Economies and diseconomies of scale

Detailed notes for Edexcel Economics A, unit 3.3.3 on economies and diseconomies of scale.
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Definitions

Economies of scale are when as firm **output increases**, **long-run average cost (LRAC) falls.**

Diseconomies of scale are when as firm **output increases**, **LRAC increases**.

Types of economies of scale

There are two types of economies of scale.

1. Internal economies of scale

The first is internal economies of scale. These occur within the firm as the firm decides to change its output level.

Types of **internal** economies of scale include:

- **Technical** economies of scale

    - Technical economies of scale come from improvements in the production process as firm output grows.
    - Some production processes require investment in a large machine (capital).
    - As the firm grows larger, the firm can spread the same cost of capital over a larger amount of output.
    - This means the long-run average cost falls as output rises
    - **Specialisation**
        - As a firm produces more output, workers may specialise in particular tasks.
        - The division of labour involves assigning different workers to different tasks. This allows workers to get more practice at their assigned task, becoming more productive and increasing firm productivity.
        - So with the same labour costs, firms can produce more output. In other words, LRAC falls as output rises.
- **Financial** economies of scale
    - Lenders are more likely to view larger firms as creditworthy.
    - Larger firms may have more assets to use as "collateral" (insurance to the lender in case of failure to repay the loan).
    - Larger firms are also likely to have a longer history of profits, reducing the risk for lenders.
    - Finally, larger firms are more likely to be listed on the stock market, providing an additional way to raise funds (by issuing shares in the company).
    - As a result, firms with larger levels of output may receive lower interest rates on loans, reducing their long-run average costs.
- **Purchasing** economies of scale
    - Firms that sell a higher output can bulk-buy their inputs needed for production. This lowers the long-run average cost of buying inputs.
    - Supermarkets for example are likely to bulk-buy most of their products, including fruits, vegetables, frozen food and fruit juice.
- **Managerial** economies of scale
    - Larger firms are more likely to be able to hire specialist managers for different parts of the firm.
    - This is because the cost of a specialised manager can be spread over a greater level of output. So LRAC falls as output rises.
- **Risk-bearing** economies of scale
    - A larger firm has a greater range of products.

    - Suppose there's a fall in demand for one good that the firm sells. This would not affect the firm as much. The firm can offset its losses on one product with profits from other products.
    - As a result, the costs to firms of any insurance may fall. Firms negotiate better deals on insurance such as liability insurance or insurance against unexpected events.
    - Pharmaceutical companies such as Astrazeneca and GSK may invest in research and development for several medicines at the same time. R&D is a risky process, as some medicines may succeed in clinical trials while others may not. Having multiple medicines in R&D at the same time can reduce risk.
- **Marketing** economies of scale
    - As output increases, the same advertising budget can spread across a larger amount of output.
    - This reduces the long-run average cost of advertising as output rises.
    - This means we are more likely to see advertising campaigns from larger companies, such as Tesco and John Lewis.

Other examples of firms with economies of scale include:

- Google:
    - The cost to Google of running servers and designing its internet browser and services may vary little with the number of users. In other words, Google may have high upfront costs, but the marginal cost (cost of extra users) is low.
    - Thus, Google can spread these costs over a large number of users, bringing down its LRAC.
    - Google also employs specialist managers for its many different teams, such as Google Search, its internet browser Chrome, Ads, AI and more.
- Utilities such as water and energy:
    - Utilities are likely to involve distribution networks, such as a set of pipes for moving water and energy to customers.
    - Water and energy distributors can spread the costs of their pipe network over a larger customer base, leading to lower LRAC.
    - As a result, having multiple smaller firms in the market would lead to higher LRAC.
    - Having multiple firms duplicating the same infrastructure could prove inefficient, not only wasting resources, but also preventing firms from spreading the cost of infrastructure over a large number of users.

2. External economies of scale

The second type of economies of scale is external economies of scale, which occur at the industry level when the industry expands as a whole.

For external economies of scale, it helps to think of areas where many firms in the same industry are based.

Examples of this include:

- Silicon Valley in the US, home to lots of technology firms.
- Financial service firms in New York and London.
- Several Formula 1 teams are based near Silverstone in the UK.

Types of external economies of scale include:

- The benefits from **suppliers or workers being located in the same area** as the firm.
    - This lowers the costs to firms of hiring workers or buying inputs.
    - For instance, there are reduced costs of transportation for locally sourced inputs.
    - It is easier and quicker to find and hire workers, with no need to cover workers' costs of relocating.
    - This reduces firms' LRAC as the size of the industry grows.
- **Knowledge sharing** between workers and firms.
    - As workers move between firms and firms meet to discuss ideas, more knowledge is shared between different firms.
    - This could increase firm productivity, so that with the same costs, firms can produce more output.
    - This decreases firms' LRAC.
- Improved **transportation networks**
    - As more firms move to a given area, faster transport routes may develop, such as faster road and train routes.
    - This may be because with more firms in an area, there is a greater demand for infrastructure. This could lead to more investment in infrastructure by firms and the government.
    - Efficient transport networks reduce the LRAC of the firm, as the cost of transporting inputs falls. It takes less time for a given amount of inputs to reach the intended location.

Types of diseconomies of scale

Types of diseconomies of scale include:

- **Coordination difficulties**
    - In larger firms, people from many different teams or from ranks of authority within the firm all have to agree and approve decisions.
    - As a result of these different layers of authority, there can be lots of paperwork or bureaucracy in a larger firm. This can slow down decision making.
    - This lack of coordination within the firm can increase long-run average costs.
- **Managerial control**
    - It may be more difficult to track worker performance in a larger firm.
    - With more employees, it's harder to separate one individual's contribution from the other.
    - This makes it more difficult to incentivise employees or for managers to improve company performance.
- **Worker performance**
    - Also in a larger firm, employees may also feel less motivated to work hard.
    - Workers may feel alienated from the purpose of the firm, feeling less connected to the firm's success. This can reduce morale and worker productivity.
- **Duplication of worker efforts**
    - As a firm grows, the production process may no longer improve and may decline, resulting in a fall in firm productivity.
    - For example, as a firm increases the number of employees, employees' tasks could overlap and there could be needless duplication of effort.

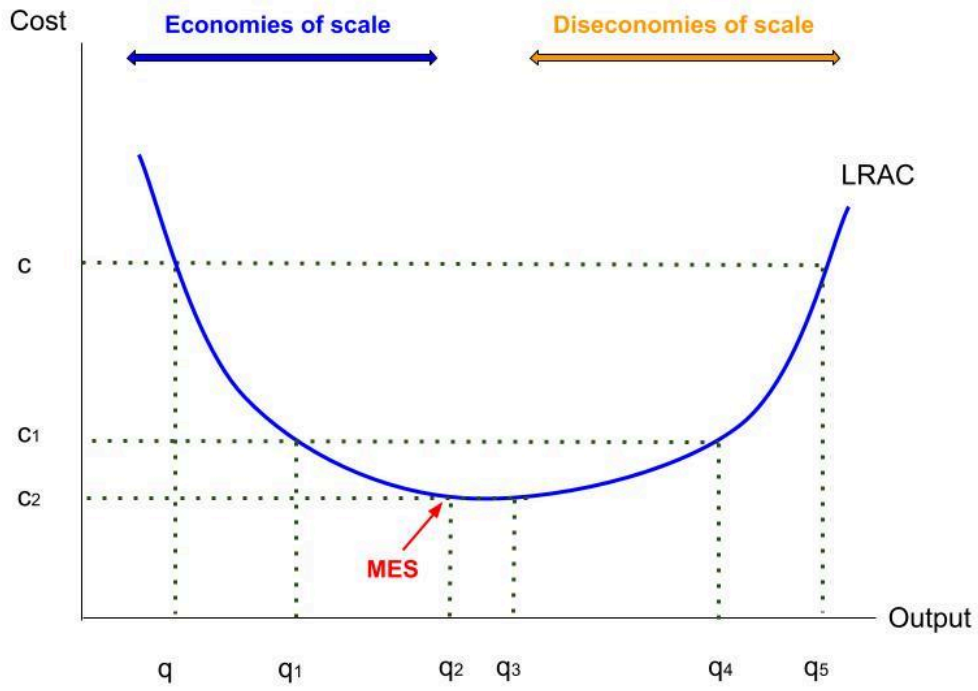
Technically, these are *internal* diseconomies of scale. As output increases, LRAC increases with a movement along the LRAC curve.

There can also be *external* diseconomies of scale (see the evaluation points section for more on this).

Diagrams for economies of scale and the minimum efficient scale

Internal economies of scale diagram

Here is a graph for a firm that experiences both internal economies and diseconomies of scale.



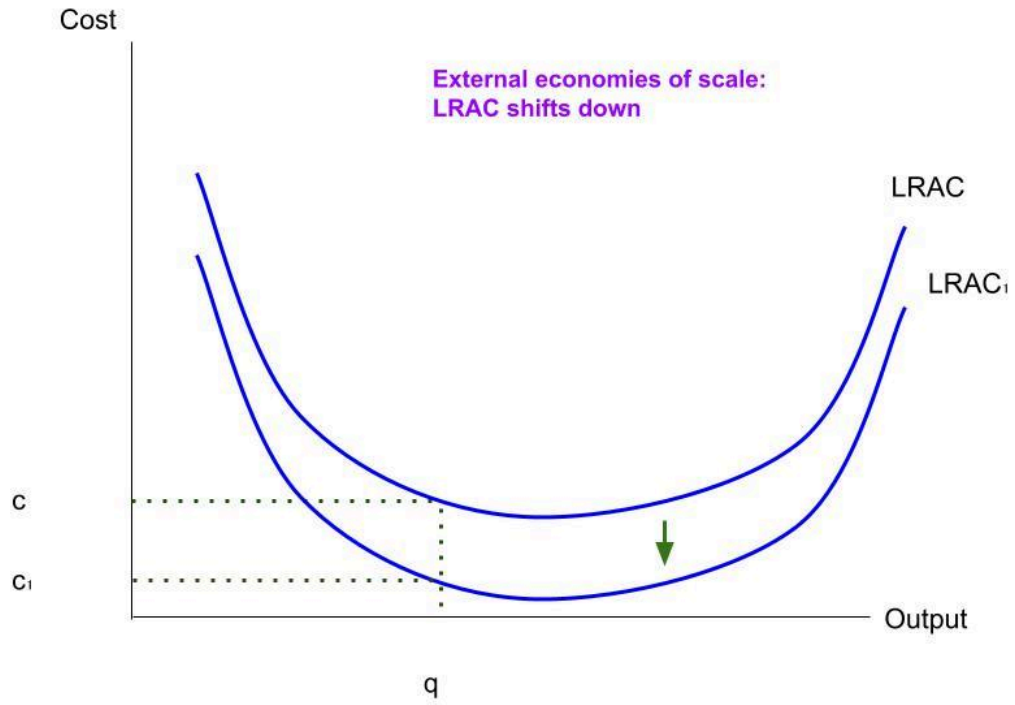
The diagram can be split into three parts:

- **Left side: internal economies of scale.**
  - As firm output increases, e.g. from q to q_1, LRAC falls, e.g. from c to c_1.
- **Centre: minimum efficient scale.**
  - The minimum efficient scale (MES) represents the minimum level of output where the firm's long-run average cost is minimised.
  - In the diagram, the MES is achieved at output level q_2.
  - You may also come across another definition of the MES as follows:
    - The MES is all level(s) of output where long-run average cost is minimised.

    - In this case, the MES on the diagram above is achieved at all output levels between q_2 and q_3.
    - Academic literature and textbooks have used both definitions for the MES. So it would be reasonable to credit either definition.
- **Right side: internal diseconomies of scale.**
    - As firm output increases, LRAC rises.
    - For example, as output increases from q_4 to q_5, LRAC rises from c_1 to c.

<u>External economies of scale diagram</u>

External economies of scale lead to a shift downwards in a firm's LRAC curve from LRAC to LRAC1. This means at a given level of firm output, such as q, LRAC has fallen from c to c_1.



Evaluation points for economies of scale

To evaluate internal economies of scale:

- For Edexcel, **diseconomies of scale** can be a solid way to evaluate economies of scale.
    - Another way to phrase this is it depends on the size of the firm. If the firm grows too large, diseconomies of scale can occur.
- Whether there are economies of scale **depends on the industry**.
    - For some industries with high initial costs, such as the water industry due to the pipe network required, there may be greater economies of scale.
    - Conversely for industries that rely on labour, such as hairdressing, scaling up may be less likely to lower long-run average costs. As the number of customers served grows, you may need proportionately more workers to serve those customers.
- **Technological progress** can create or eliminate economies of scale:
    - Technological progress may allow more firms to exploit economies of scale. Server costs can be spread over an increasing number of users, and adding extra users comes at little additional cost for firms.
    - Yet technological progress could also flatten the LRAC curve, by reducing barriers to entry. For instance, clothing companies can start businesses with an online shop as opposed to a more expensive physical store, reducing LRAC at low output levels.

To evaluate **external economies of scale**:

- There can be external diseconomies of scale too. For instance, as Silicon Valley grows, traffic problems in the area have worsened. This could increase the costs of transporting inputs.
- Remote work could reduce the benefits for firms from external economies of scale. Firms may not need to locate in the same place any more, which could lead to workers and firms spreading out.
- Structural change could reduce the demand for a product, reducing the size of the industry. This would reduce the ability of an industry to take advantage of external economies of scale.

Practice question on economies of scale in the style of Edexcel Economics A

Below there is a short extract, followed by a practice question.

Extract: Many teams in Formula 1 racing, such as Mercedes, McLaren, Williams, Red Bull, Aston Martin and Alpine have bases in the UK, most of which are near the Silverstone Formula 1 race track.

Why do seven out of ten teams in the sport have bases in the UK's "Motorsport Valley"? One reason is it's easier to attract the best engineers, so employees can move between teams without having to move house. The UK Government has also funded transport improvements and research and development in the region.

Some Formula 1 teams are larger than others. The larger teams are able to produce their own car parts, such as engines and sell car parts to others. For example Mercedes supplies engines to McLaren and Williams. Larger teams also invest more in wind tunnels and simulators for research and development.

Source: https://www.bbc.com/sport/formula1/23048643

Question: Evaluate the possible internal **and** external economies of scale for Formula 1 teams. (12 marks)

Related resources for Edexcel Economics A

Edexcel Economics A notes, model answers and practice questions:
https://tfurber.com/edexcel-economics

Edexcel Economics A Theme 3 notes, model answers and practice questions:
https://tfurber.com/theme-3-edexcel-economics/

Related topics:

- Costs.
- Revenues.
- Business objectives.