UNIT II (PART II)

COSTS OF PRODUCTION

WHAT ARE COSTS?

- Costs of production relate to the different expenses that a firm incur in producing a good or service.

Total Revenue, Total Cost, and Profit

- *Total Revenue*
  - The amount a firm receives for the sale of its output.
- *Total Cost*
  - The market value of the inputs a firm uses in production.

Total Revenue, Total Cost, and Profit

- *Profit* is the firm's total revenue minus its total cost.

- Profit = Total revenue - Total cost

Costs as Opportunity Costs

- A firm's cost of production includes all the opportunity costs of making its output of goods and services.
- Explicit and Implicit Costs
  - A firm's cost of production include *explicit costs* and *implicit costs.*
    - Explicit costs are input costs that require a direct outlay of money by the firm.
    - Implicit costs are input costs that do not require an outlay of money by the firm.

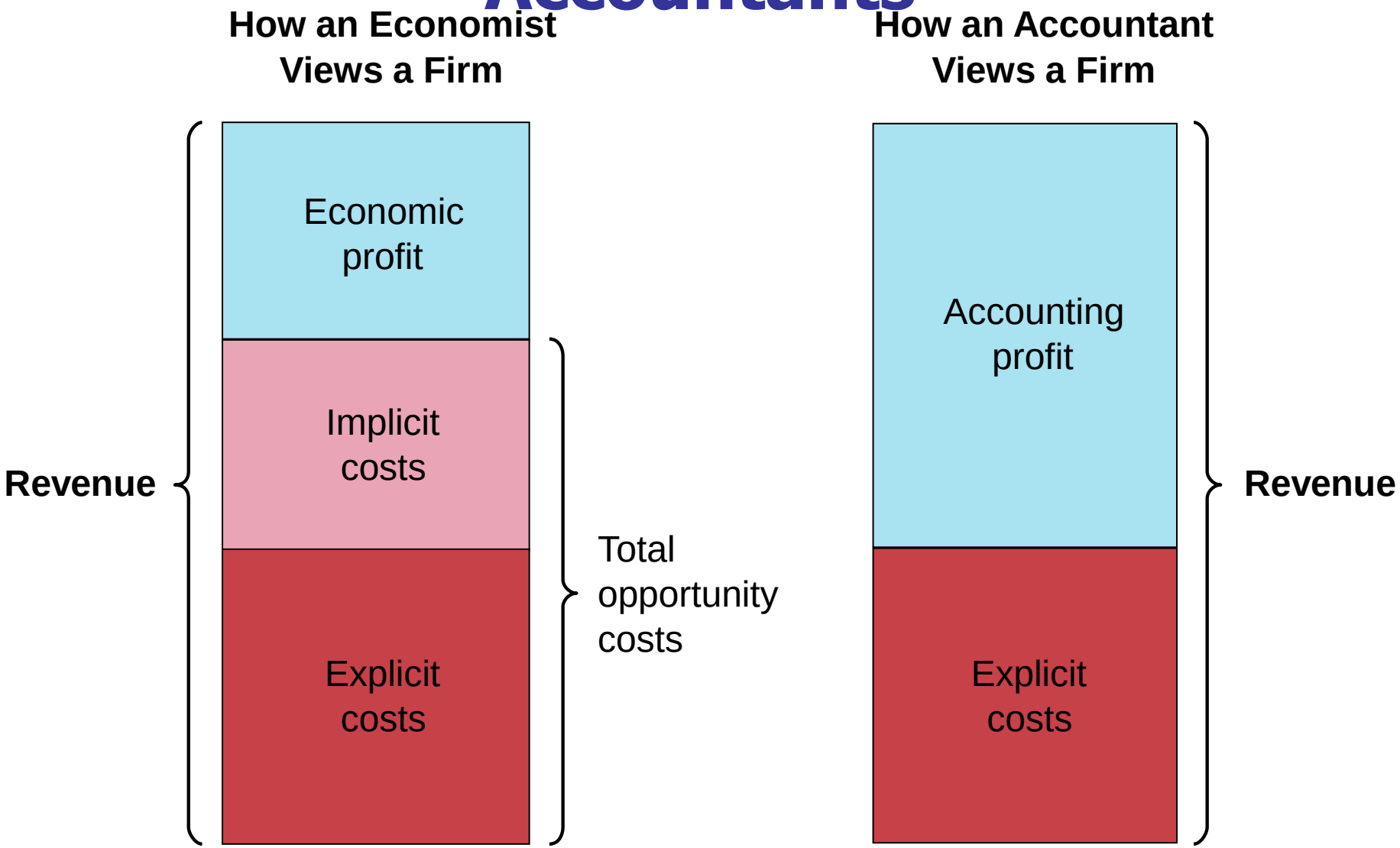
Economic Profit versus Accounting Profit

- Economists measure a firm's *economic profit* as total revenue minus total cost, including both explicit and implicit costs.
- Accountants measure the *accounting profit* as the firm's total revenue minus only the firm's explicit costs.

Economic Profit versus Accounting Profit

- When total revenue exceeds both explicit and implicit costs, the firm earns economic profit.
- Economic profit is smaller than accounting profit.

Figure 1 Economists versus Accountants



THE VARIOUS MEASURES OF COST

- Costs of production may be divided into *fixed costs* and *variable costs*.
  - **Fixed costs** are those costs that *do not vary* with the quantity of output produced.
  - **Variable costs** are those costs that *do vary* with the quantity of output produced.

Internal vs External Costs

Internal costs:

- Refer to the direct monetised costs (planning, construction, management, maintenance, disposal) for a person or organisation undertaking an activity.

External costs (also known as externalities)

- Refer to the economic concept of uncompensated social or environmental effects.
- For example, when people buy fuel for a car, they pay for the production of that fuel (an internal cost), but not for the costs of burning that fuel, such as air pollution.

Private and Social Costs

Private Costs:

- Costs we have to actually pay for any activity
- Eg: owning and driving a car
- It is private cost because it is specific to an individual.

Social Costs:

- Social costs= private cost plus externalities (external costs)

Negative vs Positive Etxernality

- Negative Externality:
- Eg: Air pollution from motor vehicle

- Positive Externality:
- Education, health, labour training in firms

Fixed and Variable Costs

- Total Costs
  - Total Fixed Costs (TFC)
  - Total Variable Costs (TVC)
  - Total Costs (TC)
  - $TC = TFC + TVC$

Fixed and Variable Costs

- Average Costs
  - Average costs can be determined by dividing the firm's costs by the quantity of output it produces.
  - The average cost is the cost of each typical unit of product.

Fixed and Variable Costs

- Average Costs
  - *Average Fixed Costs* (AFC)
  - *Average Variable Costs* (AVC)
  - *Average Total Costs* (ATC)
  - *ATC = AFC + AVC*

Average and Marginal Costs

$$AFC = \frac{\text{Fixed cost}}{\text{Quantity}} = \frac{FC}{Q}$$

$$AVC = \frac{\text{Variable cost}}{\text{Quantity}} = \frac{VC}{Q}$$

$$ATC = \frac{\text{Total cost}}{\text{Quantity}} = \frac{TC}{Q}$$

Average and Marginal Costs

- Marginal Cost
  - *Marginal cost* (MC) measures the increase in total cost that arises from an extra unit of production.
  - Marginal cost helps answer the following question:
    - How much does it cost to produce an additional unit of output?

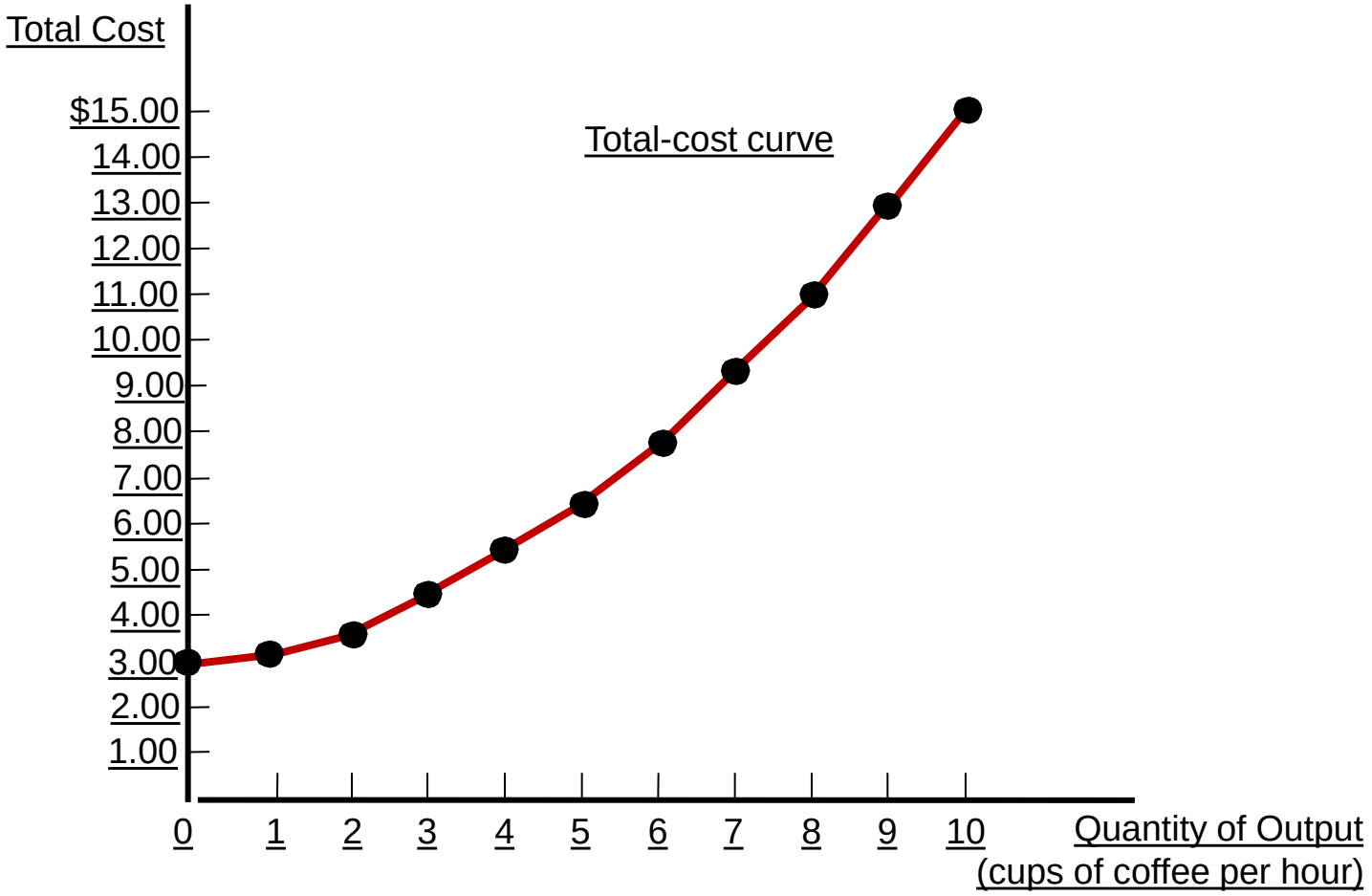
Average and Marginal Cost

$$MC = \frac{(\text{change in total cost})}{(\text{change in quantity})} = \frac{\Delta TC}{\Delta Q}$$

The various measures of cost: Conrad's coffee shop

Quantity of coffee (cups per hour)	Total Cost	Fixed Cost	Variable Cost	Average Fixed Cost	Average Variable Cost	Average Total Cost	Marginal Cost
0	$3.00	$3.00	$0.00	-	-	-	
1	3.30	3.00	0.30	$3.00	$0.30	$3.30	$0.30
2	3.80	3.00	0.80	1.50	0.40	1.90	0.50
3	4.50	3.00	1.50	1.00	0.50	1.50	0.70
4	5.40	3.00	2.40	0.75	0.60	1.35	0.90
5	6.50	3.00	3.50	0.60	0.70	1.30	1.10
6	7.80	3.00	4.80	0.50	0.80	1.30	1.30
7	9.30	3.00	6.30	0.43	0.90	1.33	1.50
8	11.00	3.00	8.00	0.38	1.00	1.38	1.70
9	12.90	3.00	9.90	0.33	1.10	1.43	1.90
10	15.00	3.00	12.00	0.30	1.20	1.50	2.10

Conrad's total-cost curve



Here the quantity of output produced (on the horizontal axis) is from the first column in Table 2, and the total cost (on the vertical axis) is from the second column. As in Figure 2, the total-cost curve gets steeper as the quantity of output increases because of diminishing marginal product.

Cost Curves and Their Shapes

- Marginal cost rises with the amount of output produced.
  - This reflects the property of diminishing marginal product.

Cost Curves and Their Shapes

- The average total-cost curve is U-shaped.
- At very low levels of output average total cost is high because fixed cost is spread over only a few units.
- Average total cost declines as output increases.
- Average total cost starts rising because average variable cost rises substantially.

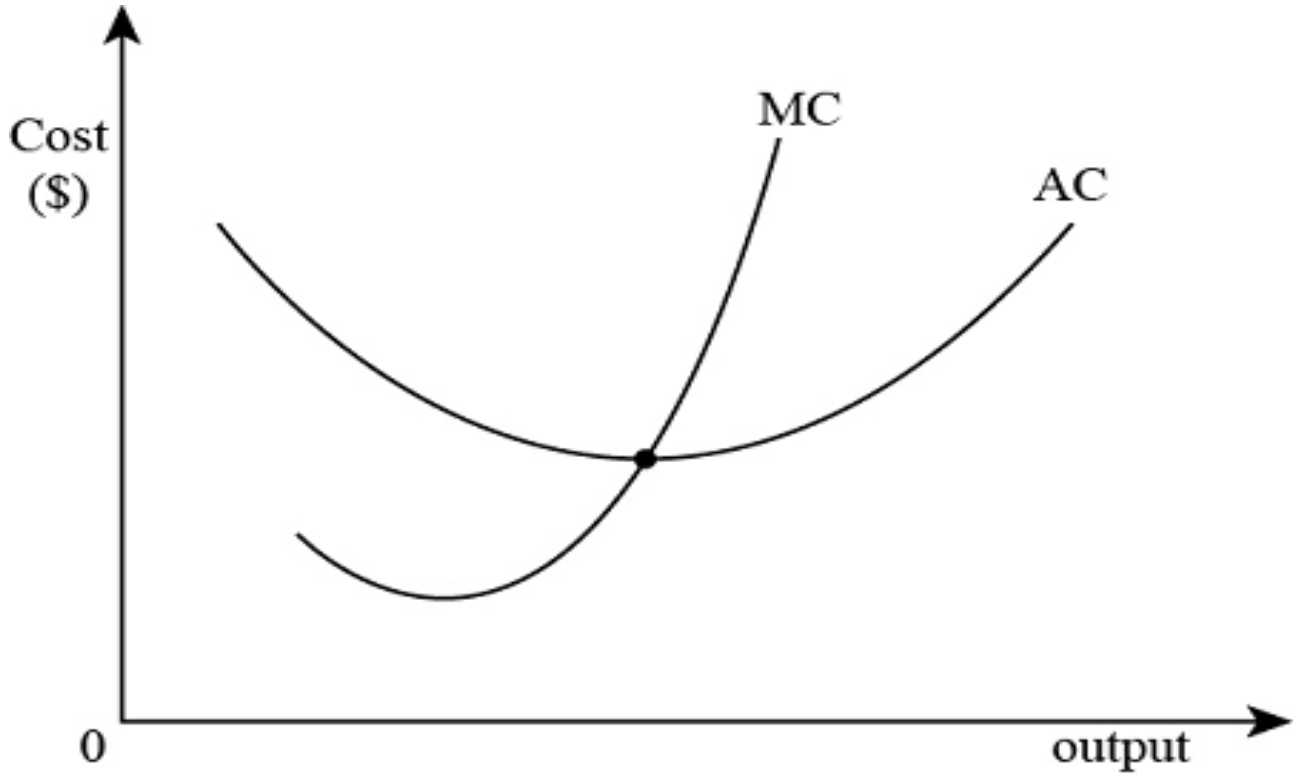
Cost Curves and Their Shapes

- The bottom of the U-shaped ATC curve occurs at the quantity that minimizes average total cost. This quantity is sometimes called the efficient scale of the firm.

Cost Curves and Their Shapes

- Relationship between Marginal Cost and Average Total Cost
  - Whenever marginal cost is less than average total cost, average total cost is falling.
  - Whenever marginal cost is greater than average total cost, average total cost is rising.

Relationship between Marginal and Average Costs



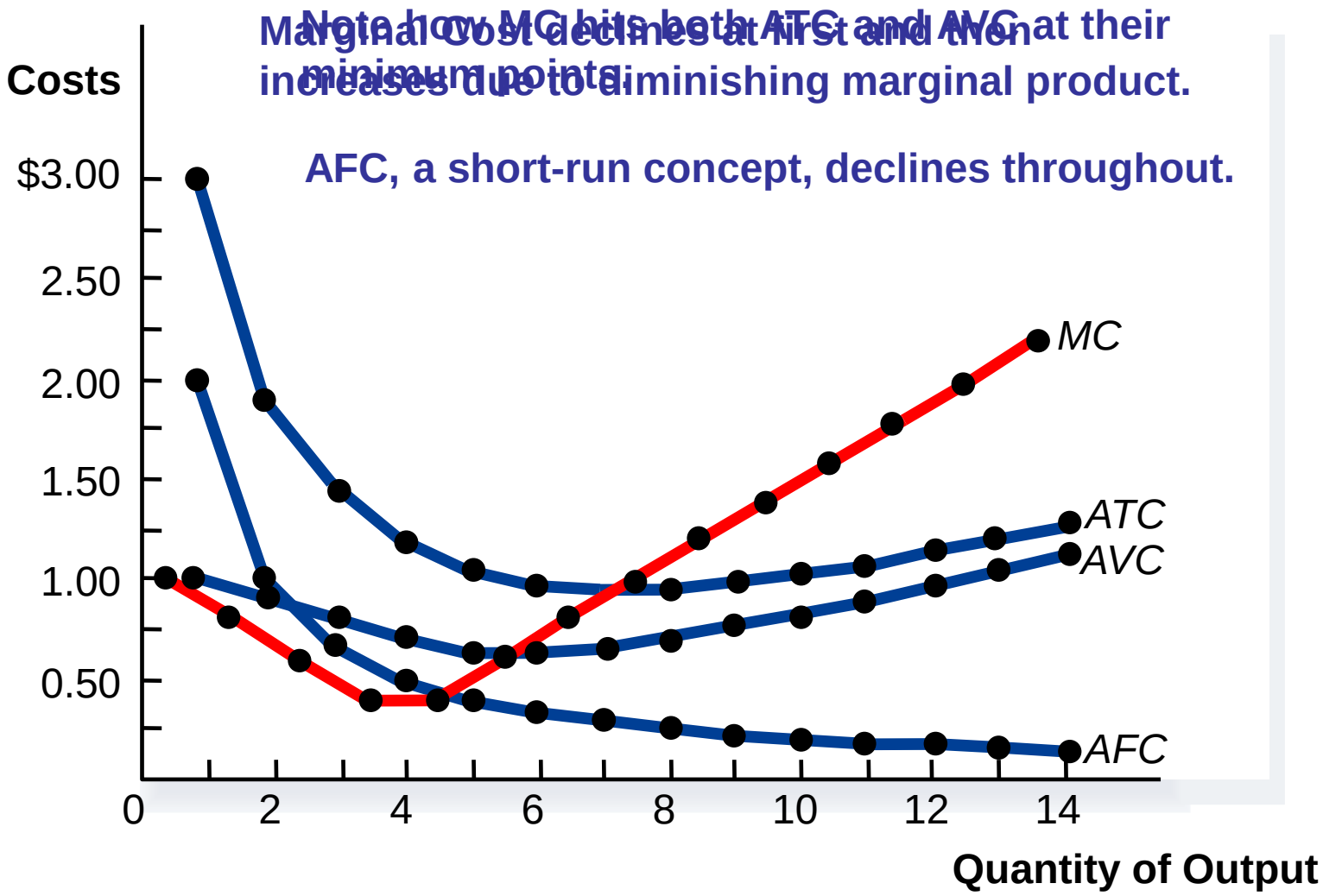
Cost Curves and Their Shapes

- Relationship between Marginal Cost and Average Total Cost
  - The marginal-cost curve crosses the average-total-cost curve at the efficient scale.
    - *Efficient scale* is the quantity that minimizes average total cost.

Typical Cost Curves

- It is now time to examine the relationships that exist between the different measures of cost.

Cost Curves for a Typical Firm



Typical Cost Curves

- Three Important Properties of Cost Curves
  - Marginal cost eventually rises with the quantity of output.
  - The average-total-cost curve is U-shaped.
  - The marginal-cost curve crosses the average-total-cost curve at the minimum of average total cost.

COSTS IN THE SHORT RUN AND IN THE LONG RUN

- For many firms, the division of total costs between fixed and variable costs depends on the time horizon being considered.
  - In the short run, some costs are fixed.
  - In the long run, *all* fixed costs become variable costs.
- Because many costs are fixed in the short run but variable in the long run, a firm's long-run cost curves differ from its short-run cost curves.

Long-run costs

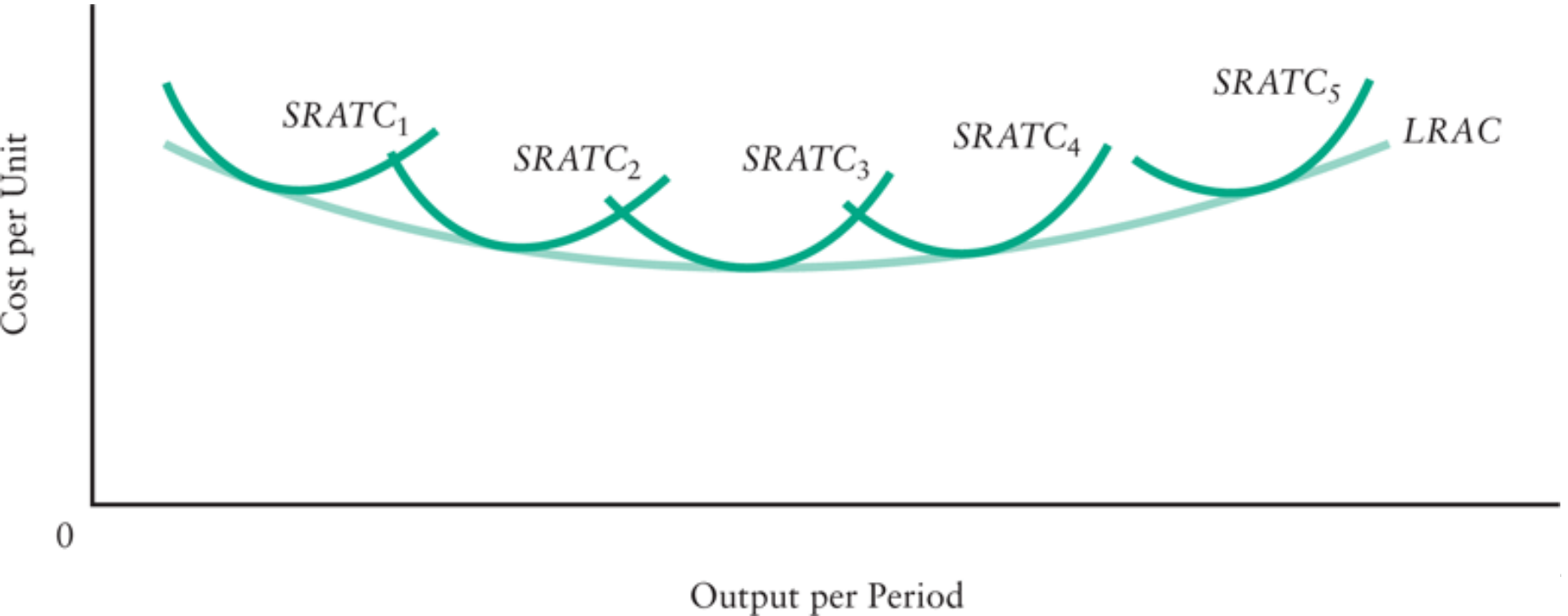
Since all inputs are variable, all costs are variable in the long run.

Long-run average cost (*LRAC*) measures the long-run cost of producing one unit of output:

$$\text{LRAC} = \frac{\text{Long-Run Total Cost of Production}}{\text{Output}}$$

The Relationship between Short-Run Average Cost and Long-Run Average Cost

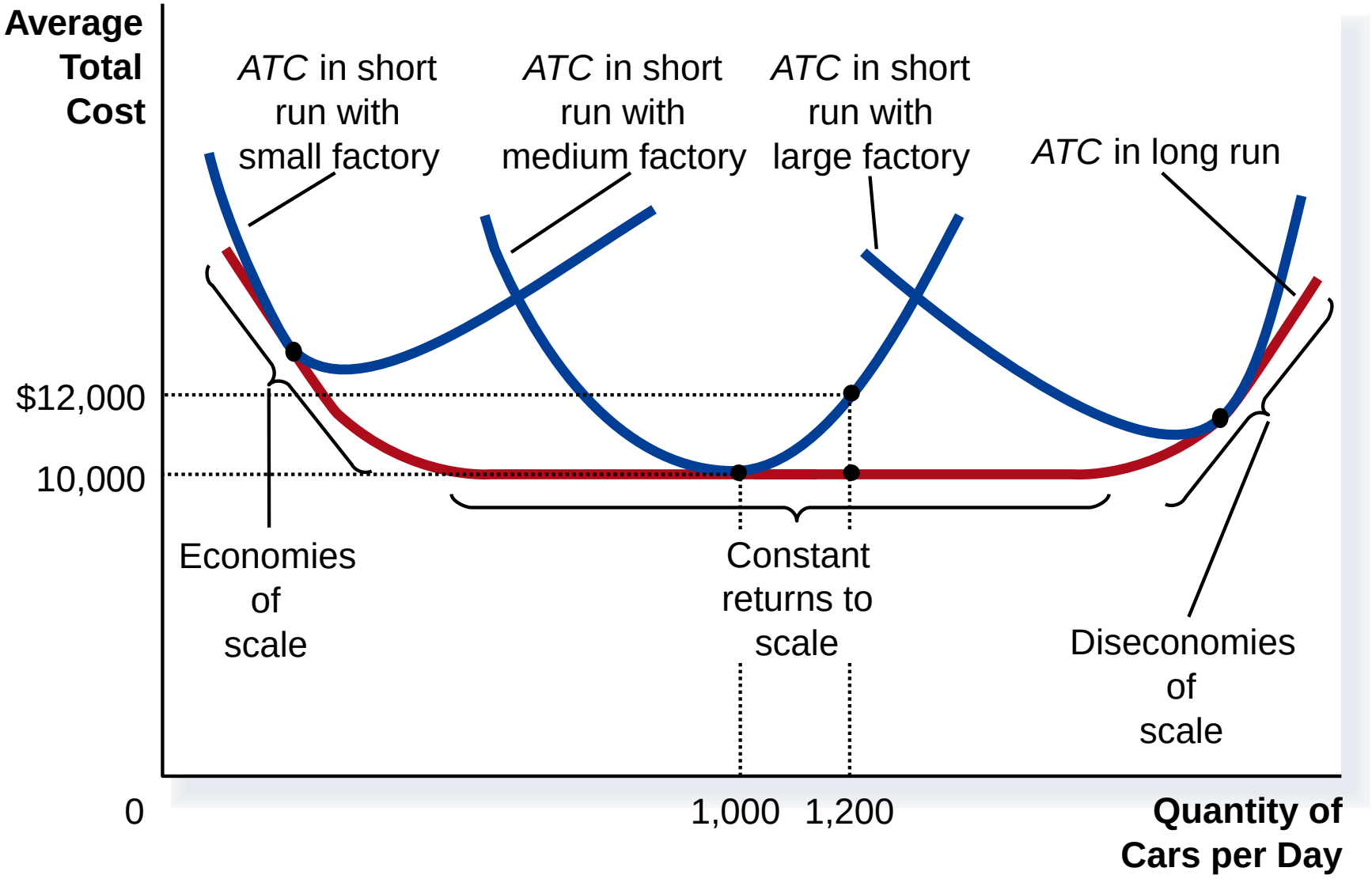
LRAC shows minimum average cost of producing any level of output when all inputs are variable



Economies and Diseconomies of Scale

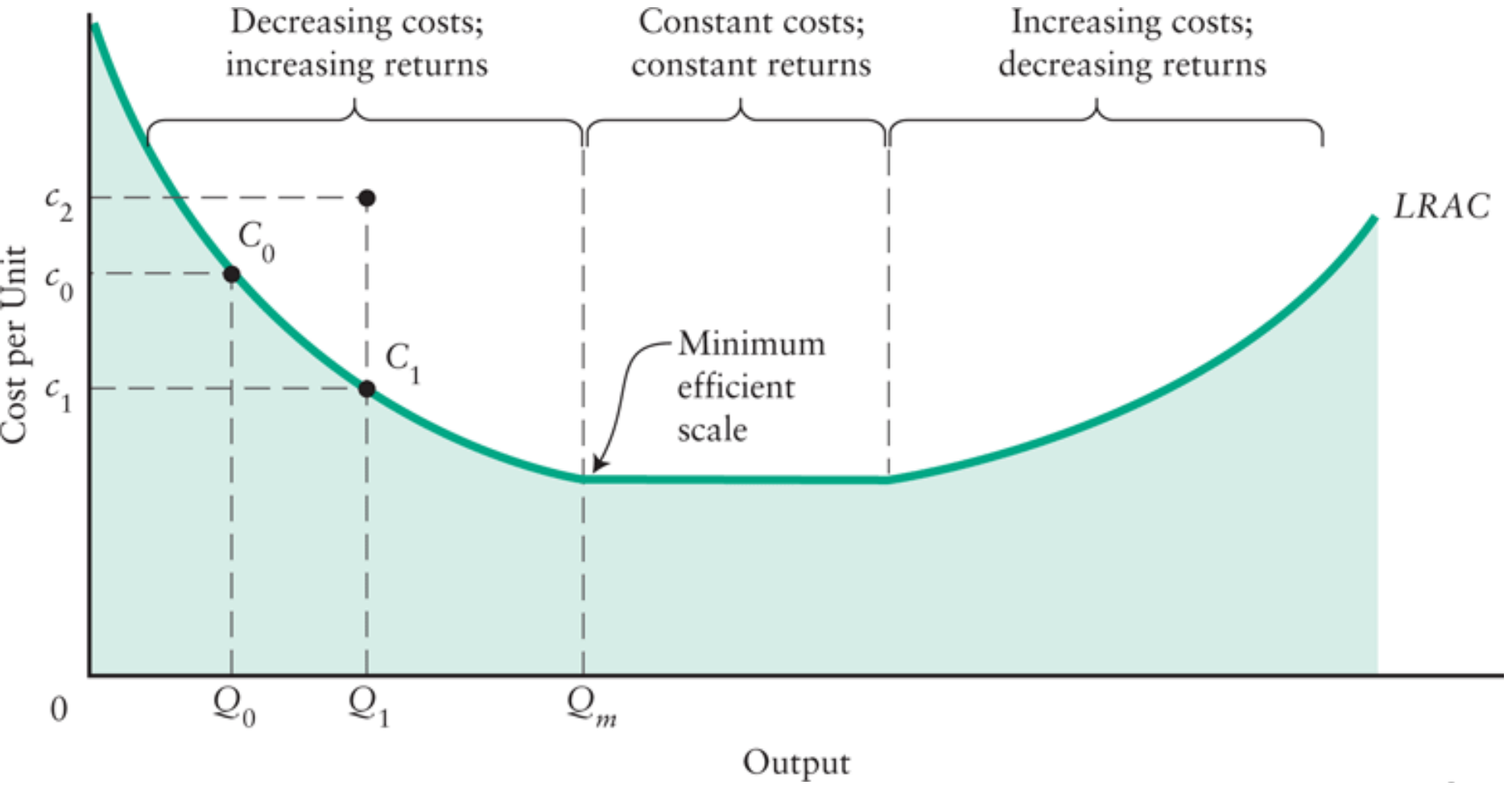
- *Economies of scale* refer to the property whereby long-run average total cost falls as the quantity of output increases.
- *Diseconomies of scale* refer to the property whereby long-run average total cost rises as the quantity of output increases.
- *Constant returns to scale* refers to the property whereby long-run average total cost stays the same as the quantity of output increases.

Average Total Cost in the Short and Long Run



Return to scale

what happens to LRAC as a firm increases its plant size



Summary

- The goal of firms is to maximize profit, which equals total revenue minus total cost.
- When analyzing a firm's behavior, it is important to include all the opportunity costs of production.
- Some opportunity costs are explicit while other opportunity costs are implicit.

Summary

- A firm's costs reflect its production process.
  - A typical firm's production function gets flatter as the quantity of input increases, displaying the property of diminishing marginal product.
  - A firm's total costs are divided between fixed and variable costs. Fixed costs do not change when the firm alters the quantity of output produced; variable costs do change as the firm alters quantity of output produced.

Summary

- Average total cost is total cost divided by the quantity of output.
- Marginal cost is the amount by which total cost would rise if output were increased by one unit.
- The marginal cost always rises with the quantity of output.
- Average cost first falls as output increases and then rises.

Summary

- The average-total-cost curve is U-shaped.
- The marginal-cost curve always crosses the average-total-cost curve at the minimum of ATC.
- A firm's costs often depend on the time horizon being considered.
- In particular, many costs are fixed in the short run but variable in the long run.

Summary

Total fixed costs	**Costs that do not depend on the quantity of output produced. These must be paid even if output is zero.**	***TFC***
Total variable costs	**Costs that vary with the level of output.**	***TVC***
Total cost	**The total economic cost of all the inputs used by a firm in production.**	**TC = TFC + TVC**
Average fixed costs	**Fixed costs per unit of output.**	***AFC = TFC/Q***
Average variable costs	**Variable costs per unit of output.**	***AVC = TVC/Q***
Average total costs	**Total costs per unit of output.**	***ATC = TC/Q*** ***ATC = AFC + AVC***
Marginal costs	**The increase in total cost that results from producing one additional unit of output.**	***MC = ΔTC/ΔQ***