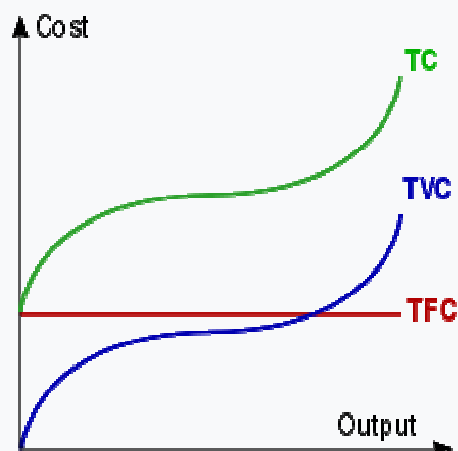


## Short-run total cost (SRTC) and long-run total cost (LRTC) curves<sup>[edit]</sup>

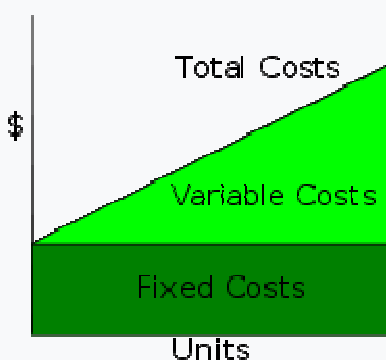


The total cost curve, if non-linear, can represent increasing and [diminishing marginal returns](#).

The **short-run total cost (SRTC)** and **long-run total cost (LRTC)** curves are increasing in the quantity of output produced because producing more output requires more labor usage in both the short and long runs, and because in the long run producing more output involves using more of the physical capital input; and using more of either input involves incurring more input costs.

With only one variable input (labor usage) in the short run, each possible quantity of output requires a specific quantity of usage of labor, and the short-run total cost as a function of the output level is this unique quantity of labor times the unit cost of labor. But in the long run, with the quantities of both labor and physical capital able to be chosen, the total cost of producing a particular output level is the result of an optimization problem: The sum of expenditures on labor (the wage rate times the chosen level of labor usage) and expenditures on capital (the unit cost of capital times the chosen level of physical capital usage) is minimized with respect to labor usage and capital usage, subject to the production function equality relating output to both input usages; then the (minimal) level of total cost is the total cost of producing the given quantity of output.

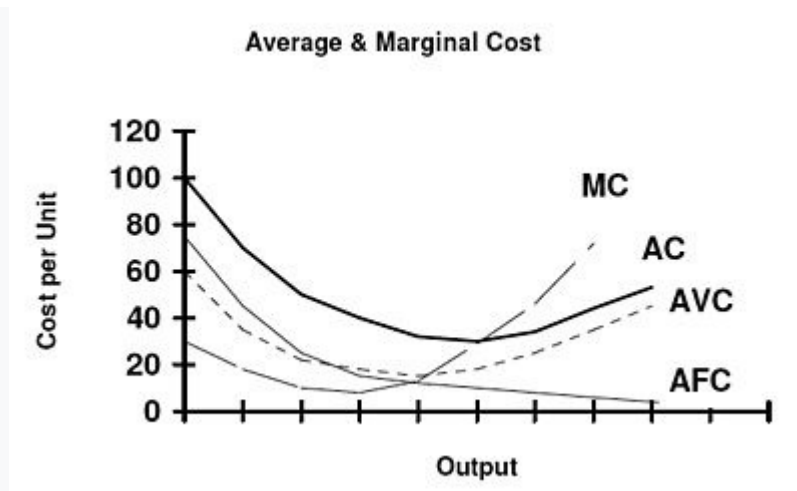
## Short-run variable and fixed cost curves (SRVC and SRFC or VC and FC)<sup>[edit]</sup>



One can decompose total costs as the sum of **fixed costs** and **variable costs**. Here output is measured along the horizontal axis. In the **Cost-Volume-Profit Analysis** model, total costs are linear in volume.

Since **short-run fixed cost (FC/SRFC)** does not vary with the level of output, its curve is horizontal as shown here. **Short-run variable costs (VC/SRVC)** increase with the level of output, since the more output is produced, the more of the variable input(s) needs to be used and paid for.

## Short-run average variable cost curve (AVC or SRAVC)<sup>[edit]</sup>



A U-shaped short-run Average Cost (AC) curve. AVC is the Average Variable Cost, AFC the Average Fixed Cost, and MC the marginal cost curve crossing the minimum of both the Average Variable Cost curve and the Average Cost curve.

**Average variable cost (AVC/SRAVC)** (which is a short-run concept) is the variable cost (typically labor cost) per unit of output:  $SRAVC = wL / Q$  where  $w$  is the wage rate,  $L$  is the quantity of labor used, and  $Q$  is the quantity of output produced. The SRAVC curve plots the short-run average variable cost against the level of output and is typically drawn as U-shaped. However, whilst this is convenient for economic theory, it has been argued that it bears little relationship to the real world. Some estimates show that, at least for manufacturing, the proportion of firms reporting a U-shaped cost curve is in the range of 5 to 11 percent.<sup>[1][2]</sup>

## Short-run average fixed cost curve (SRAFC)<sup>[edit]</sup>

Since fixed cost by definition does not vary with output, **short-run average fixed cost (SRAFC)** per unit of output is lower when output is higher, giving rise to the downward-sloped curve shown.

## Short-run and long-run average total cost curves (SRATC or SRAC and LRATC or LRAC)<sup>[edit]</sup>

The average total cost curve is constructed to capture the relation between cost per unit of output and the level of **output**, *ceteris paribus*. A perfectly competitive and productively efficient firm organizes its **factors of production** in such a way that the usage of the factors of production is as low as possible consistent with the given level of output to be produced. In the **short run**, when at least one factor of production is fixed, this occurs at the output level where it has enjoyed all possible average cost gains from increasing production.