Microeconomics - BA Economics Hons, DU

Microeconomics

BA Economics Hons, DU - Semester I: Exam-Focused Notes with Graphs

This document provides a comprehensive and detailed overview of essential concepts in Microeconomics, tailored for students of BA Economics Honours, aligned with the Delhi University Semester I syllabus. It includes theoretical explanations, mathematical derivations, real-world examples, and graphical illustrations to facilitate exam preparation.

1. Introduction to Microeconomics

Microeconomics examines the behavior of individual economic agents—consumers, firms, and markets—and their interactions to determine prices, quantities, and resource allocation.

- Definition: Microeconomics is the branch of economics that studies individual economic units, such as consumers, firms, and specific markets. It focuses on decision-making processes, resource allocation, and how interactions in markets determine prices and quantities of goods and services.
- Nature of Economics:
  - Positive Economics: Analyzes economic phenomena as they are, using factual data and empirical evidence without value judgments. Example: Studying the impact of a tax increase on cigarette consumption.
  - Normative Economics: Involves subjective judgments about what economic policies or outcomes should be. Example: Recommending subsidies for renewable energy to reduce carbon emissions.
- Methodology:
  - Deductive Method: Begins with general economic theories or assumptions (e.g., consumers maximize utility) and derives specific predictions (e.g., demand curves slope downward). This method is often used in microeconomic models.
  - Inductive Method: Starts with specific observations (e.g., consumer spending patterns) and generalizes to form broader theories or principles. This method is common in empirical studies.
- Micro vs. Macroeconomics:

  - Microeconomics: Focuses on individual markets and agents. Examples: Pricing of coffee in a local market, a firm's production decisions.
  - Macroeconomics: Examines the economy as a whole, including aggregates like national income, inflation, and unemployment. Examples: GDP growth rate, monetary policy effects.
- Importance in Economics:
  - Provides a foundation for understanding how resources are allocated efficiently.
  - Informs policy decisions, such as taxation, subsidies, and market regulations.
  - Helps analyze consumer behavior, firm strategies, and market dynamics.

PYQ: Distinguish between micro and macroeconomics with examples. Explain the role of positive and normative economics.

2. Demand and Supply Analysis

Demand and supply analysis is the cornerstone of microeconomics, explaining how prices and quantities are determined in competitive markets through the interaction of buyers and sellers.

- Law of Demand:
  - States that, ceteris paribus, as the price of a good increases, the quantity demanded decreases, and vice versa, leading to an inverse relationship.
  - Reason: Substitution effect (consumers switch to cheaper alternatives) and income effect (higher prices reduce purchasing power).
  - Demand Curve: Downward-sloping, representing the inverse relationship between price (P) and quantity demanded (Q_d). Mathematically, a linear demand function can be expressed as $Q_d = a - bP$, where a and b are positive constants.
  - Determinants of Demand: Price of the good, income, prices of related goods (substitutes and complements), tastes and preferences, expectations, and population size.
  - Example: A decrease in the price of smartphones increases the quantity demanded, as consumers find them more affordable.
- Law of Supply:
  - States that, ceteris paribus, as the price of a good increases, the quantity supplied increases, and vice versa, leading to a direct relationship.
  - Reason: Higher prices incentivize producers to supply more due to increased profitability.
  - Supply Curve: Upward-sloping, representing the direct relationship between price (P) and quantity supplied (Q_s). A linear supply function can be expressed as $Q_s = c + dP$, where c and d are positive constants.
  - Determinants of Supply: Price of the good, production costs, technology, prices of inputs, government policies (taxes, subsidies), and expectations.

- Example: An increase in wheat prices encourages farmers to supply more wheat to the market.

- Market Equilibrium:
  - Occurs when quantity demanded equals quantity supplied ($Q_d = Q_s$), determining the equilibrium price (P^*) and quantity (Q^*).
  - At equilibrium, there is no surplus (excess supply) or shortage (excess demand), and the market clears.
  - Mathematical Derivation: For demand function $Q_d = a - bP$ and supply function $Q_s = c + dP$, set $Q_d = Q_s$:

$$a - bP = c + dP \implies P^* = \frac{a-c}{b+d}, \quad Q^* = a - b\left(\frac{a-c}{b+d}\right)$$

  - Example: In the market for apples, if demand is $Q_d = 100 - 5P$ and supply is $Q_s = 20 + 3P$, equilibrium occurs at $P^* = 10$, $Q^* = 50$.

- Shifts in Demand and Supply:
  - Demand Shift: A change in a non-price determinant (e.g., income increase) shifts the demand curve. Rightward shift (increase in demand) raises P^* and Q^*; leftward shift (decrease in demand) lowers them.
  - Supply Shift: A change in a non-price determinant (e.g., improved technology) shifts the supply curve. Rightward shift (increase in supply) lowers P^* and raises Q^*; leftward shift (decrease in supply) raises P^* and lowers Q^*.

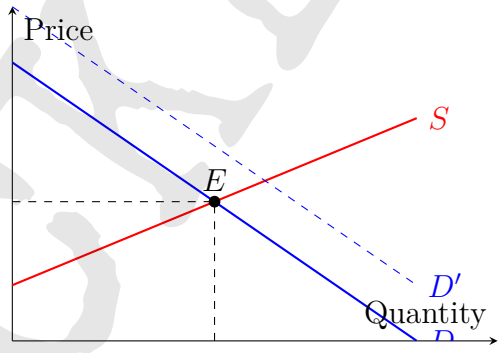

Figure 1: Demand and Supply Equilibrium: The demand curve (D) and supply curve (S) intersect at equilibrium point (E) with price P^* and quantity Q^*. A rightward shift in demand (D') increases equilibrium price and quantity.

PYQ: Explain demand and supply with graphical analysis. Discuss the effects of shifts in demand and supply curves.

3. Elasticity of Demand

Elasticity measures how sensitive the quantity demanded or supplied is to changes in its determinants, providing insights into consumer and producer behavior.

- Price Elasticity of Demand (E_d):

  - Measures the responsiveness of quantity demanded to a change in the price of the good.
  - Formula: $E_d = \left|\frac{\%\ \Delta Q_d}{\%\ \Delta P}\right| = \left|\frac{\Delta Q_d}{\Delta P} \cdot \frac{P}{Q_d}\right|$, where ΔQ_d is the change in quantity demanded and ΔP is the change in price.
  - Point Elasticity: For a specific point on the demand curve, $E_d = \left|\frac{dQ_d}{dP} \cdot \frac{P}{Q_d}\right|$.
  - Arc Elasticity: For large changes, $E_d = \left|\frac{(Q_2-Q_1)/(Q_2+Q_1)/2}{(P_2-P_1)/(P_2+P_1)/2}\right|$.
  - Types:
    * Elastic ($|E_d| > 1$): Quantity demanded changes more than proportionally to price changes. Example: Luxury goods like designer clothes.
    * Inelastic ($|E_d| < 1$): Quantity demanded changes less than proportionally to price changes. Example: Necessities like salt.
    * Unitary Elastic ($|E_d| = 1$): Quantity demanded changes proportionally to price changes. Example: Some consumer electronics.
  - Determinants: Availability of substitutes, necessity vs. luxury, proportion of income spent, and time horizon.
  - Application: Firms use price elasticity to set pricing strategies; elastic goods may see price reductions to boost revenue, while inelastic goods may tolerate price increases.
- Income Elasticity of Demand (E_I):
  - Measures responsiveness of quantity demanded to a change in income.
  - Formula: $E_I = \frac{\%\ \Delta Q_d}{\%\ \Delta I} = \frac{\Delta Q_d}{\Delta I} \cdot \frac{I}{Q_d}$, where I is income.
  - Types:
    * Normal Goods ($E_I > 0$): Demand increases with income. Example: Clothing.
    * Inferior Goods ($E_I < 0$): Demand decreases as income rises. Example: Low-quality substitutes like cheap instant noodles.
    * Luxury Goods ($E_I > 1$): Demand increases more than proportionally with income. Example: High-end cars.
- Cross-Price Elasticity of Demand (E_{XY}):
  - Measures responsiveness of quantity demanded of one good to a change in the price of another good.
  - Formula: $E_{XY} = \frac{\%\ \Delta Q_X}{\%\ \Delta P_Y} = \frac{\Delta Q_X}{\Delta P_Y} \cdot \frac{P_Y}{Q_X}$.
  - Types:
    * Substitutes ($E_{XY} > 0$): Increase in price of good Y increases demand for good X. Example: Tea and coffee.
    * Complements ($E_{XY} < 0$): Increase in price of good Y decreases demand for good X. Example: Cars and petrol.

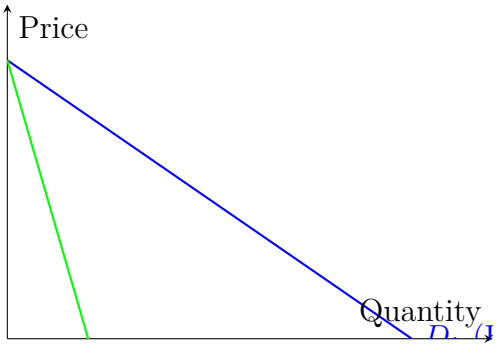

Figure 2: Price Elasticity of Demand: D_1 (flatter) is elastic ($|E_d| > 1$), where a price change causes a large change in quantity demanded. D_2 (steeper) is inelastic ($|E_d| < 1$), where quantity demanded is less responsive to price changes.

PYQ: Define elasticity and explain its types with diagrams. Calculate price elasticity for a given demand function.

4. Theory of Consumer Behavior

Consumer behavior theory examines how individuals allocate their limited resources to maximize satisfaction or utility, using cardinal and ordinal approaches.

- Cardinal Utility Approach:
  - Assumes utility is measurable in numerical units (utils).
  - Law of Diminishing Marginal Utility: As a consumer consumes additional units of a good, the marginal utility (additional satisfaction from one more unit) decreases.
  - Marginal Utility (MU): $MU = \frac{\Delta U}{\Delta Q}$, where U is total utility and Q is quantity consumed.
  - Consumer Equilibrium: Occurs when the marginal utility per rupee spent is equal across all goods. For two goods X and Y, with prices P_X and P_Y:

$$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y}$$

  - Example: If a consumer derives 10 utils from an extra unit of good X costing 2 and 15 utils from an extra unit of good Y costing 3, then $\frac{10}{2} = \frac{15}{3} = 5$, indicating equilibrium.
  - Limitations: Assumes utility is measurable, which is subjective and difficult to quantify in practice.
- Ordinal Utility - Indifference Curve Analysis:
  - Assumes utility is not measurable but can be ranked (ordinal preferences). Consumers can indicate whether one bundle of goods is preferred, less preferred, or indifferent to another.
  - Indifference Curve (IC): A curve showing all combinations of two goods (e.g., X and Y) that yield the same level of utility. Properties:

* Downward Sloping: Due to the trade-off between goods (more of X means less of Y for constant utility).
* Convex to Origin: Reflects diminishing marginal rate of substitution (MRS), where MRS $= \frac{\Delta Y}{\Delta X} = -\frac{MU_X}{MU_Y}$.
* Non-Intersecting: Higher indifference curves represent higher utility.

– Indifference Map: A family of indifference curves, with curves farther from the origin indicating higher utility levels.

– Budget Line: Represents all combinations of two goods a consumer can afford given income (I) and prices (P_X, P_Y). Equation: $I = P_X X + P_Y Y$.

– Consumer Equilibrium: Occurs where the budget line is tangent to the highest possible indifference curve, where MRS $= \frac{P_X}{P_Y}$. At this point, the consumer maximizes utility subject to the budget constraint.

– Example: A consumer with 100 to spend on goods X (10/unit) and Y (5/unit) has a budget line $100 = 10X + 5Y$. Equilibrium occurs where the slope of the indifference curve equals the slope of the budget line ($-\frac{P_X}{P_Y} = -2$).

– Income and Substitution Effects:
* Substitution Effect: When the price of a good falls, it becomes relatively cheaper, leading consumers to substitute it for other goods.
* Income Effect: A price decrease increases real income, affecting consumption depending on whether the good is normal or inferior.

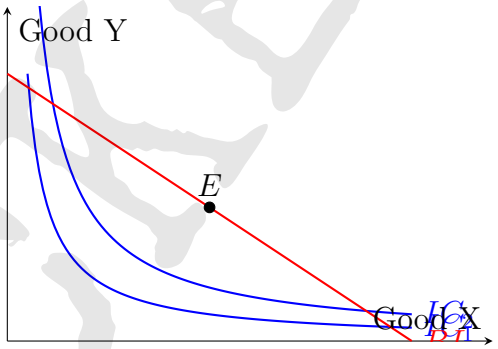

Figure 3: Consumer Equilibrium: The budget line (BL) is tangent to the highest indifference curve (IC_2) at point E, where MRS $= \frac{P_X}{P_Y}$, maximizing utility.

PYQ: Explain consumer equilibrium using indifference curve analysis. Derive the equilibrium condition mathematically.

5. Theory of Production

Production theory examines how firms combine inputs to produce goods and services efficiently, focusing on the relationship between inputs and outputs.

- Production Function: Describes the relationship between inputs (e.g., labor L, capital K) and output (Q). General form: $Q = f(L, K)$.

- Total, Average, and Marginal Product:
  - Total Product (TP): The total output produced with a given amount of inputs. Example: $Q = 10L - 0.5L^2$ (labor-based production function).
  - Average Product (AP): Output per unit of input. $AP_L = \frac{Q}{L}$.
  - Marginal Product (MP): Additional output from one additional unit of input. $MP_L = \frac{\Delta Q}{\Delta L}$ or $\frac{dQ}{dL}$.
  - Law of Diminishing Marginal Returns: As more of a variable input (e.g., labor) is added to a fixed input (e.g., capital), the marginal product eventually decreases.
- Stages of Production:
  - Stage I: Increasing returns (MP_L increases, AP_L rises).
  - Stage II: Diminishing returns (MP_L decreases but positive, AP_L peaks then declines).
  - Stage III: Negative returns (MP_L becomes negative).
  - Efficient Production: Occurs in Stage II, where $MP_L > 0$ and AP_L is maximized.
- Isoquants: Curves showing all combinations of inputs (e.g., L and K) that produce the same level of output. Similar to indifference curves, they are downward-sloping and convex due to the diminishing marginal rate of technical substitution (MRTS $= -\frac{\Delta K}{\Delta L} = \frac{MP_L}{MP_K}$).

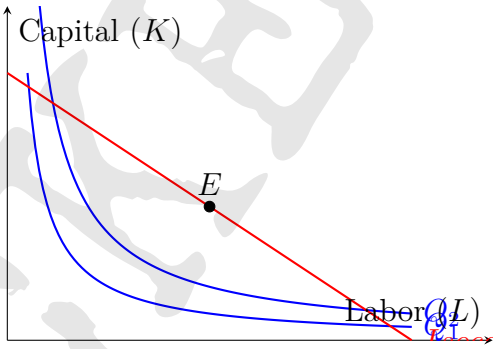

Figure 4: Production Equilibrium: The isocost line is tangent to the highest isoquant (Q_2) at point E, where MRTS $= \frac{w}{r}$ (ratio of input prices), minimizing cost for a given output.

PYQ: Explain the law of diminishing marginal returns and illustrate with production curves.

6. Cost and Revenue Analysis

Cost and revenue concepts are critical for understanding firm behavior and profitability in different market structures.

- Cost Concepts:
  - Total Cost (TC): Sum of total fixed cost (TFC) and total variable cost (TVC). $TC = TFC + TVC$.

- Average Cost (AC): $AC = \frac{TC}{Q}$. Includes average fixed cost (AFC) and average variable cost (AVC).
- Marginal Cost (MC): Additional cost of producing one more unit. $MC = \frac{\Delta TC}{\Delta Q}$.
- Short Run vs. Long Run:
  * Short Run: At least one input is fixed, leading to U-shaped AC and MC curves due to diminishing returns.
  * Long Run: All inputs are variable, leading to economies and diseconomies of scale. Long-run average cost (LRAC) is typically U-shaped.

- Revenue Concepts:
  - Total Revenue (TR): $TR = P \times Q$.
  - Average Revenue (AR): $AR = \frac{TR}{Q} = P$ (equals price in most market structures).
  - Marginal Revenue (MR): Additional revenue from selling one more unit. $MR = \frac{\Delta TR}{\Delta Q}$.
- Profit Maximization: Occurs where $MC = MR$ and the MC curve is rising, ensuring maximum profit or minimum loss.

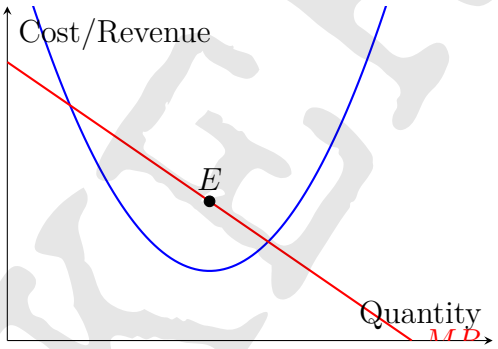

Figure 5: Profit Maximization: Equilibrium occurs at point E where $MC = MR$, maximizing profit.

PYQ: Discuss cost curves and their relationship with revenue for profit maximization.

7. Market Structures

Market structures define the competitive environment in which firms operate, influencing pricing, output, and efficiency.

- Perfect Competition:
  - Characteristics: Many buyers and sellers, identical products, perfect information, no barriers to entry/exit, price takers.
  - Equilibrium: Firms produce where $P = MC = AR = MR$. In the long run, $P = minimum AC$, ensuring zero economic profit.
  - Example: Agricultural markets like wheat.
- Monopoly:

  - Characteristics: Single seller, unique product, high barriers to entry, price maker.
  - Equilibrium: $MC = MR$, but $P > MR$, leading to higher prices and lower output than perfect competition.
  - Example: Public utilities like electricity distribution.
- Monopolistic Competition:
  - Characteristics: Many firms, differentiated products, some pricing power, low barriers to entry.
  - Equilibrium: $MC = MR$, but $P > minimumAC$ in the long run, leading to excess capacity.
  - Example: Restaurants, retail clothing.
- Oligopoly:
  - Characteristics: Few firms, interdependent decision-making, may have differentiated or identical products.
  - Models: Cournot (quantity competition), Bertrand (price competition), kinked demand curve.
  - Example: Telecommunications, automobile industries.

PYQ: Compare market structures and their implications for pricing and output.

8. Factor Pricing

Factor pricing examines how the prices of inputs (land, labor, capital, entrepreneurship) are determined in factor markets.

- Rent (Land):
  - Determined by demand and supply of land. Ricardo's theory emphasizes differential rent based on land fertility.
- Wages (Labor):
  - Determined by marginal productivity of labor (MPL). In competitive markets, wage = value of MPL.
- Interest (Capital):
  - Determined by demand for capital (investment) and supply of savings. Interest rate equilibrates the market.
- Profit (Entrepreneurship):
  - Residual income after paying other factors. Includes compensation for risk and innovation.

PYQ: Explain theories of factor pricing with examples.

9. Welfare Economics

Welfare economics evaluates economic efficiency and equity, focusing on resource allocation and social welfare.

- Pareto Efficiency: An allocation where no one can be made better off without making someone worse off.
- Edgeworth Box: A graphical tool to analyze exchange efficiency between two consumers, showing contract curves where indifference curves are tangent.
- Social Welfare Functions: Aggregate individual utilities to assess overall societal welfare, considering equity and efficiency.

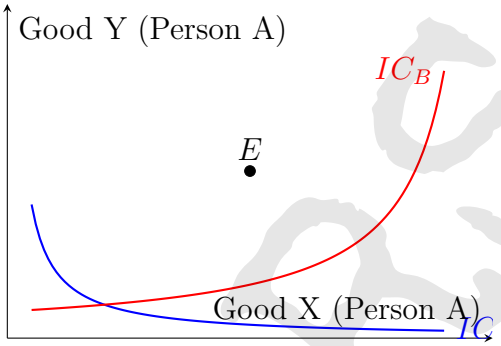

Figure 6: Edgeworth Box: Point E on the contract curve represents an efficient allocation where indifference curves of two consumers (A and B) are tangent.

PYQ: Discuss Pareto efficiency and the role of the Edgeworth box in welfare economics.

10. PYQ Practice Topics (Frequent)

The following topics are frequently asked in examinations and require thorough preparation:

Topic	Type of Question
Demand & Supply	Law, curves, equilibrium, shifts
Elasticity	Types, calculation, interpretation, applications
Consumer Theory	Utility analysis, indifference curves, equilibrium
Production	TP/MP/AP, isoquants, diminishing returns
Cost & Revenue	Curve shapes, profit maximization
Market Structures	Characteristics, equilibrium, diagrams
Factor Pricing	Rent, wage, interest, profit theories
Welfare Economics	Pareto efficiency, Edgeworth box, social welfare