Outputs and Costs

Decision Time Frames

- The **short run** is a time frame in which the quantity of one or more resources used in production is fixed
    - For most firms, the capital, called the firm's *plant,* is fixed in the short run.
    - Other resources used by the firm (such as labor, raw materials and energy) can be changed in the short run
- The **long run** is a time frame in which the quantities of all resources - including the plant size - can be varied
    - Not easily reversed
    - A **sunk cost** is a cost incurred by the firm and cannot be changed.
    - If a firm's plant has no resale value, it is a sunk cost

Short Run Technology Constraint

Product Schedules

- **Total product** is the total output produced in a given period
- The **Margninal product of labour** is the change in total product that results from a one-unit increase in the quantity of labor employed, with all other inputs remaining the same
- The **average product** of labor is equal to total product divided by the quantity of labor employed

Marginal Product Curve

- Increasing marginal returns initially
- Diminishing marginal returns eventually
- Increased marginal returns arise from increased specialization and division of labor
- Diminishing marginal returns arise from the fact that employing additional units of labor means each worker has ess access to capital and space in which to work
- The **law of diminishing returns** states that as a firm uses more of a variable inut with a given quantity of fixed inputs, the marginal product of the variable input eventually diminishes

Short-Run Cost

Total Cost

- A firm's **total cost** is the cost of *all* resources used
- **Total fixed cost** is the cost of the firm's fixed inputs. Fixed costs do not change with output
- **Total variable cost** is the cost of the firm's variable inputs. Variable costs do chage with output
- Total cost equals total fixed cost plus total variable cost (TC=TFC+TVC)

Marginal Cost

- **Marginal cost** (MC) is the increase in total cost that results form a one-unit increase in total product
- Over the output range with *increasing marginal returns*, marginal cost falls as output increases

Average Cost

- Measures can be derived from each of the total cost measures:

- **Average fixed cost** is the total fixed cost per unit of output
- **Average variable cost** is total variable cost per unit of output
- **Average total cost** is total cost per unit of output

Two Things can cause shifts in the curve:

- Technology
    - Can influence both the productivity curves and the costs curves
- Prices of factors of production
    - An increase in the price of a factor of production increases costs and shifts the cost curves

Long Run Cost

- The *marginal product of capital* is the increase in output resulting from a one-unit increase in the amount of capital employed, holding constant the amount of labor employed
- The **long run average cost curve** is the relationship between the lowest attainable average total cost and output when both the plant size and labor are varied
- The long run average cost curve is a planning curve that tells the firm the plant size that minimizes the cost of producing a given output range

Economies and Diseconomies of Scale

- **Economies of scale** are features of a firm's technology that lead to falling long-run average cost as output increases
- **Diseconomies of scale** are features of a firm's technology that lead to rising long run average cost as output increases
- **Constant returns to scale** are features of a firm's technology that lead to constant long-run average cost as output increases
- **Minimum efficient scale** is the smallest quantity of output at which the long run average cost reaches its lowest level

Perfect Competition

Perfect competition is an industry in which:

- Many firms sell identical products to many buyers
- There are no restrictions to entry into the industry
- Established firms have no advantages over new ones
- Sellers and buyers are well informed about prices

How perfect Competition Arises

- When a firm;s minimum efficient scale is small relative to market demand so there is room for many firms in the industry
- And when each firm is perceived to produce a good or service that has no unique characteristics, so consumers don't care which firm they buy from

Price Takes

- In each competition, each firm is a price taker
- A **price take** is a firm at cannot influence the price of a good or service

Economic Profit and Revenue
- The goal of each firm is to maximize *economic profit,* which equals *total revenue* minus *total cost*
- Total cost is the *opportunity cost* of production, which includes n*ormal profit*
- A firm's **total revenue** equals price multiplied by quantity sold (P*Q)
- A firm's **marginal revenue** is the change in total revenue that results from a one-unit increase in the quantity sold

<u>The Firm's Decision in Perfect Competition</u>
- A perfectly competitive firm faces two constraints
1. A market constraints sumarized by the market price and the firm;s revenue curves
2. A technology constraint summarized by firm's product curves and cost curves
- The goal of the firm is to make maximum economic profit given the constraint it faces
- So the firm must make four decisions

Short Run Decisions:
- Whether to produce or shut down temporarily
- If the decision is to produce, what quantity

Long Run decisions
- Whether to increase or decrease plant size
- Whether to stay in the industry or leave it

Profit Maximizing Output
- A perfectly competitive firm chooses the output that maximizes its economic profit
- One way to find the profit-maximizing output is to look at the firm's total revenue and total cost curves

Marginal Analysis
- The firm can use marginal analysis to determine the profit maximizing output
- Because marginal Revenue is constant and marginal cost eventually increases as output increases, profit is maximized by producing the output at which marginal revenue equals marginal cost

Profits and Losses in the Short Run
- Maximum profit is not always a positive economic profit
- To determine whether a firm is making an economic profit or incurring an economic loss, we compare the firm's average total cost at the profit-maximizing output with the market price

Temporary Plant Shutdown
- **If price is less than the minimum average variable cost, the firm shuts down temporarily** and incurs an economic loss equal to total fixed cost
- The economic loss is the largest that the firm must bear

- The **short run** industry supply curve shows the quantity supplied by the industry at each price when the plant size of each firm and the number firms remain constant

Long-Run Adjustments
- In short run equilibrium, a firm may make an economic profit, break even, or incur an economic loss
- Which of these outcomes occurs determines how the indistry adjusts in the long run
- In the long run, the firm may:
    - Enter or exit an industry
    - Change its plant size
- New firms **enter** an industry in which existing firms make an economic profit
- Firms **exit** an industry in which they incur an economic loss

Changes in Plant Size
- A firm changes its plant size whenever doing so is profitable
- If average cost exceeds the minimum long run average cost, the firm changes its plant size to lower average costs and increase economic profit

Output, Price and Profit in Perfect Competition
- As the plant size increases, the firm's short run supply increases, the average total cost falls, and its economic profit increases

Long-Run Equilibrium
- Long Run equilibrium occurs in a competitive industry when
    - Economic prifit is zero, so firms neither enter nor exit the industry
    - Long-run average is at its minimum so firms don't chage their plant size

A Permanent Change in Demand
- A decrease in demand shifts the market demand curve leftward. The price falls and the quantity decreases

Changing Tastes and Advancing Technology
- A permanent increase in demand has the opposite effect to those desrcibed and shown
- An increase in demand shifts the demand curve rightward. The price rises and the quantity increases
- Economic profit increases entry which increases short-run supply and shifts the short run industry supply curve rightward
- As industry supply increases, the price falls and the market quantity continues to increase

External Economies and Diseconomies
- The change in the long-run equilibrium price following a permanent change in demand depends on external economies and external diseconomies

- **External economies** are factors beyond the control of an individual firm that lower the firm's costs as the industry output increases
- **External diseconomies** are factors beyond the control of a firm that raise the firm's costs as industry output increases
- In absence of external economies or external diseconomies, a firm;s costs remain constant as industry output change
- The **long run industry supply curve** shows how the quantity supplied by an industry varies as the market price varies after all the possible adjustments have been made, including changes in plant size and the number of firms in the industry