3.3.2 Costs

a) Formulae to calculate and understand the relationship between:
- *total cost*
- *total fixed cost*
- *total variable cost*
- *average (total) cost*
- *average fixed cost*
- *average variable cost*
- *marginal cost*

b) Derivation of short-run cost curves from the assumption of diminishing marginal productivity

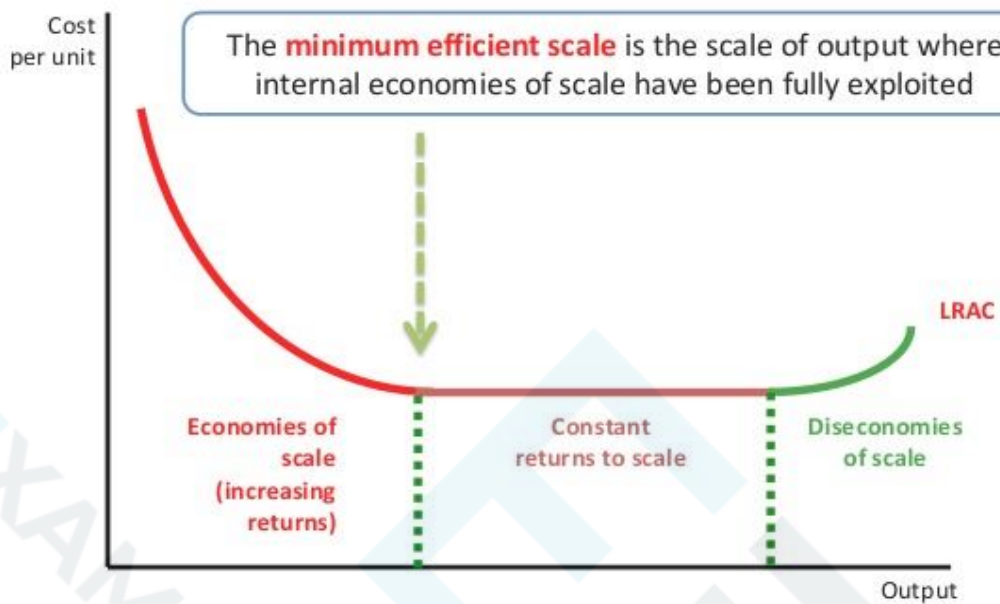*c) Relationship between short-run and long-run average cost curves*

- Costs: payments that firms must make in recompense for use of the factors of production
- Total costs: TVC + TFC (the gradient is the marginal cost)
- Normal profit: the profit needed to keep an entrepreneur doing their business i.e. the profit of the next best alternative
- Fixed costs: they do not change with output. Because fixed costs don't change with output, by definition fixed costs per unit must always fall
- Variable costs: they increase as more output is produced
- Semi-variable costs: a mixture of fixed and variable components. Costs are fixed for a set level of production and become variable after this level is succeeded
- Imputed costs: it includes opportunity costs for which no payment is made
- Average costs: total costs/ output
- Marginal cost: the cost of producing an extra unit of output
  - Change in total costs/ change in quantity
- When MC is below AVC, it means the cost of producing the next unit is less than the average cost of producing a unit so this extra unit produced will bring down the average cost. When marginal cost is above AVC, AVC always rises.
- If marginal cost is less than the average, then the average cost will fall
- In the short-run at least one factor is fixed
- Law of diminishing returns: as more of a variable factor is added to a fixed factor, the increase in output (or marginal product) eventually falls. This is because the first inputs of labour do the jobs which yield the greatest marginal product while additional labour does less fruitful tasks. Therefore, it costs more to produce more output.
- Derivation of short-run cost curves from the assumption of diminishing marginal productivity:
  - At some point adding more inputs leads to a fall in marginal output
  - Therefore, average costs increase because it costs more to produce one more unit of output
- AFC fall as the level of output expands because fixed costs are spread over a higher level of production
- Average costs fall initially as fixed costs are spread over a greater output, however, eventually the law of diminishing returns overpowers this effect

- A change in fixed costs has no effect on marginal costs as AVCs are unaffected. AC will shift vertically upwards.
- A change in variable costs leads to an upward shift in both marginal and average total costs
- Causes of shifts in costs curve are the same as causes of supply shifts.
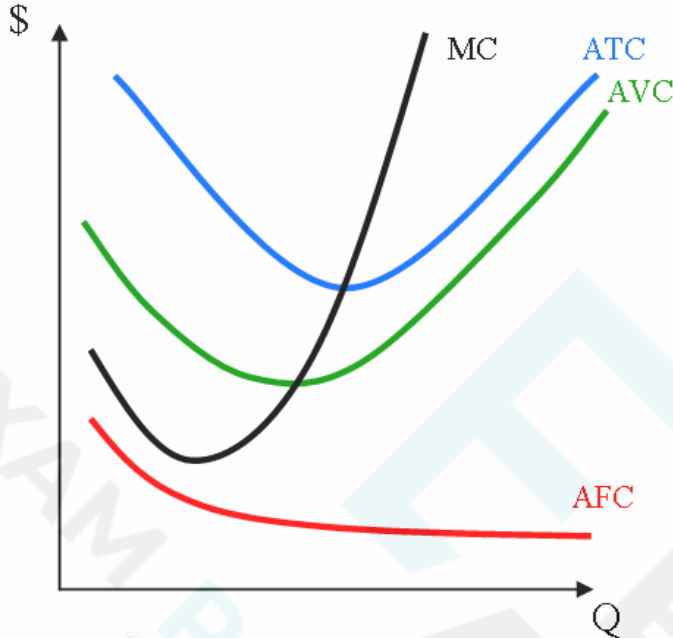
- Marginal product: the extra output when one more factor of output is added

- A fixed factor cannot be changed in the short-run
- Returns to scale: the effect on output of increasing all factors of production by the same proportion
- Returns to scale= how much **output** changes/ Economies to scale= how much **average costs** change
- Increasing returns to scale: an equal % increase in inputs leads to a more than proportional increase in output
- Constant returns to scale: an equal % increase in inputs leads to the same % increase in output
- Decreasing returns to scale: an equal % increase in inputs leads to a less than proportional increase in output
- Assumption of LRAC curve:
  - Assumes an infinite number of plant sizes
  - Assumes businesses choose least-cost production
- Points of tangency between the LRAC and SRAC curves do not occur at the minimum of the SRAC curves except where MES is achieved.
- Economies of scale occur when LRAC falls while output rises a firm experiences economies of scale

Minimum Efficient Scale (MES)

Cost per unit

The **minimum efficient scale** is the scale of output where internal economies of scale have been fully exploited

LRAC

Economies of scale (increasing returns)

Constant returns to scale

Diseconomies of scale

Output

- Minimum efficient scale of production: the lowest level of output at which the minimum possible average costs can be achieved- the optimal level of production
- MES varies within industries- industries with high fixed costs have a large MES which means the industry favours large firms
- At the MES internal economies of scale have been fully exploited
- The LRAC curve envelopes the SRAC curve
- The LRAC curve shifts when there are external economies of scale.