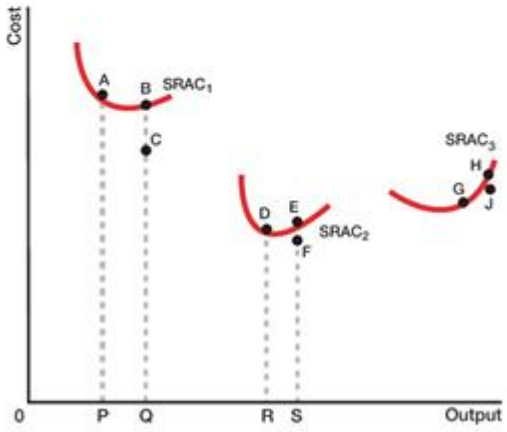


FIGURE 3

The long-run average cost curve
In the long run, all factors are variable. Points A, D and G show long run cost curves at different levels of production. If the firm in the short run then expands production, average costs may fall or rise to B, E or H respectively. But they will be above the long-run costs, C, F and J, for those levels of output because the cost of production with at least one fixed factor is likely to be higher than the cost if all factors were variable.



SUBJECT VOCABULARY

diseconomies of scale a rise in the long-run average costs of production as output rises

economies of scale A fall in the long-run average costs of production as output rises

external economies of scale falling average costs of production, shown by a downward shift in the average cost curve, which result from a growth in the size of the industry within which a firm operates

internal economies of scale economies of scale which arise because of the growth in the scale of production within a firm

minimum efficient scale (MES) of production the lowest level of output at which long-run average cost is minimised

optimal level of production the range of output over which long-run average cost is lowest

per annum per year

7 Profits and losses

NORMAL AND SUPERNORMAL PROFIT

If a firm could have made $1 million profit by using its resources in the next best way, then the $1 million profit is an opportunity cost for the firm. In economics this profit, which is counted as an economic cost, is called **normal profit.**

Supernormal profit (also called pure profit, or abnormal profit) is the profit over and above normal profit (i.e. the profit over and above the opportunity cost of the resources used in production by the firm). It is important to remember that the firm earns normal profit when total revenue equals total cost. However, total revenue must be greater than total cost if it is to earn supernormal profit.

PROFIT MAXIMISATION: THE MC = MR RULE

Marginal cost and marginal revenue can also be used to find the profit maximising level of output. Marginal cost is the addition to total cost of one extra unit of output. Marginal revenue is the increase in total revenue resulting from an extra unit of sales.

Output	Total revenue ($)	Total cost ($)	Profit ($)
1	25	35	–10
2	50	61	–11
3	75	75	0
4	100	90	10
5	125	106	19
6	150	123	27
7	175	148	27
8	200	182	18
9	225	229	–4

▲ Table 1

Output	Marginal revenue ($)	Marginal cost ($)	Addition to total profit ($)
1	25	35	–10
2	25	26	–1
3	25	14	11
4	25	15	10
5	25	16	9
6	25	18	7
7	25	25	0
8	25	34	–9
9	25	47	–22

▲ Table 2

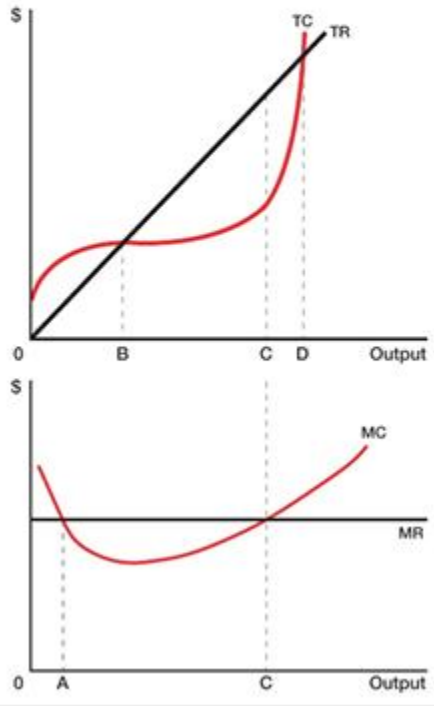
COST AND REVENUE CURVES

The cost and revenue curves in Figure 1 show that a firm will make a loss if it produces between 0 and B, as total cost is higher than total revenue. The break-even point is B, and profit is maximized at output level C. If the firm produces more than D, it will start making a loss again. The sales maximisation point is D, subject to the constraint that the firm should not make a loss. The profit maximising level of output is OC, where marginal cost equals marginal revenue. If the firm produces an extra unit above OC, the marginal cost of production is above the marginal revenue received, leading to a loss and a fall in total profit. The firm will expand production if marginal revenue is above marginal cost and reduce output if it is below marginal cost.

FIGURE 1

The profit maximising level of output

Profit is maximised at the level of output where the difference between total revenue and total cost is at its greatest, at OC. This is the point where marginal cost equals marginal revenue. OB and OD are break-even points.



SHIFTS IN COST AND REVENUE CURVES

It is now possible to analyse in greater depth the effects of changes in costs or revenues on output. Assume that costs, such as the price of raw materials, increase. This will mean that the marginal cost of production at every level of output will be higher. The marginal cost curve will shift upwards as shown in Figure 2. The profit maximising level of output will fall from OQ_1 to OQ_2. Hence a rise in costs will lead to a fall in output.

FIGURE 2

An increase in costs

An increase in costs of production which pushes up the marginal cost curve from MC_1 to MC_2 will lead to a fall in the profit maximising level of output from OQ_1 to OQ_2.

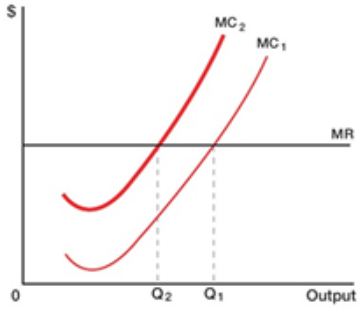
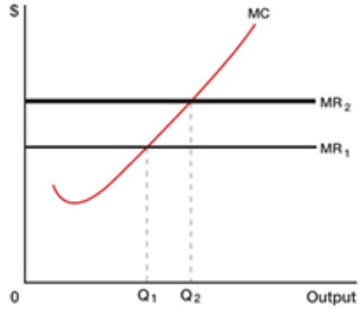


FIGURE 3

An increase in revenue

An increase in revenue at any given level of output will push the marginal revenue curve upwards from MR_1 to MR_2. This will lead to a rise in the profit maximising level of output from OQ_1 to OQ_2.



SHUT DOWN POINTS IN THE SHORT RUN AND LONG RUN

Firms may face a loss in the short run, but neo-classical economics suggests they can continue production as long as they can cover variable costs. A company would lose $20 million if it shut down its plant and produced nothing, as it still has to pay its fixed costs. The firm's trading situation worsens, with revenue declining each period. Despite this, it is better than shutting down and making a $20 million loss.

$ million						
Period	Total variable cost	Total fixed cost	Total cost	Total revenue	Profit or loss	
					If production takes place	If plant is shut down
1	30	20	50	60	+10	–20
2	30	20	50	50	0	–20
3	30	20	50	40	–10	–20
4	30	20	50	30	–20	–20
5	30	20	50	20	–30	–20

▲ Table 4

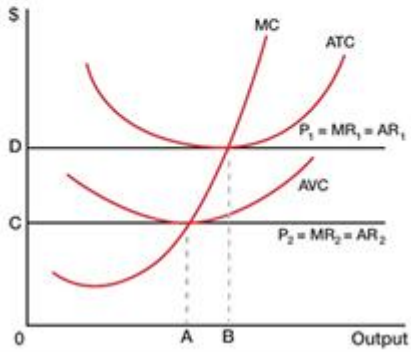
Because of profit maximisation, the firm will produce where MC = MR.

- If price, P_1 is OD, the firm will cover its costs and make normal profit on output OB.
- If price is higher than OD, it will produce more than OB and earn supernormal profit.
- If price is between OC and OD, it will not cover both its variable and fixed costs. However, the price will be higher than average variable cost.
- OC is the lowest price at which the firm will produce in the short run. At price P2, or OC, no contribution is made to paying fixed costs but the firm is earning the normal profit element included in costs.

FIGURE 4

Short-run and long-run shut down points

In the short run, a firm will shut down if the price it receives falls below OC. Below OC, the price will not even cover its variable costs. In the long run, when all costs are variable, the shut down price is OD.



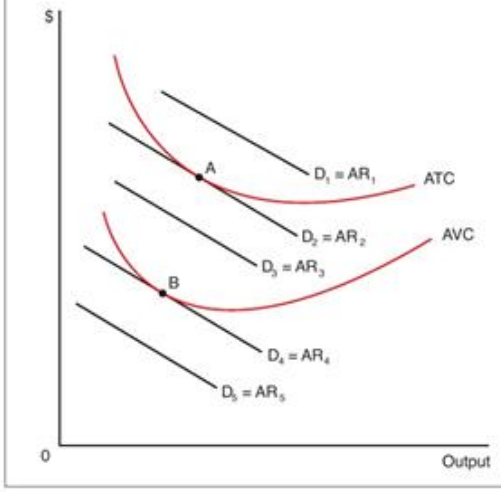
- Below a price of OC, the firm will shut down. Its losses from continuing in production will be greater than the losses made by shutting down. Not only is it not covering its fixed costs but it is not even covering its variable costs.

Point A is called the **short-run shut down.** If Figure 4 showed long-run costs, the **long-run shut down** would be OB.

FIGURE 5

Different average revenue curves will give different profit outcomes

The position of the average revenue curve in relation to average cost curves will determine whether the firm makes supernormal profit (AR_1), normal profit (AR_2), or a short-run loss (AR_3). The shut down point is along AR_4 and the firm would not produce with AR_5.



SUBJECT VOCABULARY

long-run shut down where normal profit is not being earned in the long run

loss where total cost is greater than total revenue

normal profit the profit that the firm could make by using its resources in their next best use. Normal profit is an economic cost

profit the difference between total revenue and total cost

short-run shut down where variable costs are not being covered

supernormal profit the profit over and above normal profit