Economies of Scale

Economies of scale refer to the cost advantages that a firm can enjoy when the volume of production increases, in the long run.

Economies of scale can be:

- **Internal**: lower long run unit costs are achieved *within a firm* with higher levels of output. As the firm produces more, so long run average cost fall because of technical, marketing, etc, factors.
- **External** are long run unit cost reductions made outside the firm as a result of its location

The effect of economies of scale is to reduce the long run average (unit) costs of production over a range of output.

Economies of scale benefit firms because lower unit costs increase competitiveness and consumers because lower unit costs allow lower prices.

Internal Economies & Diseconomies of Scale

**Internal Economies of Scale** occurs within a firm when an increase in use of inputs results in a fall in long run unit costs. As the firm produces more and more goods, long run average cost begin to fall because of a number of factors including:

- **Technical economies** made in the actual production of the good. For example, large firms can use expensive vehicles, intensively. Train operators can make intensive use of expensive IT systems to manage the deployment of drivers and vehicles. Large-scale production allows the gains from division of labour to be exploited.
- **Managerial economies** made spreading the fixed cost of in the administration of a large firm across a higher level of output.
- **Financial economies** made by borrowing money at lower rates of interest than smaller firms.
- **Marketing economies** made by spreading the high cost of advertising on television and in national newspapers, across a large level of output.
- **Purchasing economies** made when buying supplies in bulk and therefore gaining a larger discount.
- **Research and development** economies by spreading the high cost of developing new and better products

**Internal Diseconomies of Scale** occurs when the firm has become too large and inefficient. As the firm increases production, eventually average costs begin to rise because:

- The disadvantages of the division of labour take effect
- Management becomes out of touch with the workforce and some machinery or vehicles become over-manned.
- Decisions are not taken quickly and there is too much bureaucracy eg form filling.
- Lack of communication in a large firm means than management tasks sometimes get done twice.
- Poor labour relations may develop in large companies.
Worked Example of Internal Economies of Scale

<table>
<thead>
<tr>
<th>Capital K</th>
<th>Output Q</th>
<th>Total Cost TC</th>
<th>Long Run Average Cost LAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>80</td>
<td>300</td>
<td>£ 3.75</td>
</tr>
<tr>
<td>20</td>
<td>200</td>
<td>700</td>
<td>£ 3.50</td>
</tr>
<tr>
<td>30</td>
<td>400</td>
<td>1200</td>
<td>£ 3.00</td>
</tr>
<tr>
<td>40</td>
<td>700</td>
<td>1900</td>
<td>£ 2.71</td>
</tr>
<tr>
<td>50</td>
<td>1000</td>
<td>2500</td>
<td>£ 2.50</td>
</tr>
<tr>
<td>60</td>
<td>1200</td>
<td>3000</td>
<td>£ 2.50</td>
</tr>
<tr>
<td>70</td>
<td>1400</td>
<td>3500</td>
<td>£ 2.50</td>
</tr>
<tr>
<td>80</td>
<td>1410</td>
<td>3800</td>
<td>£ 2.70</td>
</tr>
<tr>
<td>90</td>
<td>1415</td>
<td>4000</td>
<td>£ 2.83</td>
</tr>
<tr>
<td>100</td>
<td>1420</td>
<td>4300</td>
<td>£ 3.03</td>
</tr>
</tbody>
</table>

The long run is defined as that period of time where all factor inputs, both labour and capital, can be changed. The firm can therefore alter its scale, i.e., size of production.

If as a result of increasing both labour and capital, the firm experiences a fall in long run average total cost, it is experiencing economies of scale. Conversely, if long run average unit cost rises as the firm expands, diseconomies of scale are occurring.

The table above shows a simple example of the long run average cost of a firm that experiences economies of scale up to output level 1000. The minimum efficient scale (MES) is the scale of production where internal economies of scale have been fully exploited. It corresponds to the lowest point on the long run average cost curve, the MES. Beyond output level 1400, long run unit costs are rising, and diseconomies of scale are being experienced by the business.

External Economies & Diseconomies of Sale

External Economies are long run unit cost reductions made outside the firm as a result of its location and occur when:

- A local skilled labour force is available.
- Specialist local back-up firms can supply parts or services.
- An area has a good transport network.

External Economies arise from a growing local economy and industry rather than through an individual firm. Note that geographers use the term agglomeration to describe the process where firms concentrate in specific locations in order to take advantage of specialised labour and business services.

External Diseconomies of Scale occur when too many firms have located in one area. Long run unit costs begin to rise because:

- Local labour becomes scarce and firms now have to offer higher wages to attract new workers.
- Land and factories become scarce and rents begin to rise.
- Local roads become congested and so transport costs begin to rise.
Short Run Revenues

Revenue means the income firms receive from the sale of output. There are three types of revenue. It is important to understand the difference between three types of costs.

**Total Revenue (TR)** refers to the amount of money received by a firm from selling a given level of output and is found by multiplying price \( P \) by output ie number of units sold \( TR = P \times Q \)

**Average revenue (AP)** or price is the unit income form the sale of one item and is calculated by dividing total costs \( TR \) by total output \( Q \)

\[ AR = \frac{TR}{Q} \text{ ie } P \]

**Marginal revenue (MR)** is the income received from selling one extra unit of a product and is calculated by dividing the change in \( \Delta \) total revenue \( \Delta TR \) by the change in output \( \Delta Q \)

\[ MR = \frac{\Delta TR}{\Delta Q} \]

**Worked Example of Revenues**

Like costs, revenues is an abstraction best explained by way of a worked example

Small firms like Roberta are price takers - they have to accept the going market price per mile travelled or risk losing custom. Potential revenue for a popular route from the city centre to the railway station is shown in the table below

<table>
<thead>
<tr>
<th>Revenue for a taxi operating in a perfectly competitive market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fare</td>
</tr>
<tr>
<td>Hires per day</td>
</tr>
<tr>
<td>Total Revenue</td>
</tr>
<tr>
<td>Marginal Revenue</td>
</tr>
</tbody>
</table>

Note that marginal revenue is constant and equal to price which is always average revenue

But what if Roberta was the only taxi working in the town ie a monopolist. She can set any price she chooses and travellers must decide if the ride is worth the fare being asked.

<table>
<thead>
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<th>Revenue for a taxi operating in a monopoly market</th>
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<tr>
<td>Fare</td>
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<tr>
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</tr>
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Note now that marginal revenue is no longer constant but declines with output
Revenue Curves

The shape of the revenue curve depends on the industry in which the firm operates. Consider the two revenue curve diagrams below.

- **Perfectly competitive firms** face a perfectly elastic demand curve
- **Imperfectly competitive firms** have diverging average and marginal revenue curves

**Perfectly competitive firms** are price takers and accept the market price for every unit sold. Hence $P=AR=MR$

**Imperfectly competitive firms** are price makers and can set price or output

Profit

Profit ($\pi$) is the difference between total revenue (TR) and total costs (TC). As previously mentioned, profit is the reward for risk taking. The potential penalty for failure is **loss** of funds risked, or in the case of unlimited liability, bankruptcy and loss of personal assets of the entrepreneur.

Economists distinguish between two types of profit

- **Normal profits**: the minimum the amount of money a firm must receive to carry on production of a given good. **Normal profit is included as a cost**
- **Abnormal profits** occur when revenue exceeds costs so $\pi > 0$ ie $TR>TC$
- If costs exceed revenue then a **loss** is made and profits are negative

Students are often confused by this distinction. It helps to think of the entrepreneur requiring a fixed amount per unit to compensate for the administrative duties involved in running the firm. These are a cost that must be covered if they are to stay in the industry.

This means that even if no abnormal profits are made, normal profits are earned - the firm is still rewarded for managing resources.
**Profit maximising output**

Traditionally economics assumes firms are profit maximisers. They continue to hire extra workers up to the point where the marginal cost of producing extra units is equal to the marginal revenue received from their sale.

This concept can be illustrated by bringing together the marginal cost and marginal revenue curves.

Assume a small transport firm operating in a perfectly competitive market knows that the market price for delivering a fridge for a local firm within a town is £4. How many deliveries should it offer to do in a given time period, say a day, given its marginal cost curve?

After around 25 trips, diminishing returns set in and marginal costs begin to rise. If it only takes on 40 deliveries it is forgoing profits that could be made on the next 10 trips. However, taking on more than 50 deliveries makes no sense – the cost of the extra deliveries is more than £4 - the marginal revenue earned from each trip.

Remember that the entrepreneur includes an element of normal profits in the marginal cost curve so that even though MC = MR for the 50th delivery, it still worth undertaking.

It is important to understand that marginal cost and revenue curves help firms decide on the profit maximising level of output. Without the average cost curve it is impossible to infer if the firm is making an abnormal profit, a loss or earning normal profit.

Profit maximising for an imperfectly competitive firm is tackled later in this chapter.