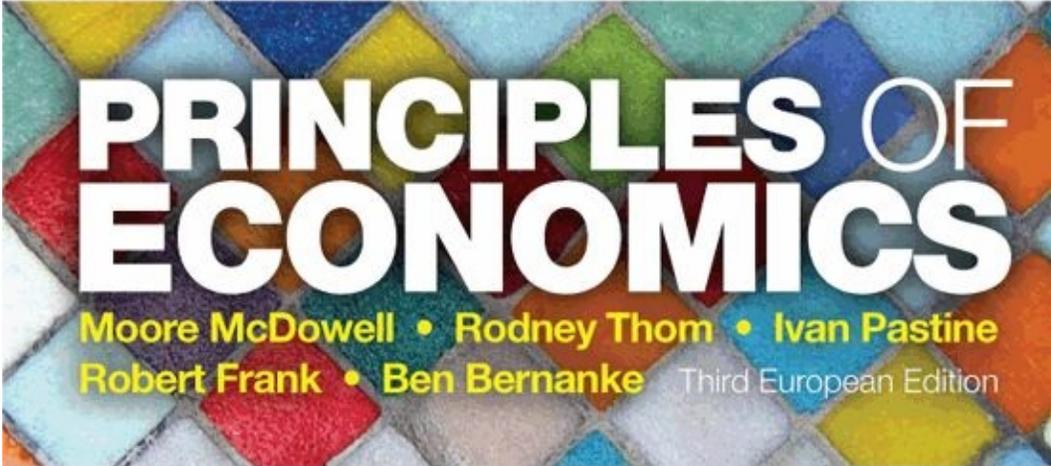


PRINCIPLES OF ECONOMICS

Moore McDowell • Rodney Thom • Ivan Pastine
Robert Frank • Ben Bernanke Third European Edition



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DEDICATION

For Nuala – MMcD

For Susan – RT

For Tuvana – IP

Brief Table of Contents

[Preface](#)

[Guided Tour](#)

[Online Resources](#)

[Connect](#)

[Acknowledgements](#)

PART 1 Introduction

- [1 Thinking Like an Economist](#)
- [2 Markets, Specialisation and Economic Efficiency](#)
- [3 Markets, Supply, Demand and Elasticity](#)

PART 2 Competition and the ‘Invisible Hand’

- [4 Demand: the Benefit Side of the Market](#)
- [5 Perfectly Competitive Supply: the Cost Side of the Market](#)
- [6 Efficiency and Exchange](#)
- [7 Profits, Entry and Exit: the Basis for the ‘Invisible Hand’](#)

PART 3 Market Imperfections (1): Market Power

- [8 Imperfect Competition and the Consequences of Market Power](#)
- [9 Thinking Strategically \(1\): Interdependence, Decision Making and the Theory of Games](#)
- [10 Thinking Strategically \(2\): Competition Among the Few](#)

PART 4 Market Imperfections (2): Externalities, Information, Distribution and the Role of the Government in a Market Economy

- [11 Externalities and Property Rights](#)
- [12 The Economics of Information](#)
- [13 Labour Markets, Income Distribution, Wealth and Poverty](#)
- [14 Government in the Market Economy: Public Sector Production and Regulation](#)
- [15 The Credit Crunch and the Great Contraction: An Application of some Microeconomics to Help Explain a Macroeconomic Crisis](#)

PART 5 Macroeconomics: Issues and Data

- [16 Macroeconomics: the Bird’s-Eye View of the Economy](#)
- [17 Measuring Economic Activity: Gross Domestic Product](#)
- [18 Measuring the Price Level and Inflation](#)
- [19 The Labour Market: Wages and Unemployment](#)

PART 6 The Economy in the Long Run

20 Economic Growth, Productivity and Living Standards

21 Capital Markets: Saving, Investment and Financial Intermediaries

PART 7 The Economy in the Short Run

22 Short-Term Economic Fluctuations

23 Money and Interest Rates

24 The IS-LM Model

25 Stabilising the Economy (1): the Role of Fiscal Policy

26 Stabilising the Economy (2): the Role of Monetary Policy

27 Aggregate Demand, Aggregate Supply and Inflation

28 The New Keynesian Phillips Curve: Expectations and Inflation Policy

PART 8 The International Economy

29 Exchange Rates, Capital Flows and the Balance of Payments

Index

Detailed Table of Contents

[Preface](#)

[Guided Tour](#)

[Online Resources](#)

[Connect](#)

[Acknowledgements](#)

Part 1 Introduction

1 Thinking Like an Economist

[Economics: studying choice in a world of scarcity](#)

[Applying the Cost–Benefit Principle](#)

[Economic surplus](#)

[Opportunity cost](#)

[The role of economic models](#)

[RECAP Cost–benefit analysis](#)

[Four important decision pitfalls](#)

[Pitfall 1: measuring costs and benefits as proportions rather than absolute money amounts](#)

[Pitfall 2: ignoring opportunity costs](#)

[Pitfall 3: failure to ignore sunk costs](#)

[Pitfall 4: failure to understand the average–marginal distinction](#)

[RECAP Four important decision pitfalls](#)

[Economics: micro and macro](#)

[The approach of this text](#)

[Economic naturalism](#)

[**Economic Naturalist 1.1** Adobe supplies its Acrobat Reader software to anyone free of charge from the internet. Why is this?](#)

[**Economic Naturalist 1.2** Why can you not buy a Jaguar without air-conditioning?](#)

[**Economic Naturalist 1.3** Why do the keypad buttons on drive-in automatic teller machines \(ATMs\) have Braille dots?](#)

[A cautionary note: economists and economics](#)

[Summary](#)

[Review questions](#)

[Problems](#)

[References](#)

Appendix A

[Working with equations, graphs and tables](#)

[Using a verbal description to construct an equation](#)

Graphing the equation of a straight line

Deriving the equation of a straight line from its graph

Changes in the vertical intercept and slope

Constructing equations and graphs from tables

Appendix B

Elements of calculus for use in economics

Dealing with the problem

How do we deal with this?

The solutions: use calculus – differentiating

2 Markets, Specialisation and Economic Efficiency

Exchange and opportunity cost

The principle of comparative advantage

Economic Naturalist 2.1 What has happened to football (soccer)? They just don't seem to be able to score goals like they used to!

Sources of comparative advantage

Economic Naturalist 2.2 How is India's education focus reflected in its trade?

RECAP Exchange and opportunity cost

Comparative advantage and production possibilities

The production possibilities curve

How individual productivity affects the slope and position of the PPC

The gains from specialisation

A PPF for a many-person economy

RECAP Comparative advantage and production possibilities

Factors that shift the economy's PPF

Why have some countries been slow to specialise?

Can we have too much specialisation?

Economic Naturalist 2.3 How did branding restore Switzerland's watch-making industry?

Comparative advantage and the gains from international trade

Economic Naturalist 2.4 If trade between nations is so beneficial, why did the WTO talks collapse so spectacularly in 2003?

RECAP Comparative advantage and international trade

Summary

Review questions

Problems

References

3 Markets, Supply, Demand and Elasticity

Buyers and sellers in markets

The demand curve

The supply curve

RECAP Demand and supply curves

Market equilibrium

Economic Naturalist 3.1 Why does an increase in demand or an interruption of supply cause few or no problems in the market for cornflakes, but can lead to a virtual collapse in the market for electricity?

Rent controls reconsidered

Pizza price controls?

RECAP Market equilibrium

Predicting and explaining changes in prices and quantities

Shifts in demand

Economic Naturalist 3.2 Why does public investment in improving school performance generally end up being enjoyed by the better off?

Shifts in the supply curve

Four simple rules

RECAP Factors that shift supply and demand

Economic Naturalist 3.3 Why do the prices of some goods (such as airline tickets from Europe to the United States) go up during the summer, while others (such as the price of strawberries) go down? And what about supermarket prices for wine, beer and spirits at Christmas?

Measuring the impact of price changes on supply and demand: elasticity

Price elasticity of demand

RECAP Factors that influence price elasticity

Some representative elasticity estimates

Using price elasticity of demand

A graphical interpretation of price elasticity

Price elasticity changes along a straight-line demand curve

Two special cases

The midpoint formula

Maths Box 3.1

RECAP Calculating price elasticity of demand

Elasticity and total expenditure

Income elasticity and cross-price elasticity of demand

RECAP Cross-price and income elasticities

The price elasticity of supply

Economic Naturalist 3.4 Why might we be concerned that lower food prices could result in a rise in inflation?

Economic Naturalist 3.5 Do economists always get it right where elasticity is concerned?

What markets deliver 1: Markets and social welfare

Cash on the table

Smart for one, dumb for all

RECAP Markets and social welfare

What markets deliver 2: Central planning versus the market

Summary

Supply and demand

Elasticity

Review questions

Problems

References

PART 2 Competition and the 'Invisible Hand'

4 Demand: the Benefit Side of the Market

The law of demand

The origins of demand

Needs versus wants

Economic Naturalist 4.1 What happens when people do not have to pay for the water they use?

Translating wants into demand

Measuring wants: the concept of utility

Allocating a fixed income between two goods

The rational spending rule

Income and substitution effects revisited

RECAP Translating wants into demand

Applying the rational spending rule

Substitution at work

Economic Naturalist 4.2 Why do the people with the highest incomes in the wealthy countries today live in houses or apartments that are small fractions of the size of the accommodation of their equivalents before the First World War?

Economic Naturalist 4.3 Do Irish drivers care more about stopping climate change than other Europeans?

The importance of income differences

Economic Naturalist 4.4 Why can you get a Big Mac on demand in Paris, but usually have to book a table a week in advance at the Tour d'Argent, a restaurant said to be the *ne plus ultra* in gourmet cuisine in Paris?

RECAP Applying the rational spending rule

Indifference curve analysis and the demand curve

The model

Income effects

Substitution effects

Economic Naturalist 4.5 Lipstick is an inferior good?

Giffen goods

Economic Naturalist 4.6 Can demand curves slope upwards?

RECAP Indifference curve analysis of rational choice

Individual and market demand curves

Horizontal addition

Demand and consumer surplus

Calculating economic surplus

Summary

Review questions

Problems

5 Perfectly Competitive Supply: the Cost Side of the Market

Thinking about supply: the importance of opportunity cost

Production in the short run

Some important cost concepts

Maths Box 5.1 Why a marginal cost curve must cut an average cost curve at its lowest point: a mathematical proof

Input prices, production capacity and the firm's cost of supply

The 'law' of supply

Determinants of supply revisited

Technology

Input prices

The number of suppliers

Expectations

Changes in prices of other products

Revenues from sales: profit-maximising firms in competitive markets

Profit maximisation

The demand curve facing a perfectly competitive firm

Using costs and revenues to determine how profits are maximised

Choosing output to maximise profit

A note on the firm's shutdown condition

Average variable cost and average total cost

Economic Naturalist 5.1 Loss-making airlines: is bankruptcy good for you?

Graphical analysis of the maximum-profit condition

Maths Box 5.2 The mathematics of profit maximisation under perfect competition

RECAP Determinants of supply

Applying the theory of supply

Economic Naturalist 5.2 Are the laws of supply and demand suspended in

California where litter is concerned?

Supply and producer surplus

Calculating producer surplus

Summary

Review questions

Problems

6 Efficiency and Exchange

Market equilibrium and efficiency

Efficiency is not the only goal

Why efficiency should be the first goal

RECAP Equilibrium and efficiency

The cost of preventing price adjustments

Price ceilings

Price subsidies

Economic Naturalist 6.1 How does one of the world's poorest countries impoverish itself by subsidising fuel oil prices?

First-come, first-served policies

Economic Naturalist 6.2 How consumer protection damages markets: the EU Commission and overbooked flights

RECAP The cost of blocking price adjustments

Marginal cost pricing of public services

RECAP Marginal cost pricing of public services

Who pays a tax imposed on sellers of a good?

How a tax collected from a seller affects economic surplus

Taxes, elasticity and efficiency

Taxes, external costs and efficiency

RECAP Taxes and efficiency

Summary

Review questions

Problems

7 Profits, Entry and Exit: the Basis for the 'Invisible Hand'

The central role of economic profit

Three types of profit

RECAP The central role of economic profit

The 'invisible hand' theory

Two functions of price

Responses to profits and losses

The importance of free entry and exit

Economic Naturalist 7.1 What happens when you forget about maximising profits?

The importance of public policy on exit: the 'globalisation' question

RECAP The 'invisible hand' theory

[Economic rent versus economic profit](#)

[RECAP Economic rent versus economic profit](#)

[The 'invisible hand' in action](#)

[The 'invisible hand' and cost-saving innovations](#)

[The 'invisible hand' in regulated markets](#)

[**Economic Naturalist 7.2** The value and cost of restricting entry](#)

[**Economic Naturalist 7.3** Should British Airports Authority \(which own London Heathrow, Gatwick and Stansted\) be obliged to lower its landing charges?](#)

[The 'invisible hand' in anti-poverty programmes](#)

[The 'invisible hand' in the stock market](#)

[**Maths Box 7.1** A technical digression: how to calculate present values of future costs and benefits](#)

[The efficient markets hypothesis](#)

[**Economic Naturalist 7.4** Pension funds hold reviews on a regular basis of the performance of the fund management firms they retain to invest their clients' money. Does this make sense?](#)

[RECAP The 'invisible hand' in action](#)

[The distinction between an equilibrium and a social optimum](#)

[Smart for one, dumb for all](#)

[RECAP Equilibrium versus social optimum](#)

[Summary](#)

[Review questions](#)

[Problems](#)

[References](#)

Part 3 Market Imperfections (1): Market Power

8 Imperfect Competition and the Consequences of Market Power

[Imperfect competition](#)

[Different forms of imperfect competition](#)

[The essential difference between perfectly and imperfectly competitive firms](#)

[RECAP Imperfect competition](#)

[Five sources of market power](#)

[Exclusive control over important inputs](#)

[Patents and copyrights](#)

[Government licences or franchises](#)

[Economies of scale \(natural monopolies\)](#)

[Network economies](#)

[RECAP Five sources of market power](#)

[Economies of scale and the importance of fixed costs](#)

[**Economic Naturalist 8.1** Why do some industry experts believe Intel's](#)

dominance of the chip market is bound to be eroded?

RECAP Economies of scale and the importance of fixed costs

Profit-maximisation for the monopolist

Marginal revenue for the monopolist

The monopolist's profit-maximising decision rule

Being a monopolist does not guarantee an economic profit

Maths Box 8.1 Marginal revenue, marginal cost and profit maximisation when a firm has market power: the mathematical approach

RECAP Profit-maximisation for the monopolist

Why the 'invisible hand' breaks down under monopoly

Economic Naturalist 8.2 Can profit-hungry firms with market power overcome the social-inefficiency problem?

RECAP Why the monopolist produces 'too little' output

Measuring market power

Contestability

Price discrimination

How price discrimination affects output

Economic Naturalist 8.3 Economies of scale have led to the concentration of production of cars into a small number of very large producers. Why, then, do they continue to produce so many different marques?

The hurdle method of price discrimination

Is price discrimination a bad thing?

Examples of price discrimination

Economic Naturalist 8.4 If price discrimination can improve economic efficiency and consumer welfare, why does European competition policy (sometimes) punish it?

RECAP Using discounts to expand the market

Public policy towards monopolies

State ownership and management

State regulation of private monopolies

Exclusive contracting for natural monopoly

Natural monopoly: do nothing?

Sorting out monopoly power: anti-trust regulation

RECAP Public policy towards monopoly

Summary

Review questions

Problems

References

9 Thinking Strategically (1): Interdependence, Decision Making and the Theory of Games

Economic Naturalist 9.1 Why did Warner have to pay Tony Bennett \$200,000 to sing a song in a film when he probably would have been happy to do it for \$15,000?

The theory of games

The three elements of a game

Nash equilibrium

RECAP The theory of games

The prisoner's dilemma

The original prisoner's dilemma

Prisoner's dilemmas in everyday life

Economic Naturalist 9.2 Why do people at rugby games stand up on one side in all-seater stadiums and obscure each other's view at critical moments in the game, while soccer fans seem to remain seated when a score is imminent?

Tit-for-tat and the repeated prisoner's dilemma

RECAP The prisoner's dilemma

Games in which timing matters

The ultimatum bargaining game

Credible threats and promises

Commitment problems

Economic Naturalist 9.3 The IMF arrives in town: a loss of independence, or just dealing with a commitment problem?

RECAP Games in which timing matters

The strategic role of preferences

Are people fundamentally selfish?

The Falklands war: another explanation

Preferences as solutions to commitment problems

RECAP The strategic role of preferences

Summary

Review questions

Problems

References

10 Thinking Strategically (2): Competition Among the Few

Competition among the few: interdependence and firm behaviour

Prisoner's dilemmas confronting imperfectly competitive firms

Why are cartel agreements notoriously unstable?

Economic Naturalist 10.1 So how do cartels actually survive?

Economic Naturalist 10.2 How can lenient regulatory treatment of cartel activity member reduce cartel strength?

Tit-for-tat and the cartel stability problem

Stability-enhancing arrangements

Economic Naturalist 10.3 Why did South African milk producers get into hot water by selling milk to each other?

RECAP

Timing and commitment problems in oligopolistic markets

Applying the tools of game theory

Credible threats

RECAP

Games, timing, beliefs and behaviour: oligopolistic markets

The oligopolist's 'reaction function'

Models of oligopoly

The Cournot model

Economic Naturalist 10.4 Is bottled water different from other goods? Or is it just that France is different?

RECAP

The Bertrand model

Repeated games

Economic Naturalist 10.5 Why was Statoil forced to abandon a rebate scheme that would have helped petrol retailers cut their prices?

RECAP

When do price wars break out, and how do they end?

Summary

Review questions

Problems

References

Appendix

Cournot and Bertrand models

Bertrand market (with product differentiation): *each firm selects a price*

Part 4 Market Imperfections (2): Externalities, Information, Distribution and the Role of the Government in a Market Economy

11 Externalities and Property Rights

Market efficiency: a reminder

External costs and benefits

How externalities affect resource allocation

Economic Naturalist 11.1 Why are positive production externalities hard to find?

The graphical portrayal of externalities

The Coase theorem

Legal remedies for externalities

The optimal amount of negative externalities is not zero

RECAP External costs and benefits

Property rights and the ‘tragedy of the commons’

Economic Naturalist 11.2 Are the issues of externalities, property rights, resource use and economic efficiency just a passing obsession?

The problem of unpriced resources

The effect of private ownership

When private ownership is impractical

Economic Naturalist 11.3 Is there any evidence to back up the story of villagers and cattle?

RECAP Property rights and the tragedy of the commons

Positional externalities

Payoffs that depend on relative performance

Positional arms races

Economic Naturalist 11.4 Why do political parties so often vote for restrictions on campaign spending?

Positional arms control agreements

Social norms as positional arms control agreements

Summary

Review questions

Problems

References

12 The Economics of Information

How the middleman adds value

RECAP How the middleman adds value

The optimal amount of information

The cost–benefit test

The free-rider problem

Economic Naturalist 12.1 Are online bookstores free riding?

Two guidelines for rational search

The gamble inherent in search

The commitment problem when search is costly

RECAP The optimal amount of information

Asymmetric information

The ‘lemons’ model

Economic Naturalist 12.2 Are used car sales people always liars?

The credibility problem in trading

The costly-to-fake principle

Economic Naturalist 12.3 Why would Renault spend a pile of money on a TV ad campaign that shows a Mirage 2000 fighter accelerating down the runway faster than a Renault Clio?

Conspicuous consumption as a signal of ability

Statistical discrimination

Economic Naturalist 12.4 What happens when firms are forbidden to use information in reaching pricing decisions?

Adverse selection

Moral hazard

RECAP Asymmetric information

Summary

Review questions

Problems

References

13 Labour Markets, Income Distribution, Wealth and Poverty

The economic value of work

Economic Naturalist 13.1 Given that slavery and indentured labour are prohibited, how do football and other professional sports clubs purchase players?

RECAP The economic value of work

The equilibrium wage and employment levels

The demand for labour

The supply curve of labour

Market shifts

RECAP Equilibrium in the labour market

Explaining differences in earnings

The human capital explanation

Trades unions

Compensating wage differentials

Economic Naturalist 13.2 Should workers on oil rigs, where risks to life and limb are significantly higher than in other occupations, welcome health and safety regulations that reduce job hazards?

Discrimination in the labour market

Discrimination by employers

Discrimination by others

Economic Naturalist 13.3 Why was Kavanagh a QC?

Other sources of the wage gap

Winner-take-all markets

Economic Naturalist 13.4 Why did Tiger Woods at the peak of his career earn a multiple of the earnings of golfers of slightly lesser ability?

RECAP Explaining differences in earnings among people

Trends in inequality

A note on poverty

Measuring the distribution of income or wealth

Inequality: a moral problem?

RECAP Why is income inequality a moral problem?

Methods of income redistribution

Welfare payments and in-kind transfers

Universality and means testing

Income tax and redistribution

Minimum wages

The earned income tax credit

Summary

Review questions

Problems

References

14 Government in the Market Economy: Public Sector Production and Regulation

Government in the economy: producing public goods

Public goods versus private goods

Paying for public goods

Economic Naturalist 14.1 Should a couple who believe in equality between the sexes agree to pay equal shares of expenses when they set up house together?

The demand curve for a public good

Private provision of public goods

Economic Naturalist 14.2 Is commercial sponsorship an efficient way to produce public goods?

Government in the economy: regulation

Government and regulation

The regulatory framework

Three case studies

Economic Naturalist 14.3 How can the EU reduce CO₂ emissions by permitting them?

RECAP Using price incentives in environmental regulation

Economic Naturalist 14.4 Why does the government require safety seats for infants who travel by road, but not for infants who travel by air?

Public health and safety

Economic Naturalist 14.5 Many governments encourage, even enforce, universal vaccination against MMR; they discourage and try to eliminate completely tobacco usage. These measures are adopted to reduce morbidity and mortality from related diseases. Why, then, do they frequently restrict access by women to subsidised mammography to detect early-stage breast cancer?

Regulatory failure

[Regulatory capture](#)

[Regulatory blunder: cheap oil for Canadian consumers](#)

[Summary](#)

[Review questions](#)

[Problems](#)

[References](#)

[15 The Credit Crunch and the Great Contraction: an Application of Some Microeconomics to Help Explain a Macroeconomic Crisis](#)

[Introduction](#)

[Economic Naturalist 15.1](#) Was Gavrilo Princip more important than John Kay thinks?

[RECAP The Great Economic Contraction](#)

[The roots of the financial crisis](#)

[Regulatory failure and failure of regulatory reform](#)

[Information economics and the crisis](#)

[Adverse selection and moral hazard](#)

[Regulation-based changes in the structure of the financial sector](#)

[Efficiency compatible incentives: the principal-agent problem](#)

[RECAP The roots of the economic crisis](#)

[A liquidity crisis?](#)

[Response to a liquidity crisis](#)

[Banks and property](#)

[RECAP A liquidity crisis?](#)

[Too big to fail: sowing dragon's teeth?](#)

[Re-regulation?](#)

[Summary](#)

[Review questions](#)

[Problems](#)

[References](#)

[Part 5 Macroeconomics: Issues and Data](#)

[16 Macroeconomics: the Bird's-Eye View of the Economy](#)

[The major macroeconomic issues](#)

[Economic growth and living standards](#)

[Productivity](#)

[Economic Naturalist 16.1](#) Explaining Europe's catch-up, 1950–73

[Recessions and expansions](#)

[Unemployment](#)

[Inflation](#)

[Economic Naturalist 16.2](#) Comparing recessions

[Economic interdependence among nations](#)

[RECAP The major macroeconomic issues](#)

[Macroeconomic policy](#)

[Economic Naturalist 16.3](#) [What should stabilisation policy stabilise?](#)

[Positive versus normative analyses of macroeconomic policy](#)

[RECAP Macroeconomic policy](#)

[Aggregation](#)

[RECAP Aggregation](#)

[Studying macroeconomics: a preview](#)

[Summary](#)

[Review questions](#)

[Problems](#)

[References](#)

[17 Measuring Economic Activity: Gross Domestic Product](#)

[Gross domestic product: measuring the economy's output](#)

[Market value](#)

[Final goods and services](#)

[Produced within a country during a given period](#)

[The expenditure method for measuring GDP](#)

[RECAP Measuring GDP](#)

[RECAP Expenditure components of GDP](#)

[GDP and the incomes of capital and labour](#)

[Nominal GDP versus real GDP](#)

[Economic Naturalist 17.1](#) [The world's largest economies?](#)

[Maths Box 17.1](#) [Chain-linking](#)

[RECAP Nominal GDP versus real GDP](#)

[Real GDP is not the same as economic well-being](#)

[Leisure time](#)

[Economic Naturalist 17.2](#) [Why do people work fewer hours today than their great-grandparents did?](#)

[Non-market economic activities](#)

[Environmental quality and resource depletion](#)

[Quality of life](#)

[Poverty and economic inequality](#)

[GDP is related to economic well-being](#)

[Availability of goods and services](#)

[Health and education](#)

[Economic Naturalist 17.3](#) [Does real GDP underestimate the recession?](#)

[RECAP Real GDP and economic well-being](#)

[Summary](#)

[Review questions](#)

[Problems](#)

[References](#)

18 Measuring the Price Level and Inflation

[The consumer price index: measuring the price level](#)

[Inflation](#)

[Economic Naturalist 18.1](#) [The EU's Harmonised Index of Consumer Prices](#)

[Deflation](#)

[Economic Naturalist 18.2](#) [Should tobacco be excluded from the CPI basket?](#)

[Adjusting for inflation](#)

[Deflating a nominal quantity](#)

[Indexing to maintain buying power](#)

[RECAP Methods to adjust for inflation](#)

[The costs of inflation: not always what you think](#)

[Relative prices and inflation](#)

[Economic Naturalist 18.3](#) [A personalised CPI](#)

[The true costs of inflation](#)

[‘Noise’ in the price system](#)

[Distortions of the tax system](#)

[Unexpected inflation](#)

[Interference with long-run planning](#)

[RECAP The true costs of inflation](#)

[Hyperinflation](#)

[Summary](#)

[Review questions](#)

[Problems](#)

[Reference](#)

19 The Labour Market: Wages and Unemployment

[The unemployment rate](#)

[The labour force participation rate](#)

[Economic Naturalist 19.1](#) [What is the ‘true’ unemployment rate?](#)

[Economic Naturalist 19.2](#) [Why are people inactive?](#)

[Types of unemployment and their costs](#)

[RECAP Unemployment](#)

[Unemployment in Europe and the United States](#)

[Economic Naturalist 19.3](#) [Does the gender wage gap imply labour market discrimination?](#)

[Summary](#)

[Review questions](#)

[Problems](#)

Part 6 The Economy in the Long Run

20 Economic Growth, Productivity and Living Standards

The remarkable rise in living standards: the record

Why 'small' differences in growth rates matter

Why nations become rich: the crucial role of average labour productivity

RECAP Economic growth and productivity

The Solow growth model

Maths Box 20.1 The steady-state growth equation

Economic Naturalist 20.1 The Heckman Equation – at what age does investment in human capital yield the highest return?

RECAP The Solow model

Total factor productivity

Entrepreneurship and management

The political and legal environment

Land and other natural resources

RECAP Determinants of average labour productivity

The worldwide productivity slowdown – and recovery?

The costs of economic growth

Promoting economic growth

Policies that support research and development

Policies to increase human capital

Policies that promote saving and investment

Policies that attract foreign direct investment

The legal and political framework

The poorest countries: a special case?

Economic Naturalist 20.2 Promoting growth and cohesion in Europe

Economic Naturalist 20.3 Is economic growth always good for you?

RECAP Economic growth: developments and issues

Summary

Review questions

Problems

References

21 Capital Markets: Saving, Investment and Financial Intermediaries

Saving and wealth

Stocks and flows

Capital gains and losses

Why do people save?

Economic Naturalist 21.1 Why do Europeans save more than Americans?

Saving and the real interest rate

RECAP Why do people save?

[National saving and its components](#)

[The measurement of national saving](#)

[Private and public components of national saving](#)

[Public saving and the government budget](#)

[RECAP National saving and its components](#)

[Investment and capital formation](#)

[RECAP Factors that affect investment](#)

[The financial system and the allocation of saving to productive uses](#)

[The banking system](#)

[Economic Naturalist 21.2 Spain's peculiar local banks](#)

[Bonds and shares](#)

[RECAP Factors affecting share prices](#)

[Bond markets, stock markets and the allocation of saving](#)

[The informational role of bond and stock markets](#)

[Risk-sharing and diversification](#)

[Saving, investment and the real rate of interest](#)

[Economic Naturalist 21.3 Should the government always balance the books?](#)

[Summary](#)

[Review questions](#)

[Problems](#)

Part 7 The Economy in the Short Run

22 Short-Term Economic Fluctuations

[Recessions and expansions](#)

[RECAP Recessions, booms and their characteristics](#)

[Output gaps and cyclical unemployment](#)

[Potential output and the output gap](#)

[The natural rate of unemployment and cyclical unemployment](#)

[RECAP Output gaps and cyclical unemployment](#)

[Why do short-term fluctuations occur? A preview and a parable](#)

[Spending and output in the short run](#)

[The Keynesian model's crucial assumption: firms meet demand at pre-set prices](#)

[Economic Naturalist 22.1 Will new technologies eliminate menu costs?](#)

[Planned aggregate expenditure](#)

[Planned spending versus actual spending](#)

[Consumer spending and the economy](#)

[Planned aggregate expenditure and output](#)

[RECAP Planned aggregate expenditure](#)

[Short-run equilibrium output](#)

[Planned spending and the output gap](#)

The multiplier

Maths Box 22.1 The income–expenditure multiplier

Economic Naturalist 22.2 Is there an Olympics multiplier?

The tax multiplier

Economic Naturalist 22.3 How big is the multiplier?

RECAP Finding short-run equilibrium output

Planned aggregate expenditure and the real interest rate

Summary

Review questions

Problems

23 Money and Interest Rates

Money and its uses

Measuring money

RECAP Money and its uses

The demand for money

Macroeconomic determinants of the demand for money

The money demand curve

RECAP Money demand

The money supply: commercial banks and the creation of money

The money supply with both currency and deposits

Securitisation

RECAP Commercial banks and the creation of money

Economic Naturalist 23.1 The Credit Crunch (1) – the subprime crisis

Economic Naturalist 23.2 The Credit Crunch (2) – the case of Northern Rock

Controlling the money supply: central banks and open-market operations

The money supply curve

Equilibrium in the market for money

How the central bank controls the nominal interest rate

The European Central Bank

ECB independence

A mandate for price stability

How the ECB controls interest rates

Economic Naturalist 23.3 How much would it cost Iceland to join the euro without permission?

The Bank of England

The Federal Reserve System

Summary

Review questions

Problems

24 The IS-LM Model

The IS curve

The position of the IS curve

Maths Box 24.1 The IS curve

The LM curve

The position of the LM curve

Maths Box 24.2 The LM curve

Equilibrium in the IS-LM model

Maths Box 24.3 Equilibrium in the IS-LM model

Summary

Review questions

Problems

25 Stabilising the Economy (1): the Role of Fiscal Policy

Discretionary fiscal policy: changes in government purchases

Crowding out

Discretionary fiscal policy: changes in net taxes

RECAP Fiscal policy and planned spending

Automatic stabilisers

The problem of deficits

Economic Naturalist 25.1 The Stability and Growth Pact

Economic Naturalist 25.2 Greece & Ireland: How did it all go wrong?

The cyclically adjusted budget deficit

Economic Naturalist 25.3 Should the government eliminate the structural deficit?

Fiscal policy as a stabilisation tool: two qualifications

Fiscal policy and the supply side

The relative inflexibility of fiscal policy

Summary

Review questions

Problems

26 Stabilising the Economy (2): the Role of Monetary Policy

How central banks can fight a recession

Economic Naturalist 26.1 Why did the Bank of England cut interest rates nine times between December 2007 and March 2009?

Modelling Central Bank behaviour – the Taylor Rule

How effective is monetary policy?

Link 1: money supply to interest rates

Economic Naturalist 26.2 Quantitative easing and the liquidity trap

Link 2: interest rates to expenditure

RECAP Monetary policy and the economy

Economic Naturalist 26.3 Project Merlin – economic wizardry or smoke and mirrors?

Summary

Review questions

Problems

27 Aggregate Demand, Aggregate Supply and Inflation

The aggregate demand curve

Shifts of the AD curve

RECAP The aggregate demand (AD) curve

The aggregate supply curve

Aggregate supply and unanticipated inflation

Shifts of the SRAS curve

RECAP The short-run aggregate supply (SRAS) curve

Short- and long-run equilibrium

RECAP AD-AS and the self-correcting economy

Changes in economic conditions

Economic Naturalist 27.1 Are all increases in the CPI inflationary?

Economic Naturalist 27.2 How did Zimbabwe conquer hyperinflation?

Responding to demand and supply shocks

Real and nominal shocks

Economic Naturalist 27.3 Monetary policy, art or science?

RECAP Sources of inflation

Stabilisation policy and the self-correcting economy

Summary

Review questions

Problems

28 The New Keynesian Phillips Curve: Expectations and Inflation Policy

The classic Phillips curve

The New Keynesian Phillips curve

The Phillips curve trade-off

Economic Naturalist 28.1 Inflation and money in the long run: the quantity theory

Inflation bias

Economic Naturalist 28.2 The Lucas critique and the breakdown of Phillips' empirical relationship

Reducing inflation bias

Economic Naturalist 28.3 The effect of theory on the missions of central banks

Controlling inflation

Adaptive expectations vs rational expectations

Economic Naturalist 28.4 Achieving credibility by committing to other targets

Should the inflation target be zero?

Should the central bank announce a numerical inflation target?

Summary

[Review questions](#)

[Problems](#)

Part 8 The International Economy

29 Exchange Rates, Capital Flows and the Balance of Payments

[Exchange rates](#)

[Nominal exchange rates](#)

[Flexible versus fixed exchange rates](#)

[Real exchange rates](#)

Economic Naturalist 29.1 Burgernomics – what does the Big Mac tell us about exchange rates?

[RECAP Exchange rates](#)

[Determination of the nominal exchange rate](#)

[Determination of the exchange rate: a supply and demand analysis](#)

[RECAP Determining the exchange rate](#)

[Fixed exchange rates](#)

[How to fix an exchange rate](#)

[Speculative attacks](#)

[Exchange rate systems](#)

Economic Naturalist 29.2 Why join the euro?

[Exchange rates and stabilisation policy](#)

[The IS curve in an open economy](#)

[The LM curve in an open economy](#)

[The foreign sector](#)

[The BP curve](#)

[Equilibrium in the IS-LM-BP model](#)

[Fiscal policy in the open economy](#)

[Monetary policy in the open economy](#)

[Monetary policy and the nominal exchange rate](#)

Economic Naturalist 29.3 Breaking the Bank of England: sterling and the 1992 ERM crisis

[Summary](#)

[Review questions](#)

[Problems](#)

[Index](#)

Preface

The fact that people must make choices, and sometimes unpleasant ones, is central to what economics is about. It applies to writers of textbooks in economics as well as to the rest of the world. The first choice in the case of a textbook concerns the approach taken to getting ideas across to different types of students. This in turn reflects the reasons for which students are taking the economics course for which the text is being used and also the abilities of the target student body, especially where mathematics is an issue. The second concerns the breadth of the subject matter the text covers. Here the choice is between an attempt to cover all the bases adequately or make sure that the more important bases are covered more fully. Compromise is inevitable, especially given cost and length constraints. Again, this is hardly surprising, trade-offs are at the heart of rational decision-making in economics.

In many, perhaps most, introductory courses the instructor is dealing with two types of student and, therefore, has two different goals. The first group comprises students whose interest in economics is just as part of a broad educational curriculum. Some of these students may never take another economics course. For them the imperative is to give them a good understanding of basic economics principles that will enable them to understand more clearly the world in which they will live, and to retain these insights. The second group comprises students progressing to a degree where economics is a major component. For this group the aim of an introductory course will be to provide a firm foundation and the tools of the trade for going further with the discipline.

The authors of this text start from the proposition that, while very few undergraduate students of economics proceed to a PhD and become professional economists, an understanding of basic economics is of immense value in everyday life. We believe that this obvious fact should inform how economics is taught at the

introductory level. In developing a European version of the original US text written by Robert Frank and Ben Bernanke, an ongoing process now leading to a third edition, we have adhered to the philosophy that informed the original text in Europe, as in the USA. An abiding concern of many academic economists was this: to judge by what is retained afterwards, many students finish introductory courses without having really learned and understood the most important basic economic principles. The problem is that these courses frequently try to teach students far too much. It seems to us that what is more important is to teach core principles and techniques well, rather than to cover all possible fields of economics at a superficial level. As will be explained below, this has led us to curtail material from the second edition. We continue, however to remind students continually of those basic principles of economics that, in the words of Frank and Bernanke, 'do most of the heavy lifting in economics'. These are:

1. **The Scarcity Principle** Having more of one good thing usually means having less of another.
2. **The Cost-Benefit Principle** Take no action unless its marginal benefit is at least as great as its marginal cost.
3. **The Incentive Principle** Cost-benefit comparisons are relevant not only for identifying the decisions that rational people should make, but also for predicting the actual decisions they do make.
4. **The Principle of Comparative Advantage** Everyone does best when each concentrates on the activity for which he or she is relatively most productive.
5. **The Principle of Increasing Opportunity Cost** Use the resources with the lowest opportunity cost before turning to those with higher opportunity costs.
6. **The Efficiency Principle** Efficiency is an important social goal because when the economic 'pie' grows larger, everyone can have a larger slice.
7. **The Equilibrium Principle** A market in equilibrium



leaves no unexploited opportunities for individuals but may not exploit all gains achievable through collective action.



We continue to use and develop the idea of the 'economic naturalist'. This means using basic economic principles to understand and explain what you see in the world around you, and to resolve some apparent paradoxes. For example, we don't fit child safety restraints in planes, but we do in cars. Do we not care about children in planes?

In the second edition we moved the emphasis of the text somewhat from the needs of the first category of students described above to those of the second group. This decision was taken because of the difference in the academic programme structures in European countries from those in the USA. We added some additional theoretical analysis (for example, an expanded use of simple game theory) and we included some rigorous explanations using mathematics rather than relying on graphs or intuition alone. This shift in emphasis is maintained in the third edition, but in a way that permits instructors to avoid using more rigorous techniques where appropriate for their students.

However, while increasing the technical content we have always been guided by the need to preserve the major advantage the original text had over other texts we had seen. This was the emphasis on getting ideas across in a fashion that captures the reader's attention and makes a lasting contribution to basic understanding of the economics underpinnings of ordinary life. Not only is this important in terms of imparting an understanding of economics as a subject and as a guide to policy, but we believe that it is very important that students who progress with economics should develop a sense of economic intuition as well as mastering technical aspects of the discipline.

CHANGES IN THE THIRD EDITION

The years since the publication of the second edition have seen enormous upheavals in economies across Europe and around the globe. Students entering economics courses today are eager to learn

how economic theory can help them understand these dramatic events. This provides a useful opportunity to engage students with economics, and so we have updated most of the economic naturalists from the second edition.

In most sections we have reduced the word count significantly, making the core ideas more accessible. Using the very helpful reviewer feedback, we have also made significant changes in the material and presentation in both the micro and macro sections of the text. We have also, we think, improved the graphical exposition of material in both sections, and, of course, we have updated data tables where appropriate. Reviewer opinion was divided on the use of in-chapter mathematics in presenting material, rather than confining mathematical treatment to chapter appendices. In general we have left the use of maths as it was in the last edition.

MICROECONOMICS

We have retained most of the changes to content and organisation introduced in the second edition, while amending some the material where potential improvements have been suggested by reviewers and users of the text.

The treatment of oligopoly has been extended with formal models being developed in appendices.

We have included a new final chapter in the micro section. This deals with the role of financial sector problems in the 'Great Contraction' of 2008–2010, for many people something that appears to have resulted from the spectacular collapse of Lehman Brothers. Our emphasis in this chapter is on using ideas from microeconomics (poor incentives, risk, opportunism, asymmetrical information, efficient markets, regulatory failure) and applying them to help students:

1. understand how the financial structures got into trouble
2. see clearly that the various ideas and concepts developed in microeconomics really do help explain reality and improve

policy

3. reinforce the idea that good macroeconomics, in theory and practice, requires a consistent microeconomics foundation, thus bridging the pedagogic chasm that seems to separate the two branches of economics analysis for many students.

The international trade chapter from the first edition has not been re-introduced, but remains available in the Online Learning Centre that accompanies this text.

MACROECONOMICS

As in the microeconomics sections, we have retained most of the changes introduced in the second edition. The modular presentation allows instructors to move from [Part 7](#), dealing with measurement issues relating to GDP, the price level and the labour market, to either long-run (Part 8, The Economy in the Long Run) or short-run (Part 9, The Economy in the Short Run) analysis with no loss of continuity. [Part 8](#) uses the Solow model to present a comprehensive analysis of long-run growth and productivity, while Part 9 presents a three-stage treatment of Keynesian macroeconomics in which analysis of the real and monetary sectors is integrated into the IS-LM model to provide a platform for discussion of the fiscal and monetary chapters. These latter chapters have been updated to deal with policy responses to the recent economic and financial crisis with particular emphasis on deficit control, bail-outs and quantitative easing.

In response to requests from users of the second edition, we have introduced new material in [Chapter 28](#), which now introduces the New Keynesian Phillips curve. This permits a more in-depth discussion of the role of expectations in macroeconomics and the interaction between policy and expectations.

[Chapter 29](#) presents a self-contained discussion of exchange rate determination that can be used whenever an instructor thinks it best to introduce this important subject. The chapter also integrates trade and capital flows into the IS-LM model and presents a discussion of

stabilisation policy in the open economy.

APPROACH

A key feature of the text is what we call 'economic naturalism'. By using examples and posing problems we seek to provide answers to questions that should encourage readers to look at the world through the eyes of an economist. Here are a few examples.

Microeconomics:

Why do airline ticket prices rise when most people fly, while strawberry prices fall when people eat more strawberries?

Sales of lipstick are said to increase when times are tough. Is lipstick an inferior good?

How does subsidising fuel prices make a country poorer?

Macroeconomics:

Is economic growth always good for you?

Why did the Bank of England cut interest rates nine times between December 2007 and March 2009?

Greece and Ireland: How did it all go wrong?

WHY THIS RATHER THAN ANOTHER TEXT?

In addition to the pedagogic approach already described, we believe that this text differs significantly from others in respect of the emphasis on modern economic analysis.

- **Modern microeconomics:** Economic surplus is more central to the presentation of economics in this than in any other text. This concept underlies the argument for economic efficiency as an important social goal. Instead of dwelling on the problem of equity versus efficiency in policy making, we stress that efficiency (maximising surplus) permits the achievement of other goals. We analyse rational decision making in a way that identifies the common decision pitfalls identified by 2002 Nobel Laureate Daniel Kahneman and others – such as the tendency to ignore implicit costs, the

tendency not to ignore sunk costs, and the tendency to confuse average and marginal costs and benefits. We introduce the student to the elements of game theory, and show how powerful an approach it can be to explaining otherwise baffling problems. We introduce the Coase theorem, and use it to explain and to question aspects of legal and regulatory policy. The text also introduces students to the economics of information, something that is widely ignored as an area of economics in its own right in many other texts.

- **Modern macroeconomics:** Recent developments have renewed interest in cyclical fluctuations without challenging the importance of such long-run issues as growth, productivity, the evolution of real wages, and capital formation. Our treatment of these issues is organised as follows:
 - **A two-chapter treatment of long-run issues**, followed by a modern treatment of short-term fluctuations and stabilisation policy, emphasising the important distinction between short- and long-run behaviour of the economy.
 - Consistent with both media reporting and public perception we **treat the interest rate rather than the money supply** as the primary instrument of central bank policy.
 - **A more realistic treatment of aggregate demand and aggregate supply** which relates output to inflation rather than to the price level, sidestepping the necessity of a separate derivation of the link between the output gap and inflation.
- This book places a **heavy emphasis on globalisation**, starting with an analysis of its effects on real wage inequality and progressing to such issues as the benefits of trade, the causes and effects of protectionism, the role of capital flows

in domestic capital formation, the link between exchange rates and monetary policy, and the sources of speculative attacks on currencies.

THE CHALLENGE

The world is a more competitive place now than it was when we started teaching in the 1970s. In arena after arena, business as usual is no longer good enough. Football players used to drink beer and go fishing during the off season, but they now lift weights and ride exercise bicycles. Academics at the start of their careers used to take life easy or make DIY repairs to their houses at weekends, but the current crop can now be found most weekends at their computers. The competition for student attention has grown similarly more intense. There are many tempting courses in the typical college curriculum and even more tempting diversions outside the classroom. Students are freer than ever to pick and choose.

Yet many academic economists seem to operate under the illusion that most students arrive at college with a burning desire to become economics majors. And many of us do not yet seem to have recognised that students' cognitive abilities and powers of concentration are scarce resources. To hold our ground, we must become not only more selective in what we teach, but also more effective as advocates for our discipline. We must persuade students that we offer something of value. A well-conceived and well-executed introductory course in economics can teach our students more about society and human behaviour in a single term than virtually any other course in the university. This course can and should be an intellectual adventure of the first order. Not all students who take the kind of course we envisioned when writing this book will go on to become economics majors, of course. But many will, and even those who do not will leave with a sense of admiration for the power of economic ideas.

Guided Tour

REVIEW QUESTIONS

his team says: 'Private tennis lessons are definitely plain what you think he means by this statement. principle to explain why private lessons are not necessary.

to drive to town to save €30 on a new appliance n of the total selling price €30 is. Explain.

ng to decide whether to see a movie be more likely to on the €20 she would fail to earn by not babysitting? travel as being free when they use frequent-flyer ople are likely to make wasteful travel decisions. ment you made to your university this year a s your university were to offer a full tuition

ainers if he searches for a second hour, n to do so must satisfy $p(400) = €6$,

container deposit rate that will lead **Exercise 5.1**

n prices for his third, fourth and fifth respectively. Having calculated these curve of container-recycling services. n containers on the vertical axis and is shown in

PRACTICE & TESTING

Exercises feature throughout the chapters, to enable you to practise the techniques you have been taught and apply the methodology to real-world situations. Each chapter ends with a set of **Review questions** and **Problems**, ranging in difficulty to consolidate learning. These questions are all integrated into Connect, through which your lecturer can set homework assignments. A **Self-Quiz** and **Study** tool is also available on Connect. This provides questions to assess your knowledge and then recommends specific readings, supplementary materials and additional practice work.



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PROBLEMS

difficult.

or having a freshly washed car before bunt for which you would be willing to going out this evening, and your car is you receive from washing it?

grow tomatoes and sell them at the ding compost to your garden, you can elow. If compost costs 50 cents per kg

connect



Economic Naturalist 1.1

Adobe supplies its Acrobat Reader software free on the internet. Why is this?

And not only Acrobat Reader: you can also download many other products from Adobe. Adobe wants to make profits, but gives away its products free of charge. In the case of the Reader extension) created with Adobe Writer. Most users have downloaded it for a variety of reasons to do with security, but they also require that the software be available. As with a telephone, it's of little use unless you can sell the Writer programme profitably.

Example 4.5 Should Eric consume more oranges?

Eric gets a total of 1,000 utils from his consumption of oranges and 400 utils per week from his consumption of apples. The price of oranges is €1 each, and the price of apples is €2 each.

True or false: Eric should consume more oranges.

Eric spends €100 per week on oranges and €50 per week on apples.

$1000 \text{ utils/week} / (\text{€}100/\text{week}) = 10 \text{ utils per euro}$
 $400 \text{ utils/week} / (\text{€}50/\text{week}) = 8 \text{ utils per euro}$
Eric might be tempted to respond that the marginal utility of oranges is higher than for apples, he should consume more oranges. But he should not. The marginal utility per euro for each good is the same.

APPLICATION

Each chapter cements your understanding of economic theory by showing you how it operates in practice. **Examples** discuss theory in practical contexts. **Economic Naturalist boxes** apply economic perspectives to real-world situations, encouraging you to 'think like an economist'. You will find further Economic Naturalists on the supporting website. Connect also provides helpful tools to relate what is learnt in the book to real life. The prisoner's dilemma (below) explains all about this classic game in one of the many **videos** available.



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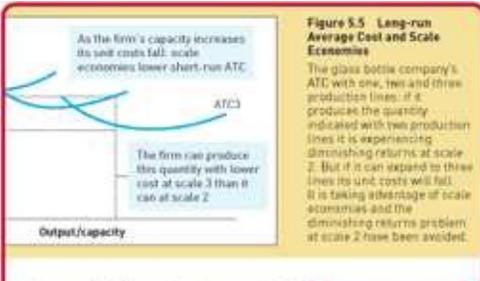


Figure 5.5 Long-run Average Cost and Scale Economies
The glass bottle company's ATC with one, two and three production lines. If it produces the quantity indicated with two production lines it is experiencing diminishing returns at scale 2. But if it can expand to three lines its unit costs will fall. It is taking advantage of scale economies and the diminishing returns problem at scale 2 has been avoided.

which starts on page 138.) The other way in which a firm can change the technology of production is by changing the technology of production. To do this, the firm changes the production function, which is the technical relation between inputs and the outputs it produces. The glass bottle firm's production function has two factors of production, capital and labour. Its output depends on its usage of capital and labour. It can be represented as a function of capital and labour employed in the firm to produce output. The production function can smoothly substitute capital for labour or labour for capital to change the proportions

production function: the technical relation between inputs in a production process and the outputs it produces

$$Q = f(K, L)$$

a firm may be able to reduce its costs in the long run because the short run diminishing returns cause the firm's

AIDING UNDERSTANDING

Each chapter offers extensive pedagogy to aid your understanding of the topics being taught. This includes **Learning objectives** and **Key terms** to outline your aims and clarify essential ideas, and detailed **Figures** and **Tables** to help you visualise economic models and important concepts. **Summaries** and **Recaps** link what you have learned in previous sections to new material and reinforce the topics discussed in each chapter to ensure you have acquired a solid understanding. **Maths boxes** are strategically placed, allowing you to dip in and out of more advanced maths content as you wish.

Maths Box 5.1
Why a marginal cost curve must cut an average cost curve at its minimum point: a mathematical proof

Recall that average cost is total cost divided by the quantity produced:

$$AC = \frac{TC}{Q}$$

where Q is the number of units being produced.
Now consider the slope of average cost, dAC/dQ . In the appendix to Chapter 1 we have

SUMMARY

- Economics is the study of the behaviour of individuals and of the results of that behaviour. It begins with the individual and tries to explain the behaviour of the individual in terms of defined goals and try to achieve those goals, people normally face limited resources, having more of one good means having less of another good thing.
- Our focus in this chapter is on the alternative courses of action available to individuals.

RECAP Applying the rational spending rule

Application of the rational spending rule highlights the importance of income in explaining differences in consumption patterns and across time. The rule also highlights the fact that income is what matters. The demand for a good falls when the real price of a complement rises.

Online Resources

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After completing each chapter, log on to the supporting Online Learning Centre website. Take advantage of the study tools offered to reinforce the material you have read in the text, and to develop your knowledge of economics in a fun and effective way.

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- PowerPoint slides
- UK data section

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A test bank of over 1800 questions is available to lecturers adopting this book for their module. A range of questions is provided for each chapter including multiple choice, true or false, and short answer or essay questions. The questions are identified by type, difficulty and topic to help you to select questions that best suit your needs and are accessible through an easy-to-use online testing tool, **McGraw-Hill EZ Test Online**.



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Part 1

Introduction

Economics differs from many other fields of study in that it is not a collection of settled facts, to be copied down and memorised. Mark Twain said that nothing is older than yesterday's newspaper, and the same can be said of yesterday's economic statistics.

If economics is not a set of durable facts, then what is it? Fundamentally, it is a way of *thinking about the world*. Over many years economists have developed some simple but widely applicable principles that help us to understand almost any economic situation (and a multitude of situations that at first sight might not appear to be concerned with economics), from the relatively simple ones such as economic decisions that individuals make every day to the workings of highly complex markets, such as international financial markets. The principal objective of this book is to help you learn these principles and how to apply them to a variety of economic questions and issues.

The three chapters of Part 1 lay out the basic economic principles that will be used throughout the book. [Chapter 1](#) introduces the notion of scarcity – the unavoidable fact that, although our needs and wants are boundless, the resources available to satisfy them are limited. The chapter goes on to show that decisions about actions based on comparing the costs and benefits of those actions is a useful in dealing with the inevitable trade-offs that scarcity creates. [Chapter 1](#) then discusses several important decision pitfalls and concludes by introducing the concept of *economic naturalism*. [Chapter 2](#) goes beyond individual decision making to consider trade, among both individuals and countries. Trade permits people (or countries) to specialise in the production of particular goods and services, which in turn enhances productivity and raises standards of living. Finally, [Chapter 3](#), a long chapter, looks at how markets work. It presents an overview of the concepts of supply and demand, perhaps the most basic and familiar tools used by economists. It also looks at one of the core concepts in economics, elasticity, the proportionate response of a dependent variable to a change in an independent or causative variable, and how this is measured.

Chapter 1

Thinking Like an Economist

A witty saying proves nothing.

Voltaire

Learning Objectives

After studying this chapter you should be able to:

1. Explain the concepts of scarcity and choice, the cost–benefit principle and the importance of incentives;
2. Assess and identify properly costs and benefits;
3. Understand the concept of economic rationality;
4. Understand why what happens ‘at the margin’ is important;
5. Distinguish between positive and normative statements in economics.

A health warning: thinking (and then speaking) like an economist can make you very unpopular. Partly this is because economists seem to take a lot of pleasure in puncturing other people’s balloons (that is, demonstrating that what their victims hold to be self-evident is far from being true). More importantly, economics as a discipline teaches you to think about problems, and solutions to problems, in a way that others find challenging to their way of thinking.

Consider the following policy issue. It is taken as almost an article of faith by teaching professionals that smaller classes are better, in terms of educational outcomes, particularly at the primary (elementary) level. Children, it is said, do better, controlling for other factors, if they are taught in smaller classes. The result is consistent pressure on governments in many countries to spend more to enable class sizes to be reduced.

Most people, parents included, would agree with the class size proposition, and not just because teachers continually argue along these lines. Everyday experience supports the concept of better classroom experience and consequent educational outcomes being linked to smaller class sizes.

An economist considering this issue would be likely to ask some hard questions. The first would be 'What evidence exists to support the proposition that reducing class sizes, all other things being equal, generally improves educational outcomes?' The economist would ask what accepted metric exists that permits objective evaluation of outcomes and comparison of results. If you can't objectively measure outcomes and make comparisons over time or across schools on a common basis, the proposition cannot be demonstrated to be correct. If the accepted metric demonstrates outcome differences statistically related to class size the economist would agree that there is support for the proposition. If not, the economist would be likely to point out that the pressure for smaller classes may reflect the fact that teachers may have a vested interest in pushing for smaller classes as a means of reducing the pressure of work.¹

People, unfortunately, tend to respond to this in exactly the same way as most people did a few hundred years ago when informed that the Earth was not flat: common sense supported the flat Earth hypothesis. A common response is that it is plainly silly even to question the class size hypothesis. People do not like being told that their 'common sense' is incorrect.

The economist's approach is, first, based on confronting a hypothesis with evidence before conditionally accepting it. This, of course, is exactly what physicists, geologists, astronomers and cosmologists do. It is why economics can credibly seek to be regarded as a science.

Second, an economist will always look at motivation. The economist argues that people tend to behave in a self-interested fashion and respond to incentives. They will combine to press for changes that improve their economic welfare. They may even persuade themselves that what they are seeking is to everyone else's advantage. They are, however, unlikely to combine to press for changes that will reduce their economic welfare. Trades unions do not seek lower wages for their members if unemployment rises. But imputing self-interest to people who are making arguments based on

hypotheses about the general good is certain to cause outrage.



There are, of course, exceptions to this. Individual altruism exists. Most people would accept that Mother Teresa of Calcutta sought primarily to improve the lot of the poor in Calcutta, not to become an international celebrity. People do combine to achieve ends that do not coincide with group self-interest. They may in some cases be spectacularly wrong-headed in the remedies they support (for example, urging motorists to switch to bio-fuels), but most environmentalists seeking to avert global warming are not doing so in order to earn a living.

Returning to the subject of class size, the next issue for economists would be the cost of reducing class sizes, and whether the cost incurred is warranted by the expected benefits. That, of course, may require putting some monetary value on levels of educational achievement. Unfortunately, where health and education are concerned, this approach tends to call forth Oscar Wilde's observation about knowing the price of everything and the value of nothing. But the economist's question is motivated by the fact that there is a social cost involved in putting more money into healthcare or education: the value of the things that can't be done as a consequence.

Finally, the economist is likely to suggest that we should stop reducing class sizes in any case well before further reductions have no effect on outcomes. The economist will talk about 'marginal', or 'incremental', costs, and 'marginal', or 'incremental', benefits. The economist will suggest that additional funding to reduce class sizes or to reduce road deaths or to improve the health status of the population should not continue beyond the point where marginal costs equal marginal benefits, even if total benefits could be increased. Try that out on a road safety lobbyist! An acceptable level of deaths on the roads?



ECONOMICS: STUDYING CHOICE IN A WORLD OF SCARCITY

No matter how rich a country is and, for most of us, at any rate, as individuals no matter how rich we are, *scarcity* is a fundamental fact of life. There is never enough time, money or energy to do everything we want to do or have everything we would like to have. Scarcity simply means we must choose, and sometimes make hard choices. **Economics** is the study of how people make choices under conditions of scarcity, and of the results of those choices for society.

economics the study of how people make choices under conditions of scarcity and of the results of those choices for society

A parent with a young child going into the educational system might definitely prefer schools with a class size of 20 rather than a class size of 30, everything else being equal. But suppose fees were payable, and that the fees in a small-class school were significantly higher than in a large-class size school. Income is limited. Therefore you must choose. If you choose small class sizes you will have to give up something as a result. Your choice will in the end come down to the relative importance of competing demands on that income. If you had a menu of schools with different class sizes to choose from, with fees reflecting class size, you could choose any one of them. In doing so you are trading off other things you might do with your income against perceived benefits from class size.



That such trade-offs are widespread and important is one of the core principles of economics. We call it the **Scarcity Principle**, because the simple fact of scarcity makes trade-offs necessary. Another name for the scarcity principle is the **No-Free-Lunch**

Principle (which comes from the observation that even lunches that are given to you are never really free – somebody, somehow, always has to pay for them).

Scarcity Principle (also called the **No-Free-Lunch Principle**) although we have boundless needs and wants, the resources available to us are limited, so having more of one good thing usually means having less of another; hence the cliché, ‘There ain’t no such thing as a free lunch’, sometimes reduced to the acronym TANSTAAFL

Inherent in the idea of a trade-off is the fact that choice involves compromise between competing interests. Economists resolve such trade-offs by using *cost–benefit analysis*, which is based on the disarmingly simple principle that an action should be taken if, and only if, its benefits exceed its costs. We call this statement the **Cost–Benefit Principle**, and it, too, is one of the core principles of economics.

Cost–Benefit Principle an individual (or a firm, or a society) should take an action if, and only if, the extra benefits from taking that action are at least as great as the extra costs

With the Cost–Benefit Principle in mind, let us think about our class-size question again. Imagine that classrooms come in only two sizes – 40-seat lecture rooms and 20-seat seminar rooms – and that your university currently offers introductory economics courses to classes of 40 students.

Question: Should administrators reduce the class size to 20 students?

Answer: Reduce if, and only if, the value of the improvement in instruction outweighs its additional cost.

This rule sounds simple, but to apply it we need some way to *measure* the relevant costs and benefits – a task that is often difficult in practice. If we make a few simplifying assumptions, however, we

can see how the analysis might work. On the cost side, the primary expense of reducing class size from 40 to 20 is that we will now need two teachers instead of one. We'll also need two smaller classrooms rather than a single big one, and this too may add slightly to the expense of the move. For the sake of discussion, suppose that the cost with a class size of 20 turns out to be €1,000 per student more than the cost per student when the class size is 40. Should administrators switch to the smaller class size? If they apply the cost–benefit principle, they will realise that the reduction in class size makes sense only if the *value of attending the smaller class is at least €1,000 per student greater than the value of attending the larger class.*

Would you (or your family) be willing to pay an extra €1,000 for a smaller economics class? If not, and if other students feel the same way, then sticking with the larger class size makes sense. But if you and others would be willing to pay the extra tuition fees, then reducing the class size to 20 makes good economic sense.

Notice that the 'best' class size, from an economics point of view, will generally not be the same as the 'best' size from the point of view of an educational psychologist. The difference arises because the economics definition of 'best' takes into account both the benefits *and* the costs of different class sizes. The psychologist ignores costs and looks only at the learning benefits of different class sizes.

In practice, of course, different people will feel differently about the value of smaller classes. People with high incomes, for example, tend to be willing to pay more for the advantage, which helps to explain why average class size is smaller, and tuition fees higher, at private schools whose students come predominantly from high-income families.

Scarcity and the trade-offs that result also apply to resources other than money. Bill Gates is one of the richest men on Earth. He has enough money to buy more houses, cars and other goods than he could possibly use. Yet Gates, like the rest of us, has only 24 hours in his day and a limited amount of energy. So even he confronts trade-

offs, in that any activity he pursues – whether it be building his business empire or redecorating his mansion – uses up time and energy that he could otherwise spend on other things.

APPLYING THE COST–BENEFIT PRINCIPLE

In studying choice under scarcity, we shall usually begin with the premise that people are **rational**, meaning they have well-defined goals and try to fulfil them as best they can. The Cost–Benefit Principle illustrated in our class-size example is a fundamental tool for the study of how rational people make choices.

rational person someone with well-defined goals, who fulfils those goals as best she can

Often the only real difficulty in applying the cost–benefit rule is to come up with reasonable measures of the relevant benefits and costs. Only in rare instances will exact money measures be conveniently available. But the cost–benefit framework can lend structure to your thinking even when no relevant market data are available.

To illustrate how we proceed in such cases, the following example asks you to decide whether to perform an action whose cost is described only in vague, qualitative terms.

Example 1.1

Should you walk to the centre of town to save €10 on a €25 computer game?

Imagine you are about to buy a €25 computer game at the nearby college book shop when a friend tells you that the same game is on sale at a city-centre store for only €15. If the store in question is a 30-minute walk away, where should you buy the game?

The Cost–Benefit Principle tells us that you should buy it from the store in the city centre if the benefit of doing so exceeds the cost. Here, the benefit of buying elsewhere is exactly €10, since that is the amount you will save on the purchase price of the game. The cost of buying in the city centre is the money value you assign to the time

and trouble it takes to make the trip. But how do we estimate that money value?

Imagine that a stranger has offered to pay you to do an errand that involves the same walk to the centre of town (perhaps to drop off a letter for her at the post office). If she offered you a payment of, say, €1,000, would you accept? If so, we know that your cost of walking to the centre of town and back must be less than €1,000. Now imagine her offer being reduced in small increments until you finally refuse the last offer. For example, if you would agree to walk there and back for €9.00 but not for €8.99, then your cost of making the trip is €9.00. In this case, you should buy the game in the town centre, because the €10 you'll save (your benefit) is greater than your €9.00 cost of making the trip.

But suppose, alternatively, that your cost of making the trip had been greater than €10. In that case, your best bet would have been to buy the game from the nearby college book shop. Confronted with this choice, different people may choose differently, depending on how costly they think it is to make the trip into town. But although there is no uniquely correct choice, many people who are asked what they would do in this situation say they would buy the game from the city-centre store.

ECONOMIC SURPLUS

Suppose again that in Example 1.1 your 'cost' of making the trip to the city centre was €9. Compared with the alternative of buying the game at the college store, buying it elsewhere resulted in an **economic surplus** of €1, the difference between the benefit of making the trip and its cost. In general, your goal as an economic decision maker is to choose those actions that generate the largest possible economic surplus. This means taking all actions that yield a positive total economic surplus, which is just another way of restating the Cost–Benefit Principle.

economic surplus the economic surplus from taking any action is the benefit of taking that action minus its cost

The fact that your best choice was to buy the game in the city doesn't imply that you *enjoy* making the trip. It simply means that the trip to town is less unpleasant than the prospect of paying €10 extra for the game. Once again, you've faced a trade-off – in this case, the choice between a cheaper game and the free time gained by avoiding the trip.

OPPORTUNITY COST

Suppose now that the time required for the trip is the only time you have left to study for a difficult test the next day. In such a case, we say that the **opportunity cost** of making the trip – that is, the value of what you must sacrifice to walk to the city centre and back – is high, and you are more likely to decide against making the trip.

opportunity cost the opportunity cost of an activity is the value of the next best alternative that must be forgone in order to undertake the activity

If watching a movie on TV, the movie is the most valuable opportunity that conflicts with the trip to the city centre, the opportunity cost of making the trip is the money value you place on watching the movie – that is, the largest amount you'd be willing to pay to avoid missing it. Note that the opportunity cost of making the trip is not the combined value of *all* possible activities you could have pursued, but only the value of your *best* alternative – the one you would have chosen had you not made the trip.



Throughout the text we will pose exercises like [Exercise 1.1](#). You will find that pausing to answer them will help you to master key concepts in economics. Because doing these exercises isn't very costly (indeed, many students report that they are actually fun), the

Cost–Benefit Principle indicates that it's well worth your while to do them.

Exercise 1.1

You would again save €10 by buying the game in the city rather than at the college store, but your cost of making the trip is now €12, not €9. How much economic surplus would you get from buying the game in the city? Where should you buy it?

THE ROLE OF ECONOMIC MODELS

Non-economists sometimes attack the economist's cost–benefit model on the grounds that people in the real world never conduct complicated mental comparisons between costs and benefits of hypothetical options until a winner emerges before deciding whether to make trips to town. But this criticism betrays a fundamental misunderstanding of how abstract models can help to explain and predict human behaviour. Economists know perfectly well that people don't conduct hypothetical mental 'auctions' between options when they make simple decisions. All the Cost–Benefit Principle really says is that a rational decision is one that is explicitly or implicitly based on a *weighing of costs and benefits*.

Most of us make sensible decisions most of the time, without being consciously aware that we are weighing costs and benefits, just as most people ride a bike without being consciously aware of what keeps them from falling off. Through trial and error, we gradually learn what kinds of choices tend to work best in different contexts, just as bicycle riders internalise the relevant laws of physics, usually without being conscious of them.

The Cost–Benefit Principle is an abstract model of how an idealised rational individual would choose among competing alternatives. (By 'abstract model' we mean a simplified description that captures the essential elements of a situation and allows us to analyse them in a logical way.) A computer model of a complex phenomenon such as climate change, which must ignore many details and include only the major forces at work, is an example of an

abstract model.

A model is to an economist in many ways what a laboratory experiment is to a physical scientist. Supposing you climbed the Leaning Tower of Pisa to test Newton's theory of gravity by dropping a feather and a kilogram of lead, you would observe that the lead fell faster and hit the ground first, and might conclude that gravity affects metals to a greater degree than it does organic material. A physicist would demonstrate that this is not the case by creating a vacuum and repeating the experiment. We live in a real world where air pressure and resistance affect how objects fall. We create a simplified world to test the gravity hypothesis by removing the pressure and resistance effects. Would you agree with someone who said that there is little value in talking about the workings of gravity because in the real world we don't live in a vacuum?

RECAP

Cost–benefit analysis

Scarcity is a basic fact of economic life. Having more of one good thing almost always means having less of another (the Scarcity Principle). The Cost–Benefit Principle holds that an individual (or a firm, or a society) should take an action if, and only if, the extra benefit from taking the action is at least as great as the extra cost. The benefit of taking any action minus the cost of taking the action is called the *economic surplus* from that action. Hence the Cost–Benefit Principle suggests that we take only those actions that create additional economic surplus.

FOUR IMPORTANT DECISION PITFALLS

Knowing that rational people tend to compare costs and benefits enables economists to predict the likely behaviour of people in the aggregate. However, there are some pitfalls of which you need to be aware in analysing how rational choices are made. People who think they are behaving rationally sometimes get it wrong. People are not born with an infallible instinct for weighing the relevant costs and benefits of many daily decisions. Indeed, one of the rewards of studying economics is that it can improve the quality of your

decisions.

PITFALL 1: MEASURING COSTS AND BENEFITS AS PROPORTIONS RATHER THAN ABSOLUTE MONEY AMOUNTS

Example 1.2

Should you walk 3 km to save €10 on a €1,000 laptop?

You are about to buy a €1,000 laptop computer at the nearby college store when you are told that the same computer is on sale at a city-centre store for only €990. If the latter is half an hour's walk away, where should you buy the computer?

Assuming that the laptop is light enough to carry without effort, the structure of this example is exactly the same as that of [Example 1.1](#) – the only difference being that the price of the laptop is dramatically higher than the price of the computer game. If you were prepared to walk into town to save €10 on a computer game, logically you should walk into town to buy the computer. But would you? When real people are asked what they would do in these situations, most say they would walk to town to buy the game but would buy the laptop at the college store. When asked to explain, most of them say something like: 'The trip was worth it for the game because you save 40 per cent, but not worth it for the laptop because you save only €10 out of €1,000, or 1 per cent.'

From a standard economics perspective this is faulty reasoning. The benefit of the trip to town is not the *proportion* you save on the original price. Rather, it is the *absolute money amount* you save. Since the cost and benefit of walking to the city to buy the laptop is exactly the same as for the computer game, the economic surplus from making both trips must be exactly the same. And this means that a rational decision maker would make the same decision in both cases. Yet, as noted, most people choose differently.

Exercise 1.2

Which is more valuable, saving £100 on a £2,000 plane ticket from London to Tokyo or saving £90 on a £200 plane ticket from London to Paris?

PITFALL 2: IGNORING OPPORTUNITY COSTS

In the story, *Silver Blaze*, Sherlock Holmes, Arthur Conan Doyle's legendary detective, is called on to investigate the theft of an expensive racehorse from its stable. A Scotland Yard inspector assigned to the case asks Holmes whether some particular aspect of the crime requires further study. 'Yes,' Holmes replies, and describes 'the curious incident of the dog in the night-time'. 'The dog did nothing in the night-time,' responds the puzzled inspector. Holmes realised that this was precisely the problem. It indicated that, when Silver Blaze was stolen, the watchdog knew the thief.

Like the Scotland Yard policeman, many of us tend to overlook the implicit value of activities that fail to happen. As discussed earlier, however, intelligent decisions require taking the value of *forgone opportunities* properly into account.

The opportunity cost of an activity, once again, is the value of the best alternative that must be forgone in order to engage in that activity. If buying a computer game in the town means not watching a movie, then the value to you of watching that movie is an opportunity cost of the trip. Many people make bad decisions because they tend to ignore the value of such forgone opportunities. To avoid overlooking opportunity costs, economists often translate questions like 'Should I walk to the pub?' into ones like 'Should I walk to the pub or watch the end of the movie on TV?'

Example 1.3

How should you use your father's frequent-flyer points?

As you contemplate what to do next summer you think about going to the United States, where you hope to work and make next year's pocket money. You expect to make €600 after all costs in the United States. The round-trip airfare to New York is €800. Your father tells you that he has accumulated sufficient frequent-flyer points to buy you the return ticket. However, you now hear that your sister is to be married in Nairobi in at the end of the summer. Your attendance is non-negotiable. The cost of a package return ticket to Nairobi and

accommodation is €700. You could use the points instead to cover the cost of the Nairobi trip. Which should you use the points for? The Cost–Benefit Principle tells us that you should go to New York if the benefits of the trip exceed its costs. If it were not for the complication of the frequent-flyer points, solving this problem would be a straightforward matter of comparing your benefit from the summer in the United States with all the relevant costs. And since your airfare exceeds the net amount you expect to earn you would not go to New York.

But what about the possibility of using your frequent-flyer coupon to make the trip? Using it for that purpose might make the flight to New York seem free, suggesting you would reap an economic surplus of €600 by making the trip. But doing so would also mean you would have to pay €700 for your airfare and accommodation costs for Nairobi. So the opportunity cost of using your coupon to go to New York is really €700. If you use the points to go to New York, the trip still ends up being a loser, because the cost, €700, exceeds the benefit by €100.

We cannot emphasise strongly enough that the key to using the concept of opportunity cost correctly lies in recognising precisely what taking a given action *prevents us from doing*. [Exercise 1.3](#) illustrates this point by modifying the details of [Example 1.3](#) slightly.

Exercise 1.3

The same as [Example 1.3](#), except that now the frequent-flyer coupon expires before the date for the wedding, so your only chance to use it will be for the New York trip. Should you use your coupon?

PITFALL 3: FAILURE TO IGNORE SUNK COSTS

In another common pitfall people are influenced by costs they ought to ignore. The only costs that should influence a decision about whether to take an action are those that we can *avoid by not taking the action*. As a practical matter, however, many decision makers appear to be influenced by **sunk costs** – costs that are beyond

recovery at the moment a decision is made. For example, money spent on a non-transferable, non-refundable airline ticket is a sunk cost.

sunk costs a cost that is beyond recovery at the moment a decision must be made

Because sunk costs must be borne *whether or not an action is taken*, they are irrelevant to the decision of whether to take the action. The sunk cost pitfall (the mistake of being influenced by sunk costs) is illustrated clearly in [Example 1.4](#).

Example 1.4

How much should you eat at an all-you-can-eat restaurant?

The Rajput, an Indian restaurant in Berlin, offers an all-you-can-eat lunch buffet for €15. Customers pay €15 at the door, and no matter how many times they refill their plates, there is no additional charge. One day, as a goodwill gesture, the owner of the restaurant tells 20 randomly selected guests that their lunch is on the house. The remaining guests pay the usual price. If all diners are rational, will there be any difference in the average quantity of food consumed by people in these two groups?

Having eaten their first helping, diners in each group confront the following question: 'Should I go back for another helping?' For rational diners, if the benefit of doing so exceeds the cost, the answer is yes; otherwise it is no. Note that at the moment of decision about a second helping, the €15 charge for the lunch is a sunk cost. Those who paid it have no way to recover it. Thus, for both groups, the (extra) cost of another helping is exactly zero. And since the people who received the free lunch were chosen at random, there is no reason to suppose that their appetites or incomes are different from those of other diners. The benefit of another helping thus should be the same, on average, for people in both groups. And since their respective costs and benefits of an additional helping are the same, the two groups should eat the same number of helpings, on average.

Psychologists and economists have experimental evidence,

however, that people in such groups do not eat similar amounts.³ In particular, those who have had to pay tend to eat substantially more than those who eat for free. People who have to pay seem somehow determined to 'get their money's worth', implicitly to minimising the average cost per mouthful, hardly very intelligent. Would you take your car out for a long drive on a motorway just to lower your average fuel consumption per 100 km?

The fact that the cost–benefit criterion failed the test of prediction in this example does nothing to invalidate its advice about what people *should* do. If you are letting sunk costs influence your decisions, you can do better by changing your behaviour.

PITFALL 4: FAILURE TO UNDERSTAND THE AVERAGE–MARGINAL DISTINCTION

In many situations, the issue is not whether to pursue the activity at all, but rather the *extent* to which it should be pursued. We can apply the Cost–Benefit Principle in such situations by repeatedly asking the question 'Should I increase the level at which I am currently pursuing the activity?'

In attempting to answer this question, the focus should always be on the benefit and cost of an *additional* unit of activity. To emphasise this focus, economists refer to the cost of an additional unit of activity as the **marginal cost** of the activity. Similarly, the benefit of an additional unit of the activity is the **marginal benefit** of the activity.

marginal cost the increase in total cost that results from carrying out one additional unit of an activity

marginal benefit the increase in total benefit that results from carrying out one additional unit of an activity

When the problem is to discover the proper level at which to pursue an activity, the cost–benefit rule is to keep increasing the level as long as the marginal benefit of the activity exceeds its marginal

cost. As [Example 1.5](#) illustrates, however, people often fail to apply this rule correctly.

Example 1.5

Should the European Space Agency (ESA) expand the Ariane programme from four launches per year to five?

Suppose it has been estimated by the economists working for the ESA that the gains from the programme are currently €12 billion per year (an average of €3 billion per launch) and that its costs are currently €10 billion per year (an average of €2.5 billion per launch). On the basis of these estimates, the ESA sends its chief economist to Brussels to persuade the Commission to provide increased EU funding to expand the launch vehicle programme. Should the Commission agree?

To discover whether expanding the programme makes economic sense, we must compare the marginal cost of a launch with its marginal benefit. The economists' estimates, however, tell us only the **average cost** and **average benefit** of the programme – which are, respectively, the total cost of the programme divided by the number of launches and the total benefit divided by the number of launches. Knowing the average benefit and average cost per launch for all satellites launched thus far is simply not useful for deciding whether to expand the programme. Of course, the average cost of the launches undertaken so far *might* be the same as the cost of adding another launch. But it might also be either higher or lower than the marginal cost of a launch. The same statement holds true regarding average and marginal benefits.

average cost the total cost of undertaking n units of an activity divided by n

average benefit the total benefit of undertaking n units of an activity divided by n

Suppose, for the sake of discussion, that the benefit of an

additional launch is in fact the same as the average benefit per launch thus far, €3 billion. Should the ESA add another launch? Not if the cost of adding the fifth launch would be more than €3 billion. And the fact that the average cost per launch is only €2.5 billion simply does not tell us anything about the marginal cost of the fifth launch.

Suppose, for example, that the relationship between the number of satellites launched and the total cost of the programme is as described in [Table 1.1](#). The average cost per launch (column (3)) when there are four launches would then be €10 billion/4 = €2.5 billion per launch. But note that, in column (2) of [Table 1.1](#), adding a fifth launch would raise costs from €10 billion to €15 billion, making the marginal cost of the fifth launch €5 billion. So if the benefit of an additional launch is €3 billion, increasing the number of launches from four to five would make absolutely no economic sense.

Table 1.1 Total Cost and Satellite Launches

Number of launches (1)	Total cost (€ billion) (2)	Average cost (€ billion) (3)
0	0	0
1	2.0	2.0
2	4.25	2.125
3	6.75	2.25
4	10.0	2.50
5	15.0	3.0

[Example 1.6](#) illustrates how to apply the Cost–Benefit Principle correctly in this case.

Example 1.6

How many space vehicles should the ESA launch?

The ESA must decide how many vehicles to launch. The benefit of each launch is estimated to be €3 billion, and the total cost of the programme again depends on the number of launches, in the manner

shown in [Table 1.1](#). How many vehicles should be launched?

The ESA should continue to launch satellites as long as the marginal benefit of the programme exceeds its marginal cost. In [Example 1.6](#), the marginal benefit is constant at €3 billion per launch, regardless of the number of launches. The ESA should thus keep launching as long as the marginal cost per launch is less than or equal to €3 billion ([Table 1.2](#)).

Table 1.2 Marginal Cost and Satellite Launches

Number of launches (1)	Total cost (€ billion) (2)	Average cost (€ billion) (3)	Marginal cost (€ billion) (4)
0	0	0	
1	2.0	2.0	2.0
2	4.25	2.125	2.25
3	6.75	2.25	2.5
4	10.0	2.5	3.25
5	15.0	3.0	5.0

Applying the definition of marginal cost to the total cost entries in column (2) of [Table 1.1](#) yields the marginal cost values in column (4) of [Table 1.2](#). (Because marginal cost is the change in total cost that results when we change the number of launches by one, we place each marginal cost entry midway between the rows showing the corresponding total cost entries.) Thus, for example, the marginal cost of increasing the number of launches from one to two is €2.25 billion, the difference between the €4.25 billion total cost of two launches and the €2 billion total cost of one launch.

As we see from a comparison of the €3 billion marginal benefit per launch with the marginal cost entries in column (4) of [Table 1.2](#), the first three launches satisfy the cost–benefit test, but the fourth and fifth launches do not. The ESA should thus launch three space satellites. The Commission should actually reduce its funding.

Exercise 1.4

If the marginal benefit of each launch had been not €3 billion but €4.5 billion, how many satellites should the ESA have launched?

The cost–benefit framework emphasises that the only relevant costs and benefits in deciding whether to pursue an activity further are *marginal* costs and benefits – measures that correspond to the *increment* of activity under consideration. In many contexts, however, people seem more inclined to compare the *average* cost and benefit of the activity.

Examples 1.2–1.4 make the point that people *sometimes* choose irrationally. This, we stress, is not to suggest that people *generally* make irrational choices. On the contrary, most people appear to choose sensibly most of the time, especially when their decisions are important or familiar ones. Rational choice thus offers not only useful advice about making better decisions, but also a basis for predicting and explaining human behaviour.

RECAP

Four important decision pitfalls

- 1. The pitfall of measuring costs or benefits proportionally** Many decision makers treat a change in cost or benefit as insignificant if it constitutes only a small proportion of the original amount. *Absolute money amounts*, not proportions, should be employed to measure costs and benefits.
- 2. The pitfall of ignoring opportunity costs** When performing a cost–benefit analysis of an action, it is important to account for all relevant *opportunity costs*, defined as the values of the most highly valued alternatives that must be forgone in order to carry out the action. A resource (such as a frequent-flyer coupon) may have a high opportunity cost, even if you originally got it ‘for free’, if its best alternative use has high value. The identical resource may have a low opportunity

cost, however, if it has no good alternative uses.

3. **The pitfall of not ignoring sunk costs** When deciding whether to perform an action, it is important to ignore *sunk costs* – those costs that cannot be avoided even if the action is not taken. Even though a ticket to a concert may have cost you €100, if you have already bought it and cannot sell it to anyone else, the €100 is a sunk cost and should not influence your decision about whether to go to the concert.
4. **The pitfall of using average instead of marginal costs and benefits** Decision makers often have ready information about the total cost and benefit of an activity, and from this it is simple to compute the activity's average cost and benefit. A common mistake is to conclude that an activity should be increased if its average benefit exceeds its average cost. The Cost–Benefit Principle tells us that the level of an activity should be increased if, and only if, its *marginal* benefit exceeds its *marginal* cost.

Some costs and benefits, especially marginal costs and benefits and opportunity costs, are important for decision making, while others, such as sunk costs and average costs and benefits, are essentially irrelevant. This conclusion is implicit in our original statement of the Cost–Benefit Principle. Yet so important are the pitfalls of using proportions instead of absolute money amounts, of ignoring opportunity costs, of taking sunk costs into account, and of confusing average and marginal costs and benefits that we enumerate these pitfalls separately as one of the core ideas for repeated emphasis.

The *Not-All-Costs-and-Benefits-Matter-Equally Principle* is that some costs and benefits (for example, opportunity costs and marginal costs and benefits) matter in making decisions, whereas others (for example, sunk costs and average costs and benefits) don't.

ECONOMICS: MICRO AND MACRO

By convention, we use the term **microeconomics** to describe the

study of individual choices and of group behaviour in individual markets. **Macroeconomics**, by contrast, is the study of the performance of national economies and of the policies that governments use to try to improve that performance. Macroeconomics tries to understand the determinants of such things as the national unemployment rate, the overall price level and the total value of national output.

microeconomics the study of individual choice under scarcity, and its implications for the behaviour of prices and quantities in individual markets

macroeconomics the study of the performance of national economies and the policies that governments use to try to improve that performance

Our focus in this chapter is on issues that face the individual decision maker, whether that individual confronts a personal decision, a family decision, a business decision, a government policy decision, or indeed any other type of decision. Further on, we shall consider economic models of groups of individuals, such as all buyers or all sellers in a specific market. Later still, we shall turn to broader economic issues and measures.

No matter which of these levels is our focus, however, our thinking will be shaped by the fact that although economic needs and wants are effectively unlimited, the material and human resources that can be used to satisfy them are finite. Clear thinking about economic problems must therefore always take into account the idea of *trade-offs* – the idea that having more of one good thing usually means having less of another. Our economy and our society are shaped to a substantial degree by the choices people have made when faced with such trade-offs.

THE APPROACH OF THIS TEXT

In planning an introductory economics course the scarcity principle

applies just as strongly as elsewhere. Inevitably we have to select from a virtually inexhaustible set of topics and issues that might be covered in an introductory course, since we have only limited time in which to cover them. There is no free lunch: covering some topics inevitably means omitting others.

All textbook authors are necessarily forced to pick and choose. It is our firm view that many, perhaps most, introductory textbooks try to cover far too much. A relatively short list of the discipline's core ideas can explain a great deal of the behaviour and events we see in the world around us. So rather than cover a large number of ideas at a superficial level, our strategy is to focus on this short list of core ideas, returning to each entry again and again, in many different contexts. This strategy will enable you to internalise these ideas remarkably well in the brief span of a single course. The benefit of learning a small number of important ideas well will far outweigh the cost of having to ignore a host of other, less important ideas.⁴

So far, we've already encountered three core ideas: the Scarcity Principle, the Cost–Benefit Principle and the principle that not all costs and benefits matter equally. As these core ideas re-emerge in the course of our discussions, we shall call your attention to them. And shortly after a *new* core idea appears, we shall highlight it by formally restating it.

A second important element in the philosophy of this text is our belief in the importance of active learning. In the same way that you can learn Spanish only by speaking and writing it, or tennis only by playing the game, you can learn economics only by *doing* economics. And because we want you to learn how to do economics, rather than just to read or listen passively as the authors or your instructor does economics, we shall make every effort to encourage you to stay actively involved.

For example, instead of just telling you about an idea, we shall usually first motivate the idea by showing you how it works in the context of a specific example. Often, these examples will be followed by exercises for you to try, as well as applications that show the

relevance of the idea to real life. Try working the exercises *before* looking at the answers.

Think critically about the applications: Do you see how they illustrate the point being made? Do they give you new insight into the issue? Work the problems at the end of the chapters, and take extra care with those relating to points that you do not fully understand. Apply economic principles to the world around you. (We shall say more about this when we discuss economic naturalism below.) Finally, when you come across an idea or example that you find interesting, tell a friend about it. You'll be surprised to discover how much the mere act of explaining it helps you understand and remember the underlying principle. The more actively you can become engaged in the learning process, the more effective your learning will be.

ECONOMIC NATURALISM

With the rudiments of the cost–benefit framework under your belt, you are now in a position to become an ‘economic naturalist’, someone who uses insights from economics to help make sense of observations from everyday life. During a walk in the woods in early April the novice may see only trees, whereas the biology student notices many different species of trees and understands why some are already in leaf while others still lie dormant. Likewise, the novice may notice that in some animal species males are much larger than females, but the biology student knows that such a pattern occurs only in species in which males take several mates. Natural selection favours larger males in those species because their greater size helps them obtain access to females. By contrast, males tend to be roughly the same size as females in monogamous species, in which there is much less fighting for mates.

In similar fashion, learning a few simple economic principles enables us to see the mundane details of ordinary human existence in a new light. Whereas the uninitiated often fail even to notice these details, the economic naturalist not only sees them, but becomes actively engaged in the attempt to understand them. Let us consider a few examples of questions that economic naturalists might pose for

themselves.

[Economic Naturalist 1.1](#) illustrates a case in which the *benefit* of a product depends on the number of other people who own that product. As the next example demonstrates, the *cost* of a product may also depend on the number of others who own it.



Economic Naturalist 1.1

Adobe supplies its Acrobat Reader software to anyone free of charge from the internet. Why is this?

And not only Acrobat Reader: you can also download the Adobe Flashplayer at no charge. Adobe wants to make profits, but gives away its products free of charge? The answer lies in why people use Adobe or equivalent products. In the case of the Reader, it is to be able to receive files (*.pdf file extension) created with Adobe Writer. Most users have little use for Writer, and those who value it do so for a variety of reasons to do with security and replication. They are willing to pay for it ... but they also require that those to whom documents are to be sent can receive and read them. As with a telephone, it's of little use if there are very few people able to receive a call. To be able to sell the Writer programme profitably, Adobe adopts a strategy designed to ensure that as many people as possible can read Acrobat files. The same applies to videos and Flashplayer.

The insights afforded by [Economic Naturalist 1.2](#) suggest an answer to the following strange question.



Economic Naturalist 1.2

Why can you not buy a Jaguar without air-conditioning?

If you lived in the Scottish Highlands you would have little use for air-conditioning in your car, even in what passes for summer up there. But if you decided to buy a Jaguar, or a Saab (and many other up-market cars), you would find that climate control is standard, as are things like cruise control. If you bought a Fiat Punto you could get one

without these add-ons, but would expect to pay more to buy the same car with the add-ons. So why do Saab or Jaguar not offer this choice? Most buyers of these cars with price tags of anything up to €100,000, depending on the country in Europe, have high incomes, so the makers believe that the overwhelming majority of them would have chosen to order climate control etc., had it been sold as an option. Because of the savings made possible when *all* cars are produced with the same equipment, it would have actually cost more to supply cars for the few who would want them without climate control. Buyers of the least expensive makes of car have much lower incomes on average and many have more pressing alternative uses for their money than to pay for air-conditioning for their cars, even in hot climates. The market for cars without add-ons is larger, so inexpensive marques continue to offer cars at lower prices but without add-ons.

Economic Naturalist 1.3 was suggested by Cornell student Bill Tjoa, in response to the following assignment.



Economic Naturalist 1.3

Why do the keypad buttons on drive-in automatic teller machines (ATMs) have Braille dots?

Braille dots are common in America and Europe on, for example, the buttons in lifts (elevators) and similar places. Braille keypads enable blind people to participate more fully in the normal flow of daily activity. Indeed, equality and access regulations have reinforced this in order to facilitate blind people in everyday life. Curiously, in North America it is common to find them on the key-pads at drive-in ATMs outside banks. Their usefulness in these circumstances is a little unclear, since blind people cannot drive automobiles on public roads. Why, then, do the manufacturers of automatic teller machines install Braille dots on the machines at drive-in locations?

The answer to this riddle is that once the keypad moulds have been manufactured, the cost of producing buttons with Braille dots is no higher than the cost of producing smooth buttons. Making both would

require separate sets of moulds and two different types of inventory. If the patrons of drive-in machines found buttons with Braille dots harder to use, there might be a reason to incur these extra costs. But since the dots pose no difficulty for sighted users, the best and cheapest solution is to produce only keypads with dots.

There is probably no more useful step you can take in your study of economics than to perform several versions of the assignment in [Exercise 1.6](#). Students who do so almost invariably become lifelong economic naturalists. Their mastery of economic concepts not only does not decay with the passage of time; it actually grows stronger. We urge you, in the strongest possible terms, to make this investment!

Exercise 1.6

In 500 words or fewer, use cost–benefit analysis to explain some pattern of events behaviour you have observed in your own environment.

A CAUTIONARY NOTE: ECONOMISTS AND ECONOMICS

We have argued that economics has a legitimate claim to be considered as a science. Any scientist will have personal views as to how the world might be improved, and these will usually reflect the body of knowledge that constitutes the science concerned as well as the scientist's own ethical views. To take global warming as an example, a climatologist can use the results of the empirical and theoretical investigation of climate change to predict the consequences of different levels of greenhouse gases on average temperatures over the next century. In so doing the climatologist is engaging in *positive* scientific analysis. The climatologist may be asked, what can be done about this? As a scientist, his answer should follow this general form. If you wish to reduce climate change by such and such an amount you will have to reduce emissions by so much per annum. Notice that the response avoids the question of what *ought* to be done. Our climate change scientist is still engaging

in positive science: his answer (assuming the truth is being told) does not reflect his values, but reflects only the conclusions of his science. A key test of this is whether in principle his answer can be falsified.

Suppose, however, the climatologist had answered: we must ban all use of private cars. This means choosing (implicitly) a level of emissions reductions and a mechanism to achieve it, and will reflect the chooser's values, priorities and willingness to impose costs on others and the value placed on reductions in climate change. His response is not a positive one, but a *normative* one. Conclusions based on tastes or values cannot be subjected to scientific verification or falsification.

Economists are often called on to advise on economic policy or to comment in the media on economic events and developments. In so far as their involvement is based on using economics to demonstrate cause and effect, options that are open, and consequences of proposed actions, economists are engaging in 'positive' economics. Once they stray beyond this, they are making 'normative' economics statements. The critical test is whether there is an express or implied 'ought' in the statement. If there is, the statement may be economics in the sense of a conclusion as to economic policy, but it is normative economics, not positive economics.

In practice, it may be difficult for a non-economist to see when an economist is speaking positively or normatively (and this applies to climatologists, too), so that the listener may believe that what is said is in some sense objectively true while in reality it reflects the values of the speaker as much as the science involved. Scientists, including economists, frequently use (abuse?) their scientific knowledge to advance their ethical views on the basis that their statements reflect the conclusions of science: 'I am Sir Oracle and when I ope my lips let no dog bark' (Shakespeare: *Merchant of Venice*, I (i)).

SUMMARY

- Economics is the study of how people make choices under conditions of scarcity and of the results of those

choices for society. Economic analysis of human behaviour begins with the assumption that people are *rational* – that they have well-defined goals and try to achieve them as best they can. In trying to achieve their goals, people normally face trade-offs: because material and human resources are limited, having more of one good thing means making do with less of some other good thing.

- Our focus in this chapter has been on how rational people make choices among alternative courses of action. Our basic tool for analysing these decisions is *cost–benefit analysis*. The Cost–Benefit Principle says that a person should take an action if, and only if, the benefit of that action is at least as great as its cost. The benefit of an action is defined as the largest money amount the person would be willing to pay in order to take the action. The cost of an action is defined as the money value of everything the person must give up in order to take the action.
- Often the question is not whether to pursue an activity but rather how many units of it to pursue. In these cases, the rational person pursues additional units as long as the marginal benefit of the activity (the benefit from pursuing an additional unit of it) exceeds its marginal cost (the cost of pursuing an additional unit of it).
- In using the cost–benefit framework, we need not presume that people *choose rationally* all the time. Indeed, we identified four common pitfalls that plague decision makers in all walks of life: a tendency to treat small proportional changes as insignificant, and/or to ignore opportunity costs, and/or not to ignore sunk costs, and/or to confuse average and marginal costs and benefits.

- *Microeconomics* is the study of individual choices and of group behaviour in individual markets, while *macroeconomics* is the study of the performance of national economies and of the policies that governments use to try to improve economic performance.
- *Statements may be positive or normative.* Positive economics consists in the conclusions of economics that are independent of the ethical value system of the economist. Normative economics consists in statements in economics that reflect or are based on the ethical value system of the economist, implicitly, explicitly or by omission.

REVIEW QUESTIONS

1. A friend of yours on the tennis team says: 'Private tennis lessons are definitely better than group lessons.' Explain what you think he means by this statement. Then use the Cost–Benefit Principle to explain why private lessons are not necessarily the best choice for everyone.
2. True or false: Your willingness to drive to town to save €30 on a new appliance should depend on what fraction of the total selling price €30 is. Explain.
3. Why might someone who is trying to decide whether to see a movie be more likely to focus on the €9 ticket price than on the €20 she would fail to earn by not babysitting?
4. Many people think of their air travel as being free when they use frequent-flyer coupons. Explain why these people are likely to make wasteful travel decisions.
5. Is the non-refundable tuition payment you made to your university this year a sunk cost? How would your answer differ if your university were to offer a full tuition refund to any student who dropped out of school during the first two months of the semester?

PROBLEMS

connect

Problems marked with an asterisk (*) are more difficult.

1. The most you would be willing to pay for having a freshly washed car before going out on a date is €6. The smallest amount for which you would be willing to wash someone else's car is €3.50. You are going out this evening, and your car is dirty. How much economic surplus would you receive from washing it?
2. To earn extra money in the summer, you grow tomatoes and sell them at the farmers' market for 30 cents per kg. By adding compost to your garden, you can increase your yield as shown in the table below. If compost costs 50 cents per kg and your goal is to make as much money as possible, how many kilograms of compost should you add?

Kg of compost	Kg of tomatoes
0	100
1	120
2	125
3	128
4	130
5	131
6	131.5

3. Residents of your city are charged a fixed weekly fee of €6 for garbage collection. They are allowed to put out as many bins as they wish. The average household disposes of three bins of garbage per week under this plan. Now suppose that your city changes to a 'tag' system. Each bin to be collected must have a tag affixed to it. The tags cost €2 each and are not reusable. What effect do you think the introduction of the tag system will have on the total quantity of garbage collected in your city? Explain briefly.
4. Once a week, Smith purchases a six-pack of cola and puts

it in his refrigerator for his two children. He invariably discovers that all six cans are gone on the first day. Jones also purchases a six-pack of cola once a week for his two children but, unlike Smith, he tells them that each may drink no more than three cans. If the children use cost–benefit analysis each time they decide whether to drink a can of cola, explain why the cola lasts much longer at Jones' house than at Smith's.

5. Tom is a mushroom farmer. He invests all his spare cash in additional mushrooms, which grow on otherwise useless land behind his barn. The mushrooms double in weight during their first year, after which time they are harvested and sold at a constant price per kilogram. Tom's friend Dick asks Tom for a loan of €200, which he promises to repay after one year. How much interest will Dick have to pay Tom in order for Tom to recover his opportunity cost of making the loan? Explain briefly.
6. Suppose that in the last few seconds you devoted to Question 1 in your physics exam you earned 4 extra points, while in the last few seconds you devoted to Question 2 you earned 10 extra points. You earned a total of 48 and 12 points, respectively, on the two questions, and the total time you spent on each was the same. If you could take the exam again, how – if at all – should you reallocate your time between these questions?
7. Martha and Sarah have the same preferences and incomes. Just as Martha arrived at the theatre to see a play, she discovered that she had lost the €10 ticket she had purchased earlier. Sarah had also just arrived at the theatre planning to buy a ticket to see the same play when she discovered that she had lost a €10 note from her purse. If both Martha and Sarah are rational and both still have enough money to pay for a ticket, is one of them more likely than the other to go ahead and see the play anyway?

- 8.* You and your friend Joe have identical tastes. At 2 pm, you go to the local Ticketmaster outlet and buy a €30 ticket to a football match to be played that night 50 km away. Joe plans to attend the same game, but because he cannot get to the Ticketmaster outlet, he plans to buy his ticket at the game. Tickets sold at the game cost only €25, because they carry no Ticketmaster surcharge. (Many people nonetheless pay the higher price at Ticketmaster, to be sure of getting good seats.) At 4 pm, an unexpected snowstorm begins, making the prospect of the 50 km drive much less attractive than before (but assuring the availability of good seats). If both you and Joe are rational, is one of you more likely to attend the game than the other?
- 9.* For each long-distance call anywhere in the continental United States, a new phone service will charge users 30 cents per minute for the first 2 minutes and 2 cents per minute for additional minutes in each call. Tom's current phone service charges 10 cents per minute for all calls, and his calls are never shorter than 7 minutes. If Tom's dorm switches to the new phone service, what will happen to the average length of his calls?
- 10.* The meal plan at university A lets students eat as much as they like for a fixed fee of €500 per semester. The average student there eats 250 kg of food per semester. University B charges €500 for a book of meal tickets that entitles the student to eat 250 kg of food per semester. If the student eats more than 250 kg, he or she pays €2 for each additional kilogram; if the student eats less, he or she gets a €2 per kg refund. If students are rational, at which university will average food consumption be higher? Explain briefly.

REFERENCES

Thaler, R. (1980) 'Towards a positive theory of consumer choice', *Journal of Economic Behaviour and Organization*,

1(1).

Appendix A

Although many of the examples and most of the end-of-chapter problems in this book are quantitative, none requires mathematical skills beyond rudimentary high-school algebra and geometry. In this brief appendix we shall review some of the skills you will need for dealing with these examples and problems.

One important skill is to be able to read simple verbal descriptions and translate the information they provide into the relevant equations or graphs. You will also need to be able to translate information given in tabular form into an equation or graph, and sometimes you will need to translate graphical information into a table or equation. The following examples illustrate all the tools you will need.

We begin with an example that shows how to construct a long-distance telephone billing equation from a verbal description of the billing plan.

Example 1A.1

Your long-distance telephone plan charges you €5 per month plus 10 cents per minute for long-distance calls. Write an equation that describes your monthly telephone bill.

An **equation** is a simple mathematical expression that describes the relationship between two or more **variables**, or quantities that are free to assume different values in some range. The most common type of equation we shall work with contains two types of variable: **dependent variable** and **independent variable**. In this example, the dependent variable is the money amount of your monthly

telephone bill, and the independent variable is the variable on which your bill depends – namely, the volume of long-distance calls you make during the month. Your bill also depends on the €5 monthly fee and the 10 cents per minute charge. But, in this example, those amounts are **constants**, not variables. A constant, also called a **parameter**, is a quantity in an equation that is fixed in value, not free to vary. As the terms suggest, the dependent variable describes an outcome that depends on the value taken by the independent variable.

equation a mathematical expression that describes the relationship between two or more variables

variable a quantity that is free to take a range of different values

dependent variable a variable in an equation whose value is determined by the value taken by another variable in the equation

independent variable a variable in an equation whose value determines the value taken by another variable in the equation

constant (or **parameter**) a quantity that is fixed in value

Once you have identified the dependent variable and the independent variable, choose simple symbols to represent them. In algebra courses, X is typically used to represent the independent variable and Y the dependent variable. Many people find it easier to remember what the variables stand for, however, if they choose symbols that are linked in some straightforward way to the quantities that the variables represent. Thus, in this example, we might use B to represent your monthly *bill* in money terms and T to represent the total *time* in minutes you spent during the month on long-distance

calls.

Having identified the relevant variables and chosen symbols to represent them, you are now in a position to write the equation that links them:

$$B = 5 + 0.10T \quad (1A.1)$$

where B is your monthly long-distance bill in money terms and T is your monthly total long-distance calling time in minutes. The fixed monthly fee (5) and the charge per minute (0.10) are parameters in this equation. Note the importance of being clear about the units of measure. Because B represents the monthly bill, we must also express the fixed monthly fee and the per-minute monetary charge, which is why the latter number appears in [Eq. \(1A.1\)](#) as 0.10 rather than 10. [Equation \(1A.1\)](#) follows the normal convention in which the dependent variable appears by itself on the left-hand side while the independent variable or variables and constants appear on the right-hand side.

Once we have the equation for the monthly bill, we can use it to calculate how much you will owe as a function of your monthly volume of long-distance calls. For example, if you make 32 minutes of calls, you can calculate your monthly bill by simply substituting 32 minutes for T in [Eq. \(1A.1\)](#):

$$B = 5 + 0.10(32) = 8.20 \quad (1A.2)$$

Your monthly bill when you make 32 minutes of calls is thus equal to €8.20.

Exercise 1A.1

Under the monthly billing plan described in [Example 1A.1](#), how much would you owe for a month during which you made 45 minutes of long-distance calls?

Example 1A.2 shows how to portray the billing plan described in Example 1A.1 as a graph.

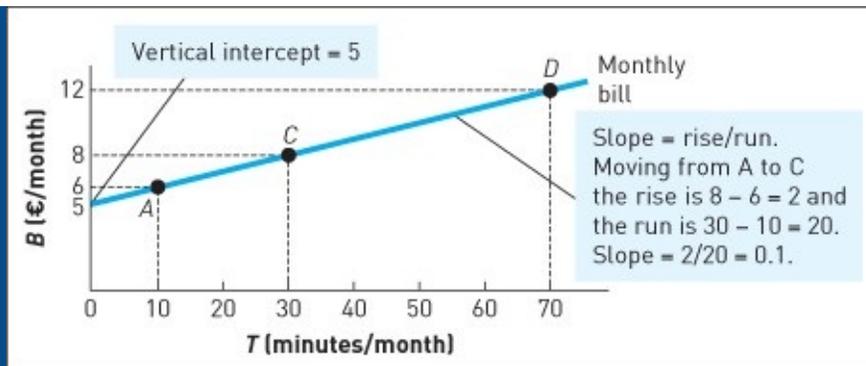
Example 1A.2

Construct a graph that portrays the monthly long-distance telephone billing plan described in Example 1A.1, putting your telephone charges, in money per month, on the vertical axis, and your total volume of calls, in minutes per month, on the horizontal axis.

The first step in responding to this instruction is the one we just took, namely to translate the verbal description of the billing plan into an equation. When graphing an equation, the normal convention is to use the vertical axis to represent the dependent variable and the horizontal axis to represent the independent variable. In Fig. 1A.1, we therefore put B on the vertical axis and T on the horizontal axis. One way to construct the graph shown in Fig. 1A.1 is to begin by plotting the monthly bill values that correspond to several different total amounts of long-distance calls. For example, someone who makes 10 minutes of calls during the month would have a bill of $B = 5 + 0.10(10) = \text{€}6$. Thus, in Fig. 1A.1 the value of 10 minutes per month on the horizontal axis corresponds to a bill of €6 per month on the vertical axis (point A). Someone who makes 30 minutes of long-distance calls during the month will have a monthly bill of $B = 5 + 0.10(30) = \text{€}8$, so the value of 30 minutes per month on the horizontal axis corresponds to €8 per month on the vertical axis (point C). Similarly, someone who makes 70 minutes of long-distance calls during the month will have a monthly bill of $B = 5 + 0.10(70) = \text{€}12$, so the value of 70 minutes on the horizontal axis corresponds to €12 on the vertical axis (point D). The line joining these points is the graph of the monthly billing in Eq. (1A.1).

Figure 1A.1 The Monthly Telephone Bill in Example 1A.1

The graph of the equation $B = 5 + 0.10T$ is the straight line shown. Its vertical intercept is 5, and its slope is 0.10.



As shown in Fig. 1A.1, the graph of the equation $B = 5 + 0.10T$ is a straight line. The parameter 5 is the **vertical intercept** of the line – the value of B when $T = 0$, or the point at which the line intersects the vertical axis. The parameter 0.10 is the **slope** of the line, which is the ratio of the **rise** of the line to the corresponding **run**. The ratio rise/run is simply the vertical distance between any two points on the line divided by the horizontal distance between those points. For example, if we choose points A and C in Fig. 1A.1, the rise is $8 - 6 = 2$ and the corresponding run is $30 - 10 = 20$, so rise/run = $2/20 = 0.10$. More generally, for the graph of any equation $Y = a + bX$, the parameter a is the vertical intercept and the parameter b is the slope.

vertical intercept in a straight line, the value taken by the dependent variable when the independent variable equals zero

slope in a straight line, the ratio of the vertical distance the straight line travels between any two points (**rise**) to the corresponding horizontal distance (**run**)

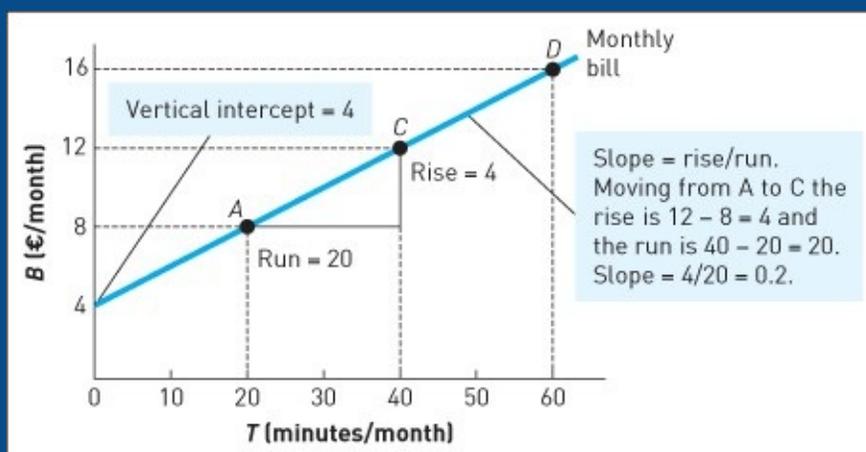
Example 1A.3 shows how to derive the equation for a straight line from a graph of the line.

Example 1A.3

Figure 1A.2 shows the graph of the monthly billing plan for a new long-distance plan. What is the equation for this graph? How much is the fixed monthly fee under this plan? How much is the charge per minute?

Figure 1A.2 Another Monthly Long-Distance Plan

The vertical distance between points A and C is $12 - 8 = 4$ units, and the horizontal distance between points A and C is $40 - 20 = 20$, so the slope of the line is $4/20 = 1/5 = 0.20$. The vertical intercept (the value of B when $T = 0$) is 4, so the equation for the billing plan shown is $B = 4 + 0.20T$.



The slope of the line shown in Fig. 1A.2 is the rise between any two points divided by the corresponding run. For points A and C, rise = $12 - 8 = 4$, and run = $40 - 20 = 20$, so the slope equals rise/run = $4/20 = 1/5 = 0.20$. And since the horizontal intercept of the line is 4, its equation must be given by

$$B = 4 + 0.20T \quad (1A.3)$$

Under this plan, the fixed monthly fee is the value of the bill when $T = 0$, which is €4. The charge per minute is the slope of the billing line, 0.20, or 20 cents per minute.

Exercise 1A.2

Write the equation for the billing plan shown in the graph below. How