

Short Run Costs

Part 2



The Costs of Production



- There are many different types of costs.
- Invariably, firms believe costs are too high and try to lower them.

Fixed Costs, Variable Costs, and Total Costs



- **Fixed costs** are those that are spent and cannot be changed in the period of time under consideration.
 - In the long run there are no fixed costs since all costs are variable.
 - In the short run, a number of costs will be fixed.

Fixed Costs, Variable Costs, and Total Costs



- Workers represent **variable costs** – those that change as output changes.

Fixed Costs, Variable Costs, and Total Costs



- The sum of the variable and fixed costs are total costs.

$$TC = FC + VC$$

Average Costs



- Much of the firm's discussion is of average cost.

Average Costs

- **Average fixed cost** equals fixed cost divided by quantity produced.

$$AFC = FC/Q$$

Average Costs

- **Average variable cost** equals variable cost divided by quantity produced.

$$AVC = VC/Q$$

Average Costs

- Average total cost can also be thought of as the sum of average fixed cost and average variable cost.

$$ATC = AFC + AVC$$

Average Total Costs

- **Average total cost (ATC):** the per unit cost derived by dividing total cost by the quantity of output.
- Plotting the cost on the vertical axis and quantity of output on the horizontal axis generates the ATC curve.

$$ATC = \frac{\text{total cost}}{\text{total output}}$$

The Costs of Production

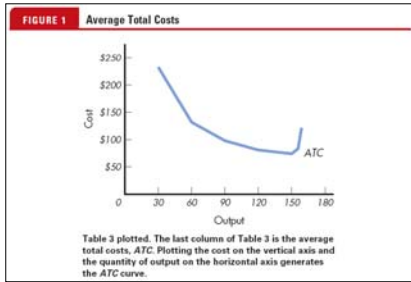
- **Fixed costs (FC)** are those that are spent and cannot be changed in the period of time under consideration
 - In the long run, there are no fixed costs since all inputs (and therefore their costs) are variable
 - In the short run, a number of inputs and their costs will be fixed
- Workers are an example of **variable costs (VC)** which are costs that change as output changes
- The sum of the variable and fixed costs are **total costs (TC)**

$$TC = FC + VC$$

The Costs of Production

- **Average fixed costs (AFC)** equals fixed cost divided by quantity produced, $AFC = FC/Q$
- **Average variable costs (AVC)** equals variable cost divided by quantity produced, $AVC = VC/Q$
- **Average total costs (ATC)** equals total cost divided by quantity produced, $ATC = TC/Q$ or $ATC = AFC + AVC$
- **Marginal cost (MC)** is the increase in total cost when output increases by one unit, $MC = \Delta TC/\Delta Q$

Average Total Costs



Marginal Cost

- **Marginal cost** is the increase (decrease) in total cost of increasing (or decreasing) the level of output by one unit.
- In deciding how many units to produce, the most important variable is marginal cost.

Marginal Costs

- **Marginal cost (MC)**: the change in cost caused by a change in output, derived by dividing the change in total cost by the change in the quantity of output.

$$MC = \frac{\text{change in total cost}}{\text{change in quantity of output}}$$

The Cost of Producing Earrings

Output	FC	VC	TC	MC	AFC	AVC	ATC
3	50	38	88	—	16.67	12.66	29.33
4	50	50	100	12	12.50	12.50	25.00
9	50	100	150	—	5.56	11.11	16.67
10	50	108	158	8	5.00	10.80	15.80
16	50	150	200	—	3.13	9.38	12.50
17	50	157	207	7	2.94	9.24	12.18
22	50	200	250	—	2.27	9.09	11.36
23	50	210	260	10	2.17	9.13	11.30
27	50	255	305	—	1.85	9.44	11.30
28	50	270	320	15	1.79	9.64	11.42

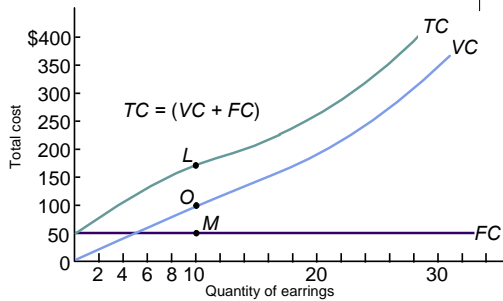
Graphing Cost Curves

- To gain a greater understanding of these concepts, it is a good idea to draw a graph.
- Quantity is put on the horizontal axis and a dollar measure of various costs on the vertical axis.

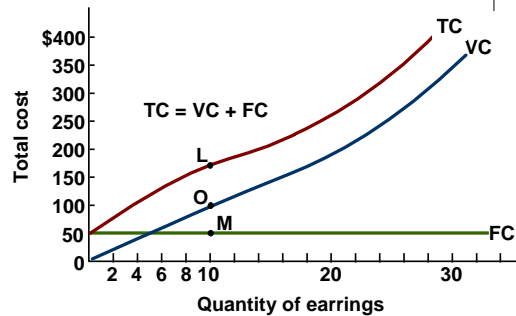
Total Cost Curves

- The total variable cost curve has the same shape as the total cost curve—increasing output increases variable cost.

Total Cost Curves



Total Cost Curves



Average and Marginal Cost Curves

- The marginal cost curve goes through the minimum point of the average total cost curve and average variable cost curve.
- Each of these curves is U-shaped.

Average and Marginal Cost Curves

- The average fixed cost curve slopes down continuously.

Downward-Sloping Shape of the Average Fixed Cost Curve

- The average fixed cost curve looks like a child's slide – it starts out with a steep decline, then it becomes flatter and flatter.
- It tells us that as output increases, the same fixed cost can be spread out over a wider range of output.

The U Shape of the Average and Marginal Cost Curves

- When output is increased in the short-run, it can only be done by increasing the variable input.

The U Shape of the Average and Marginal Cost Curves



- The law of diminishing marginal productivity sets in as more and more of a variable input is added to a fixed input.
- Marginal and average productivities fall and marginal costs rise.

The U Shape of the Average and Marginal Cost Curves



- And when average productivity of the variable input falls, average variable cost rise.

The U Shape of the Average and Marginal Cost Curves



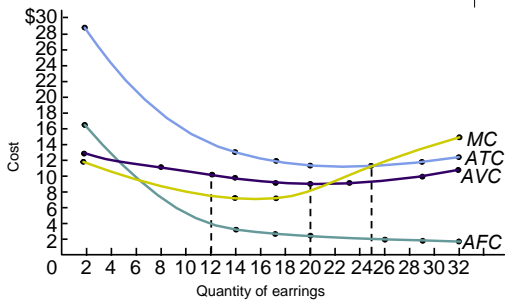
- The average total cost curve is the vertical summation of the average fixed cost curve and the average variable cost curve.

The U Shape of the Average and Marginal Cost Curves

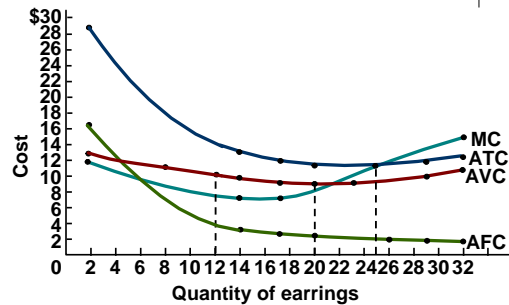


- If the firm increased output enormously, the average variable cost curve and the average total cost curve would almost meet.
- The firm's eye is focused on average total cost—it wants to keep it low.

Per Unit Output Cost Curves



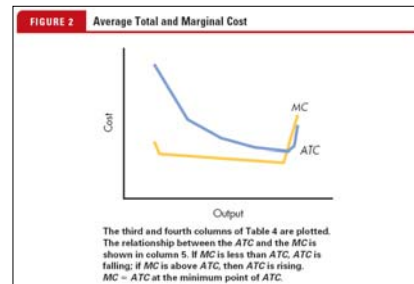
Per Unit Output Cost Curves



Relationship Between Marginal and Average Costs

- The marginal cost and average cost curves are related.
 - When marginal cost exceeds average cost, average cost must be rising.
 - When marginal cost is less than average cost, average cost must be falling.

Average and Marginal Costs



Relationship Between Marginal and Average Costs

- Marginal cost curves always intersect average cost curves at the minimum of the average cost curve.

Relationship Between Marginal and Average Costs

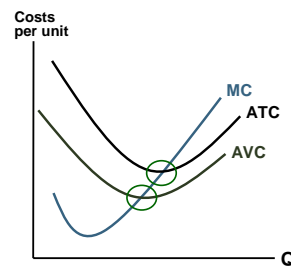
- The position of the marginal cost relative to average total cost tells us whether average total cost is rising or falling.

The Relationship Between Marginal Cost and Average Cost

- If $MC > ATC$, then ATC is rising
- If $MC > AVC$, then AVC is rising
- If $MC < ATC$, then ATC is falling
- If $MC < AVC$, then AVC is falling
- If $MC = AVC$ and $MC = ATC$, then AVC and ATC are at their minimum points

12-35

The Relationship Between Marginal Cost and Average Cost



The marginal cost curve goes through the minimum point of both the ATC and AVC curves

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Relationship Between Marginal and Average Costs

- To summarize:

If $MC > ATC$, then ATC is rising.

If $MC = ATC$, then ATC is at its low point.

If $MC < ATC$, then ATC is falling.

Relationship Between Marginal and Average Costs

- Marginal and average total cost reflect a general relationship that also holds for marginal cost and average variable cost.

If $MC > AVC$, then AVC is rising.

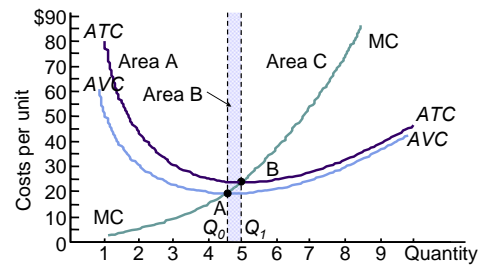
If $MC = AVC$, then AVC is at its low point.

If $MC < AVC$, then AVC is falling.

Relationship Between Marginal and Average Costs

- As long as average variable cost does not rise by more than average fixed cost falls, average total cost will fall when marginal cost is above average variable cost,

Relationship Between Marginal and Average Costs



Definition of Costs

- Total Costs (TC)** -- the expenses a business has in supplying goods and/or services.
- Total Fixed Costs (TFC)** -- payments to resources whose quantities can not be changed during a fixed period of time – the short run.
- Total Variable Costs (TVC)** -- payments for additional resources used as output increases.
- Average Fixed Cost** -- the total fixed cost divided by total output.
- Average total Cost (SRATC):** -- the total cost of production divided by the total quantity of output produced when at least one resource is fixed
- Average Variable Cost** -- total variable cost divided by total output