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**HIGHLIGHTED HANDOUT**

## **ECO614**

Microeconomic Analysis

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# **ECO614**

Microeconomic Analysis

## **Lecture Handouts**

Prepared for the students of Virtual University of Pakistan

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## 1. The Scope and Method of Microeconomics

### LEARNING OBJECTIVES

- Define microeconomics and its central questions
- Explain scarcity, choice and opportunity cost
- Distinguish positive from normative analysis

**Microeconomics** studies the economic behavior of individual units - consumers, firms and industries - and how their interaction in markets determines prices and allocates resources. Its central questions: **what** to produce, **how** to produce, and **for whom** - answered in market economies chiefly through the price mechanism. Because resources are **scarce** relative to wants, every choice has an **opportunity cost**: the value of the next-best alternative forgone.

Method: economists build **models** - simplified abstractions using the **ceteris paribus** (other things equal) assumption - then test predictions against data. **Positive** statements describe what is ('a minimum wage raises unemployment among teens' - testable); **normative** statements prescribe what ought to be ('the minimum wage should be higher' - value judgment). Microeconomic analysis in this course is primarily positive and uses optimization (marginal analysis) as its engine: rational agents maximize objectives subject to constraints.

### Production Possibility Frontier (PPF)

The curve showing maximum attainable combinations of two goods; its slope is the opportunity cost, and its bowed-out shape reflects increasing opportunity costs as resources are specialized.

### SECTION SUMMARY

Microeconomics = individual-unit analysis via the price mechanism. Scarcity forces choice; opportunity cost prices it; models analyzed ceteris paribus yield testable positive predictions.

## 2. Demand, Supply and Market Equilibrium

### LEARNING OBJECTIVES

- Derive demand and supply curves
- Find equilibrium and analyze shifts
- Apply the model to price controls

**Demand** reflects marginal willingness to pay: the law of demand (quantity demanded falls as price rises) follows from diminishing marginal utility and income/substitution effects. **Supply** reflects marginal cost: higher prices draw out higher-cost producers. **Equilibrium** ( $Q_d = Q_s$ ) is where the curves cross; at prices above it, surplus drives price down; below it, shortage drives price up - the market's self-correction (Walrasian adjustment).

Shifts vs movements: price changes move **along** curves; income, tastes, related-goods prices, expectations and buyer numbers shift demand; input prices, technology, taxes and seller numbers shift supply. Applications: a **price ceiling** (e.g. rent control) below equilibrium creates persistent shortage and black markets; a **price floor** (e.g. wheat support price - used by Pakistan's government) above equilibrium creates surplus the state must buy. **Tax incidence** falls more on the less elastic side - consumers bear most of a cigarette tax because demand is inelastic.

#### ■ VERY IMPORTANT

Draw every shift carefully: label axes (P vertical, Q horizontal), mark old and new equilibria, and state the direction of price and quantity change. Half the exam marks are in clean diagrams.

#### SECTION SUMMARY

Equilibrium is  $Q_d = Q_s$ ; surpluses/shortages self-correct. Distinguish shifts from movements; price ceilings cause shortages, floors cause surpluses, and inelastic sides bear taxes.

## 3. Elasticity

#### LEARNING OBJECTIVES

- Compute and interpret elasticities
- Relate elasticity to total revenue
- Identify determinants of elasticity

**Price elasticity of demand** =  $(\% \text{ change in } Q_d) / (\% \text{ change in } P)$ . If  $|E_d| > 1$ , demand is elastic (luxuries, many substitutes);  $< 1$  inelastic (necessities like wheat flour, addictive goods);  $= 1$  unitary. **Total revenue** ( $P \times Q$ ) rises with a price increase only when demand is inelastic - the pricing rule every firm uses. **Income elasticity**: positive for normal goods, negative for inferior goods (e.g. coarse cloth); **cross elasticity**: positive for substitutes (tea/coffee), negative for complements (cars/petrol).

**Price elasticity of supply** rises with time horizon: momentary (fixed stock)  $\rightarrow$  short run  $\rightarrow$  long run (most elastic, capacity adjusts). Determinants of demand elasticity: availability of substitutes, necessity vs luxury, share of budget, and time. Policy uses: inelastic demand for cigarettes makes taxation an effective revenue-raiser; inelastic food demand explains why good harvests can **lower** farmers' total revenue (the farm paradox - highly relevant to Pakistan's agriculture).

#### Arc vs point elasticity

Point elasticity uses calculus at a point ( $dQ/dP \times P/Q$ ); arc elasticity averages over a price interval to avoid the base-value problem.

**SECTION SUMMARY**

Elasticity measures responsiveness. Inelastic demand: raise price, raise revenue. Time lengthens supply elasticity; substitutes widen demand elasticity; the farm paradox follows from inelastic food demand.

**4. Consumer Choice Theory****LEARNING OBJECTIVES**

- Explain utility maximization
- Use indifference curves and budget lines
- Derive the demand curve from optimization

Consumers maximize **utility** subject to a **budget constraint**. Cardinal approach: **diminishing marginal utility** (Gossen's first law) - each extra unit adds less satisfaction; optimum where  $MU_x/P_x = MU_y/P_y$  (equimarginal principle) - the last rupee spent on each good yields equal marginal utility. Ordinal approach: **indifference curves** (bundles yielding equal utility - downward sloping, convex, non-intersecting) tangent to the **budget line** at the optimum.

A price fall rotates the budget line outward: the **substitution effect** (always toward the cheaper good, moving along the original indifference curve) plus the **income effect** (toward/away depending on normal/inferior). For **Giffen goods** (strongly inferior staples like potatoes for the very poor), the income effect outweighs substitution and demand slopes upward - the rare exception to the law of demand. **Revealed preference** theory (Samuelson) deduces preferences from observed choices without utility measurement.

**SECTION SUMMARY**

Optimum: MU per rupee equalized, or indifference curve tangent to budget line. Price effects decompose into substitution (always negative) and income (sign depends on normal/inferior; Giffen if it dominates).

**5. Production Theory****LEARNING OBJECTIVES**

- Explain the production function
- Distinguish short run from long run
- Relate TP, AP and MP curves

The **production function**  $Q = f(K, L)$  maps inputs to maximum output. In the **short run**, at least one input (usually capital) is fixed; in the **long run** all inputs vary. **Total product (TP)**, **average**

**product ( $AP = TP/L$ )** and **marginal product ( $MP = dTP/dL$ )**: MP rises then falls due to the **law of diminishing marginal returns** - adding workers to fixed land eventually yields smaller increments. MP crosses AP at AP's maximum; when  $MP = 0$ , TP is maximized.

Long-run analysis uses **isoquants** (input combinations yielding equal output - like indifference curves for firms) and **isocost lines** ( $C = wL + rK$ ). Optimum: isoquant tangent to isocost, i.e.  **$MRTS = w/r$**  (marginal rate of technical substitution equals input price ratio). **Returns to scale**: doubling inputs more than doubles output (increasing - specialization), exactly doubles (constant), or less than doubles (decreasing - managerial limits). Cobb-Douglas  $Q = AL^aK^b$  makes this testable:  $a + b > 1$  means increasing returns.

### SECTION SUMMARY

Short run: diminishing returns govern TP/AP/MP. Long run: tangency of isoquant and isocost ( $MRTS = w/r$ ); returns to scale describe size economies.

## 6. Cost Theory

### LEARNING OBJECTIVES

- Derive cost curves from production
- Explain the U-shape of ATC
- Distinguish economic from accounting cost

**Economic cost** includes **opportunity cost**: explicit (wages, rent paid) plus implicit (forgone salary, normal profit on own capital). **Accounting profit** ignores implicit costs, so economic profit is smaller - and zero economic profit means the firm earns exactly normal profit. Short-run costs: **TFC** (fixed), **TVC**,  **$TC = TFC + TVC$** ;  **$MC = dTC/dQ$** ; **AFC** falls continuously, **AVC** and **ATC** are U-shaped - MC cuts both at their minima (when  $MC < AC$  it pulls AC down).

Long-run: the **LRAC** is the envelope of short-run ATC curves - U-shaped due to economies then diseconomies of scale. **Economies of scale** (bulk buying, specialization, indivisible machinery) lower LRAC; minimum efficient scale determines industry structure. The **shutdown rule**: produce in the short run only if  $P \geq \min AVC$  (cover variable costs); the **break-even/exit rule**: stay in the long run only if  $P \geq \min ATC$ . These rules generate the firm's supply curve: the MC curve above min AVC.

### ■ VERY IMPORTANT

The MC-crosses-minima diagram is the most drawn figure in microeconomics. Practice it: U-shaped ATC and AVC, upward MC through both minima, falling AFC approaching the axis.

**SECTION SUMMARY**

Costs are opportunity costs; MC crosses AVC and ATC at their minima. Produce if  $P > \min \text{AVC}$  (short run), stay if  $P > \min \text{ATC}$  (long run); the MC curve above AVC is supply.

**7. Perfect Competition****LEARNING OBJECTIVES**

- State the assumptions of perfect competition
- Find short-run and long-run equilibrium
- Evaluate efficiency properties

Assumptions: many small buyers/sellers, **homogeneous product**, free entry/exit, perfect information, perfect factor mobility - the firm is a **price taker** facing a horizontal demand curve ( $P = \text{MR}$ ). Short-run equilibrium:  **$P = \text{MC}$**  (profit max where  $\text{MR} = \text{MC}$ ); profits may be positive, zero or negative (but produce if  $P > \min \text{AVC}$ ).

Long run: entry/exit drives  **$P = \min \text{ATC}$**  - firms earn **zero economic profit** (normal profit only), producing at efficient scale. Efficiency: **allocative** ( $P = \text{MC}$ : value to consumers equals cost) and **productive** ( $\min \text{ATC}$ ). This is the welfare benchmark: the **First Fundamental Theorem** - competitive equilibrium is Pareto efficient. Real markets approximate it in agriculture and forex; Pakistan's wheat market is near-competitive at the farm gate.

**Pareto efficiency**

An allocation where no one can be made better off without making someone worse off - the efficiency standard competitive markets achieve.

**SECTION SUMMARY**

Perfect competition:  $P = \text{MC}$  short run;  $P = \min \text{ATC}$ , zero economic profit long run. It is the efficiency benchmark - allocatively and productively efficient.

**8. Monopoly****LEARNING OBJECTIVES**

- Explain monopoly pricing
- Measure deadweight loss
- Discuss price discrimination

A **monopolist** faces the market demand curve (downward sloping), so  **$\text{MR} < P$** ; profit max at  **$\text{MR} = \text{MC}$**  with price read off demand - price exceeds marginal cost, output is restricted. Sources of

monopoly: control of inputs, patents, network effects, and **natural monopoly** (huge fixed costs - e.g. electricity transmission - where one firm has lowest cost).

**Deadweight loss**: the lost consumer + producer surplus from restricted output (the Harberger triangle) - monopoly's efficiency cost. **Price discrimination** converts consumer surplus into profit: first-degree (each buyer pays willingness to pay), second-degree (quantity discounts - e.g. WAPDA slab tariffs), third-degree (different prices to groups with different elasticities - student discounts). Regulation options: marginal-cost pricing (needs subsidy under natural monopoly), average-cost pricing, or rate-of-return regulation - relevant to Pakistan's NEPRA-regulated power sector.

### SECTION SUMMARY

Monopoly:  $MR=MC$ ,  $P>MC$ , restricted output, deadweight loss. Price discrimination (3 degrees) extracts surplus; natural monopolies need price regulation.

## 9. Monopolistic Competition and Oligopoly

### LEARNING OBJECTIVES

- Explain monopolistic competition equilibrium
- Model oligopoly: Cournot, Bertrand, kinked demand
- Discuss game theory basics

**Monopolistic competition** (restaurants, clothing brands): many sellers, **differentiated products**, free entry. Short run like monopoly ( $P > MC$ , possible profits); long run: entry shifts each firm's demand left until **tangent to ATC** - zero profit but **excess capacity** (output below min ATC) - the cost of variety.

**Oligopoly** (telecom, cement - Pakistan's key oligopolies): few interdependent firms. **Cournot** (quantity competition -> output between monopoly and competition), **Bertrand** (price competition with homogeneous goods ->  $P = MC$  paradox), **kinked demand** (rivals match cuts not hikes -> price rigidity), **Stackelberg** (leader-follower). **Game theory**: the **prisoners' dilemma** explains why cartels cheat; **Nash equilibrium** (each firm's strategy optimal given rivals') is the solution concept; repeated games sustain collusion via punishment strategies - the logic behind OPEC and cement-price coordination.

### Nash equilibrium

A set of strategies where no player can gain by unilaterally deviating - the workhorse solution concept of oligopoly analysis.

**SECTION SUMMARY**

Monopolistic competition: variety at the cost of excess capacity. Oligopoly: strategic interdependence modeled by Cournot/Bertrand/kinked-demand and Nash equilibrium - cartels are prisoners' dilemmas.

## 10. Factor Markets and Income Distribution

**LEARNING OBJECTIVES**

- Derive factor demand (MRP)
- Explain wage determination
- Discuss inequality measures

A competitive firm hires labor until **MRP = MFC**: marginal revenue product ( $MRP = MR \times MP$ ) equals marginal factor cost (the wage). Factor demand is **derived** from product demand; it shifts with productivity, product price and technology. **Economic rent** is payment above opportunity cost - land earns pure rent (Ricardo); talented workers earn quasi-rents.

In **monopsony** (single buyer of labor - e.g. a lone factory town),  $MFC > \text{wage}$ , so employment and wages are below competitive levels - minimum wages can then **raise** both. **Inequality**: measured by the **Lorenz curve** and **Gini coefficient** (0 = perfect equality, 1 = maximal); Pakistan's Gini  $\sim 0.30$ . Causes: skill-biased technology, education gaps, land concentration. Policies: progressive taxation, transfers (e.g. BISP/Ehsaas), minimum wages, education investment.

**SECTION SUMMARY**

Hire until  $MRP = \text{wage}$ ; factor demand is derived. Monopsony suppresses wages/employment. Inequality is measured by Lorenz/Gini and addressed via taxes, transfers and human capital.

## 11. General Equilibrium and Welfare Economics

**LEARNING OBJECTIVES**

- Explain Edgeworth box exchange
- State the welfare theorems
- Discuss market failure

The **Edgeworth box** shows two consumers dividing fixed goods: the **contract curve** (tangencies of indifference curves) is the set of Pareto-efficient allocations; competitive trading from any endowment reaches it - the **First Welfare Theorem**. The **Second**: any Pareto-efficient allocation can be a competitive equilibrium after lump-sum transfers - separating efficiency from equity (in principle).

**Market failures** break the theorems: **externalities** (pollution -  $MSC > MPC$ ; find Pigouvian tax = marginal damage; Coase: with clear property rights and low transaction costs, bargaining internalizes externalities), **public goods** (non-excludable, non-rival - free-rider problem -> underprovision; e.g. national defense, street lights), **asymmetric information** (adverse selection - Akerlof's lemons; moral hazard), and missing markets. Each justifies targeted government intervention - the normative payoff of the whole course.

### ■ VERY IMPORTANT

Externality diagrams are exam staples: draw MPC vs MSC (negative externality), shade the deadweight loss, and mark the Pigouvian tax that shifts MPC to MSC.

### SECTION SUMMARY

Welfare theorems: competition yields Pareto efficiency; redistribution can (in theory) achieve any efficient equity. Market failures - externalities, public goods, asymmetric info - justify intervention.

## 12. Exam Pointers

### High-yield topics

- Diagrams: equilibrium shifts, tax incidence, price ceiling/floor, elasticity-revenue, indifference tangency, isoquant/isocost, MC-ATC minima, monopoly DWL, externality MSC/MPC, Lorenz curve.
- Derivations:  $MU_x/P_x = MU_y/P_y$ ;  $MRTS = w/r$ ;  $P=MC$ ;  $MR=MC$ ;  $MRP=MFC$ .
- Comparisons: accounting vs economic profit; short vs long run; IntServ-style per-unit vs market approaches (not needed - instead: Cournot vs Bertrand vs kinked demand).
- Decompositions: substitution vs income effects; Giffen condition.
- Welfare: Pareto efficiency, two theorems, DWL measurement, Pigouvian tax, Coase theorem.
- Pakistan applications: wheat support price, farm paradox, NEPRA regulation, BISP transfers.

### SECTION SUMMARY

Every topic = definition + diagram + optimization condition + welfare verdict + one Pakistan example. Master that template and the paper is predictable.