

**Lesson
Five**

Production, Costs and Revenue

Aims

The aims of this lesson are to enable you to

- examine the theory of perfect competition
- analyse the flaws in the perfect competition model
- look at economies and diseconomies of scale
- analyse the model of monopoly
- look at definitions of efficiency

Context

This lesson will examine some practical implications of the price mechanism for markets and will look briefly at the behaviour of producers and the concept of efficiency.



Ray Powell & James Powell: *AQA A-level Economics, Book 1*, ch. 5, pp. 55-73.



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Markets in Theory and Practice

Before we move on to look at market theory, it is worth noting that there are a range of market structures which can operate, and we will look at a number of these in this lesson, including monopolies and perfectly competitive markets. It is also important to note that there are a range of theories, and that not all businesses and markets are the same.

Ultimately, the market is influenced by a range of factors, including the number of firms already in or entering the market, product differentiation (how different the market is), and ease of entry, including set-up costs and access to raw materials.

As you work through this lesson, remember that when you are looking at a market's structures and prices, profit is a key overriding objective for businesses, and for this to be achieved, the business must grow and survive, increase revenue and their market share. Standing still is rarely an option.



Thinking point

Think about the objectives of a business that you know, and how this can affect the market structure and the way the business operates. Can you identify any examples from your wider reading?

Costs

Costs can be subdivided into a number of types:

1. **Fixed Costs:** These are those costs which *do not vary directly with output* and are sometimes called *indirect* costs. These costs have to be met, whether or not the firm produces any goods. They include annual rent payable for land, interest on capital borrowed and salaries of employees which must be paid irrespective of output.
2. **Variable Costs:** These are those costs which *do vary directly with output* and are sometimes called *direct* costs. If a firm is not producing, it can stop its expenditure on power, raw materials and hourly paid labour.

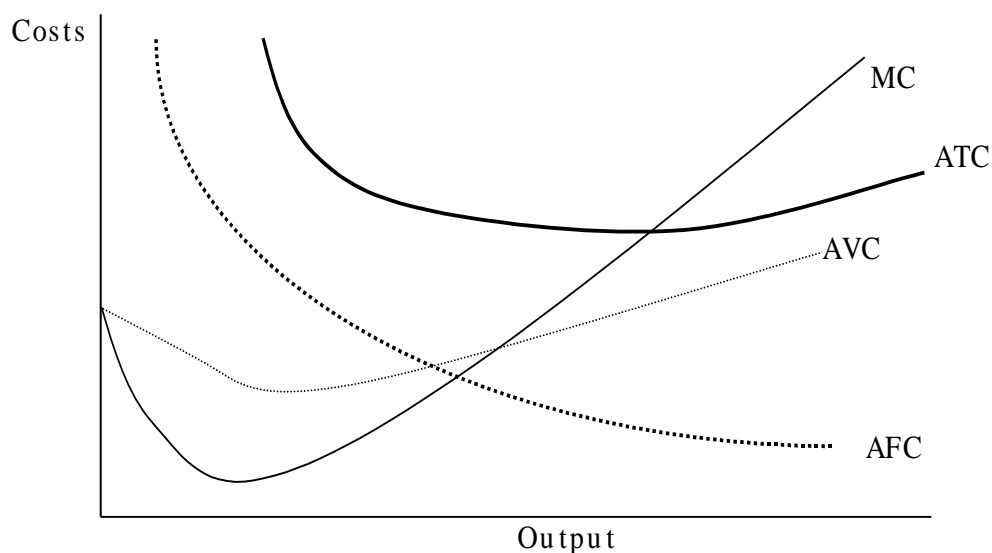
3. **Long-Term and Short-Term:** If the break in production is prolonged, then some costs initially regarded as fixed will become variable – the salaries of monthly paid workers provide a good example. So fixed, or indirect or overhead costs are only unchangeable in the short-term, but in the long-term all costs must eventually be variable.

It is, of course, impossible to give a time limit to the short-term as it depends on so many factors. It may be quicker to find a purchaser for a factory used for light than for one adapted for a car plant.

4. **Average Costs:** These are simply the costs divided by the number of units produced. There can be average variable costs, AVC, averaged fixed costs, AFC, and average total costs, ATC.

Average total costs are simply the sum of $AVC + AFC$. In Diagram 1 the relationship of these three types of cost is shown. Note that at first ATC falls as output increases. Eventually a point is reached beyond which ATC becomes more or less constant. This occurs because, over this range of output, a fall in AFC is roughly balanced by a rise in AVC.

Diagram 1



5. **Marginal Cost:** This is the *cost of producing one extra unit* and is always a variable cost. The marginal cost curve is U-shaped due to the operation of the **Law of Diminishing Returns** – this states that:

as increasing amounts of a variable factor of production are applied to fixed amounts of other factors of production, the marginal product (the extra amount produced) and the average product at first increase but eventually decline.



Thinking point

You should be able to find detailed examples of how marginal cost works in any of your textbooks. Look at the examples, and think about what happens to other costs as well.

It is essential to distinguish between marginal cost and average variable cost. Marginal cost relates an increase in output to an increase in variable costs, whereas average variable costs relate total output to total variable costs. So when measuring average variable costs all the production that has taken place is considered; measurements of marginal costs relate only to the extra output.

Perfect Competition

The theory of price determination can only partially explain the actual operation of real markets. This is because the theory is based on the assumption that the market is in a state of **perfect competition**. The principles on which the theoretical state of perfect competition is based are as follows:

1. Producers aim to maximise their profits and consumers are interested in maximising their utility (the enjoyment they get from what they buy).
2. There are a large number of actual and potential buyers and sellers.
3. All actual and potential buyers and sellers have perfect knowledge of all existing opportunities to buy and sell.
4. Although tastes differ, buyers consider all the units for sale as being homogeneous (indistinguishable, e.g. eggs) .
5. Factors of production are perfectly mobile.
6. Productive processes are perfectly divisible so constant returns to scale prevail (see below).

In practice, all of these conditions never exist in the same market, though they may exist sufficiently for the market to act as if it is in perfect competition.

Returns to Scale

The sixth principle of perfect competition as listed above – that returns to scale are constant – very rarely operates in practice. Returns to scale means the output per productive unit – if returns to scale are constant, this would mean that each worker/machine/£1000 of investment results in the same amount of product – 20 workers produce twenty times as much as one worker, etc.

However, returns to scale are usually not constant – for example, 20 workers may produce forty times as much as one, or only ten times. This is because the efficiency of production changes according to the amount of each factor employed.

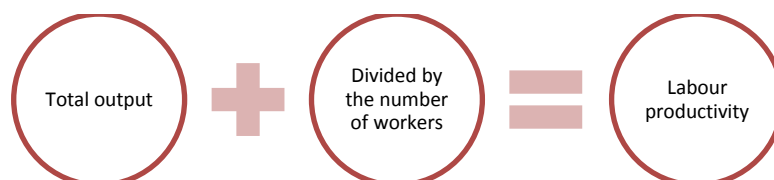
The twenty workers working in a production line, each doing a different job, *may* be able to undertake their work more quickly and efficiently, than one person doing all the jobs.

Production and Productivity

Production is defined as the total amount of a commodity produced by using the factors of production in a specific combination. Productivity is the amount of a commodity produced per unit of resources used. So, the firm converts its inputs into its output.

When a firm attempts to improve its productivity it may do so by altering its shift and labour patterns, it may re-train or re-skill management, or it may introduce more efficient and technically superior manufacturing equipment. It will attempt to increase output using a smaller amount of resources.

Productivity is difficult to measure, so one of the most common methods is to take the total output and divide it by the number of workers to give **labour productivity**.



Increasing productivity, and in particular labour productivity, is vital if a country is to compete effectively with other countries, both inside Europe and internationally.


 Thinking point

Most governments try to encourage increases in labour productivity through education and training, whilst firms are given tax incentives to invest in new technology and research into new products and methods of production.

Think about a company you know, and how these types of initiatives could help the company.

Costs of Production and Economies of Scale

Economies of scale increase efficiency as the scale of production increases. Some economies of scale arise from the actual process of production while others are related to the organisation of production. Both kinds of economies are known as **internal** economies of scale since they benefit an individual firm. There are other economies available to many firms or industries which result from the general advancement of industrialisation. These are termed **external** economies of scale.

Internal economies of scale	Processes used inside a company, which improve production
External economies of scale	Wider factors which benefit countries and economies as a whole

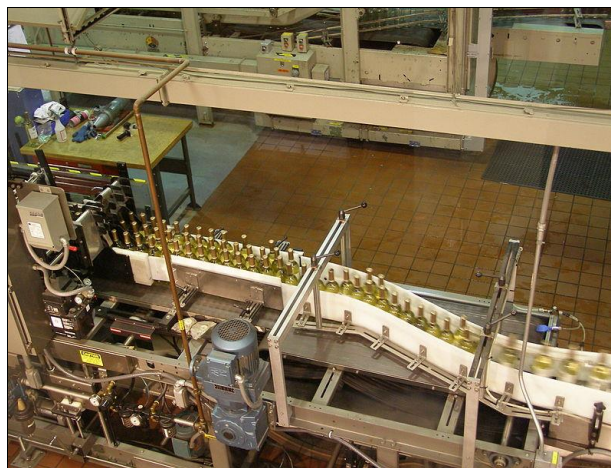
Internal Economies of Scale

1. **Technical economies** are the type normally found in plants, e.g. the size of the cement kilns. So a company that can justify the use of a 250,000 ton bulk oil carrier gains in two respects:
 - (a) The capital cost per 1,000 tons of capacity is smaller than for a tanker of 100,000 tons;
 - (b) Neither the size of the crew nor the amount of fuel required by the vessel increases in proportion to its size.

Recently the introduction of automatic data-processing equipment and especially the computer have meant that substantial reductions in the average cost of equipment can be obtained by increases in scale.

Example: many manufacturing companies now use robotic production lines to manufacture goods, using the latest technology to improve efficiency.

An example is the winery in the picture below, where the wine is bottled by a machine, meaning the wine can be bottled more quickly and cheaply than by hand, thus providing internal economies of scale.



Wine bottling line at Chateau Ste. Michelle Winery

2. Buying and marketing economies may be available both in the purchase of new materials and components and also in the sale of the finished products. A large firm may not only receive normal discounts for bulk purchases but may also be able to dictate very advantageous terms if it constitutes a large proportion of the supplier's market. For example, a report on Metal Containers by the Monopolies Commission (now the Competition Commission) in the early '70s showed that Metal Box – the dominant supplier – had 624 customers of whom all but 45 bought at the terms specified in the published quantity discount schedules. These 45 were able to gain additional cost-savings by special negotiations. The importance of these special negotiations can be judged from the fact that these 45 customers accounted for 88% of the company's sales.

Selling in bulk may enable savings to be made in **invoicing and distribution costs**. Large firms may also enjoy economies in advertising. This is especially important for firms which

serve a national market, since the cost of advertising on a nationwide basis to launch new products may be very expensive.

For example, consider the enormous super tankers, which are growing ever bigger, to ship products across the world. The larger the tanker the more it can carry, and the cheaper the transport becomes. But only certain ports can cope with a tanker of this size.

3. **Financial economies** arise from the ability of large firms to raise capital more cheaply. When it comes to raising capital for the purchase of new plant or for investment in stocks of raw materials the valuable assets of the large firm give it a further advantage. Investors in ordinary or preference shares or purchasers of debentures are likely to be more impressed by the status and achievements of a large nationally known company than by those of a small relatively unknown one.

The actual administrative costs of raising money through the capital market will be proportionately lower for large firms as the costs do not increase in proportion to the size of the share issue.

4. **Risk-bearing economies** are based on the fact that underlying factors enable large firms to spread their risks as their activities are more diverse than those of the small firm.

Research and development of new products can be a protracted, expensive and risky undertaking. Small firms cannot devote resources to this activity. So as large firms develop new fields, they can increase their competitive advantage over their smaller rivals and so move even further ahead. This is why, for example, drug companies, who rely for their products on research which takes years and may either yield a new 'wonder-drug' or fail utterly, tend to be very large, as small firms could not fund long term, large scale research projects.

5. **Managerial and administrative economies:** The cost of processing large orders is not likely to increase in proportion to the size of the orders. The major managerial economies, however, are likely to be those derived from specialisation; the large firms can employ specialist accountants, marketing managers and production engineers, who by devoting all their attention to a relatively small part of the company's work, may do much to increase productivity.

A large firm will also have the ability to offer the high rewards needed to attract highly talented staff in various fields. It will

also be able to use administrative procedures which might be too costly for the smaller firm.

In summary these are:

- Technical economies of scale
- Purchasing and distribution economies of scale
- Financial economies of scale
- Risk-bearing economies of scale
- Managerial economies of scale

Specialisation and Division of Labour

At this point, it is important to look at specialisation and the division of labour, as they are alluded to in the above discussion.

Specialisation is when workers are given specific roles or jobs, so they become specialists in this area. The benefit of specialisation is that the good or service can be produced more quickly and to a higher standard or quality, using staff who are specialised in this field.

For example, if you run an IT company, you may employ members of staff who are specialists in networking, a specialist in hardware and a specialist in websites. This may enable you to offer those specialist services to customers.

The **division of labour** on the other hand, is when the labour force are assigned specific tasks, and work together to produce the good or service.

For example, in a car manufacturing company, the staff would be divided into groups completing different tasks in the manufacturing process, while all are working together to produce the car. For example, assembling the engine, fitting the electronics and making the seats. The labour force focuses on specific tasks, thus becoming specialist in their own area, while still having an overall knowledge of the process.

External Economies of Scale

These are available to all the firms in the industry and indeed may be of advantage to a number of firms in different industries. The major ones are:

1. **Trade Associations** such as the society of motor manufacturers who will advertise on behalf of all car firms and who may set up their own specialist training centres and manufacturing supply chains. They may also support research

and development and organise trade-fairs or other marketing facilities beyond the scope of any single manufacturer.


2. **Economies related to industrialisation:** Areas of high economic activity attract many service companies who provide components and specialist maintenance services to the large firms. The activities of the services sector multiply, providing advantages to firms in the area compared to those in less developed regions.

Example: the M4 corridor phenomenon in the UK, which has seen significant growth of the service industry to support other economies within the region, such as IT companies.

3. **Economies related to society:** As industrial areas grow, local authorities will provide social capital –new roads, housing, schools, etc. The better housing attracts more skilled workers and better communication links lowers distribution costs.

In summary these are:

- Trade Associations' economies of scale
- Industrialisation economies of scale
- Geographical and social influences on economies of scale

Activity 1	List as many advantages as you can to being a small firm.
	

The Limits to Growth

Beyond a certain size, the unit cost may begin to rise again owing to the effect of **diseconomies of scale**. These are again internal and external.

Internal Diseconomies

1. **Technical diseconomies** occur as the size of the plant increases. In the chemistry industry the construction and

safety problems associated with large plants are enormous. Bulk oil tankers need special berthing facilities, the cost of which may go a long way to offsetting the savings made by the use of larger units. If new equipment is installed and output drops, average costs could be higher as the new machine is not efficient working at less than capacity.

2. **Administrative and managerial diseconomies** arise through the over-division of management into specialist functions. The impersonal nature of management, the expense of informing staff of routine changes through internal memoranda and the long chain of command all cause problems for large companies.

Larger plants have traditionally tended to be more susceptible to strikes because boredom and dissatisfaction are more prevalent.

For example, there was a series of strikes held by Royal Mail staff due to changes in the worker's pay and conditions and changing job requirements.

External Diseconomies of Scale

These result from the overcrowding of industrial areas and the consequent increase in the price of land, labour and services. Infrastructure may also become overloaded – e.g. firms experience distribution problems because of congestion due to over-development in the area.

Example: the City of London, which saw businesses moving out from the centre due to traffic congestion and environmental concerns.

This led to the Congestion Charge in the centre of London.

Non-Perfect Markets - Monopoly

Perfect competition assumes a large number of buyers and sellers. This does not always exist. Part of the reason for this is the existence of economies of scale, which mean that large firms, or in extreme cases one very large firm, represents the most efficient means of production, with the lowest costs.

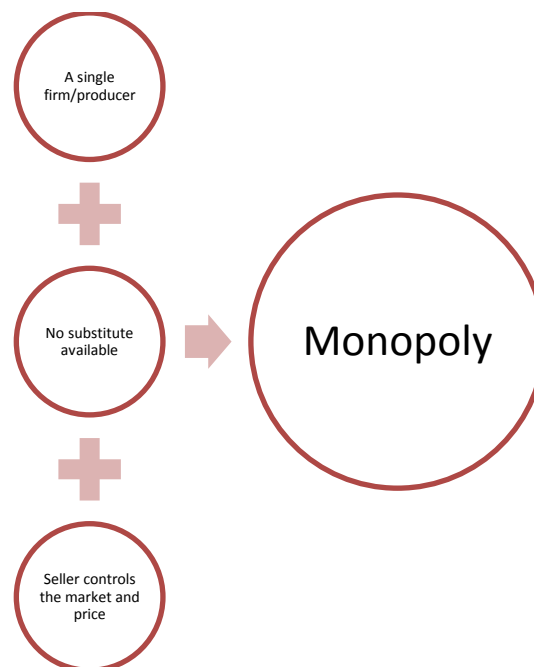
This extreme case is called **monopoly** – this is defined as a state in which a single supplier controls an entire market. Monopoly may also be a result of other factors such as legal controls, e.g. patents preventing other firms from producing the same good.

As with perfect competition, perfect monopoly is a theoretical rather than a practical concept. Two conditions are required for an absolute monopoly:

1. a single firm or producer;
2. no substitute available for the commodity produced.

Under monopoly the market is controlled by one seller who can either:

- (a) sell as much as they want at a price determined by the consumer; or
- (b) sell at the price they want with only the amount determined by the consumer.



In other words the monopolist can have control of either price or quantity but not both at the same time.

Example: the Post Office had a (legally enforced) monopoly on delivering mail for many years, though this is gradually being eroded.

This was a near perfect model of monopoly.

Do remember that there is a difference between pure monopoly and monopoly power. Pure monopoly is when there is only one company selling the good or service. Monopoly power is when a company has a significant market share and can dictate much of the market activity, but there are other companies. The number of other companies can be low due to it being difficult to enter the market, high costs or technical requirements, etc.

Monopoly power is usually defined as one company with over 25% share of the market.

Thinking point

From your reading, have you identified any companies that could be classed as having a monopoly power? If so, what characteristics do these companies have, and why would you class them as having a monopoly power?

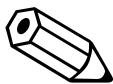
The Concentration Ratio

The concentration ratio tells us the market share of the top companies in a specific sector or industry. For example, the market share of the top 4 companies – CR4 – adding together their market share to tell us whether there is a monopoly or an oligopoly situation in the industry.

Activity 2

Which browser do you use to search the internet? You may use Google Chrome, Internet Explorer, Safari or Firefox, etc.

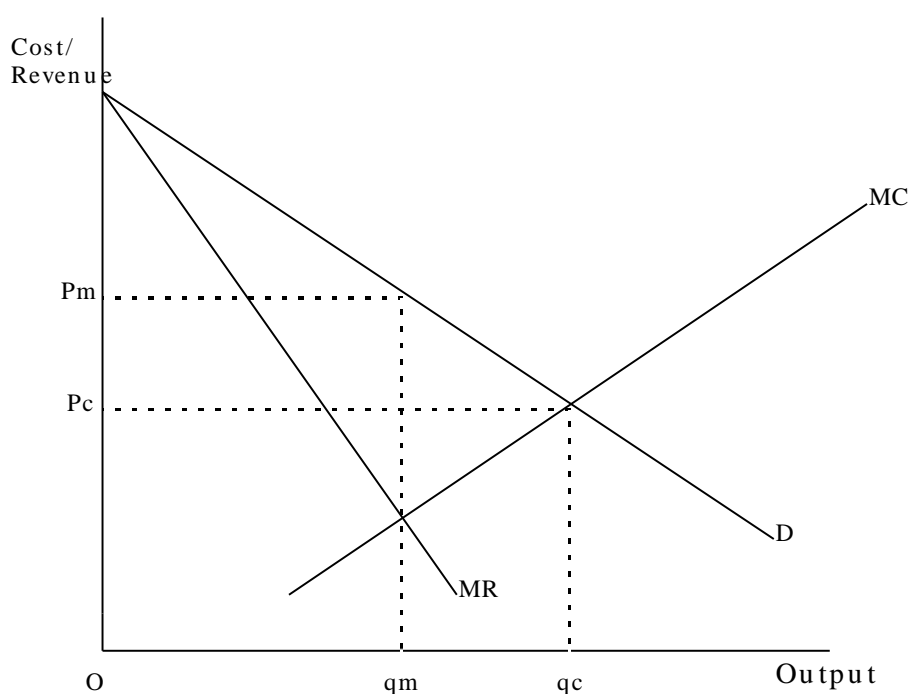
Look at their market share, and see if you can identify the top four companies, and calculate the concentration ratio from the data that you find.



Disadvantages of Monopoly

1. The classical case against monopoly is to a very great extent based on a single prediction – **if a perfectly competitive industry should be monopolised, and the cost curves of all productive units are unaffected by this change, the price will rise and the quantity produced will fall.**

Diagram 1



The effect of monopolising a perfectly competitive industry

Thus, given identical cost and demand conditions, monopoly leads to a lower output and a higher price than does perfect competition.

Diagram 1 illustrates this concept. The competitive supply curve (marginal cost curve – marginal cost is the cost of producing one more unit) labelled **MC** is the sum of the supply/MC curves of the individual firms; the competitive output is **qc**, and the competitive price **pc**.

Now if this industry is monopolised as a result of a single firm buying out all the individual producers, and each plant's cost curve is unaffected by this change, then the marginal costs will be the same to the monopolist as to the competitive industry. So the competitive industry's supply curve will be the marginal cost curve to the monopolist.

But the monopolist who seeks to maximise profits will equate marginal cost not to price but to marginal revenue (the revenue that would be gained from selling an extra unit). So the output of the industry falls from q_c to q_m , while the price rises from p_c to p_m .

2. Under perfect competition, marginal cost equals price in equilibrium. It follows that consumers are prepared to pay for the last unit they actually purchase an amount exactly equal to the cost of producing that last unit. In monopoly, price exceeds marginal cost so consumers pay, for the last unit they actually purchase, an amount greater than the cost of producing it.

Consumers would be willing to purchase even more units (in monopoly) but are not allowed to buy since the monopolist is restricting output in order to maximise profits.

Thinking point



As a result of these disadvantages, many Governments put safeguards in place to reduce the risk of monopolies forming. For example, the Competition Commission in the UK, which considers the impact of mergers, looks at market share and regulates a number of markets.

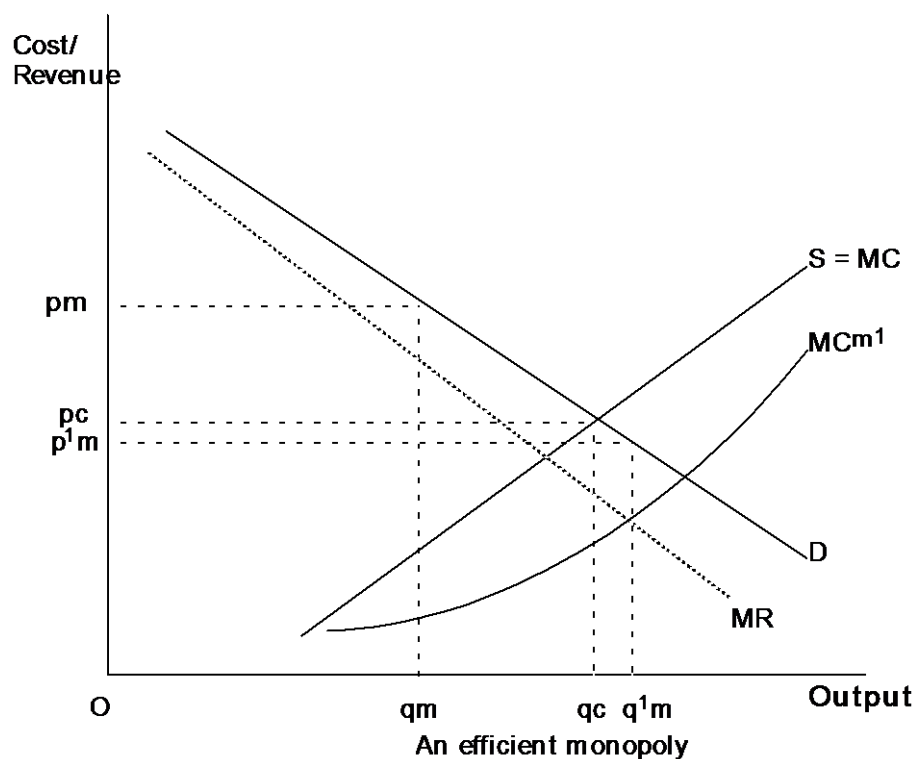
Look at the Competition and Markets Authority website to identify the scope of its work, and its work with the Office for Fair Trading at www.oof.co.uk/0515ea.

The Case for Monopoly

If economies of scale result from the merging of numerous competing groups into a single integrated operation, then the costs of producing any given level of output will be lower than they were previously. This is shown in diagram 2, where the competitive equilibrium = q_c at p_c ; the monopolised equilibrium with unchanged costs = q_m at p_m ; while the final equilibrium after the fall in costs will be q^1_m at p^1_m so production has actually increased and price fallen.

There is of course no guarantee that monopoly will result in either lower costs through the elimination of wasteful duplication and other economies of scale or in less efficient production and increased costs – the net effect will depend on the conditions of the particular industry.

Diagram 2



N.B. mc^{m^1} = the cost curve after the benefits of integration.

Innovation and Monopoly

In the short-term, both firms in perfect competition and those in monopoly have an incentive to produce cost-reducing innovations as this will reduce costs and so increase profits. In both industries abnormal or extra profits are possible in the short-term.

However, in perfect competition, in the long-term these extra profits will attract new firms into the industry who will copy the cost-saving innovations and eventually the extra profits will be eliminated. The length of time it takes the new entrants to copy the process will determine the extent of the incentive to innovate in a competitive industry.

However, a monopolist is able to prevent the entry of new firms into their industry so the additional profits will persist into the long term. There thus exists a more certain incentive for the monopolist to innovate. Joseph A Schumpeter was a major proponent of this, as one of the advantages of monopoly.

He argued that innovations that lower the costs of production, thus increasing output per head and creating economic growth, have a

much larger effect on living standards than any 'misallocation' of resources. He also argued that firms unable to break down the barriers of entry erected by monopoly firms would search for new products which could circumvent the patent protection of the monopolist.

Example: the history of the biro illustrates the way in which a monopoly develops and then is destroyed:

1. The first ballpoint was introduced in 1945 at a price of 12 $\frac{1}{2}$ dollars – it cost less than one dollar to produce.
2. By March 1946, the firm had made more than 3 million dollars profit and then competition started.
3. By December 1946 more than 100 manufacturers were producing the pen and they were selling for as little as 3 dollars. By February 1947 a price war had reduced this to less than a dollar.

The above shows that:

- (a) A monopoly can in the short run charge prices not remotely related to costs and earn enormous profits.
- (b) New firms will find ways of entry and so drive prices down to be more in relation to the costs of production.
- (c) The time lag is normally sufficient for very large profits to be amassed.

It is also worth noting that a monopoly company is not working in the best interests of its consumers/users. It may be that the consumers are exploited in relation in price, or in the use of resources.

Other Arguments for Monopoly

1. When UK firms compete against very large foreign firms in world markets, a large UK monopolistic firm may be justified to balance the market power of the foreign firms and so reduce import penetration.
2. There is still, even after privatisation, a strong argument for monopoly in the case of the utility industries, such as the gas and electricity industries, since competition would lead to unnecessary and costly duplication of distribution networks.

Remember that even if a company is a monopoly in a specific industry, it will still work to reduce costs and improve the product or service offered, to ensure that it is achieving the greatest possible profit. This will also help the company to maintain its overall market position, and strengthen the company for the future.

Activity 3

Think about the train service where you live.

Would you class the train service as a monopoly?
Write your reasons in the box below



Read Ray Powell & James Powell: *AQA A-level Economics, Book 1*, ch. 1, pp. 55-73.

Efficiency

Most of this lesson has used 'efficiency' to mean 'maximum production at minimum cost', but economists distinguish various types of efficiency.

- **Productive efficiency** is reached when all available resources are employed, i.e. any point on the production possibility frontier is productively efficient
- **Allocative efficiency** is only reached when productive efficiency exists **and** the combination of goods being produced matches people's needs and preferences

You will encounter other definitions of efficiency as you continue with the course.

At this point, it is useful to look back at how markets work, and the previous discussion on price determination, and compare this to a monopoly in terms of the similarities and differences. Look, particularly, at price fluctuations and the basis for price determination.

Summary

Economies of scale are increases in efficiency as the scale of production increases.

Internal scale of production refers to efficiencies within the business.

External economies of scale refers to wider efficiencies affecting the whole country or sector.

Economies of scale can also turn into **diseconomies** of scale

A **monopoly** is when a single supplier controls the whole market.

A monopoly may be more efficient and give consumers lower prices.

Suggested Answer to Activity One

In addition to the diseconomies considered in the 'Limits to Growth' section, your list may also include the following factors:

1. **Variety:** catering for different tastes (e.g. jewellery).
2. **Bulk:** some suppliers of heavy low value items will only have a small market because of transport costs.
3. **Personal services:** the corner shop is often successful because the shopkeeper can get to know the particular needs of his or her limited number of customers.
4. **Luxury items:** some goods have a limited market because the customers need to be rich to afford them (e.g. private helicopters).
5. **Specialisation:** this may create small firms performing a very limited part of the production process or operating in naturally

limited markets, e.g. producing window locks which can be operated by people who are unable to use their hands.

Suggested Answer to Activity Three

Reasons why the train service may be classed as a monopoly include:

There is no alternative to the one train provider within the area and for a specific route. Consumers are not able to choose a different train provider for a journey, with a different priced ticket. National Government may prevent other train operators being able to operate trains on the line, after the bidding process is concluded.

Reasons why the train service may NOT be classed as a monopoly include:

Tendering processes are undertaken to ensure the best value for money. In some circumstances there can be numerous operators running services on a line or part of a line. Consumers can choose other forms of transport, such as the bus.

Self-Assessment Test (Lesson Five)

1. Is bigger always better?

Syllabus Review Section 3.1.3 Production, costs and revenue

3.1.3.1 Production and productivity

- Production converts inputs, or the services of factors of production such as capital and labour, into final output.
- The meaning of productivity, including labour productivity.

3.1.3.2 Specialisation, division of labour and exchange

- The benefits of specialisation and division of labour.
- Why specialisation necessitates an efficient means of exchanging goods and services, such as the use of money as a medium of exchange.

3.1.3.3 Costs of production

- The difference between the short run and the long run.
- The difference between fixed and variable costs.
- The difference between average and total costs.

Students should be able to calculate average and total costs from given data.

Students should appreciate that the short-run average cost curve is likely to be U-shaped but a formal link with the law of diminishing returns is not expected. They should understand that the shape of the long-run average cost curve is determined by economies and diseconomies of scale.

3.1.3.4 Economies and diseconomies of scale

- The difference between internal and external economies of scale.
- Reasons for diseconomies of scale.
- The relationship between economies of scale, diseconomies of scale and the shape of the long-run average cost curve.

Students should be able to categorise and give examples of both internal and external economies of scale.

3.1.3.5 Average revenue, total revenue and profit

- The difference between average and total revenue.
- Why the average revenue curve is the firm's demand curve.
- Profit is the difference between total revenue and total costs.

Students should be able to calculate average, total revenue and profit from given data.