Chapter 13:
The Costs of Production

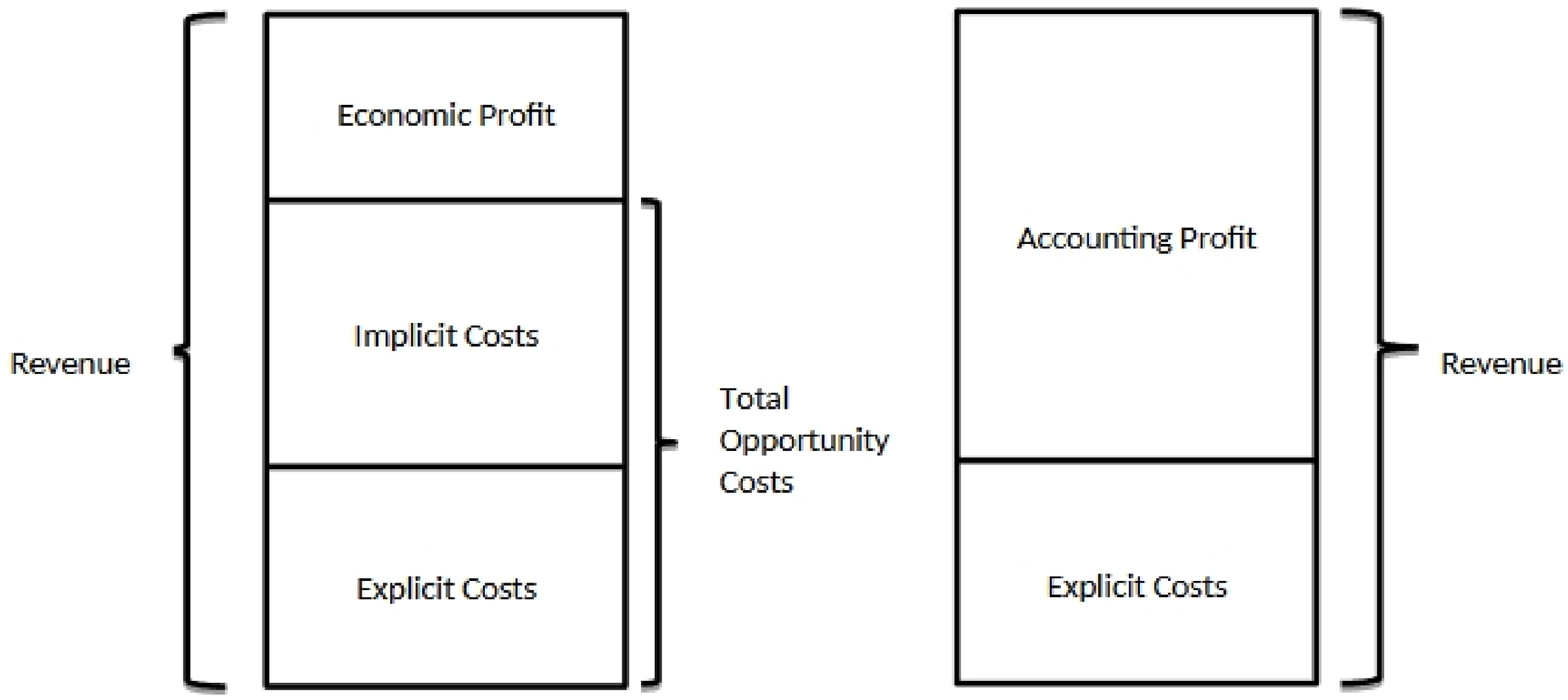
1. What are Costs?

a) Total Revenue, Total Cost, and Profit
- Assumed goal of all firms is to maximize profit
- *Profit = total revenue – total cost*
    - 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

b) Costs as Opportunity Costs
- Economists consider opportunity costs to include explicit and implicit costs
    - Explicit: input costs that require an outlay of money by the firm
        - ex: wages, money to buy an input, etc.
    - Implicit: input costs that do not require an outlay of money by the firms
        - ex: money someone could be making at a different job
- Total cost = explicit costs + implicit costs

c) The Cost of Capital as an Opportunity Cost
- An important *implicit cost* of almost any business is *the opportunity cost of the financial capital* that has been invested in the business.
    - ex: If you invest $300,000 into a business but could have put that money in savings, and gotten $15,000 in interest, this amount is considered an implicit cost.

d) Economic Profit vs. Accounting Profit
- Economic profit: total revenue – total cost (explicit + implicit costs)
- Accounting profit: total revenue – explicit cost



2. Production and Costs

a) The Production Function

- Production Function: the relationship between the quantity of inputs used to make a good and the quantity of output of that good.
- Marginal Product: the increase in output that arises from an additional unit of input
    - As the number of workers increase, marginal product decreases
- Diminishing Marginal Product: the property whereby the marginal product of an input declines as the quantity of the input increases.
    - Graph gets flatter as the number of inputs (workers) increase
    - In terms of slope, as the number of workers increases, the marginal product declines, and the production function becomes flatter (curve starts out with steep slopes but as more workers are added, the slope becomes flatter and flatter as it increases)

b) From the Production Function to the Total-Cost Curve

- Production function: relatively flat because as the number of workers increases, it becomes crowded, less is produced (diminish marginal produced).
- Total-cost curve: when the quantity produced is large, total-cost curve is relatively steep.
    - Gets steeper as the amount produced rises

3. The Various Measures of Cost

a) Fixed and Variable Costs

- Fixed Cost: costs that do not vary with the quantity of output produced
    - ex: rent, bookkeeper (not affected by quantity sold)
- Variable Cost: costs that vary with the quantity of output produced
    - ex: cost of inputs (more coffee sold, more coffee beans needed to be bought)
- Total cost = Fixed costs + Variable Costs

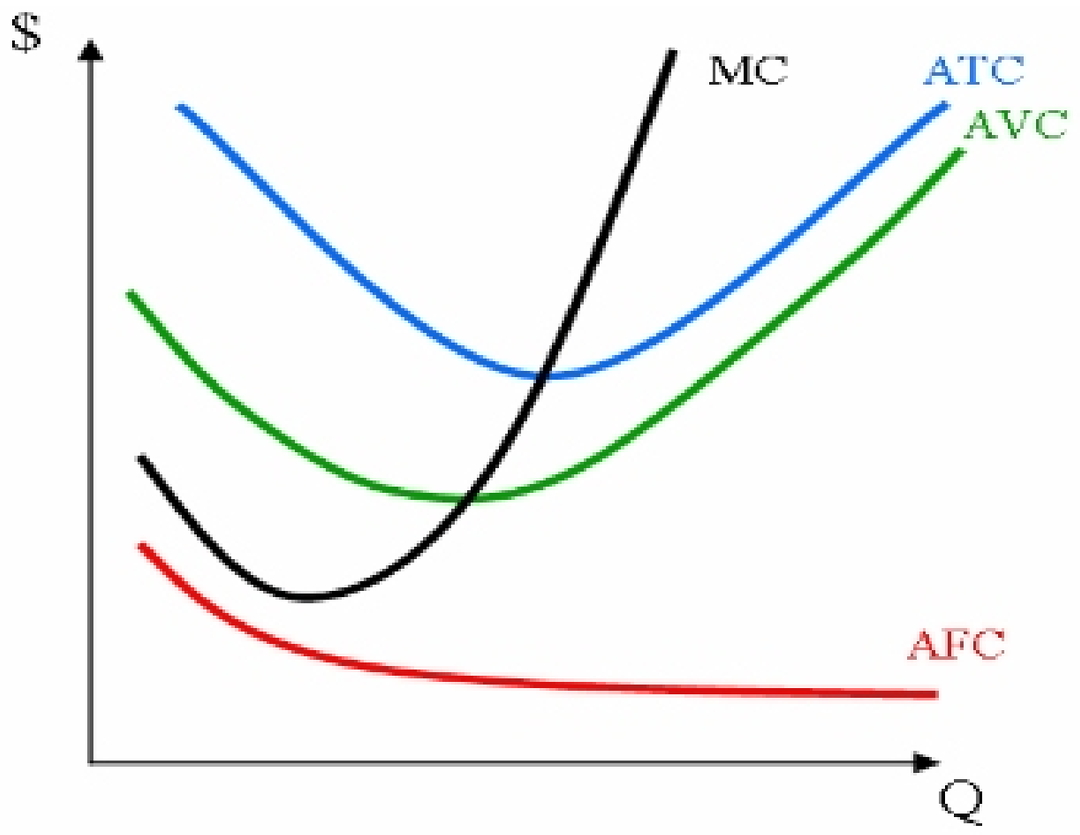
b) Average and Marginal Cost

- Average Total Cost: total cost divided by quantity of output
    - Total cost = sum of fixed cost and variable cost
    - Average fixed cost: fixed cost / quantity of output
    - Average variable cost: variable cost / quantity of output
    - ATC Tells us the cost of the typical unit, but it does not tell us how much total cost will change as the firm alters its level of production.
- Marginal Cost: the increase in total cost that arises from an extra unity of production
    - $MC = \Delta TC / \Delta Q$
- Average total cost tells us the cost of a typical unit of output if total cost id divided evenly over all the units produced.
- Marginal cost tells us the increase in total cost that arises from producing an additional unit of output.

c) Typical Cost Curves

- **Efficient scale**: the quantity of output that minimizes average total cost (U-shaped curve)
- 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.
- The marginal cost curve crosses the average total cost curve at its minimum because at low levels of output, marginal cost is below average total cost, so average total cost is falling. But after the two curves cross, marginal cost rises above average total cost.

- Marginal cost eventually rises with the quantity of output



4. Costs in the Short Run and in the Long Run

a) The Relationship between Short-Run and Long-Run Average Total Cost
   - Because many decisions 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.
   - LR ATC curve is much flatter U-shaped that the SR ATC curve.
     - Due to the greater flexibility firms have in the long run.

b) Economies and Diseconomies of Scale
   - Economies of Scale: the property whereby long-run average total cost falls as the quantity of output increases.
     - Often arise because higher production levels allow *specialization* among workers, which permits each worker to become better at a specific task.
   - Diseconomies of Scale: the property whereby long-run average total cost rises as the quantity of output increases.
     - Often arise because of *coordination problems* that are inherent in any large organization.
   - Constant returns to scale: the property whereby long-run average total cost stays the same as the quantity of output changes.

5. Conclusion

Term	Definition	Mathematical Description
Explicit Costs	Costs that require an outlay of money by the firm	
Implicit Costs	Costs that do not require an outlay of money by the firm	
Fixed Costs	Costs that do not vary with the quantity of output produced	FC
Variable Costs	Costs that vary with the quantity of output produced	VC
Total Costs	The market value of all the inputs that a firm uses in production	TC = FC + VC
Average Fixed Costs	Fixed cost divided by the quantity of output	AFC = FC / Q
Average Variable Costs	Variable cost divided by the quantity of output	AVC = VC / Q
Average Total Costs	Total cost divided by quantity of outputs	ATC = TC / Q
Marginal Costs	The increase in total cost that arises from an extra unit of production	MC = ΔTC / ΔQ