# 3.3.2 Costs

Costs in the short run

- Costs are the payments that firms make for use of factors of production. Examples of costs are rent (for land), wages (for labour) and interest (for capital)
- Included in costs is a rewards for risk taking, which is known as normal profit. This is the amount the risk taker must recieve to keep resources in current use.
- Normal profit is considered a cost and it is built into the Average Cost curve.

Total Cost (TC)

- This is the cost of producing a certain output level
- $TC = TFC + TVC$
- Total Fixed costs do not change directly with output. These are things such as business rates, advertising and rent.
- Total Variable costs vary directly with output. Examples are raw materials, energy costs when energy is used in production and zero hour contract wages.
- Total cost curve and variable cost curve shape influenced heavily by law of diminishing marginal returns
- In the SR, when we add a variable factor of production to a stock of fixed factors of production, initially total output will rise then it will start to fall. Initially, productivity gains cause output to increase. This is shown on the first part of the curve. When the curve becomes shallower and then inflects we see diminishing returns. This is due to overutilisation of factors. Overcrowding calls productivity to fall. Costs now increase faster than output. Initially increasing returns to labour then decreasing returns to labour

- Total costs will never fall and unless they are fixed costs, they will always be rising.
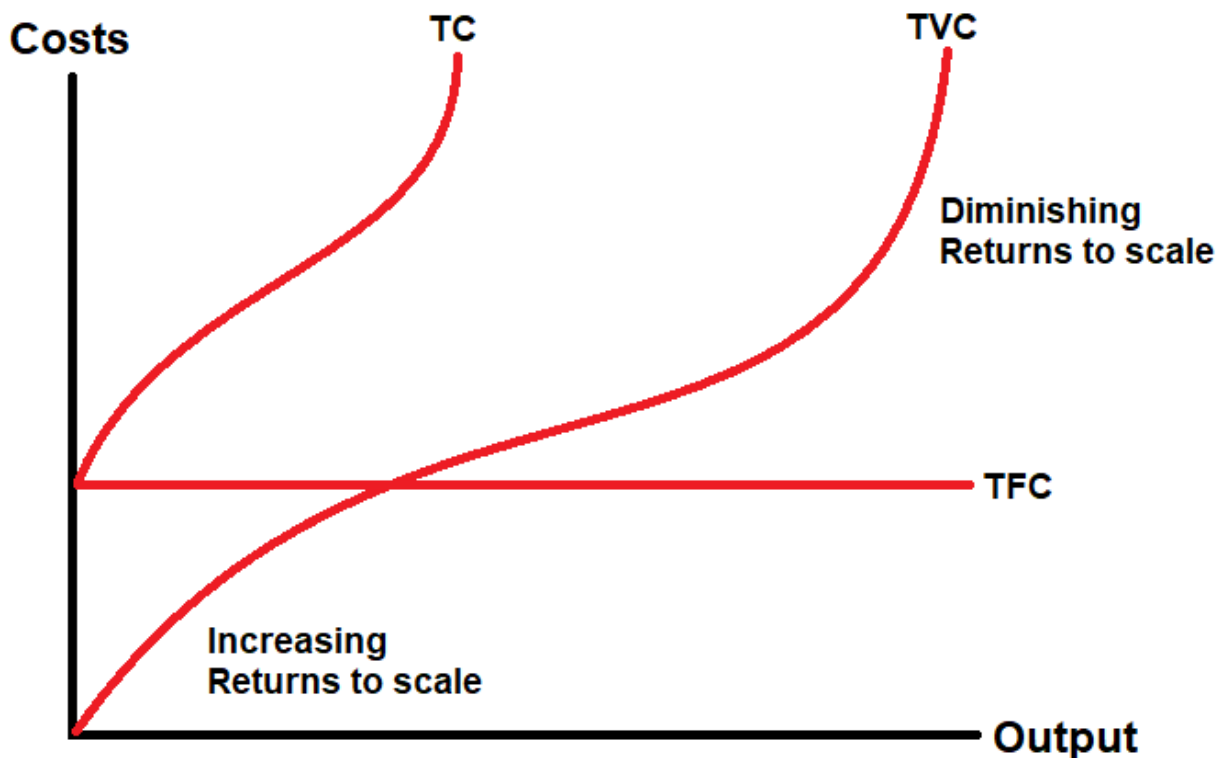

Average Cost (AC or ATC)

- Cost per unit of output
- $AC = \frac{TC}{Q}$
- AC initally falls as more is produced as fixed cost is spread out over more output
- AFC is fixed cost per unit of output. Since fixed costs don't change with output, then AFC must fall always with an increase in output
- $AFC = \frac{TFC}{Q}$
- AVC is variable cost per unit
- $AVC = \frac{TVC}{Q}$
- AVC is important in considering whether a firm should close down in SR

Marginal Cost (MC)

- The cost of producing one more unit of output
- $MC = \frac{\Delta TC}{\Delta Q}$
- The gradient of the TC curve is the MC
- When MC < AC, cost of producing the next unit is less than producing a unit. This means that this extra unit brings down AC, although it doesn't fall as much as MC.
- When MC > AC, cost of producing next unit is more than average cost of producing a unit. This means that this extra unit causes AC to rise.
- The MC curve cuts the AC curve at its lowest point (Minimum efficient scale)
- When MC is below AC, MC could be rising or falling but AC will still fall

Derivation of SR cost curves from assumption of diminishing marginal productivity

- The law of diminishing marginal returns states that as more variable factors are added to fixed factors, the increase in output (marginal product) will eventually fall
- It is only in SR because in LR all factors are varaible
- MP is the extra output when an extra variable factor is added
- Initially, increasing the variable factor causes output to increase at an increasing rate (MP increases). This is due to increased productivity from workers. Marginal cost falls. This is known as increasing returns to scale. This is the left side of the SRAC curve. However beyond a certain point, increasing the variable factor leads to output increasing at a decreasing rate. This is due to diminishing marginal returns and things such as overcrowding. There is a decrease in marginal product. This is known as diminishing returns to scale.
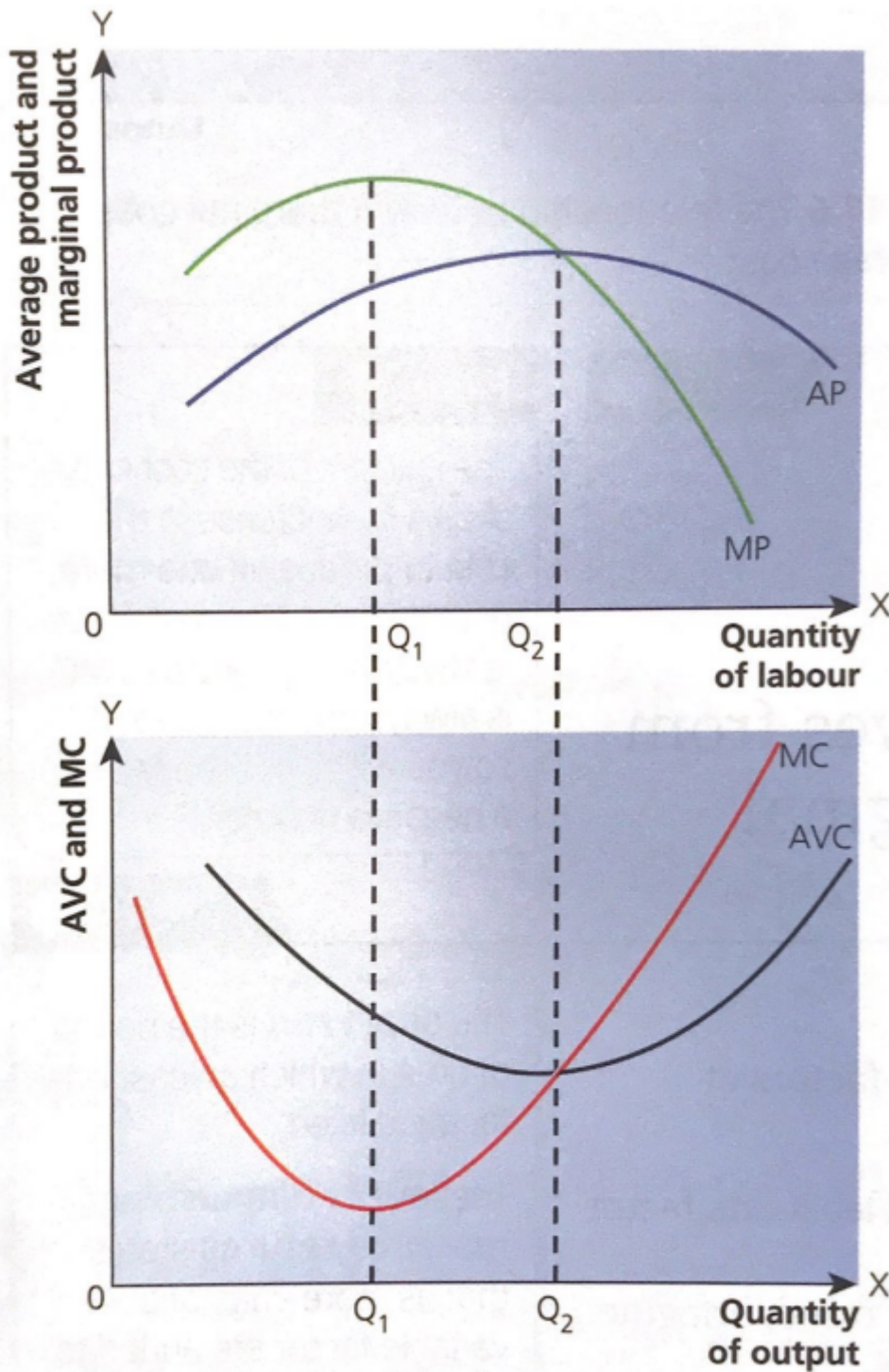
- Total Product is the total output of firm in given time
- Average Product is the unit of output produced per unit of a variable factor
- $AP = \frac{TP}{Q}$
- Marginal product is the change in output resulting from employing extra unit of variable factor
- $MP = \frac{\Delta TP}{\Delta Q}$
- Q1 is point of diminishing returns
- When MP is rising, MC is falling
- When AP is rising, AVC is falling
- Cost curves are mirror image of product curves

- Relation between MC and AC is the same as MC and AVC since the only different is the average fixed cost which has no relation with MC

Relation between SR and LR AC curves

- In SR, SRAC determined by law of diminishing returns
- In LR, resources are all variable. LRAC drawn at a tangent to multiple SRAC curves. It shows what the LR cost of producing each output will be. It is relevant when looking at (dis)economies of scale