

## 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.

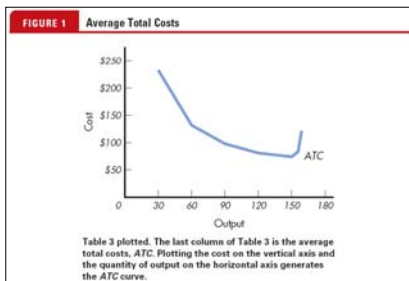
$$ATC = AFC + AVC$$

## 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.

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

## 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.

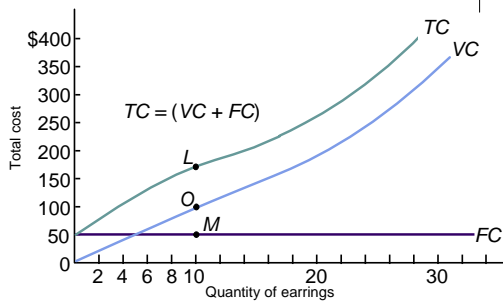


## Total Cost Curves

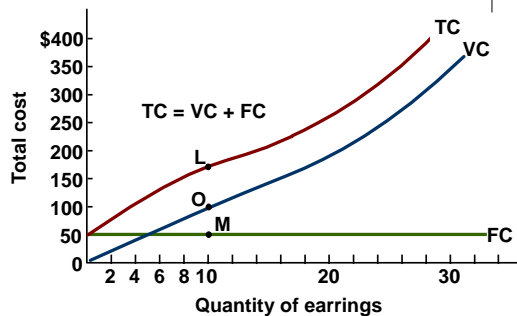
- The total variable cost curve has the same shape as the total cost curve—increasing output increases variable cost.



## 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.

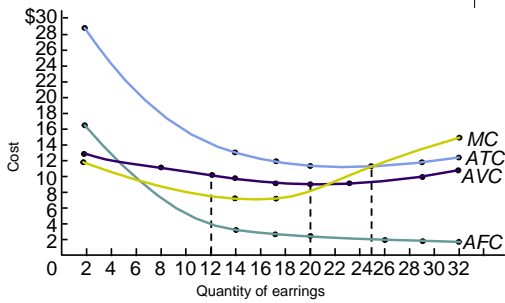
## The U Shape of the Average and Marginal Cost Curves

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

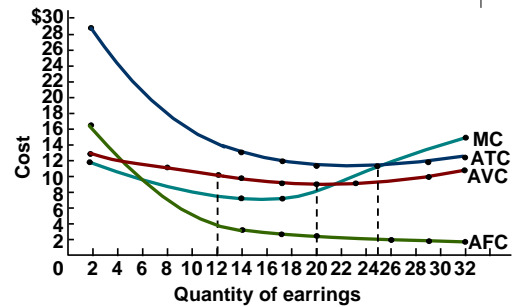
## The U Shape of the Average and Marginal Cost Curves

- 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



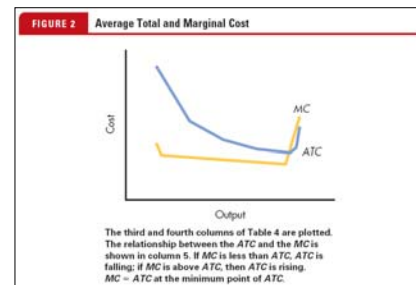
## Per Unit Output Cost Curves



## 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.

## 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.*

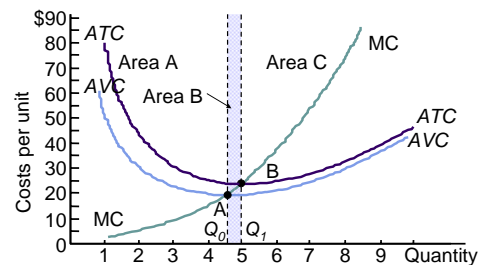
*If  $MC = AVC$ , then  $AVC$  is at its low point.*

*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