

Long Run Average Costs (LRAC) and Economies of Scale

GCE A-LEVEL & IB ECONOMICS

Lesson Structure

- Deriving the LRAC curve from SRAC (short-run average costs)
- Economies of Scale
 - Internal and External
 - Diseconomies of Scale

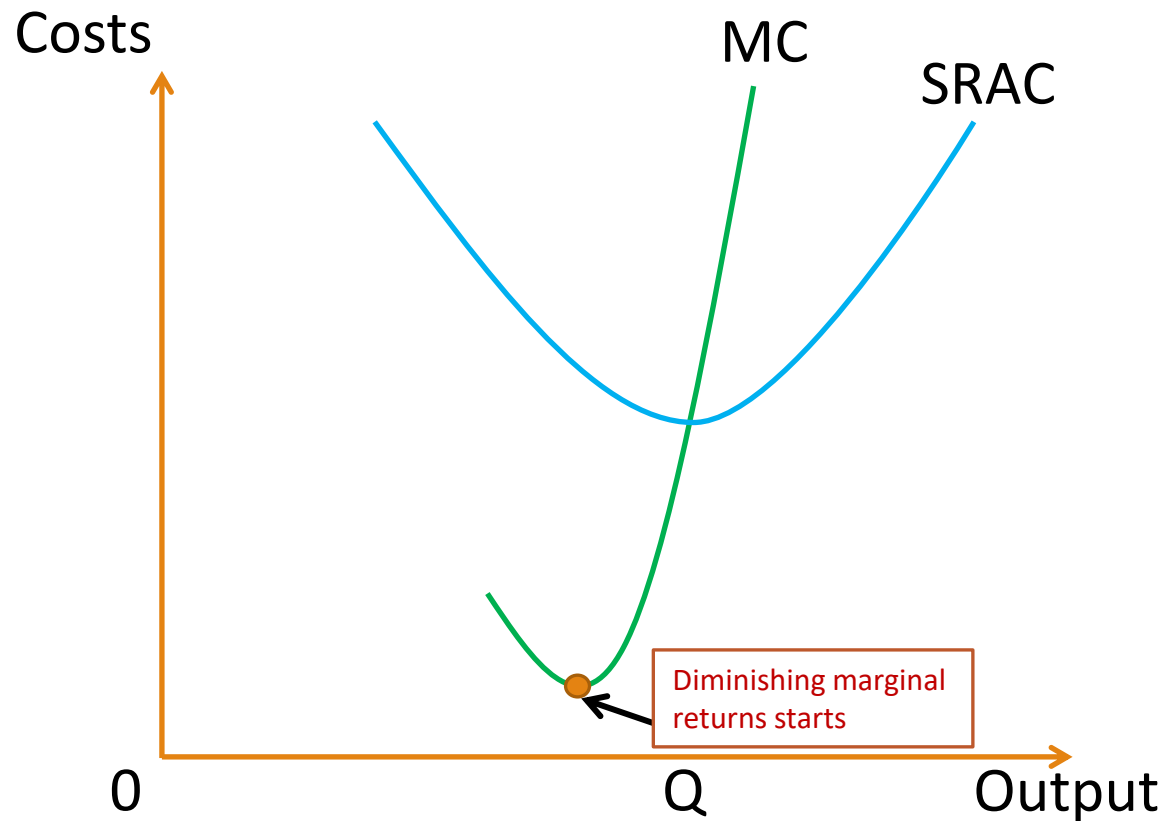
Short-Run Average Cost (SRAC)

- In the short run, at least one factor of production is **fixed** (cannot be changed e.g. number of machines)
- This contributes to the phenomenon of **diminishing marginal returns**
 - Definition: If one factor of production increases while another is fixed, the gains from increasing the variable factor will eventually decrease

In other words: If you keep increasing one type of raw material (e.g. labour) to produce more of a good, but hold others constant (e.g. no. of machines), you will eventually gain less output from each unit (of labour) you increase

If you are unfamiliar with this, please read our Economics notes on Average/Marginal/Total Costs and Production Returns (AQA)

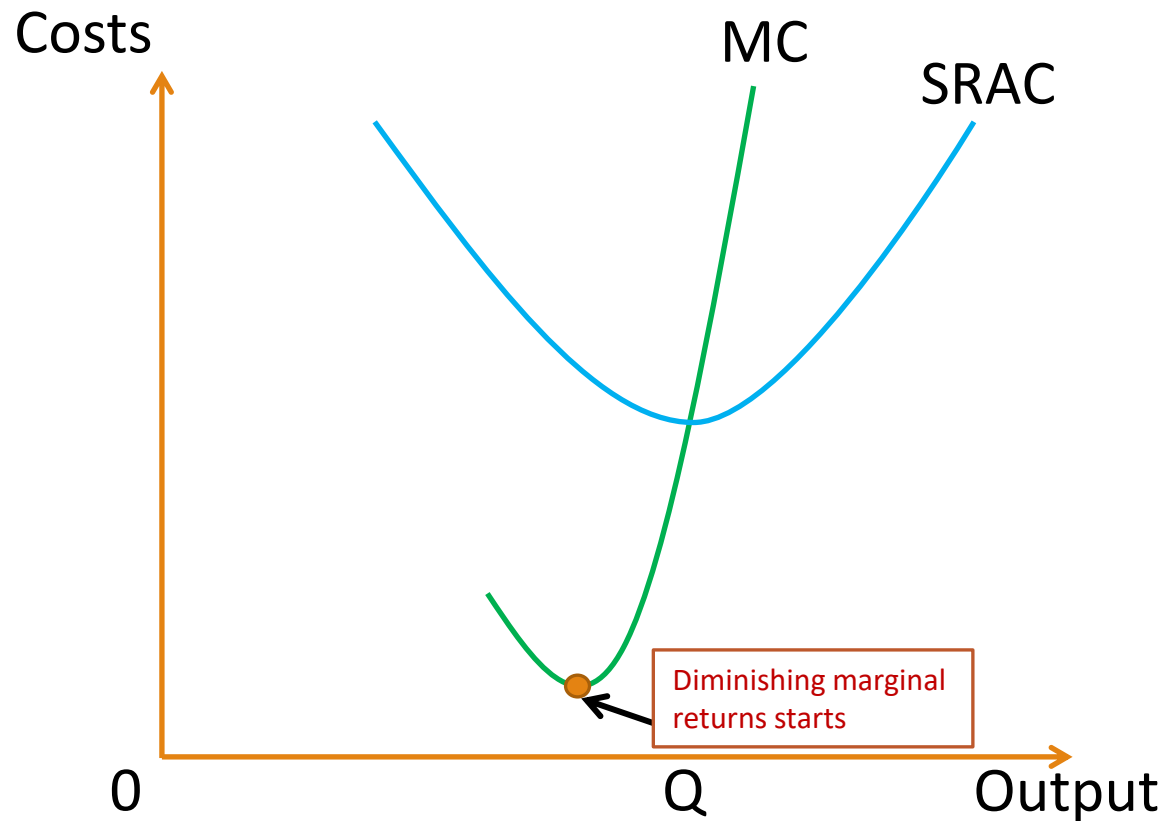
Shape of the SRAC



When the marginal cost (MC) increases, it means the cost of producing one additional unit of the good becomes higher.

The MC rises due to diminishing marginal returns. This is because if we are gaining less output from raw materials (factors of production e.g. labour), this means we need more of it to produce the next unit, hence incurring a higher marginal cost. i.e. Production costs increase as the raw materials we add are giving us less output

Shape of the SRAC



When the cost of producing the next unit (MC) becomes higher and higher, eventually this will pull up the short-run average cost curve. This is because the average cost will include the higher cost unit production in its average calculation.

Hence, this explains the U-shaped nature of the short-run average cost (SRAC) curve. It is due to diminishing marginal returns in the short-run and having fixed factors of production that cannot be easily changed.

Long Run Average Costs (LRAC)

In the long run, all factors of production are **variable**... What does this mean?

- Fixed factors of production can increase
 - The firm can keep expanding by increasing any inputs (without compromising on amount of output generated)
- No diminishing marginal returns
 - If too many workers are using the same machine leading to inefficiency... Just add another machine!

Long Run Average Costs (LRAC)

In the long run, all factors of production are **variable**, as a result...

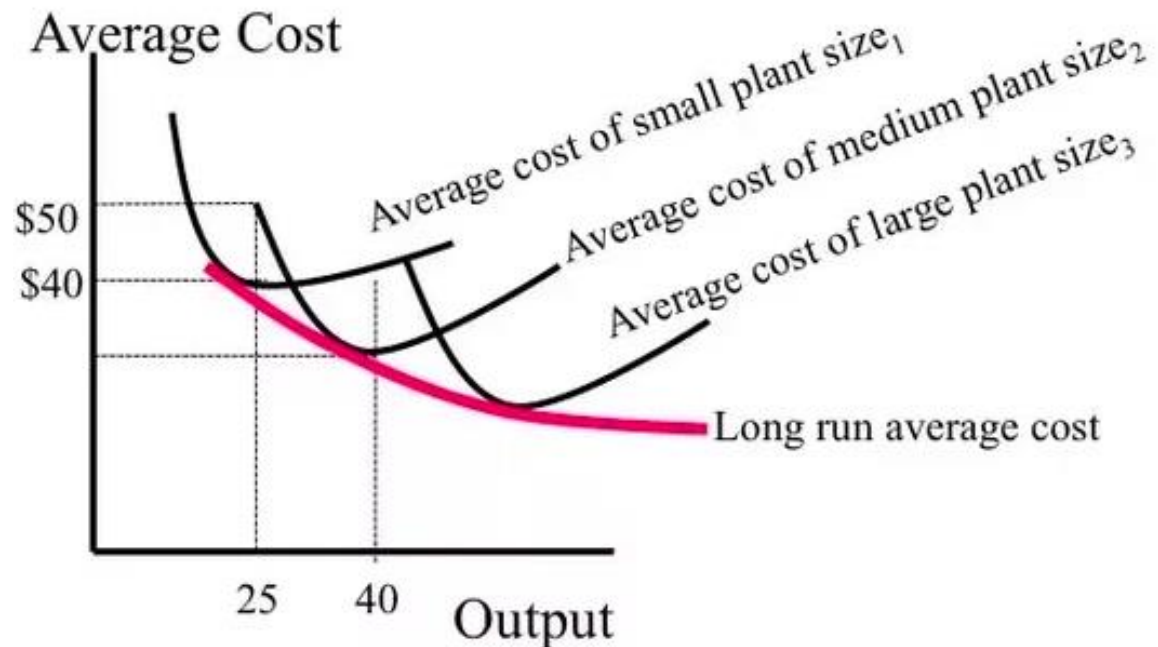
- Firms optimize towards the most productive input combination

i.e. Optimal Resource Mix

- Firms can produce at a lower cost when output increases

i.e. Economies of Scale

Long Run Average Costs (LRAC)

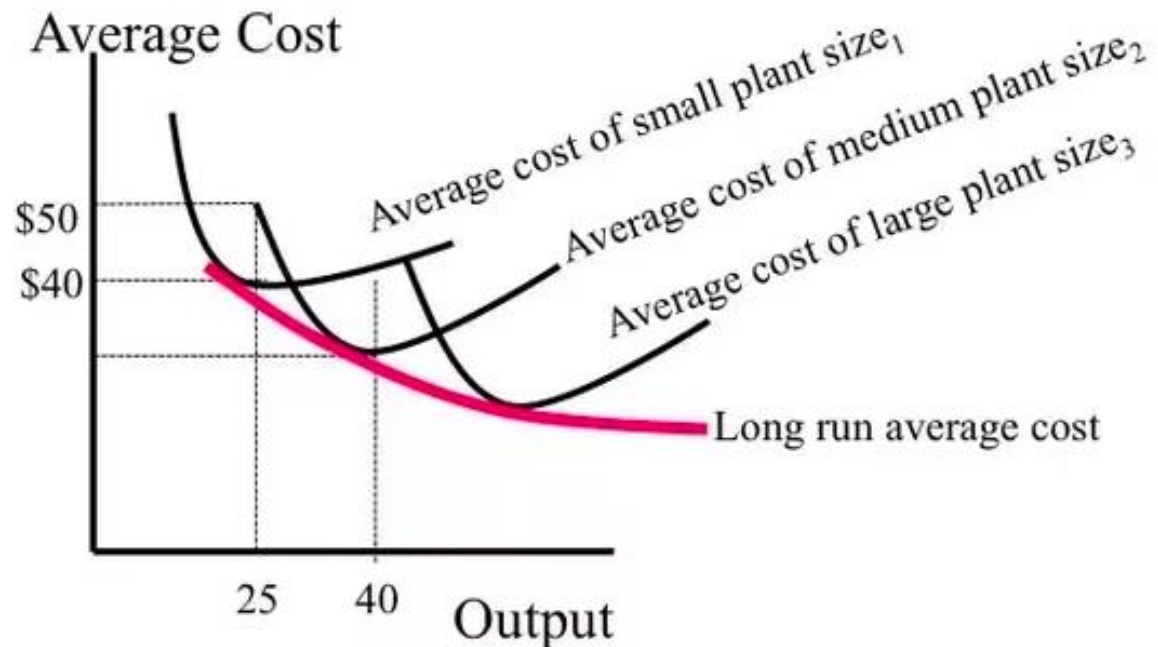


The LRAC is simply a collection of SRAC curves. An increase in fixed inputs (factors of production) once capacity is full will shift SRAC to the right.

Any point of any SRAC has a higher or equal cost compared to the LRAC, as fixed inputs can be changed to avoid diminishing marginal returns in the long run, achieving lower costs.

Hence, the LRAC is an 'envelope' curve containing a series of SRAC curves. Thus the LRAC is formed by a series of points tangent to various SRAC curves with different input combinations and outputs.

Long Run Average Costs and EOS



Each SRAC curve becomes lower than the other one as output increases

Why? Economies of Scale

E.g. Lower costs when having a bigger plant which can use more efficient machines, or buying raw materials in bulk to get a discount

Economies of Scale Definition

Economies of Scale is when the business is able to reduce **average costs** in the **long run** when **output** of goods/services increases.

How can McDonalds reduce their costs as they expand?



Internal Economies of Scale

Internal economies of scale (EOS) means the source of the cost saving is from within the firm. It can take a variety of forms:

- Purchasing economies of scale
 - Firms can get better discounts for bulk-buying raw materials from suppliers (e.g. beef) when they produce more goods
- Technical economies of scale
 - Firms that produce more can afford to use specialised/productive capital (e.g. beef patty machines), and invest in research and development to reduce operational costs
 - This allows them to be more cost effective since the fixed cost of the capital/machine can be divided by a large number of units produced, lowering average cost of capital

Internal Economies of Scale

Internal economies of scale (EOS) means the source of the cost saving is from within the firm. It can take a variety of forms:

- **Managerial economies of scale**
 - When the firm is large enough to hire specialist labour (e.g. marketers, HR managers)
 - This means division of labour can take place, causing staff to be more experienced, efficient and hence can reduce costs
- **Financial economies of scale**
 - Larger firms have better credit ratings since they are seen as less likely to fail
 - Hence, when firms grow bigger, they can borrow money at lower interest rates to reduce costs for the business

Economies of Scale

Short video on why budget airlines are so cheap. Take note of what types of economies of scale they used.

<https://www.youtube.com/watch?v=069y1MpOkQY>



Economies of Scale – Budget Airlines

- Buying 151 planes (737s) from Boeing, airport landing/services -> purchasing economies of scale
- Fuel efficiency of Boeing jets, check-in machines -> technical economies of scale (more efficient & productive machinery spread over a large number of output i.e. passengers)
- One type of plane used -> specialisation and managerial economies of scale (expert engineers and pilots)

External Economies of Scale

External economies of scale occurs when there is a fall in average cost for firms, when the scale of production within the industry increases.

This can happen in a variety of ways, one of which is better **infrastructure** (transportation, communications etc.) for the industry.

Case example: Aerospace industry - East Lancashire (UK)

- By having aircraft manufacturing firms in the same region, suppliers can transport aircraft parts in bulk. This will generate cost savings to be passed to the manufacturers. This can also happen when new transportation infrastructure gets built (e.g. HS2)



External Economies of Scale

External economies of scale occurs when there is a fall in average cost for firms, when the scale of production within the industry increases

Another possibility is when skilled workers/firms group together to form a business hub around a particular area

Case example: Silicon Valley / East London Shoreditch (Tech City)

- IT clusters allowing specialist labour supplied to be concentrated in a particular region. This will make it easier for firm to hire workers and reduce costs.



Bitcoin Example

<https://99bitcoins.com/bitcoin-mining/>

The better the computing technology, the more efficient the bitcoins are being mined. This means lower _____ for ALL firms in the industry.

As ALL firms are benefiting from reduced costs, this is an example of _____ Economies of Scale.



Can Economies of Scale Last Forever?

Your CEO is concerned about possible over-expansion of John Lewis/Waitrose, and that there are too many branches. He wants the board of directors (you) to figure out the risks of growing too big and the costs involved.

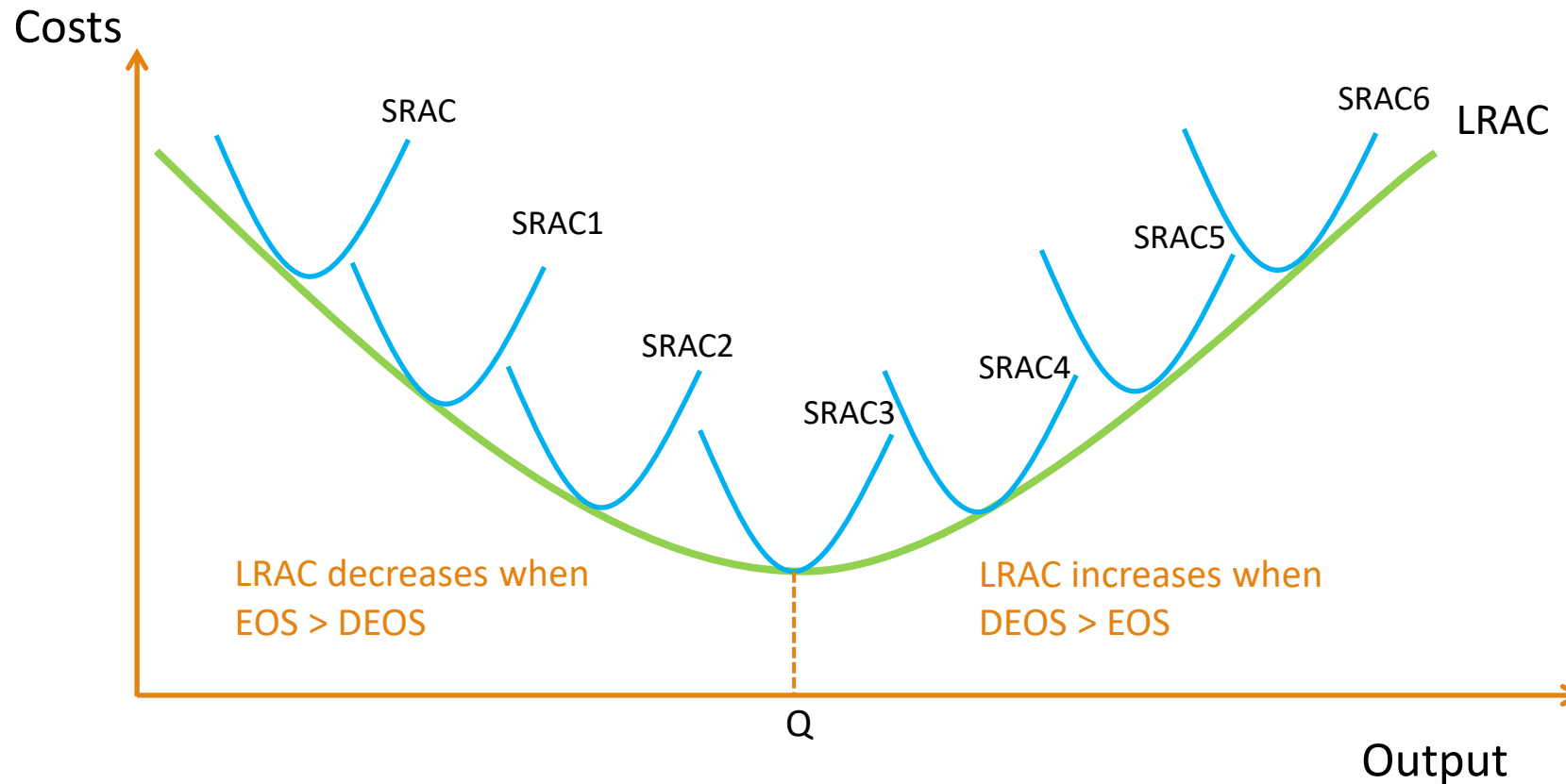


Diseconomies of Scale Definition

Diseconomies of Scale (DEOS) is when **average costs increases** in the **long run** when **output** of goods/services increases. This can be due to:

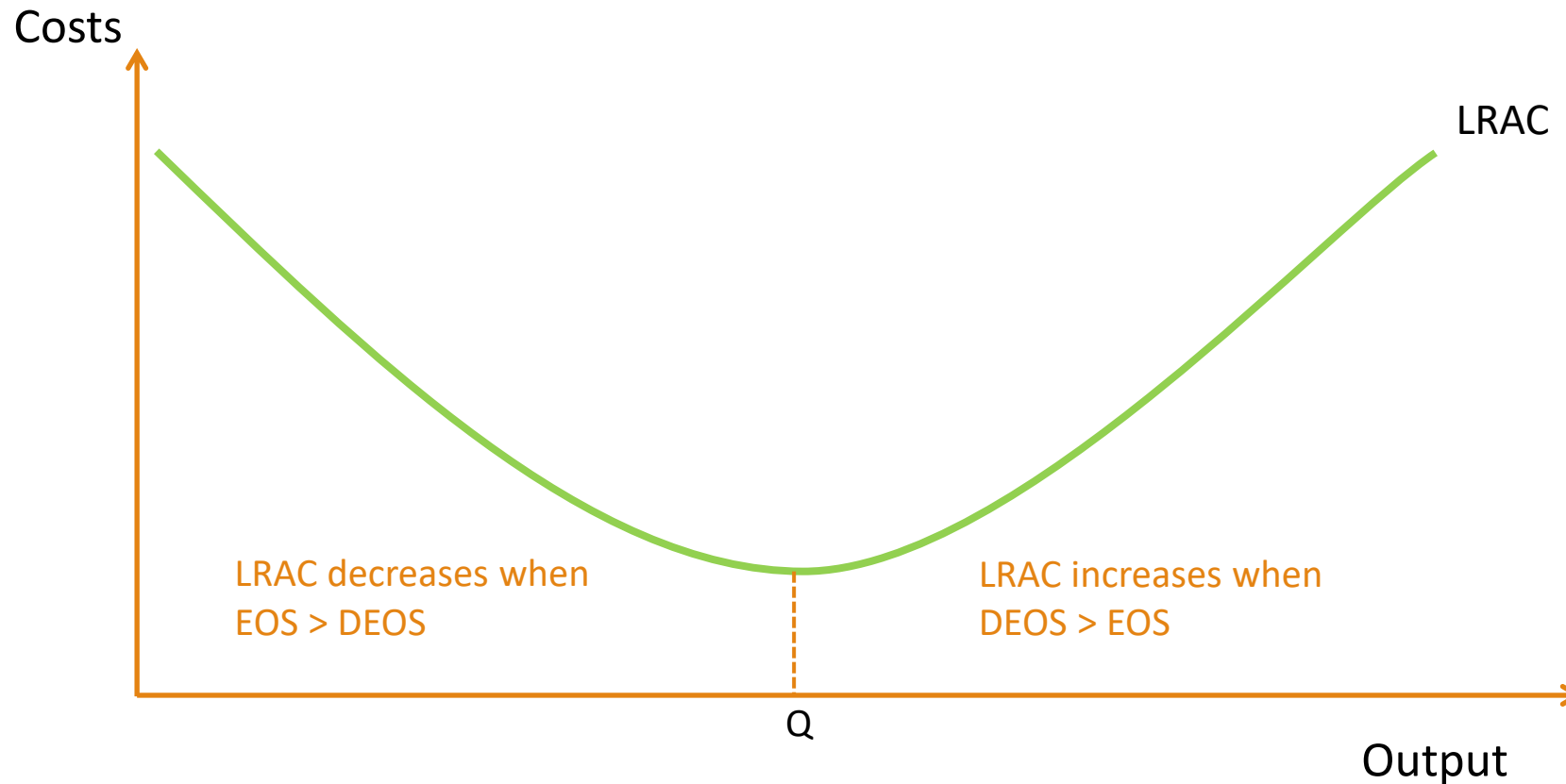
- **Lack of Communication**
 - It is more costly to ensure good communication in the organisation for larger firms (e.g. international branches), as an effective system needs to be in place (e.g. IT/Zoom)
- **Lack of Control**
 - Larger firms have more employees, which makes managing and monitoring them difficult. Separation of ownership from control may occur, leading to inefficiencies and higher cost.
- **Lack of Coordination**
 - Big companies with multiple teams, branches, and departments have a harder time coordinating with each other, due to differences in incentives and objectives. Similarly, it can be tricky to motivate workers or serve customers that are in another team/place.

The LRAC Curve (Envelope Curve)



This is what the full LRAC curve looks like, when drawn with SRAC curves (not required)

The LRAC Curve (Envelope Curve)



As we can see from the diagram, the full LRAC curve is U-shaped. The reason for that is the firm is experiencing economies of scale in the first part of the curve, hence long-run average costs are decreasing.

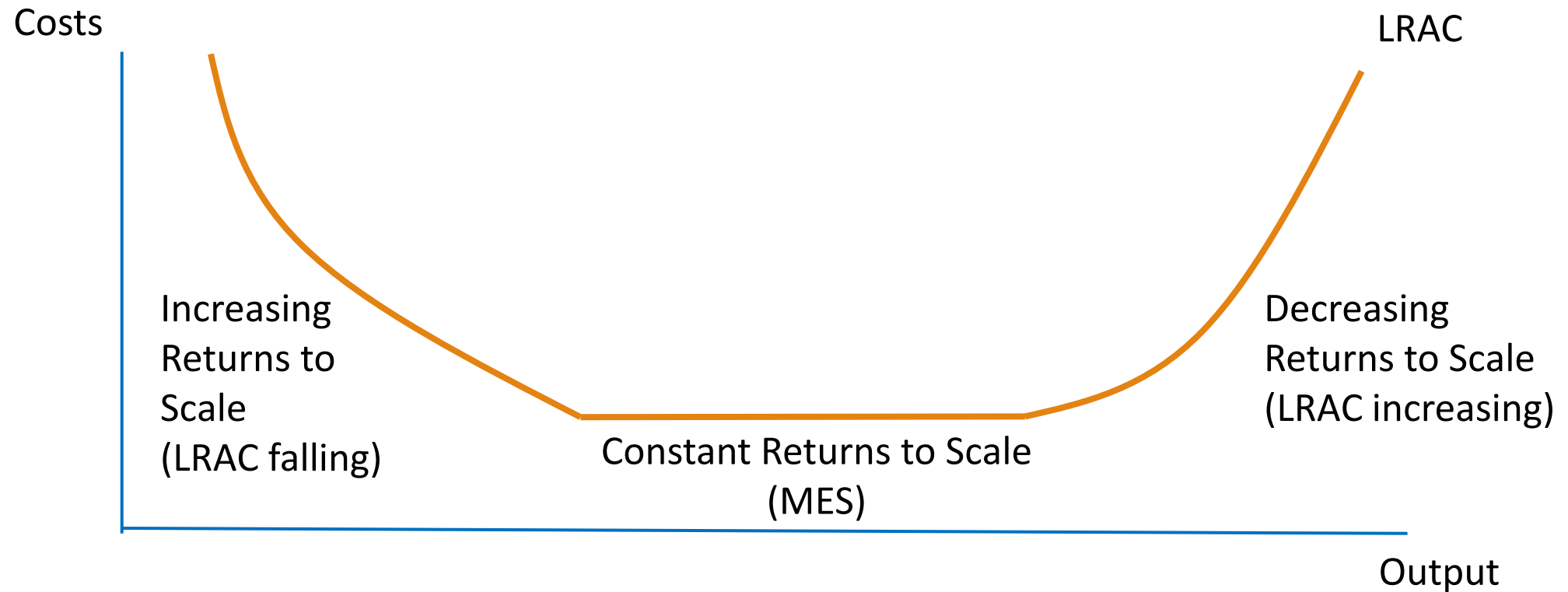
However, after output reaches a certain quantity Q , diseconomies of scale eventually kick in and increase long-run average costs, pulling up the curve.

Returns to Scale

Another way to look at the LRAC curve is using the **returns to scale** concept.

- **Increasing returns to scale** is when an increase in input results in a larger than proportional increase in output (e.g. adding 1 more patty gives 2 burgers)
 - The firm is producing more with the same resources/costs, and LRAC decreases
- **Constant returns to scale** is when an increase in input results in the same proportional increase in output (e.g. adding 1 more patty gives 1 burger)
 - The firm's production is proportional to resources/costs, and LRAC stays the same
- **Decreasing returns to scale** is when an increase in input results in a lower than proportional increase in output (e.g. adding 1 more patty gives 0.5 burgers)
 - The firm is producing less with the same resources/costs, and LRAC decreases

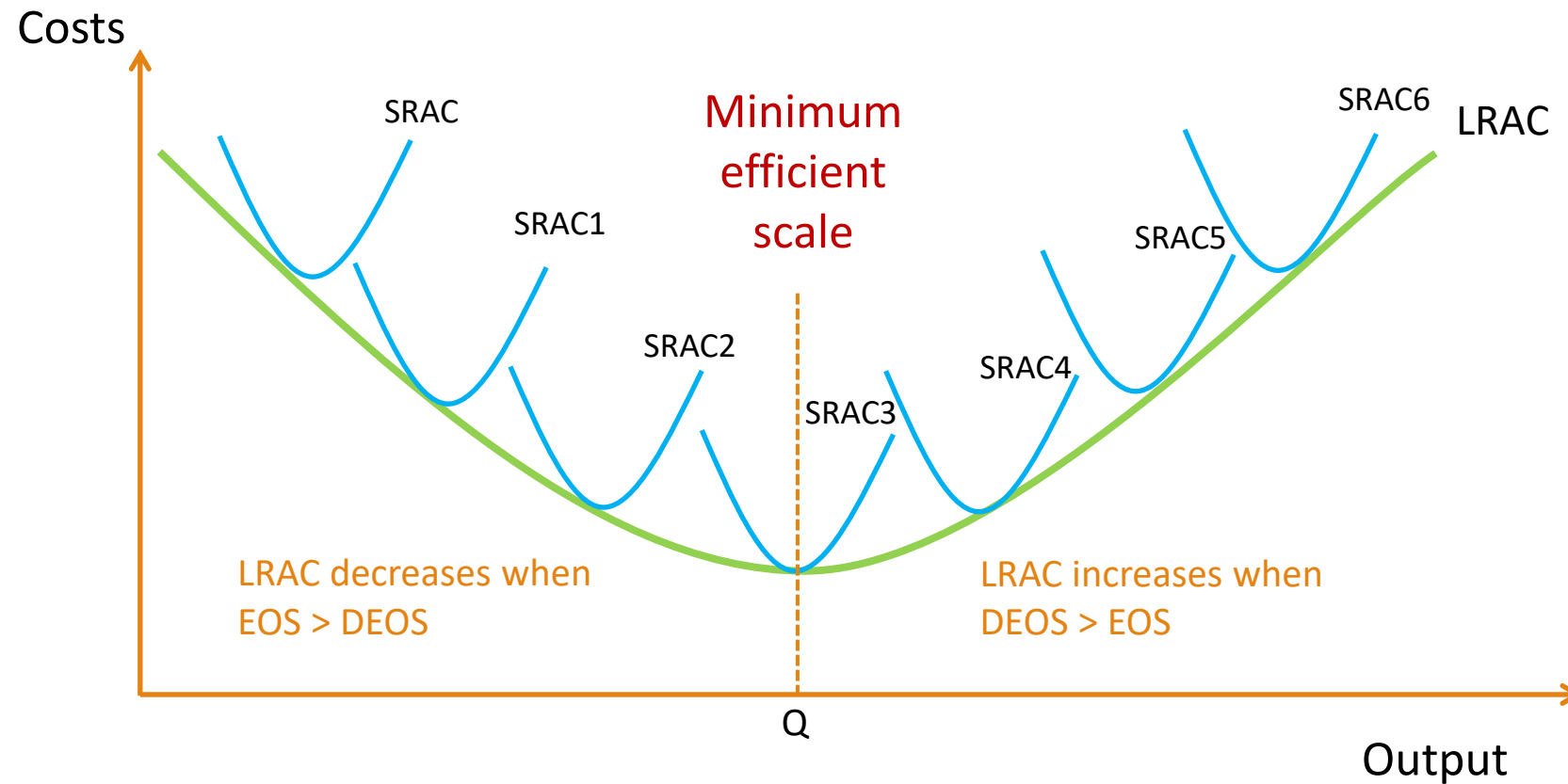
Returns to Scale



Minimum Efficient Scale

- The firm generally wants to reach the lowest point of the LRAC, called the **Minimum Efficient Scale (MES)**
- Reaching that point requires a minimum amount of output, which means new firms will not be able to produce at such low costs (i.e. they are not able to achieve sufficient Economies of Scale)
- This acts as a **barrier to entry**, since the incumbent firms can sell the good at a lower price due to their cost savings, undercutting potential new entrants

The LRAC Curve (Envelope Curve)



Minimum Efficient Scale

- Do you think the output required for the industries below to reach the MES is big or small?



Oil Companies



Pizza Shop



Hotel/Hostels

Minimum Efficient Scale

- The output required to reach MES depends on the number of firms in the industry (i.e. market structure)
- In general:
 - The larger the number of firms, the smaller their output compared to the whole industry, the smaller the MES required, vice versa
- However, an important aspect to consider is whether larger scale production will actually keep costs down (there are industries with both large and small players)

Evaluating Economies of Scale

Internal Economies of Scale can depend on the type of firm :

Labour intensive Firms

- Firms that require a lot of labour to produce
- Mostly in the tertiary sector of the economy (E.g. Accountancy or legal advice firms)
- Affected more by managerial economies of scale (imagine a merger)

Capital intensive Firms

- Firms that require a lot of capital (asset/machinery) to produce
- Mostly in the secondary sector of the economy (E.g. Manufacturing)
- Affected more by technical and buying economies of scale

Evaluating Economies of Scale

External Economies of Scale

- If all firms in the industry receives similar cost savings, benefits to individual firms may be limited if they all decide to pass on the savings to consumers by a lower price
- Requires pre-existing conditions. E.g. location, industry size and type of industry. Firms that require a fixed location or are easily affected by ongoing research may find it easier to benefit from external economies.

Diseconomies of Scale

- Depends on operations of the firm. Technology may be able to delay diseconomies of scale setting in by reducing the difficulty in communication and co-ordination of staff.
- Separation of ownership from control: firms can own other businesses instead of running them to avoid managerial diseconomies of scale. E.g. conglomerates like Marriott group may own Ritz Carlton, but not necessarily run day to day operations of the hotel.

Question Time

- Define economies of scale
- Explain why MES can act as a barrier to entry
- State 2 types of economies of scale
- State 2 types of diseconomies of scale
- Explain the shape of the LRAC.