

1. Production Possibility Curve and Basic Concepts

(a) PPC Changes

(i) Factor inputs become two times more efficient than before: The Production Possibility Curve (PPC) would shift outward in a symmetrical manner. With twice the efficiency, the economy can produce twice as much of both wheat and machines. The new PPC would be parallel to the original but further from the origin, indicating increased productive capacity for both goods.

(ii) Scientists discover a new variety of seeds that yields three times more wheat: The PPC would pivot outward along the x-axis (wheat axis) while the y-intercept (machines) remains unchanged. This represents that maximum wheat production increases threefold while machine production capacity remains the same. The curve becomes flatter.

(b) Trade-off between inflation and unemployment (Phillips Curve)

There exists a short-run trade-off between inflation and unemployment, known as the Phillips Curve relationship. When unemployment is low, firms compete for workers, driving up wages which are then passed to consumers as higher prices (inflation). Conversely, high unemployment reduces wage pressures, leading to lower inflation. However, this is only a short-run phenomenon - in the long run, the Phillips Curve becomes vertical at the Natural Rate of Unemployment (NAIRU).

(c) "Invisible Hand" Concept

Adam Smith's "invisible hand" describes how individuals' self-interested actions in a free market lead to socially beneficial outcomes. When consumers seek the best products at lowest prices and producers seek maximum profits, the market reaches equilibrium where resources are allocated efficiently without central planning. For example, if demand for a product rises, prices increase, attracting more producers which eventually brings prices down to benefit consumers.

(d) Trade Benefits Example

The principle of comparative advantage shows how trade benefits all parties. For instance, suppose Country A can produce 10 cars or 5 computers, while Country B can produce 6 cars or 12 computers. Country A has comparative advantage in cars (opportunity cost of 0.5 computers per car vs B's 2 computers per car), while B has advantage in computers. By specializing and trading, both can consume beyond their PPCs.

2. Pizza Market Analysis

(a) Graph the demand and supply curves. What are the equilibrium prices and quantity in this market.

Equilibrium price = \$6

Equilibrium quantity = 81 pizzas

Price (\$)	4	5	6	7	8	9
Qd	135	104	81	68	53	39
Qs	26	53	81	98	110	121

Table 1: Pizza Market Data

(b) If the actual price in this market were above the equilibrium price, what would drive the market towards the equilibrium?

If price were above equilibrium (say \$8), quantity supplied (110) would exceed quantity demanded (53), creating a surplus. Sellers would compete by lowering prices, increasing quantity demanded while decreasing quantity supplied, moving toward equilibrium.

(c) If the actual price in this market were below the equilibrium price, what would drive the market towards the equilibrium?

If price were below equilibrium (say \$5), quantity demanded (104) would exceed quantity supplied (53), creating a shortage. Buyers would compete by offering higher prices, decreasing quantity demanded while increasing quantity supplied, moving toward equilibrium.

3. Elasticity and Surplus Concepts

(a) Elasticity Concepts

Elasticity measures responsiveness of one variable to changes in another.

Income Elasticity: Measures how quantity demanded changes with income.

$$E_y = \frac{\% \Delta Q_d}{\% \Delta \text{Income}}$$

Example: Luxury cars have high income elasticity (> 1), while rice has low (< 1).

Cross-Price Elasticity: Measures how demand for good X changes with price of good Y.

$$E_c = \frac{\% \Delta Q_{dX}}{\% \Delta P_Y}$$

Example: Tea and coffee have positive cross-elasticity (substitutes), while cars and petrol have negative (complements).

(b) Producer and Consumer Surplus

Consumer surplus is the difference between what consumers are willing to pay and what they actually pay. Producer surplus is the difference between the market price and the minimum price producers are willing to accept.

(c) Melissa's iPhone Purchase

(i) Willingness to Pay

$$\text{WTP} = \text{Price Paid} + \text{Consumer Surplus} = \$240 + \$160 = \$400$$

(ii) Consumer Surplus at \$180

$$CS = WTP - \text{Price} = \$400 - \$180 = \$220$$

(iii) Consumer Surplus at \$500 Since \$500 $>$ WTP (\$400), Melissa wouldn't buy.
CS = \$0

4. Market Interventions

(a) Price Ceiling and Floor Effects

Price Ceiling (max legal price below equilibrium):

- Creates shortages ($Q_d > Q_s$)
- Example: Rent control leads to housing shortages
- May lead to black markets

Price Floor (min legal price above equilibrium):

- Creates surpluses ($Q_s > Q_d$)
- Example: Minimum wage may cause unemployment
- Government may need to buy surplus

(b) Tax Incidence

Tax burden division depends on relative elasticities:

- More inelastic side bears more burden
- If demand is more elastic than supply, producers bear more burden
- If supply is more elastic, consumers bear more

(c) Tariffs and Effects

A tariff is a tax on imports:

- Increases domestic price
- Domestic producers gain, consumers lose
- Government gains revenue
- Creates deadweight loss from reduced trade
- May lead to trade wars

5. Indifference Curve Analysis

(a) Indifference Curve Definition and Properties

An indifference curve shows combinations of goods giving equal satisfaction.

Properties:

1. Downward sloping (more of one good requires less of another)
2. Convex to origin (diminishing MRS)
3. Higher curves represent higher utility
4. Cannot intersect

(b) Perfect Substitutes and Complements

Perfect Substitutes: Straight line indifference curves (constant MRS), e.g., \$1 and \$5 bills.

Perfect Complements: L-shaped curves, goods consumed in fixed proportions, e.g., left and right shoes.

(c) Work-Leisure Trade-off

The work-leisure trade-off analyzes how individuals allocate time between labor (income) and leisure. The budget constraint shows possible combinations given the wage rate, while indifference curves represent preferences. The optimal choice occurs where the marginal rate of substitution between leisure and income equals the wage rate.

6. Public Goods and Market Failure

(a) Public Goods vs Common Resources

Public Goods: Non-rivalrous and non-excludable (national defense)

Common Resources: Rivalrous but non-excludable (fish stocks)

Education isn't pure public good because:

- It's excludable (can charge tuition)
- Some rivalry (crowded classrooms reduce quality)

(b) Public Goods and Market Failure

Public goods lead to underprovision because:

- Free rider problem (users won't pay)
- No profit incentive for private firms
- Example: Private markets underprovide lighthouses

(c) Free Rider Problem

Individuals benefit without paying, hoping others will bear the cost. This leads to underprovision of public goods. Example: People may not contribute to public TV, hoping others will fund it.

7. Externalities and Solutions

Positive and Negative Externalities

Positive Externality: Social benefit $>$ private benefit (e.g., education)

Negative Externality: Social cost $>$ private cost (e.g., pollution)

Coase Theorem

If property rights are clearly defined, transaction costs are low, and parties can bargain, they can reach efficient solutions to externalities regardless of initial rights allocation. Example: Factory and residents can negotiate pollution levels.

Pollution Permits vs Taxes

Pollution Permits:

- Set quantity, let price vary
- Certainty about pollution level
- Creates market for permits

Corrective Taxes:

- Set price, let quantity vary
- Certainty about cost
- Revenue for government

Permits may be better when strict pollution limits are needed (e.g., carbon budgets), while taxes work better when costs need predictability.

8. Short Notes

Game Theory Concepts

Strategies: Possible actions players can take

Payoff: Outcomes/benefits from strategy combinations

Rationality: Players choose strategies to maximize their payoffs

Example: Prisoner's dilemma shows rational choices leading to suboptimal outcomes.

Giffen Goods

Giffen goods violate the law of demand - demand increases when price rises. This occurs with inferior goods where the income effect outweighs the substitution effect. Example: During famine, as rice price rises, poor consumers may buy more rice because they can't afford meat.

Market Efficiency

In competitive markets without externalities, the equilibrium quantity maximizes total surplus (consumer + producer surplus). This is because:

- All mutually beneficial trades occur
- No deadweight loss
- Marginal benefit equals marginal cost

However, this assumes perfect competition and no market failures.