Perfect Competition: Defining Features

In a perfectly competitive market, firms operate under specific conditions that define the market environment. These conditions include:

- A large number of buyers and sellers, ensuring no single participant can influence the market price.
- Homogeneous products, meaning the goods offered by different firms are identical and indistinguishable.
- Free entry and exit of firms, allowing firms to enter or leave the market without restrictions.
- Perfect information, where all buyers and sellers have complete knowledge about prices, quality, and other relevant market details.

These features lead to price-taking behavior, where individual firms and buyers accept the market price as given. Firms cannot sell above the market price as buyers will switch to other sellers, and buyers cannot purchase below the market price as sellers will not sell at a loss.

Example: If a firm tries to charge a price higher than the market price, it will lose all customers because identical products are available at the market price from other firms.

Revenue

Revenue is the income a firm earns from selling its output. In perfect competition, the firm is a price taker and sells its product at the market price *p*. If the firm produces and sells quantity *q*, then:

Total Revenue (TR) = Price (p) × Quantity (q)

Average Revenue (AR) = Total Revenue / Quantity = p

Marginal Revenue (MR) = Change in Total Revenue / Change in Quantity = p

Thus, for a perfectly competitive firm, AR and MR are equal to the market price.

Numerical Example: If the market price of a box of candles is Rs 10, and the firm sells 5 boxes, then:

TR = 10 × 5 = Rs 50

The total revenue curve is a straight line starting from the origin with slope equal to the market price.

Profit Maximisation

Profit (π) is the difference between total revenue and total cost:

$$\pi = TR - TC$$

The firm aims to choose output q_0 that maximises profit. The conditions for profit maximisation are:

1. Price equals marginal cost: $p = MC$
2. Marginal cost is non-decreasing at q_0 (i.e., MC curve is rising or flat)
3. In the short run, price must be at least average variable cost: $p \geq AVC$; in the long run, price must be at least average cost: $p \geq AC$

Explanation: As long as marginal revenue exceeds marginal cost, increasing output increases profit. When MR = MC, profit is maximised. Producing beyond this point reduces profit.

Graphical Illustration: The profit-maximising output is where the market price line intersects the marginal cost curve from below, with the MC curve rising.

Supply Curve of a Firm

The supply curve shows the quantity a firm is willing to produce and sell at different prices, holding technology and input prices constant.

Short Run Supply Curve

In the short run, the firm's supply curve is the portion of the marginal cost curve above the minimum average variable cost (AVC). If the market price is below the minimum AVC, the firm supplies zero output.

Case 1: If price ≥ minimum AVC, the firm produces where price equals marginal cost.

Case 2: If price < minimum AVC, the firm shuts down and produces zero output.

Long Run Supply Curve

In the long run, the firm's supply curve is the portion of the long-run marginal cost (LRMC) curve above the minimum long-run average cost (LRAC). If the price is below minimum LRAC, the firm produces zero output.

Shut Down Point

The shut down point in the short run is the minimum point of the AVC curve. Below this price, the firm stops production. In the long run, the shut down point is the minimum point of the LRAC curve.

Normal Profit and Break-even Point

Normal profit is the minimum profit required to keep a firm in business, considered part of total cost (opportunity cost). Super-normal profit is profit above normal profit. The break-even point is where the firm earns only normal profit, occurring at the minimum average cost where the supply curve cuts the LRAC or SAC curve.

Determinants of a Firm's Supply Curve

The supply curve depends on factors affecting marginal cost:

- **Technological Progress:** Improves productivity, lowers marginal cost, shifts supply curve rightward (more output at same price).
- **Input Prices:** Increase in input prices raises marginal cost, shifts supply curve leftward (less output at same price).

Impact of Unit Tax: A per-unit tax increases costs, shifting the LRAC and LRMC curves upward, causing the supply curve to shift leftward. The firm supplies less output at any given price, and consumers pay a higher price.

Market Supply Curve

The market supply curve is the horizontal summation of individual firms' supply curves. For a market with *n* firms, the total supply at price *p* is:

$$S_m(p) = S_1(p) + S_2(p) + \cdots + S_n(p)$$

Example: For two firms with supply functions:

$$S_1(p) = \begin{cases} 0 & p < 10 \\ p - 10 & p \geq 10 \end{cases} \quad \text{and} \quad S_2(p) = \begin{cases} 0 & p < 15 \\ p - 15 & p \geq 15 \end{cases}$$

The market supply is:

$$S_m(p) = \begin{cases} 0 & p < 10 \\ p - 10 & 10 \leq p < 15 \\ (p - 10) + (p - 15) = 2p - 25 & p \geq 15 \end{cases}$$

Price Elasticity of Supply

Price elasticity of supply (e_s) measures the responsiveness of quantity supplied to a change in price:

$$e_s = \frac{\%\text{ change in quantity supplied}}{\%\text{ change in price}} = \frac{\Delta Q/Q}{\Delta P/P} = \frac{\Delta Q}{Q} \times \frac{P}{\Delta P}$$

Numerical Example: If the price of cricket balls rises from Rs 10 to Rs 30, and quantity supplied rises from 200 to 1000:

- Percentage change in quantity supplied = $\frac{1000-200}{200} \times 100 = 400\%$
- Percentage change in price = $\frac{30-10}{10} \times 100 = 200\%$

Therefore,

$$e_s = \frac{400}{200} = 2$$

This indicates elastic supply, where quantity supplied changes more than the price change.

Geometric Interpretation

For a straight-line supply curve:

- If the supply curve cuts the price axis at a positive value and the quantity axis at a negative value, elasticity > 1 (elastic supply).
- If the supply curve passes through the origin, elasticity = 1 (unit elastic supply).
- If the supply curve cuts the quantity axis at a positive value, elasticity < 1 (inelastic supply).

Summary

- Firms in perfect competition are price takers.
- Total revenue = price × quantity; average and marginal revenue equal price.
- Demand curve faced by a firm is perfectly elastic (horizontal line at market price).
- Profit = total revenue – total cost; profit maximised where price = marginal cost, with MC non-decreasing and price ≥ AVC (short run) or AC (long run).
- Short run supply curve is the portion of the marginal cost curve above minimum AVC; long run supply curve is the portion of LRMC above minimum LRAC.
- Technological progress shifts supply curve right; increase in input prices or taxes shifts it left.
- Market supply curve is the horizontal sum of individual firms' supply curves.
- Price elasticity of supply measures responsiveness of quantity supplied to price changes.

Glossary

- **Perfect Competition:** Market structure with many buyers and sellers, homogeneous products, free entry and exit, and perfect information.
- **Price Taker:** A firm or buyer who accepts the market price as given and cannot influence it.
- **Total Revenue (TR):** Total income from sales, calculated as price × quantity.
- **Average Revenue (AR):** Revenue per unit sold, equal to price in perfect competition.
- **Marginal Revenue (MR):** Additional revenue from selling one more unit.
- **Profit Maximisation:** The process of choosing output to maximize the difference between total revenue and total cost.
- **Marginal Cost (MC):** Additional cost of producing one more unit of output.
- **Average Variable Cost (AVC):** Variable cost per unit of output.
- **Average Cost (AC):** Total cost per unit of output.
- **Supply Curve:** Graph showing quantity supplied at different prices.
- **Shut Down Point:** The price below which a firm stops production in the short run.
- **Normal Profit:** Minimum profit needed to keep a firm in business, considered part of total cost.
- **Super-normal Profit:** Profit above normal profit.
- **Break-even Point:** Output level where total revenue equals total cost, earning normal profit.
- **Price Elasticity of Supply:** Measure of how quantity supplied responds to price changes.