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Study Manual for CB2 Business Economics Exam

1st Edition

Lucas Goldberg Da Rosa, PhD



An IFoA & IAI Exam



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Preface

Economics is fundamentally about choices. Individuals, businesses, and governments constantly face decisions involving limited resources, competing objectives, and uncertain outcomes. Understanding how these decisions are made, and how they interact, is at the heart of economic reasoning. For future actuaries, this perspective is particularly valuable, as economic conditions influence financial decisions, risk assessment, and the broader environment in which businesses operate.

The CB2 Business Economics examination introduces students to the fundamental principles of microeconomics and macroeconomics. From understanding how markets function and how consumers and firms make decisions to examining inflation, unemployment, interest rates, and economic policy, the subject provides a foundation for interpreting economic events and their consequences.

This manual was developed to make these topics more accessible and to provide a structured, exam-focused approach to studying the CB2 syllabus. Based on the required reading, Economics (11th Edition) by John Sloman, Dean Garratt and Jon Guest, it brings together key concepts, definitions, diagrams, and economic relationships, with an emphasis on understanding the reasoning behind them rather than simply memorising information.

Throughout my experience teaching economics, I have found that understanding the intuition behind a concept is essential. My main recommendation is to approach the subject with curiosity and always ask why. Why does a change in price affect demand? Why might a central bank raise interest rates? Why can a government intervention improve an economic outcome in some circumstances but make it worse in others? Being able to explain these relationships in your own words is an important step towards mastering the material.

I encourage students to use this manual actively. Begin each chapter by reviewing its learning objectives, work through the concepts and diagrams carefully, and use the unit summaries to consolidate your understanding. The revision and exam-style questions provide opportunities to test your knowledge and practise applying economic reasoning. Whenever possible, attempt the questions independently before consulting the worked solutions.

As you approach the examination, make use of the additional resources included in this manual, particularly the guidance on answering questions, the core diagrams, key formulae, and mock examinations. Practising under timed conditions and reviewing your mistakes can help identify areas that require further attention.

Finally, remember that economics is not simply about finding the correct answer. It is also about recognising assumptions, evaluating different perspectives, and understanding the trade-offs involved in economic decisions. Developing these skills will serve you well beyond the CB2 examination.

The manual emphasises:

- core economic intuition
- diagram interpretation
- policy analysis
- exam-style explanation

Students are encouraged to practise writing clear economic arguments rather than simply memorising definitions.

Know Your Author

Lucas Goldberg Da Rosa, PhD, MA, is an economist and business analyst with a strong background in quantitative research, financial analysis, forecasting, and data-driven decision-making. He holds a Ph.D. and a Masters degree in Economics from Kansas State University, as well as a Bachelors degree in Economics with a minor in Statistics.

Dr. Goldberg Da Rosa has an extensive academic background in teaching and research. He has taught courses in Money and Banking, Macroeconomics, Microeconomics, and has conducted research in areas including macroeconomic forecasting, international education, and applied quantitative analysis. His combination of economics, statistics, technology, and business experience enables him to translate complex data into clear insights and practical recommendations.

His professional experience includes working in financial planning and analysis at Align Technology, where he applied economic models and data analysis to business forecasting.

As the author of ACTEX Learning's CB2 Business Economics study manual, Dr. Goldberg Da Rosa draws on his academic, teaching, and professional experience to make economic concepts accessible and relevant to actuarial students. His educational approach emphasises economic intuition, clear explanations, and practical applications, helping students develop both a strong conceptual foundation and the analytical skills needed for examinations.

Dr. Goldberg Da Rosa currently works as a Business Analyst at AUTO1 Group in Berlin.

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Chapter 2: Competitive Markets

Chapter Overview

This unit introduces the basic model of a competitive market. It explains how demand and supply determine equilibrium price and quantity, and how changes in market conditions affect that equilibrium. The unit then examines government intervention through price controls, indirect taxes and subsidies. These tools provide the foundation for much of the microeconomic analysis used throughout the CB2 syllabus.

Learning Objectives

- Explain demand, supply and the price mechanism.
- Distinguish between movements along curves and shifts of curves.
- Determine equilibrium price and quantity using demand and supply analysis.
- Analyse the effects of changes in demand and supply on market equilibrium.
- Explain the effects of maximum and minimum prices.
- Calculate and interpret price, income and cross-price elasticities.
- Analyse the impact of indirect taxes and subsidies on price, quantity and welfare.

2.1 Demand

Demand describes the behaviour of consumers in a market. It shows how much of a good or service consumers are willing and able to buy at different prices over a specified period of time.

Definition

Demand is the quantity of a good or service that consumers are willing and able to purchase at a given price over a given period of time.

The phrase "willing and able" is important. A consumer may want a product, but this only becomes effective demand if the consumer has the purchasing power to buy it.

2.1.1 The Law of Demand

In most markets, a higher price leads to a lower quantity demanded, other things being equal. This relationship is known as the law of demand.

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Definition

The **law of demand** states that quantity demanded is inversely related to price, *ceteris paribus*.

There are several reasons why demand curves usually slope downwards. First, as a consumer buys more of a good, the additional satisfaction obtained from each extra unit tends to fall. This is known as diminishing marginal utility. A lower price may therefore be needed to persuade consumers to buy additional units.

Second, a fall in price increases the purchasing power of consumers' income. This is the **income effect**: consumers can afford to buy more of the good than before. Third, when the price of a good falls relative to other goods, consumers may switch towards it and away from substitutes. This is the **substitution effect**.

2.2 The Demand Curve

A demand curve is a diagrammatic representation of the relationship between price and quantity demanded.

Definition

A **demand curve** shows the relationship between the price of a good and the quantity demanded, holding other influences constant.

A change in the price of the good itself causes a movement along the demand curve. For example, if the price falls, there is an extension of demand; if the price rises, there is a contraction of demand.

A change in any non-price determinant of demand shifts the whole demand curve. An increase in demand shifts the curve to the right, meaning that more is demanded at each price. A decrease in demand shifts the curve to the left.

Exam Tip

A change in the good's own price causes a **movement along** the demand curve. A change in any other determinant of demand causes a **shift** of the demand curve.

2.3 Determinants of Demand

Demand depends on more than the price of the good itself. Important determinants include income, tastes and preferences, the prices of related goods, population size, expectations and advertising.

For a normal good, an increase in income increases demand. For an inferior good, an increase in income reduces demand, because consumers switch towards higher-quality alternatives. The price of related goods also matters. If the price of a substitute rises, demand for the original good is likely to increase. If the price of a complement rises, demand for the original good is likely to fall.

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Expectations can also affect present demand. If consumers expect prices to rise in the future, they may bring forward purchases, increasing current demand. Advertising and changes in tastes can also shift demand by changing the perceived benefits of a product.

Worked Example

Suppose the price of train travel rises. Demand for coach travel may increase because coach travel is a substitute. However, demand for snacks sold on trains may fall because these are complementary to train journeys.
This example shows why the effect of a price change in one market may spread to related markets.

2.4 Supply

Supply describes the behaviour of producers. It shows how much of a good or service firms are willing and able to sell at different prices over a specified period of time.

Definition

Supply is the quantity of a good or service that producers are willing and able to sell at a given price over a given period of time.

In most markets, firms are willing to supply more at a higher price. This is because a higher price increases the potential reward from production and may make it profitable to use more costly production methods.

2.4.1 The Law of Supply

Definition

The **law of supply** states that quantity supplied is positively related to price, *ceteris paribus*.

The law of supply reflects two main ideas. First, higher prices create a stronger profit incentive for firms to expand production. Second, as output increases, marginal costs may rise, especially in the short run when some factors of production are fixed. A higher price may therefore be required to cover the cost of producing additional units.

2.5 Determinants of Supply

The supply curve shifts when non-price factors affect firms' willingness or ability to produce. These factors include production costs, technology, indirect taxes, subsidies, the number of firms in the market and expectations about future prices.

A rise in production costs shifts supply to the left because firms are willing to supply less at each price. Examples include higher wages, higher raw material costs and higher energy prices. Technological progress shifts supply to the right because it allows firms to produce more efficiently. Entry of new firms also increases market supply.

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Government policy can directly affect supply. An indirect tax raises firms' costs and shifts supply to the left. A subsidy lowers firms' effective costs and shifts supply to the right.

2.6 Market Equilibrium

A competitive market is in equilibrium when the quantity consumers wish to buy equals the quantity producers wish to sell. At this point, there is no tendency for the market price to change.

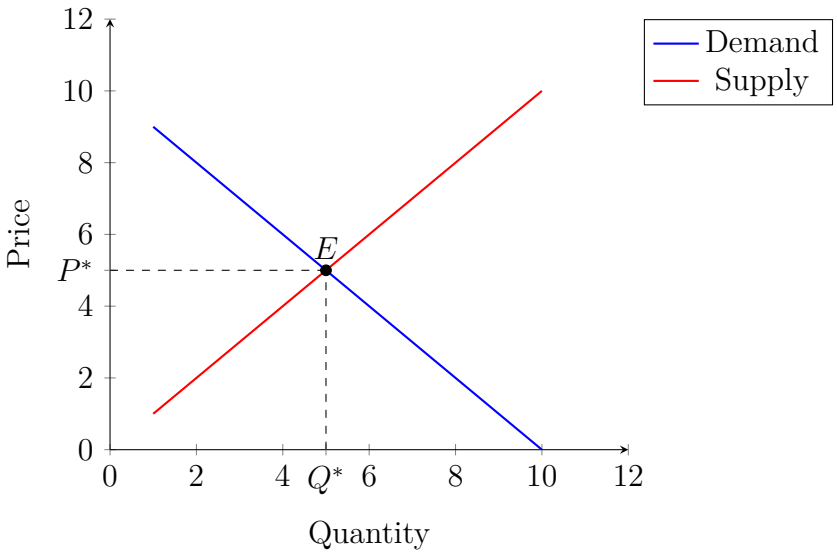


Figure 2.6.1: Market Equilibrium

At equilibrium,

$$Q_d = Q_s.$$

Definition

The **equilibrium price** is the price at which quantity demanded equals quantity supplied.

Definition

The **equilibrium quantity** is the quantity bought and sold at the equilibrium price.

If the market price is above equilibrium, quantity supplied exceeds quantity demanded. This creates excess supply, placing downward pressure on price. If the market price is below equilibrium, quantity demanded exceeds quantity supplied. This creates excess demand, placing upward pressure on price. The price mechanism therefore helps to coordinate the decisions of buyers and sellers.

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2.7 Changes in Equilibrium

Market equilibrium changes when either demand or supply shifts. An increase in demand raises both equilibrium price and equilibrium quantity. A decrease in demand lowers both equilibrium price and equilibrium quantity.

An increase in supply has a different effect. It lowers equilibrium price but raises equilibrium quantity. A decrease in supply raises equilibrium price but lowers equilibrium quantity.

When both curves shift at the same time, the final effect may be ambiguous. For example, if both demand and supply increase, equilibrium quantity will rise, but the effect on price depends on the relative size of the two shifts.

Exam Tip

When analysing a market change, use four steps: identify the curve affected, state the direction of the shift, explain the effect on equilibrium price, and explain the effect on equilibrium quantity.

Worked Example

Suppose demand for electric cars increases because consumers become more concerned about fuel costs. The demand curve shifts to the right. At the original price, there is now excess demand, so price rises. The higher price encourages firms to expand output, and the new equilibrium has both a higher price and a higher quantity.

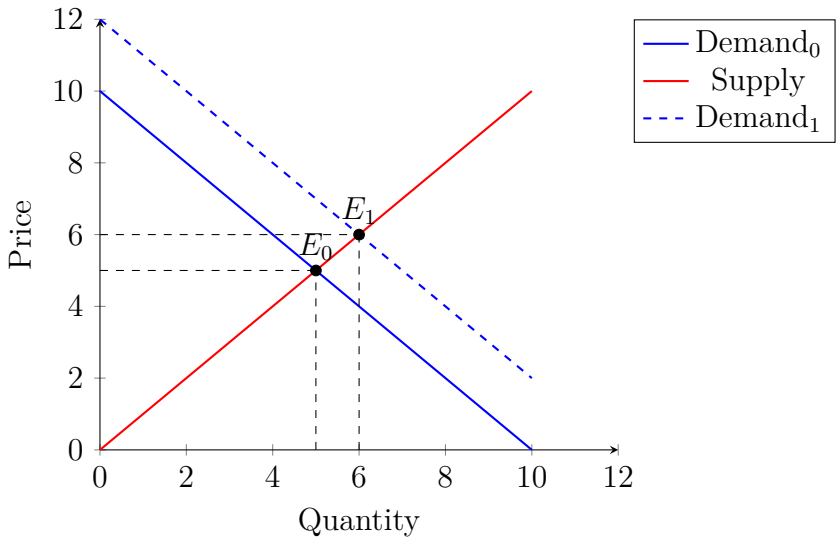


Figure 2.7.1: Demand Increase

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2.8 Price Controls

Governments sometimes prevent markets from reaching their free-market equilibrium price. Price controls are usually introduced because the government regards the free-market outcome as socially or politically unacceptable.

There are two main types of price control: maximum prices and minimum prices.

2.8.1 Maximum Price

A maximum price, or price ceiling, is a legal limit above which the price cannot rise. It is binding only if it is set below the free-market equilibrium price.

When a maximum price is set below equilibrium, quantity demanded exceeds quantity supplied. This creates a shortage. Because price is not allowed to rise to remove the shortage, some other method of allocation is required. This may involve rationing, waiting lists, queues or informal allocation by sellers.

Maximum prices may be intended to make essential goods more affordable. Rent controls are a common example. However, if rents are held below the equilibrium level, landlords may supply fewer rental properties and tenants may demand more, creating excess demand in the rental market.

Exam Tip

A maximum price affects the market only if it is set *below* the equilibrium price. If it is set above equilibrium, it is non-binding.

2.8.2 Minimum Price

A minimum price, or price floor, is a legal limit below which the price cannot fall. It is binding only if it is set above the free-market equilibrium price.

When a minimum price is set above equilibrium, quantity supplied exceeds quantity demanded. This creates a surplus. If the government wants to maintain the minimum price, it may need to purchase the surplus, restrict supply or create additional demand.

Examples include agricultural price supports and minimum wage legislation. In the case of a minimum wage, the price is the wage rate and the quantity is labour. If the minimum wage is set above the equilibrium wage, the quantity of labour supplied may exceed the quantity demanded, creating unemployment in that labour market.

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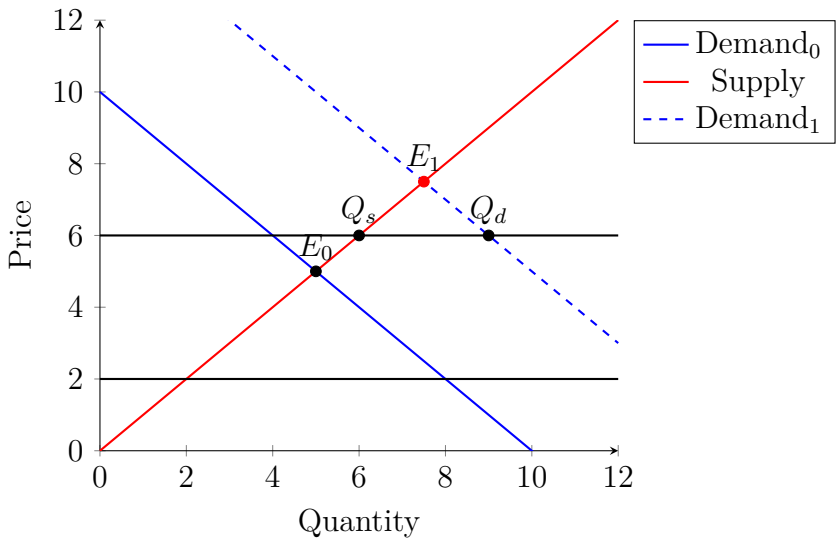


Figure 2.8.1: Price Controls

2.9 Price Elasticity of Demand

Elasticity measures responsiveness. Price elasticity of demand measures how strongly quantity demanded responds to a change in price.

Definition

Price elasticity of demand measures the responsiveness of quantity demanded to a change in the price of the good.

Key Formula

$$\text{PED} = \frac{\%\Delta Q_d}{\%\Delta P}$$

For most goods, PED is negative because price and quantity demanded move in opposite directions. In practice, economists often refer to the absolute value of PED when classifying demand as elastic or inelastic.

Demand is **elastic** if

$$|\text{PED}| > 1.$$

In this case, quantity demanded responds proportionately more than price. Demand is **inelastic** if

$$|\text{PED}| < 1.$$

In this case, quantity demanded responds proportionately less than price.

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The value of PED matters for firms and governments. If demand is elastic, a price rise will reduce total revenue because the fall in quantity demanded is proportionately larger than the increase in price. If demand is inelastic, a price rise will increase total revenue because quantity demanded falls by a smaller proportion than price rises.

Worked Example

Suppose the price of a product rises by 10% and quantity demanded falls by 20%. Then

$$\text{PED} = \frac{-20}{10} = -2.$$

Since $|PED| = 2$, demand is elastic. Quantity demanded is relatively responsive to the change in price.

Exam Tip

When interpreting PED, comment on both the sign and the magnitude. The negative sign shows the inverse relationship between price and quantity demanded; the magnitude shows the degree of responsiveness.

2.10 Other Elasticities

Price elasticity of demand is not the only useful elasticity measure. Economists also use elasticities to measure the responsiveness of supply, the effect of income changes and the relationship between related goods.

2.10.1 Price Elasticity of Supply

Definition

Price elasticity of supply measures the responsiveness of quantity supplied to a change in price.

Key Formula

$$\text{PES} = \frac{\%\Delta Q_s}{\%\Delta P}$$

Supply tends to be more elastic when firms can increase output quickly, when spare capacity exists, and when production inputs are readily available. Supply tends to be less elastic in the short run, especially when production capacity is fixed.

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2.10.2 Income Elasticity of Demand

Definition

Income elasticity of demand measures the responsiveness of quantity demanded to a change in income.

Key Formula

$$\text{YED} = \frac{\%\Delta Q_d}{\%\Delta Y}$$

A normal good has positive income elasticity: demand rises as income rises. An inferior good has negative income elasticity: demand falls as income rises.

2.10.3 Cross-Price Elasticity of Demand

Definition

Cross-price elasticity of demand measures the responsiveness of demand for one good to a change in the price of another good.

Key Formula

$$\text{XED} = \frac{\%\Delta Q_d^A}{\%\Delta P^B}$$

Substitutes have positive cross-price elasticity. If the price of one good rises, demand for the substitute increases. Complements have negative cross-price elasticity. If the price of one good rises, demand for the complementary good falls.

2.11 Indirect Taxes

An indirect tax is a tax on expenditure. It is imposed on goods and services rather than directly on income or profit. Examples include value added tax and excise duties.

An indirect tax raises firms' costs and shifts the supply curve to the left. The effect is to increase the price paid by consumers, reduce the price received by producers after tax, and reduce the quantity traded.

For a specific tax, the tax is a fixed amount per unit sold. This creates a fixed wedge between the price paid by consumers and the price received by producers.

Key Formula

$$\text{Specific tax:} \quad P_c - P_p = t$$

For an ad valorem tax, the tax is charged as a percentage of the price.

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Key Formula

Ad valorem tax: $P_c = P_p(1+t)$

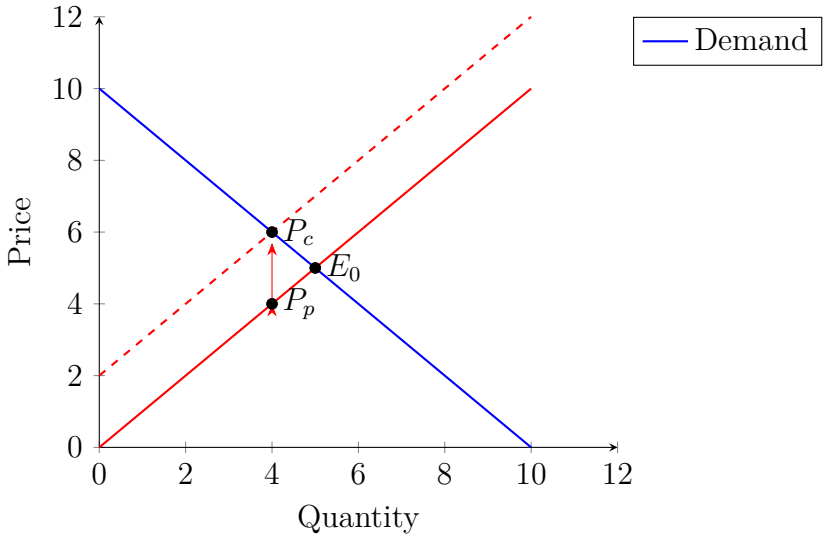


Figure 2.11.1: Indirect Tax

The total tax revenue collected by the government is equal to the tax per unit multiplied by the quantity sold after the tax. However, because the tax raises price and reduces quantity, it may also create a welfare loss. This is explored more fully in later units.

Exam Tip

In a tax diagram, distinguish carefully between the price paid by consumers, P_c, and the price received by producers, P_p. The vertical distance between them is the tax per unit.

2.12 Tax Incidence

The incidence of a tax refers to who bears the economic burden of the tax. This is not necessarily the same as who legally pays the tax to the government.

Definition

Tax incidence describes the distribution of the economic burden of a tax between buyers and sellers.

Tax incidence depends on the relative elasticities of demand and supply. If demand is relatively inelastic, consumers bear a larger share of the tax because quantity demanded does not fall much when price rises. If demand is relatively elastic, producers bear more of the burden because consumers are more responsive to price increases.

Similarly, if supply is relatively inelastic, producers bear more of the burden. If supply is relatively elastic, consumers bear more of the burden.

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Worked Example

Taxes on products such as petrol or cigarettes are often largely passed on to consumers because demand tends to be relatively inelastic. Consumers may reduce consumption only slightly when price rises, allowing firms to pass on much of the tax in the form of higher prices.

2.13 Subsidies

A subsidy is a payment by the government that reduces firms' production costs or encourages consumption of a particular good. A subsidy to producers shifts the supply curve to the right, reducing the price paid by consumers and increasing the equilibrium quantity.

Subsidies may be used to encourage the consumption of goods with wider social benefits, such as education, public transport or renewable energy. However, subsidies require government expenditure and may create inefficiency if they encourage overproduction or support firms that would otherwise be uncompetitive.

Definition

A **subsidy** is a payment by the government to producers or consumers that lowers the effective cost of producing or consuming a good.

The effect of a subsidy is the opposite of an indirect tax: price paid by consumers falls, quantity traded rises, and producers receive a higher effective price than consumers pay.

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Unit Summary

- Demand shows the quantity consumers are willing and able to buy at different prices.
- Supply shows the quantity producers are willing and able to sell at different prices.
- A change in the good's own price causes a movement along a demand or supply curve.
- A change in any non-price determinant causes the relevant curve to shift.
- Market equilibrium occurs where quantity demanded equals quantity supplied.
- A maximum price set below equilibrium creates excess demand.
- A minimum price set above equilibrium creates excess supply.
- Price elasticity of demand measures the responsiveness of quantity demanded to price.
- Indirect taxes shift supply to the left and create a wedge between consumer and producer prices.
- The burden of a tax depends on the relative elasticities of demand and supply.
- Subsidies shift supply to the right, reducing price and increasing quantity traded.

Revision Questions

1. [Easy] State the law of demand.
2. [Easy] Define equilibrium price.
3. [Easy] Explain the difference between a movement along a demand curve and a shift of the demand curve.
4. [Medium] Explain why demand curves usually slope downwards.
5. [Medium] Explain how an increase in production costs affects market equilibrium.
6. [Medium] Calculate PED if price rises by 5% and quantity demanded falls by 15%.
7. [Medium] Explain the effect of an indirect tax on equilibrium price and quantity.
8. [Hard] Analyse the effect of a maximum price set below the equilibrium price.
9. [Hard] Explain how elasticity affects the incidence of an indirect tax.

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Exam-Style Questions

1. [Medium] Using a demand and supply diagram, explain the effect of an increase in demand on equilibrium price and quantity.
2. [Medium] Explain the likely effect of an indirect tax on a competitive market. In your answer, distinguish between the price paid by consumers and the price received by producers.
3. [Medium] Explain how the price elasticity of demand affects a firm's total revenue following a price increase.
4. [Hard] Discuss the impact of a minimum price set above equilibrium in a competitive market.
5. [Hard] A government is considering subsidising public transport. Discuss the likely economic effects of this policy.

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Chapter 3: Consumer Demand

Chapter Overview

This unit develops the economic theory of consumer behaviour. It begins with the concept of utility and explains how consumers allocate limited income between competing goods. It then shows how the demand curve can be derived from utility maximisation. The unit also considers decision-making under risk and uncertainty, which is especially important in actuarial work, before introducing behavioural economics and the limits of the traditional rational consumer model.

Learning Objectives

- Explain the meaning of utility, total utility and marginal utility.
- Apply the law of diminishing marginal utility to consumer choice.
- Use the equi-marginal principle to explain consumer equilibrium.
- Explain how a downward-sloping demand curve can be derived from utility theory.
- Analyse indifference curves and budget lines.
- Define and interpret consumer surplus.
- Analyse consumer decision-making under risk and uncertainty.
- Explain how behavioural economics modifies the traditional rational choice model.

3.1 Utility

The theory of consumer demand begins with the idea that consumers obtain satisfaction from consuming goods and services. Economists call this satisfaction **utility**. Although utility cannot usually be measured directly, it is a useful concept for explaining how consumers make choices.

Definition

Utility is the satisfaction or benefit gained from consuming a good or service.

Traditional consumer theory assumes that consumers behave rationally. This means that, given their preferences, income and the prices of goods, they attempt to choose the combination of goods that gives them the greatest possible total utility. This does not mean that consumers always make perfect decisions in practice. Rather, it provides a simple benchmark model from which demand behaviour can be analysed.

A key implication is that consumer choice is constrained. Consumers may want many goods and services, but their income is limited. The economic problem for the consumer is therefore to allocate a limited budget in a way that maximises satisfaction.

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3.2 Total and Marginal Utility

Utility can be analysed using two related concepts: total utility and marginal utility.

Definition

Total utility is the total satisfaction obtained from consuming a given quantity of a good or service.

Definition

Marginal utility is the additional utility gained from consuming one more unit of a good or service.

Key Formula

$$MU = \frac{\Delta TU}{\Delta Q}$$

Total utility usually rises as more of a good is consumed, at least over the relevant range. However, the additional satisfaction from each extra unit may decline. For example, the first glass of water consumed when thirsty may provide high marginal utility, while the fourth or fifth glass may add much less satisfaction.

Marginal utility is important because rational consumers make decisions at the margin. They consider whether the additional benefit from consuming one more unit is worth the additional cost.

3.3 The Law of Diminishing Marginal Utility

One of the central assumptions of marginal utility theory is that marginal utility tends to fall as consumption increases.

Definition

The **law of diminishing marginal utility** states that, as more units of a good are consumed, the additional utility obtained from each extra unit eventually falls, holding other factors constant.

This principle helps explain why consumers diversify their spending across many goods. If a consumer spent all income on one good, the marginal utility from further units of that good would eventually become low relative to the marginal utility available from other goods.

Diminishing marginal utility also helps explain the downward slope of the demand curve. As more of a good is consumed, the marginal benefit of additional units falls. Consumers will therefore usually be willing to buy extra units only if the price falls.

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Exam Tip

When using diminishing marginal utility to explain demand, link the idea clearly to willingness to pay. Consumers are willing to pay less for additional units because the extra satisfaction from those units declines.

3.4 Consumer Equilibrium

A consumer with a limited budget must decide how to allocate spending between goods. The rational consumer will not simply buy the good with the highest marginal utility. Instead, the consumer compares the marginal utility gained per pound spent.

Consumer equilibrium occurs when the marginal utility per pound is equal across all goods purchased. If this condition is not met, the consumer can increase total utility by reallocating spending.

Definition

Consumer equilibrium occurs when a consumer has allocated income so that the marginal utility per unit of money spent is equal across goods.

Key Formula

$$\frac{MU_A}{P_A} = \frac{MU_B}{P_B}$$

This condition is known as the **equi-marginal principle**. It states that total utility is maximised when the consumer cannot increase utility by transferring spending from one good to another.

If

$$\frac{MU_A}{P_A} > \frac{MU_B}{P_B},$$

then the consumer gains more extra utility per pound from good A than from good B. The consumer should therefore buy more of good A and less of good B. As more of good A is consumed, its marginal utility falls; as less of good B is consumed, its marginal utility rises. This adjustment continues until marginal utility per pound is equalised.

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Worked Example

Suppose a consumer is choosing between coffee and sandwiches. A cup of coffee costs £2 and gives marginal utility of 20 units. A sandwich costs £4 and gives marginal utility of 24 units.

$$\frac{MU_{\text{coffee}}}{P_{\text{coffee}}} = \frac{20}{2} = 10$$

$$\frac{MU_{\text{sandwich}}}{P_{\text{sandwich}}} = \frac{24}{4} = 6$$

The consumer receives more marginal utility per pound from coffee. To increase total utility, the consumer should buy more coffee and fewer sandwiches, assuming the current pattern of spending can be adjusted.

Exam Tip

In exam answers, do not simply write the equi-marginal formula. Explain the intuition: consumers shift spending towards the good that gives the highest marginal utility per pound until no further gain from reallocation is possible.

3.5 Indifference Analysis

The marginal utility approach provides one way of analysing consumer choice, but it appears to require utility to be measured. An alternative is **indifference analysis**. This does not require the consumer to attach a numerical value to utility. Instead, it assumes that the consumer can rank different combinations of goods according to preference.

Indifference analysis combines two elements. **Indifference curves** represent the consumer's preferences, while the **budget line** represents the combinations of goods that the consumer can afford.

3.5.1 Indifference Curves

Definition

An **indifference curve** shows all combinations of two goods that give a consumer the same level of satisfaction or utility. The consumer is therefore indifferent between all combinations lying on the same curve.

Suppose the consumer chooses between goods X and Y. If the consumer moves along an indifference curve and consumes more of X, some quantity of Y must normally be given up to keep total satisfaction unchanged. For this reason, indifference curves generally slope downwards.

An **indifference map** consists of several indifference curves. Curves further from the origin represent higher levels of utility, assuming that more of each good is preferred to less. Indifference curves cannot cross, since this would imply inconsistent rankings of the same combinations of goods.

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