



# **Introduction to economics**

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EC1002

**2016**

Undergraduate study in  
**Economics, Management,  
Finance and the Social Sciences**

This is an extract from a subject guide for an undergraduate course offered as part of the University of London International Programmes in Economics, Management, Finance and the Social Sciences. Materials for these programmes are developed by academics at the London School of Economics and Political Science (LSE).

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London WC1B 5DN  
United Kingdom  
[www.londoninternational.ac.uk](http://www.londoninternational.ac.uk)

Published by: University of London

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## Notes



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# Introduction

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## Introduction to the subject area

Every day people make decisions that belong within the realm of economics. What to buy? What to make and sell? How many hours to work? We have all participated in the economy as consumers, many of us as workers, some of us also as producers. We have paid taxes. We have saved our earnings in a bank account. All of these activities (and many more) belong to the realm of economics. Households and firms are the basic units of an economy and are concerned with the economic problem: how best to satisfy unlimited wants using the limited resources that are available? As such, economics is the study of how society uses its scarce resources. Its aim is to provide insight into the processes governing the production, distribution and consumption of goods and services in an exchange economy.

The previous paragraph could be taken to imply that the 'realm of economics' is limited and clearly defined. However, if economics is viewed as a way of thinking, or a set of tools that can be used to analyse human behaviour and the world around us, then you will find that the principles of economics can be applied to many different areas of life. The scope is thus very broad, but the principles of analysis are well defined and these are what you will become familiar with through undertaking this course. Although the course provides some information that is descriptive, such as how the banking system works, for example, its main focus is on introducing models and concepts which are used as tools of economic analysis. Concepts such as opportunity cost and approaches such as marginal analysis can be widely applied and prove very useful in understanding various aspects of society and people's lives.

Studying economics doesn't just impart knowledge; it also develops skills such as logical and analytical thinking and problem-solving skills, which are useful beyond the formal study of economics. For some of you, economics is not the main area of study, and you may not be intending to pursue a career as an economist. However, we are sure that an understanding of basic economic concepts will still prove useful to you in whatever direction your studies and subsequent career may take.

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## Aims of the course

The course aims to:

- introduce you to an understanding of the domain of economics as a social theory
- introduce you to the main analytical tools which are used in economic analysis
- introduce you to the main conclusions derived from economic analysis and to develop your understanding of their organisational and policy implications
- enable you to participate in debates on economic matters.

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## Learning outcomes

At the end of the course and having completed the Essential reading and activities, you should be able to:

- define the main concepts and describe the models and methods used in economic analysis
- formulate real world issues in the language of economic modelling
- apply and use economic models to analyse these issues
- assess the potential and limitations of the models and methods used in economic analysis.

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## Overview of learning resources

### Textbooks

This subject guide follows the structure of the primary textbook (below) and works through the parts of the textbook included in the syllabus section by section, providing commentary, additional activities and extending the material in some parts.

### Primary textbook

Begg, D., G. Vernasca, S. Fischer and R. Dornbusch *Economics*. (London: McGraw Hill, 2014) 11th edition [ISBN 9780077154516]. Referred to as **BVFD**.

The two supplementary textbooks below can be used to extend your understanding and also provide an alternative approach which you may find suits your own style. Although you are encouraged to make use of these, you should check that you have a good understanding of the material covered in the primary textbook and the subject guide, as this is the required material for this course.

### Supplementary textbooks

Lipsey, R.G. and K.A. Chrystal *Economics*. (Oxford: Oxford University Press, 2015) 13th edition [ISBN 9780198746577] international edition; [ISBN 9780199676835] UK edition. Referred to as **L&C**.

Witztum, A. *Economics*. (Oxford: Oxford University Press, 2005) [ISBN 9780199271634]. Referred to as **AW**.

The material contained in the two supplementary textbooks (where it goes beyond that contained in BVFD and the subject guide) is not directly examinable and you are not required to purchase these texts. However, if you are able to access them, you will find them beneficial and they will enhance your understanding of the text and this guide. Both have certain key advantages, for example, L&C contains very clear explanations and is structured in a very logical way, while AW provides a deeper understanding of the core concepts both philosophically and in terms of the analytical approach.

### How to use the subject guide

Each of the 23 blocks of the subject guide covers one or two chapters from the primary textbook. The guide works through the textbook section by section and you will find additional explanations, activities and questions to aid and test your understanding. The subject guide has been designed to accompany the textbook, so you should use them jointly and follow the reading instructions listed throughout (e.g. 'Read sections 14.2–14.3; answer the following questions to check your understanding' etc.).

One key aim of the guide is to encourage active engagement with the material, as this is how you will really gain a good understanding. For example, many of the models which will be covered in this course are expressed graphically and the subject guide contains empty boxes where you can practise drawing these graphs. It is very difficult to understand and remember graphs just by looking at them, so you will need to practise drawing them for yourself. For more complex graphs in later chapters, you could even practise using blank paper and then, when you are confident, draw the graph in the empty box in the subject guide. You are also encouraged to actively undertake the other activities and questions in the subject guide. Answers to these are available on the virtual learning environment (VLE).

The subject guide and the primary textbook must be used together. The guide will not make much sense without the textbook. Equally, do not be tempted to neglect the guide and just focus on the textbook. You need to be aware that the subject guide not only seeks to complement and clarify the contents of the textbook, but also to extend it in certain places. For the final examination, you will need to be familiar with the material in both the textbook and the subject guide. The textbook chapters that are not covered in the guide, and are not examinable, are: Chapters 11 (except for section 11.9), 12, 26, 29. We hope that this guide will help you as you work through the textbook and that you will find it useful in your studies.

### Online study resources (VLE, Online Library)

In addition to the subject guide and the Essential reading, it is crucial that you take advantage of the study resources that are available online for this course, including the VLE and the Online Library.

You can access the VLE, the Online Library and your University of London email account via the Student Portal at: <http://my.londoninternational.ac.uk>

You should have received your login details for the Student Portal with your official offer, which was emailed to the address that you gave on your application form. You have probably already logged in to the Student Portal in order to register! As soon as you registered, you will automatically have been granted access to the VLE, Online Library and your fully functional University of London email account.

If you forget your login details at any point, please email [uolia.support@london.ac.uk](mailto:uolia.support@london.ac.uk) quoting your student number.

### The VLE

The VLE, which complements this subject guide, has been designed to enhance your learning experience, providing additional support and a sense of community. It forms an important part of your study experience with the University of London and you should access it regularly.

The VLE provides a range of resources for EMFSS courses:

- **Electronic study materials:** All of the printed materials which you receive from the University of London are available to download, to give you flexibility in how and where you study.
- **Discussion forums:** An open space for you to discuss interests and seek support from your peers, working collaboratively to solve problems and discuss subject material. Some forums are moderated by an LSE academic.

- **Videos:** Recorded academic introductions to many subjects; interviews and debates with academics who have designed the courses and teach similar ones at LSE.
- **Recorded lectures:** For a few subjects, where appropriate, various teaching sessions of the course have been recorded and made available online via the VLE.
- **Audiovisual tutorials and solutions:** For some of the first year and larger later courses such as Introduction to Economics, Statistics, Mathematics and Principles of Banking and Accounting, audio-visual tutorials are available to help you work through key concepts and to show the standard expected in exams.
- **Self-testing activities:** Allowing you to test your own understanding of subject material.
- **Study skills:** Expert advice on getting started with your studies, preparing for examinations and developing your digital literacy skills.

Note: Students registered for Laws courses also receive access to the dedicated Laws VLE.

Some of these resources are available for certain courses only, but we are expanding our provision all the time, and you should check the VLE regularly for updates.

### Answers on the VLE

Answers to the subject guide exercises can be found on the VLE. By far the most beneficial approach is to attempt the questions and activities yourself before you look at the answers. If, when you do look at them, you discover that your own answer is incorrect, try to work out what led you to that answer (to clear away your misconceptions) and furthermore, try to understand **why** the given answer is in fact correct. This will help you to gain a solid understanding.

### Making use of the Online Library

The Online Library (<http://onlinelibrary.london.ac.uk>) contains a huge array of journal articles and other resources to help you read widely and extensively.

To access the majority of resources via the Online Library you will either need to use your University of London Student Portal login details, or you will be required to register and use an Athens login.

The easiest way to locate relevant content and journal articles in the Online Library is to use the **Summon** search engine.

If you are having trouble finding an article listed in a reading list, try removing any punctuation from the title, such as single quotation marks, question marks and colons.

For further advice, please use the online help pages (<http://onlinelibrary.london.ac.uk/resources/summon>) or contact the Online Library team: [onlinelibrary@shl.london.ac.uk](mailto:onlinelibrary@shl.london.ac.uk)

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## Route map to the guide

The subject guide consists of 23 blocks – an introductory block, and then 11 for microeconomics and 11 for macroeconomics. Throughout the guide, ‘chapter’ refers to the sections of the textbook, while ‘block’ refers to the sections of the subject guide. This is to avoid confusion – for example, when the guide says ‘this concept will be explored further in Chapter 12’, it

should be clear to the reader that this refers to Chapter 12 of the textbook (BVFD).

Breakdown of readings for each block:

### Microeconomics

Block	1	2	3	4	5	6	7	8	9	10	11	12
Chapter	1, 2	3	4	5	6; 7.1, 7.2 and 7–appendix	7.3–7.9	8.1–8.4	8.5–8.10	9	10	13	14; 11.9

### Macroeconomics

Block	13	14	15	16	17	18	19	20	21	22	23
Chapter	15	16, 17	18, 19	20	21	22	23	24	25	27	28

Specific topics and concepts to be covered are as follows: This differs from the syllabus only in the order that topics are listed. The full syllabus can be found in Appendix 1.

<b>Block 1</b>	<b>Introduction:</b> The economic problem, production possibility frontiers, opportunity cost, the role of the market, absolute and comparative advantage, positive and normative economics, micro and macro economics, nominal and real values, theory and models in economics
<b>Microeconomics</b>	
<b>Block 2</b>	<b>Demand, supply and the market:</b> demand, supply, demand functions, supply functions, equilibrium, consumer and producer surplus.
<b>Block 3</b>	<b>Elasticity:</b> price elasticity of demand, cross-price elasticity of demand, income elasticity (normal, inferior and luxury goods), elasticity of supply.
<b>Block 4</b>	<b>Consumer choice:</b> rationality, utility, indifference curves, the budget constraint, utility maximisation, substitution and income effects, substitutes and complements.
<b>Block 5</b>	<b>The Firm I:</b> the firm, profit maximisation, marginal cost and marginal revenue, technology and production functions, returns to scale, the law of diminishing marginal returns, isoquants and isocost lines.
<b>Block 6</b>	<b>The Firm II:</b> cost functions, the distinction between the long and the short-run, fixed and variable costs, behaviour of the firm in the long and in the short-run, the firm's supply function.
<b>Block 7</b>	<b>Perfect competition:</b> competitive industry, the competitive firm, entry and exit, short-run and long-run equilibrium, some comparative statics.
<b>Block 8</b>	<b>Pure monopoly:</b> monopoly, price discrimination, natural monopoly, supernormal profit, monopoly and competitive equilibrium compared.
<b>Block 9</b>	<b>Market structure and imperfect competition:</b> monopolistic competition (differentiated products, the firm's behaviour, the role of entry), oligopoly (interdependence, game theory, reaction functions).
<b>Block 10</b>	<b>Inputs to production: the labour market:</b> the factors of production, demand and supply of labour (profit maximisation and the demand for labour, utility maximisation and the supply of labour), economic rent, monopsony, factors affecting labour market equilibrium (unions, minimum wages).
<b>Block 11</b>	<b>Welfare economics:</b> general equilibrium, horizontal and vertical equity, allocative and Pareto efficiency, market failures, externalities, Coase theorem.
<b>Block 12</b>	<b>The role of government:</b> government interventions, public goods, taxation; the income distribution, the Gini coefficient and Lorenz curves.

Macroeconomics	
Block 13	<b>Introduction to macroeconomics:</b> the problem of aggregation, the circular flow of income, leakages and injections, national income accounting, depreciation, value added and the $NNP = Y$ identity, real and nominal gross domestic product (GDP).
Block 14	<b>Aggregate demand:</b> actual and potential output, consumption, investment, income determination, equilibrium, the multiplier, the paradox of thrift, consumption and taxation, the government budget, automatic stabilisers (the financing of government), the multiplier and taxation, the role of fiscal policy, imports and exports, the multiplier in an open economy.
Block 15	<b>Money and banking:</b> the role of money, real balances, the liquidity preference approach and the demand for money (liquid assets), commercial banks and the supply of money (banks and the various multipliers), central banks and monetary control, equilibrium in the money market.
Block 16	<b>Monetary and fiscal policy:</b> aggregate demand and equilibrium (IS), equilibrium in the money market (LM), the <i>IS-LM</i> model, monetary and fiscal policies in a closed economy.
Block 17	<b>Aggregate demand and aggregate supply:</b> Keynesian and classical assumptions regarding wages and prices, aggregate supply in the long-run and the short-run, the effects of exogenous demand and supply shocks.
Block 18	<b>Inflation:</b> inflation targeting, the Taylor rule, the quantity theory of money, the Phillips curve in the long-run and the short-run, stagflation and the role of expectations, costs of inflation
Block 19	<b>Unemployment:</b> types of unemployment, voluntary and involuntary unemployment, causes of unemployment, private and social costs, hysteresis
Block 20	<b>Exchange rates and the balance of payments:</b> the foreign currency market, exchange rate regimes, the balance of payments, capital mobility, the rate of interest and the price of foreign currency
Block 21	<b>Open economy macroeconomics:</b> the effects of fiscal and monetary policies under fixed and floating exchange rates with and without capital mobility
Block 22	<b>Business cycles:</b> trend path and business cycles, theories of the business cycle, real business cycles
Block 23	<b>Supply-side economics and economic growth:</b> growth in potential output, the steady state, technological progress, capital accumulation, convergence, endogenous growth, policies to promote growth

## Study advice

The British education system, possibly more than others, and economics as a subject, possibly more than others, both emphasise understanding above rote learning (learning by heart). It is very difficult (if not impossible) to do well in economics examinations simply by rote learning. A much better strategy is to try to gain a good understanding of the concepts and the models. Although this may involve more work in the short term, the final outcome will be much better, and the examination much easier. For example, many of the models we will cover can be summarised in a single graph or set of equations. You will need to be able to use these graphs to demonstrate the effects of changes in the economic environment to which the model relates. This is very difficult to do well through memorisation, but if you understand **why** the different lines of the graph are drawn in that particular way or what a particular equation represents, then adjusting the graph or modifying the equations will become a relatively simple and straightforward exercise.

The textbook, which the subject guide accompanies, assumes that you haven't done any economics before and starts from the basics. It gives a good explanation of all concepts and uses examples to make these new concepts intuitive. It also includes material to stretch you, including Maths boxes. You are required to really master this textbook, including the Maths boxes and more challenging elements. If there are sections which are difficult to understand at first, you may find that reading these through several times is very helpful. In certain places, the subject guide will also seek to extend the textbook if there are areas where it does not go far enough. Although you will find the textbook approach of starting at a fairly basic level very useful, you should expect the examination to be quite rigorous. For example, examination questions are likely to be similar to the 'hard' questions in the review questions at the end of each chapter. In this way, we hope to help you really lay a firm foundation of understanding in economics, and at the same time demonstrate the high standard that is expected of you as University of London students.

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## Use of mathematics

Economic models can be expressed in various ways, in words, in diagrams and in equations. Although this course mainly uses diagrammatic representations accompanied by words, simple equations can also be a concise way of expressing an economic model, and you will need to become familiar with this approach. At this stage, the maths involved will be limited to simple algebra and elementary calculus. Some basic mathematical techniques and ideas will be also introduced in the first block. It is important to work through the Maths boxes in each chapter, as these often provide a step-by-step explanation of the mathematical approach to the models covered. The subject guide will also provide further explanations where we think this will be helpful. Economics is becoming an increasingly technical subject and, although the level of mathematics required for this course is quite basic, we hope that you will become confident in taking a mathematical approach to analysing economic issues.

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## Examination advice

**Important:** the information and advice given here are based on the examination structure used at the time this guide was written. Please note that subject guides may be used for several years. Because of this we strongly advise you to always check both the current Programme regulations for relevant information about the examination, and the VLE where you should be advised of any forthcoming changes. You should also carefully check the rubric/instructions on the paper you actually sit and follow those instructions.

**Examination structure:** The structure for the 2016–17 examination is as follows:

- Part I
  - worth 50 marks
  - 30 multiple choice questions covering the entire syllabus in microeconomics and macroeconomics. Candidates should answer **all** 30 multiple choice questions.

- Part II, Section A
  - worth 25 marks
  - three long response questions in microeconomics of which candidates should answer **one** question.
- Part II, Section B
  - worth 25 marks
  - three long response questions in macroeconomics of which candidates should answer **one** question.

**Further advice for multiple choice questions:** Read the question and each of the possible answers carefully, paying attention to words such as 'not' and 'never'. Try to manage your time so you are able to check over your answers again at the end.

**Further advice for long-response questions:** Marks are not awarded for irrelevant material. For this reason, when you read a question, it is best to spend some time thinking about your answer before you start to write. Quickly writing everything remotely connected to the topic will not impress the examiner. The best answers demonstrate that candidates recognise the tools of analysis that are relevant to that question and they are able to use them effectively to provide a well-reasoned answer.

You can find further guidance on examination technique in the annual *Examiners' commentaries* for the course which are available on the University of London International Programmes website, and also in your academic and study skills handbook, *Strategies for success*.

Remember, it is important to check the VLE for:

- up-to-date information on examination and assessment arrangements for this course
- where available, past examination papers and *Examiners' commentaries* for the course which give advice on how each question might best be answered.



# Block 1: Economics, the economy and tools of economic analysis

## Introduction

This block covers the first two chapters of the textbook and is designed to give you an introduction to economics and some help in starting to use the tools of economic analysis. The concepts introduced in this block, such as scarcity, opportunity cost and *ceteris paribus* (more on these below), are absolutely essential to your understanding of economics. The more thoroughly you work through the material in this block, the better your foundation will be for all the material that follows.

So what is economics? The word ‘economy’ comes from two Greek words – *oikos* (meaning house) and *nemein* (meaning manage) – its original meaning was ‘household management’. Households have limited resources and managing these resources requires many decisions and a certain organisational system. The meaning of the word economics has developed over time. Today, economics can be defined as the study of how societies make choices on what, how and for whom to produce, given the limited resources available to them. Furthermore, the key economic problem can be defined as being to reconcile the conflict between people’s virtually unlimited desires and the scarcity of available resources and means of production.

These are the definitions provided in the core textbook (BVFD) and indeed in many other textbooks. They are traditional definitions and have their origins in an essay by Lionel Robbins (of the London School of Economics and Political Science) written in 1932<sup>1</sup> in which he defined economics as ‘the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses’.

It is important to realise that this definition is not without its critics. The textbook does not pretend to discuss in any depth the definition of economics or the legitimate domain of economic investigation. Those wishing to pursue the philosophical foundations of the nature of economics could consult the collection of papers edited by Frank Cowell and Amos Witztum,<sup>2</sup> especially papers by Atkinson, Witztum, Backhouse and Medema.

On a less philosophical note, if we were to follow the definition attributed to Jacob Viner (an early member of the ‘Chicago School’ and a teacher of Nobel laureate Milton Friedman) that ‘economics is what economists do’, the Robbins definition stated above would fall short of describing the way in which the subject has evolved, in particular in its failure to reflect the time and effort devoted today to empirical analysis.

Arguably, the definitions provided in the textbook apply more directly to microeconomics than macroeconomics, the latter being more concerned with the structure and performance of the aggregate economy and such issues as growth, cycles, unemployment and inflation. However, underlying these ‘big’ issues is the behaviour of individual agents such as consumers and firms. Recent developments in macroeconomics have been concerned with establishing microeconomic foundations. So scarcity and the rational responses to it are not absent from macroeconomics.

<sup>1</sup> Lionel Robbins An essay on the nature and significance of economic science. (London: Macmillan, 1932, 2nd edition 2014) p.16.

<sup>2</sup> Cowell, Frank and Amos Witztum (eds) Lionel Robbins’s essay on the nature and significance of economic science: 75th anniversary conference proceedings. (London: Suntory and Toyota International Centres for Economics and Related Disciplines, 2009) pp.1–500. Available at <http://darplse.ac.uk/papersdb/LionelRobbinsConferenceProceedingsVolume.pdf>

Although the definitions above may appear abstract, economics deals with phenomena you will be very familiar with from your daily activities, and provides tools and a language to analyse these. While it is not the only language available, we hope it will prove useful to you.

## Economics and the real world

One of the main reasons that BVFD was chosen as the textbook for the course is that it combines the exposition of economic theory with liberal use of actual data on many economic issues. Modern economics is a subject which, at its best, does not theorise in a vacuum but addresses issues of real world importance and attempts to make its concepts and theories consistent with the facts. When economists make policy recommendations these address issues of current importance and concern. Furthermore, the effectiveness of economic policy is increasingly subject to empirical evaluation. Sometimes this happens by piloting a policy on a restricted scale before it is rolled out nationally. Almost always government departments, private sector analysts and academic economists attempt to evaluate the consequences of policy in the months or years after implementation. If you pursue your study of economics to a more advanced level you will learn how applied economists attempt to test the relevance and accuracy of their theories and the success or failure of economic policy using statistical techniques broadly known as econometrics. However, even at this early stage of your study you should attempt to familiarise yourself with actual facts about the economy and think about what these imply for economic theory and the formation and evaluation of economic policy. The statistics and policy discussions in BVFD often (but not always) relate to the UK economy; we encourage you to look for comparable examples wherever you live.

## Learning outcomes

By the end of this block and having completed the Essential reading and activities, you should be able to:

- recognise economics as the study of how society addresses the conflict between unlimited desires and scarce resources
- describe ways in which society decides what, how and for whom to produce
- identify the opportunity cost of a decision or action
- explain the difference between positive and normative economics
- define microeconomics and macroeconomics
- explain why theories deliberately simplify reality
- recognise time-series, cross section and panel data
- construct index numbers
- explain the difference between real and nominal variables
- build a simple theoretical model
- plot data and interpret scatter diagrams
- use 'other things equal' to ignore, but not forget, some aspects of a problem in order to focus on core issues.

## Essential reading

Begg, Vernasca, Fischer and Dornbusch (BVFD), Chapters 1 and 2.

## Further reading

Lipsey and Chrystal (L&C) international edition, Chapter 1; UK edition, Chapter 1.

Witztum (AW), Chapter 1.

## Synopsis of this block

This block introduces some of the key concepts in economics. First, scarcity – the idea that the means available to society (its labour force, its capital stock, its natural resources, its technology) are insufficient to meet all the wants (or the desired goods and services) of the people making up that society. Related to scarcity is the concept of opportunity cost – which is the value of the best alternative that must be sacrificed. The concept of scarcity gives rise to the **production possibility frontier** (PPF), which shows the maximum amount of one good that can be produced given the output of another good. The slope of the PPF is the opportunity cost. The fact that different individuals and countries have different opportunity costs of producing various goods gives rise to comparative advantage and creates the possibilities for gains from trade.

In economics, people are assumed to behave rationally – only taking a course of action if its benefits outweigh its costs. Furthermore, people are assumed to be motivated by self-interest. The idea of the ‘invisible hand’ describes how market forces allocate resources efficiently despite the self-interested motivations of individuals. Markets resolve production and consumption decisions via the adjustment of prices.

Economics can be divided into different sub groups and approaches. Positive economics deals with ‘facts’ about how the economy behaves and with empirically testable propositions, while normative economics involves subjective judgements. Microeconomics studies particular markets and activities in detail, while macroeconomics deals with aggregates and studies the economy as a whole system.

The interplay of data and theory/models in economics is very important. Models are deliberate simplifications of reality which help organise how we think about a problem. A key approach of economic analysis is to abstract from various factors by holding them constant – this is known as *ceteris paribus* or ‘other things equal’. The second half of this block examines the relationship between data and theory and also provides guidance and instruction regarding key practical concepts and skills such as index numbers, nominal and real variables, measuring change, diagrams, lines and equations. Chapter 2 concludes by briefly addressing some popular criticisms of economics and economists.

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### ► BVFD: read Chapter 1.

Sections 1.1 and 1.3 introduce the concepts of scarcity, opportunity cost, and efficiency. These are not separate concepts but are all interrelated and can be demonstrated using the production possibility frontier introduced in section 1.3. For a more detailed introduction to these fundamental concepts, you can refer to AW Chapter 1.

### Read section 1.1, concept 1.1 and case 1.1.

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## Scarcity

BVFD defines scarcity by saying: ‘a resource is scarce if the demand for that resource at a zero price would exceed the available supply’. Since the concepts of demand and supply have not yet been introduced to you, we can also define scarcity by stating that the means available to society (its labour force, its capital stock, its natural resources, its technology) are insufficient to meet all the wants (or the desired goods and services) of the people making up that society. This implies that for any one person to have more of something, they or someone else must have less of something else. In turn, this requires choice, both at the level of the individual agent but also at the societal or collective level. How individuals and societies cope with scarcity in relation to wants is central to economics. This course concentrates on the market economy as the basic organisational principle for coping with scarcity, but modified by governments to rectify market shortcomings and to achieve distributional ends.

## Opportunity cost

Related to scarcity is the concept of opportunity cost – one of the key concepts in economic analysis.

To cement your understanding of opportunity cost, complete the following activity on this concept.

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### Activity SG1.1

- a. Let us change the details of the problem in concept box 1.1. Suppose that there were no jobs in the campus shop. The only job available, and this is the alternative to going to the beach with your friends, is to work at the local fast food restaurant clearing tables and washing dishes. This job also pays £70, but because of its general unpleasantness you wouldn't do it unless you were paid at least £55. Should you go to the beach or work at the fast food restaurant?
- b. A high-end ladies fashion boutique purchases winter coats from a manufacturer at a price of £300 per coat. During the winter the boutique will try to sell the coats at a price higher than £300 but may not be able to sell all of the coats. Since they are the latest fashion, no customers would be interested in buying the coats next season. However, at the end of the winter, the manufacturer will pay the boutique 20% of the original price for any unsold coats (and re-use the expensive fabrics they are made from for the next year's designs).
  - i. At the beginning of the year, before the boutique has purchased any coats, what is the opportunity cost of these coats?
  - ii. After the boutique has purchased the coats, what is the opportunity cost associated with selling a coat to a prospective customer? (You can assume the coat will be unsold at the end of the winter if that customer doesn't buy the coat).
  - iii. Suppose towards the end of the winter the boutique still has a large inventory of unsold coats. The boutique has set a retail price of £950 per coat. The marketing manager argues that the boutique should cut the price to £199 to try to sell the remaining coats before they become unfashionable at the end of the winter. However, the general manager disagrees, arguing that would mean a loss of £101 on each coat. Which makes more economic sense – the marketing manager's suggestion or the general manager's argument?

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► **BVFD: read section 1.2 and case 1.2.**

**This section raises various economic issues which you may be familiar with through the news or other sources. It demonstrates what kinds of issues economics deals with, although in the case of income distribution this is**

**often left to specialised courses. In each case, the authors demonstrate the impact on the three key questions of what to produce, how to produce it and for whom.**

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The global financial crisis of 2007–09 was a time of great disruption to economies around the world and indeed to the world economy. As can be seen in Figure 1.1 of the textbook, the US economy shrank at a faster rate than had been seen since before the 1980s. The textbook will come back to this period again and again to provide a fuller account of what happened, why it happened, and how various countries reacted – and to use this period of recent economic history to illustrate and explain various points of economic theory.

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## Rationality

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► BVFD: read concept box 1.2.

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This concept box comes back to the idea of rationality, introduced in section 1.1 of the textbook. In economics, people are assumed to act rationally, using all available information to maximise their satisfaction. In the real world, human behaviour is complex. The field of behavioural economics examines human behaviour, especially when it appears to depart from the assumption of rationality. Chapter two (covered in the second part of this block) concludes with some criticisms of economics, including the criticisms that ‘people are not as mercenary as economists think’. In fact, depending on the task at hand, behaviour can be modelled very simply, or in a more complex way to include various other factors, including altruism. In some cases, even very simple models can go a long way in explaining human behaviours. When these fail, more complex elements can be included to make the model more realistic. Behavioural economics indicates some ways that the simple assumption of rationality can be extended to provide further insights into human behaviour.

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## The production possibility frontier (PPF)

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► BVFD: read section 1.3.

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The production possibility frontier is one of the most basic and important concepts in economics. It shows all the combinations of goods that can be produced if the means of production are fully employed. It will come up again in Block 7 when we discuss the perfect competition model of market structure, Block 11 when we discuss welfare economics and also in Block 23 when we discuss economic growth.

### The PPF: scarcity and desirability

The PPF is a boundary. It demonstrates scarcity in that any point beyond the frontier is unattainable. Society cannot produce combinations that lie outside the PPF because there are insufficient resources to do so. The economic problem has been defined as reconciling scarcity with people’s virtually limitless desires. These desires mean that people wish to have more of everything – as such, points above and to the right of the origin are seen as better than points closer to the origin. If society produces at a point on the frontier rather than inside it, society will be better off.

## The PPF and efficiency

The statements above relate to the idea of efficiency. Points on the PPF are productive efficient, while points within the curve are inefficient. An efficient allocation of means of production is one which yields a combination of outputs where it is not possible to increase the output of one good without reducing the output of the other.<sup>3</sup> Societies must also choose not just any point on the PPF but a specific point. This relates to allocative efficiency and will be discussed further in Block 11.

<sup>3</sup> For simplicity, we assume all goods in the economy are grouped into two groups, or that it is a two-good economy.

## The PPF and opportunity cost

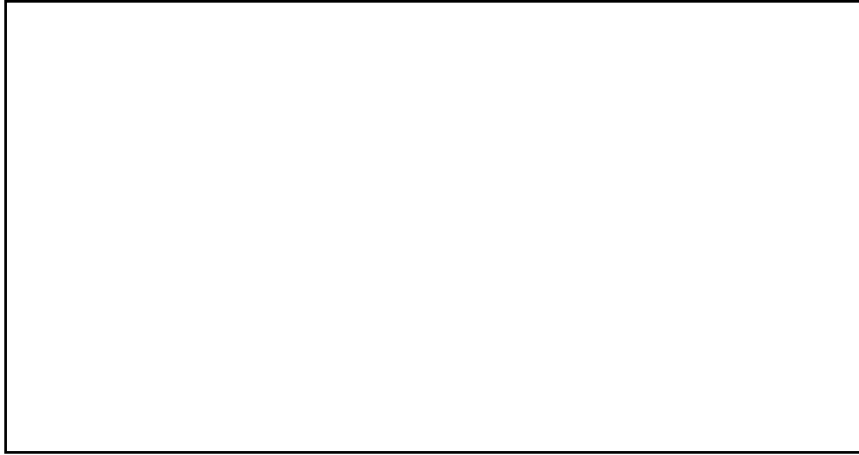
Society has a given amount of resources at its disposal and when the economy is using these efficiently, using more resources to increase the production of one good necessarily implies decreasing the production of the other. This trade-off helps demonstrate the idea of opportunity cost. The amount by which good B is reduced to increase the production of good A is the opportunity cost of increasing the production of good A. Moving along the PPF from one point on the curve to another shows how much of one good must be given up to increase the production of the other – thus the slope of the PPF is the opportunity cost. The opportunity cost can also be described as the real price of a good, since it represents the amount of one good that must be sacrificed in order to attain more of the other.

## The shape of the PPF and marginal analysis

In economics, marginal analysis is very important. ‘Marginal’ simply means ‘extra’ or ‘additional’ and marginal analysis has to do with decision making at the margin. Economists often analyse the effects of a one unit change in something – for example: how much better off will a consumer be if they can purchase one additional unit of a good? How much extra profit will a company earn by producing one additional unit of a good? How much more can a company produce if they hire one additional worker? Asking such questions helps to find the optimal level of (for example) consumption and production, and you will come across this again and again throughout the course. For example, Block 4 introduces the idea of diminishing marginal utility: the first glass of lemonade you drink on a hot day is very refreshing, the second is less so, and by the time you finish the third, you may not want to drink any more lemonade for a while. In this block, the shape of the PPF is linked to diminishing marginal returns: in the example given in section 1.3, the first worker employed in the film industry produces 9 units of output, the second produces 8 units, the third produces 7 units and the fourth produces only 6 units. The fact that the extra output each additional input can produce diminishes is one reason why the PPF is concave toward the origin.

**Activity SG1.2**

In the box below, draw a production possibility frontier, clearly marking the regions of inefficient production, efficient production and unattainable production. Illustrate how the slope of the PPF represents opportunity cost. Why is the frontier concave to the origin?




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## Opportunity cost and absolute and comparative advantage

The concept of opportunity cost can also help us to understand why people (and countries) specialise in the production of certain goods and then trade.

Let us expand a bit on the treatment of PPFs in the second part of section 1.3, dealing with the two individuals, Jennifer and John, making the two goods, T-shirts (T) and cakes (C).

We can write, for **Jennifer**:

Number of T-shirts produced = (T-shirts produced per hour) \* hours spent on T-shirt production ( $L_T$ ).

Or

$$T = 4L_T$$

$$\therefore L_T = \frac{T}{4}$$

Similarly for Jennifer cake production can be written as:

$$C = 2L_C$$

$$\therefore L_C = \frac{C}{2}$$

Now, we are also told that Jennifer can work up to 10 hours, in T-shirt and/or cake production. When she does work 10 hours:

$$L_T + L_C = 10$$

$$\therefore \frac{T}{4} + \frac{C}{2} = 10$$

Be sure that you understand that for **John** we have the equation:

$$2T + C = 10$$

These equations will show the production possibilities for Jennifer and John. They will help you in Activity SG1.3 which you should now attempt.

**Activity SG1.3**

- Putting cakes on the horizontal axis and T-shirts on the vertical axis draw Jennifer and John's production possibility frontiers for a 10-hour working day.
- In what way do these PPFs differ from that drawn in Figure 1.4? Why?
- Write down the equations of these production possibility frontiers, making T (T-shirts) a function of C (cakes).
- What is the interpretation of the slope of these PPFs?
- In your diagram what represents Jennifer's absolute advantage in producing both goods?
- In your diagram what represents John's comparative advantage in making cakes?

To cement your understanding of comparative advantage, complete the following activity.

**Activity SG1.4**

Suppose there are two countries (M and W) and two goods (shoes and hats). The table gives the labour requirements to produce a unit of each output in each country.

	Country M	Country W
Shoes	10 labour hrs/unit of output	12
Hats	2	5

- Which country has an **absolute advantage** in shoes? In hats?
- Which country has a **comparative advantage** in shoes? In hats?
- Assuming each country has 100 labour hours available, what will the total production of shoes and hats be if each country specialises fully in the production of the good in which it has a comparative advantage (presumably they would then engage in trade with each other) compared to what they could produce in a situation with no trade if they spent half their available labour on each good?

If you are interested in exploring these concepts in more detail you can read Chapter 29 on Trade (which is optional and will not be covered in this subject guide).

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## Markets

- **BVFD: read section 1.4 and case 1.3 and complete activity 1.1.**

As noted above, economics can be defined as the study of how societies make choices on what, how and for whom to produce. As such, economics is concerned with the organisation of economic activities in a society and the institutional arrangements that will provide optimal answers to the questions above. These institutional arrangements can be thought of as existing along a continuum from, on the one hand, 'command economies', where decisions are made centrally by the government planning office, to, on the other hand, 'free market economies' where decisions are taken by individual agents driven by self-interest but organised by market forces as by an 'invisible hand'.

This section begins to explain how free markets can often bring about efficient outcomes. In subsequent blocks we will discuss in much greater detail, and with more rigour, how market forces guide resource allocation. Although it is true that centrally planned economies (command economies)



were riddled with inefficiencies, it would be incorrect to believe that all non-planned economies are pure market economies. Today we all live in mixed economies, in which governments play a major role. Subsequent chapters (13 and 14) will analyse some of the reasons why markets fail to allocate resources ideally, creating a potential role for the state to step in. The actual extent of state intervention does, of course, differ quite significantly across countries and how large the role of the state should be is a highly contentious issue. Broadly speaking, governments can intervene in the economy either to promote efficient resource allocation where markets fail to achieve this end or to achieve more equitable outcomes than markets generate if left to operate unhindered.

## Positive and normative economics

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► BVFD: read section 1.5.

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This short section distinguishes in a quite traditional way between positive and normative economics and you should be clear about the distinction. There have been some quite eminent economists, such as the Swedish Nobel Prize winner Gunnar Myrdal who rejected the positive-normative dichotomy, claiming that normative values are inextricably intertwined with so called 'objective' or value-free economic analysis. Myrdal argued that economists would be much better advised to state their values openly and explicitly rather than pretend that they could be put to one side while conducting positive analysis. This is not the orthodox view in the profession! Returning to the treatment in BVFD, complete the following activity.

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### Activity SG1.5

Classify the following statements as positive or normative:

- Inflation is more harmful than unemployment.  
\_\_\_\_\_
  - An increase in the minimum wage to £8 per hour would reduce employment by 0.5 percentage points.  
\_\_\_\_\_
  - The government should raise the national minimum wage to £8 per hour to help reduce poverty in society.  
\_\_\_\_\_
  - An increase in the price of crude oil on world markets will lead to an increase in cycling to work.  
\_\_\_\_\_
  - A reduction in personal income tax will improve the incentives of unemployed people to find paid employment.  
\_\_\_\_\_
  - Discounts on alcohol have increased the demand for alcohol among teenagers.  
\_\_\_\_\_
  - The retirement age should be raised to 70 to combat the effects of our ageing population.  
\_\_\_\_\_
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## Microeconomics and macroeconomics

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► BVFD: read section 1.6.

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**Microeconomics** takes a bottom-up approach to studying the economy – focusing on individual consumers, households and firms; while **macroeconomics** takes a top-down approach, studying the economy as a whole system and focusing on aggregates. One analogy that can be used to describe the difference between macroeconomics and microeconomics is the study of a rainforest. Macroeconomics studies the ecology of the rainforest as a whole, while microeconomics studies individual plants and animals that live there. Most professional economists tend to specialise in either microeconomics or macroeconomics (indeed, they will specialise on sub-fields within this broad dichotomy). As you work through the textbook and the subject guide you may find yourself drawn either to micro or to macro ahead of the other. That is natural. What you should not do at this stage of your study of economics is unbalance your commitment of time to the two halves; that is not a good strategy, either in terms of doing well in examinations or of building a solid foundation for further study of the subject. Blocks 11 and 12 cover welfare economics and the role of the government. Welfare economics employs microeconomic techniques to analyse welfare at an aggregate (economy-wide) level, and the role of the government is both micro and macro – as governments are involved in specific markets but also attempt to manage the aggregate level of demand and encourage economic stability and growth. For simplicity, blocks 11 and 12 are included in the first half of the course on microeconomics.

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► BVFD: read the Summary and work through the review questions.

► BVFD: read Chapter 2.

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## A note on mathematics

In discussing the tools of economic analysis, this chapter, perhaps surprisingly, has little to say in general terms about the role of mathematics in economics. In its methods and approaches, if not its subject matter, economics today is almost unrecognisable from the subject taught under the same name 60 or 70 years ago. Of course, one wouldn't expect the subject to stand still, but in this case the change has been dramatic. Today, top universities require a high level of mathematical competence of their students, even at undergraduate level (and even higher at postgraduate level) while a cursory scan of the top economics journals might give the impression that the subject is a branch of mathematics. It isn't. Correctly used, mathematics in economics is a tool – a means to an end not an end in itself. Nevertheless, some have argued that the pervasiveness of mathematics in modern economics has had damaging consequences both on the development of the subject (with concentration on topics that lend themselves to mathematical analysis and relative neglect of those that don't) and on the ability of economists to communicate with non-economists, often including those responsible for formulating economic policy.

Whether or not these criticisms are correct, it is highly unlikely that the trend towards greater reliance on mathematical tools is likely to be reversed in the near future. For those of you pursuing the subject beyond the introductory level you will need to be prepared to use considerably more

mathematics. That said, the mathematical requirements of this particular course are quite low. You need to be able to do basic arithmetic and algebra, (including solving simultaneous equations) and you need to be able to read and use graphs. Some of the Maths boxes in BVFD use calculus, including partial differentiation and you should certainly try to understand this material. Do not regard the mathematics boxes as optional extras.

## Models and theory

► BVFD: read the introduction to Chapter 2.

The introduction provides a brief but useful argument explaining why models and theory are so important in economics. Sometimes students of introductory economics complain that there is too much theory/too many models. Why can't the subject just stick to the facts? But which facts? And what can they tell us without guiding principles? On their own the facts are silent. Teamed with appropriate models, however, they can be eloquent. Broadly speaking, two key tools of economic analysis are models/theory and data and they are best deployed in tandem. Sections 2.1 to 2.4 lay out some important issues relating to economic data, and then the later sections of the chapter introduce economic models and discuss how models and data are used together in economics.

► BVFD: read sections 2.1 and 2.2 as well as concept 2.1.

### Activity SG1.6

Index numbers: work through the following example to help you understand how index numbers are calculated. Say we want to calculate inflation (a Retail Price Index) for four specific goods. The index for each good is set at 100 for the first year. Work out the percentage price change in each good (the first one is filled in for you).

Product	Price – year 1	Index – year 1	Price – year 2	Index – year 2
Bread	80p	100	120p	150
Cheese	260p	100	312p	
Sausages	300p	100	390p	
Toothpaste	100p	100	80p	
TOTAL		400/4		
Overall index		100		

The change in the overall index is the **average** rate of inflation. What was the rate of inflation for these four products?

Inflation between year 1 and 2 \_\_\_\_\_?

However, the products in the price index are not equally important and should not be given an equal weighting in the calculation of the index. That is why Weighted Index Numbers are often used.

Of the four products above, which do you think represents the lowest proportion of a family's total spending? Which represents the highest?

If toothpaste represents a small proportion of each family's total spending, then we should make the price change for toothpaste have a much smaller overall effect on the price index. To do this we **weight** each price change to give it more or less importance in the overall index.

This has been done in the table below – see if you can complete the last column:

Product	Weights	Price – year 1	Index – year 1	Weighted index – year 1	Price – year 2	Index – year 2	Weighted index – year 2
Bread	4	80p	100	400	120p	150	600
Cheese	2	260p	100	200	312p		
Sausages	3	300p	100	300	390p		
Toothpaste	1	100p	100	100	80p		
<b>TOTAL</b>	10			1,000/10			
<b>Overall index</b>				100			

Inflation between year 1 and 2 \_\_\_\_\_?

This figure is considerably higher than the original inflation figure. This is because the products with the highest weights went up in price the most. The effect of the falling price of toothpaste on the overall index was reduced because this item had a very small weight. A weighted index gives a much better estimate of inflation, since it reflects which items are most important to family’s expenditure.

► **BVFD: read sections 2.3 and 2.4 and concept 2.2.**

**Activity SG1.7**

You got a job in the year 2012 with a salary of £25,000. In 2014, you receive a £3,000 increase in your salary. CPI in 2014 with base year 2012 is 108. Calculate your real income in 2012 and 2014 as well as the percentage changes in your nominal income and your real income.

► **BVFD: read section 2.5.**

Economic models are a deliberate simplification of reality. Just the same way that an architectural drawing shows all the important features of a house without necessarily looking ‘realistic’, economic models abstract from reality to clarify important features. This helps to simplify and clarify the analysis of the problem at hand.

Economic models often use mathematics as the system of logic which ties various parts of the model together.

Two terms which you should be familiar with are **exogeneity** and **endogeneity**: Following the definitions provided in L&C (glossary), an endogenous variable is a variable that is explained within a model or theory. An exogenous variable influences endogenous variables, but is itself determined by forces outside the model/theory. In the example of a model of London Underground revenue, the number of passengers is an endogenous variable, while factors such as bus fares and passenger incomes are exogenous.

► **BVFD: read sections 2.6 and 2.7 and complete activity 2.1.**

These sections, and 2.9 below, turn to the use of empirical evidence in economics. They begin to give an intuitive feel for **econometrics**, the application of statistical and mathematical techniques, often with the help of computers, to economic data, in order to test hypotheses and/or forecast

the effects of changes in the economic environment on outcomes of interest (quantity demanded, hours worked, inflation, unemployment, etc.). Econometrics is a central and well developed aspect of the subject, which is generally a required component of an undergraduate degree in economics. However, it is not usually introduced at elementary level.

Fitting lines through scatter diagrams – although the term is not provided explicitly in this section, the description of how a computer, programmed to apply defined statistical criteria, quantifies the influences of various factors in a single model is describing **multiple regression analysis**.

The subsection 'Reading diagrams' is very basic mathematics, not econometrics. You need to be competent (and confident) in these basic techniques to follow subsequent chapters of the textbook and this subject guide. The following activity enables you to practise basic graphical techniques.

Note: Figures 2.4 and 2.5 plot quantity on the vertical axis and price on the horizontal axis. These are simply exercises to teach you techniques for interpreting diagrams and finding the slope and intercept of a line. In the following chapter, demand and supply diagrams will be introduced – typical demand and supply diagrams put price on the vertical axis and quantity on the horizontal axis. Of course, the basic techniques of finding the slope and intercept of the line will remain the same.

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#### Activity SG1.8

Use the following functions to draw diagrams in the boxes below:

$Q = 50 + 20P$ Curve	$Q = 150 - 10P$ Curve
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Slope =  
Intercept =

Slope =  
Intercept =

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► **BVFD: read section 2.8.**

In economics, a Latin term is often used to indicate that other factors are held constant, this term is *ceteris paribus*, which means 'other things the same'. This has to do with the conditions under which a theory holds. For example, the market for one product is often studied under the assumption that prices of other products are held constant. The purpose of this is not to say that such factors are unimportant, but rather to focus on one effect at a time. If many factors are allowed to vary simultaneously, the effects of these can be difficult to disentangle. This section illustrates a technique of showing the effect of two variables (fares and income in Figure 2.7) in a two dimensional diagram. When we study the demand for a good we will

do something very similar; allowing changes in income to shift the whole (downward sloping) relationship between price and quantity.

► **BVFD: read section 2.9.**

Regarding the relationship between economic theories and data, one could ask the old question: what came first – the chicken or the egg? In fact, economic theories and empirical evidence (data) feed back on one another. Someone may notice a certain relationship expressed in economic data and develop a theory to explain this relationship. That theory will then be tested by other data, from different time periods and different contexts – these data will either corroborate the theory, or lead to it being modified or abandoned in favour of a theory that better fits the evidence.

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## Criticisms of economics

► **BVFD: read section 2.10 and case 2.1.**

One criticism levied against economics which is mentioned briefly in this section is that ‘the actions of human beings cannot be reduced to scientific laws’. However, if we look at human behaviour in general, we can see stable patterns **on average** even though the behaviour of individuals is unpredictable. This has to do with the ‘law of large numbers’, a statistical concept or ‘law’ which states that as the number of individual cases increases, random movements tend to offset each other, such that the difference between the expected value and the actual value tends to zero. That means the behaviour of a group of people is much more predictable than the behaviour of certain individuals, because the odd things one individual does tend to be cancelled out by the odd things that some other individual does (this is discussed further in previous versions of L&C e.g. Chapter 2 of the 12th edition).

More recently, economics has been criticised for failing to predict the financial crisis and associated recession beginning in 2007–08.<sup>4</sup> This led to some damage to the reputation of the subject and to the status of the profession. It is too early to say just how damaging this has been (there doesn’t seem to be any major decrease in the demand to study economics at university or, broadly speaking, in the longer-term employment prospects of economics graduates in either the private or public sectors). One consequence of the crisis has been considerable self-examination of the way in which the subject has been taught in the past and the first signs of new pedagogical approaches can be detected in the revamping of some introductory courses.

<sup>4</sup> Some economists were prescient. Nouriel Roubini (NYU. Stern School of Business) as early as 2006 was predicting that the US housing bubble would burst, leading to damaging loss of consumer confidence and ultimately to recession. Widely criticised for being too pessimistic at the time Roubini’s forecasts were, if anything, exceeded by actual events. The link provides some thoughts of the Chairman of the US Federal Reserve, Ben Bernanke on the implications of the crisis for economics: [www.federalreserve.gov/newsevents/speech/bernanke20100924a.htm](http://www.federalreserve.gov/newsevents/speech/bernanke20100924a.htm)

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## Overview

Economics analyses what, how and for whom society produces. The key economic problem is to reconcile the conflict between people’s virtually unlimited desires and the scarcity of available resources and means of production. The PPF shows the maximum amount of one good that can be produced given the output of another. The slope of the PPF is the opportunity cost (of the good on the horizontal axis in terms of the other). More generally, opportunity cost is the value of the best alternative that must be sacrificed. The fact that different individuals and countries have different opportunity costs of producing various goods gives rise to comparative advantage and creates the possibilities for gains from trade.

In economics, people are assumed to behave rationally – only taking an action if its benefits outweigh its costs. Furthermore, people are assumed to be motivated by self-interest. The idea of the ‘invisible hand’ describes how, under certain conditions, market forces allocate resources efficiently despite the self-interested motivations of individuals. Markets resolve production and consumption decisions via the adjustment of prices. There is a spectrum of government involvement in the economy – from a command economy to a free market economy. Most industrialised nations have mixed economies.

Economics has many dimensions. Positive economics deals with ‘facts’ about how the economy behaves, while normative economics involves subjective judgements. Microeconomics studies particular markets and activities in details, while macroeconomics deals with aggregates and studies the economy as a whole system.

The second half of this block examined the relationship between data and theory and provided guidance and instruction regarding key practical concepts and skills such as index numbers, nominal and real variables, measuring change, diagrams, lines and equations. The interplay of data and theory/models in economics is very important. Models are deliberate simplifications of reality which help organise how we think about a problem. Data can indicate a relationship that will later be theorised about, and can also be used to quantify relationships and test existing theories. A key approach of economic analysis is to abstract from various factors by holding them constant – this is known as *ceteris paribus* or ‘other things equal’. Chapter 2 concludes by briefly addressing some popular criticisms of economics and economists, such as the extent of disagreement in the discipline (which in fact often relates more to normative than to positive economics) and assumptions about human behaviour, which are sometimes seen as oversimplified.

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## Reminder of learning outcomes

Now go back to the list of learning outcomes at the start of the block, and be sure that they have been achieved.

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## Sample examination questions

### Multiple choice questions

For each question, choose the correct response:

1. Every summer, New York City puts on free performances of Shakespeare in Central Park. Tickets are distributed on a first-come-first-served basis at 13.00 on the day of the show, but people begin lining up before dawn. Most of the people in the lines appear to be young students, but at the performances most of the audience appears to be made up of older working adults (tickets can be transferred, so the person picking up the tickets does not have to be the person watching the performance). Which of the following concepts best explains this fact?
  - a. *Ceteris paribus*.
  - b. Opportunity cost.
  - c. Marginal analysis.
  - d. Absolute advantage.

2. The output produced by Samuel and Roberto in 20 labour hours is given below for wine and cheese. Choose the option with the correct statement below.

	Wine	Cheese
Samuel	6	4
Roberto	2	3

- a. Samuel has an absolute advantage in both products and a comparative advantage in cheese.
- b. Roberto has an absolute advantage in both products and a comparative advantage in cheese.
- c. Roberto has an absolute advantage in cheese and a comparative advantage in wine, while the opposite is true for Samuel.
- d. Samuel has an absolute advantage in both products and a comparative advantage in wine.
- e. Roberto has an absolute advantage in both products and a comparative advantage in wine.

### Long response question

Use the production possibility frontier to illustrate the following concepts:

- i. scarcity
- ii. opportunity cost
- iii. productive efficiency
- iv. diminishing marginal returns.



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# Block 2: Demand, supply and the market

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## Introduction

The previous block introduced economics as ‘the study of how societies make choices on what, how and for whom to produce, given the limited resources available to them’ and described how societies adopt various institutional arrangements to answer these questions as best they can. In the societies we all live in, the role of the market is very important as a means of answering these questions. Markets bring together buyers and sellers and the mechanism of prices operates to coordinate the quantities sellers wish to sell with the quantities buyers wish to buy. This chapter examines demand and supply and the way they interact within markets to determine quantities and prices.

The focus of this chapter, the demand and supply model, is perhaps the ‘iconic’ model of economics. Like all models it has its shortcomings and knowing when it is appropriate to the analysis of a particular problem, and when it is not, is something of an art. Some of the strengths and weaknesses of this basic model will become clearer in subsequent chapters of the text and blocks in this guide, but first you need to become familiar with the basic workings of the model. Also postponed until later is the analysis of the behaviour of individual consumers and individual firms which lie behind demand and supply curves. It would also be possible to start with the behaviour of these individual agents and then derive the market demand and supply curves, however, experience suggests that the power of supply and demand analysis in showing how prices and quantities respond to changes in the economic environment can also be experienced without all the detailed foundations being in place (as long as they provided subsequently) and that this approach is often more motivating than the reverse sequencing. The blocks of the subject guide therefore follow the order of the textbook in firstly presenting the demand and supply model and then showing later how demand and supply curves are derived from the behaviour of individual consumers and firms.

Demand is the quantity of a product that buyers wish to purchase at any given price, while supply is the quantity of a product that suppliers are willing to sell at any given price. Demand and supply come together in a market and this determines the price and quantity of goods sold. This will be described in more detail in this chapter. Since we have all bought (and maybe also sold) goods before, many of these ideas are quite intuitive. Nonetheless, it is important to become familiar with the language economists use to explain these ideas and the way that economics deals with them. Graphical analysis is very important in economics and you will need to become very comfortable with drawing demand and supply curves and using them to demonstrate changes in various influential factors. You will hopefully find this a very useful tool of analysis.

## Learning outcomes

By the end of this block and having completed the Essential reading and activities, you should be able to:

- define the concept of a market
- draw demand and supply curves (and inverse demand and supply curves)

- find equilibrium price and equilibrium quantity
- describe how price adjustment reconciles demand and supply in a market
- analyse what shifts demand and supply curves
- define reservation prices
- describe consumer and producer surplus
- analyse excess supply and excess demand
- discuss the consequences of imposing price controls
- discuss how markets answer what, how and for whom to produce
- describe the functions of prices (to ration, to allocate).

### Essential reading

Begg, Vernasca, Fischer and Dornbusch (BVFD), Chapter 3.

### Further reading

Lipsey and Chrystal (L&C), Chapter 2.

Witztum (AW), sections 2.1 and 4.1.

### Synopsis of this block

This chapter introduces demand and supply and how these come together in a market to determine equilibrium price and quantity. The factors that underlie demand curves and supply curves are outlined, as is the way that a change in one of these factors will lead to a shift in the relevant curve. The concepts of consumer and producer surplus will also be introduced. These exist because there are consumers who would be happy to pay more than the market price, and suppliers who would be happy to sell for less than the market price. The chapter will also show that allowing the market to determine price (rather than having the government impose a price) results in the maximum amount of consumer and producer surplus. Through the readings and the exercises below, these ideas will now be examined in further detail.

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## Equilibrium

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► BVFD: read sections 3.1–3.3.

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Before turning to some activities which will help to consolidate your understanding of the material in these sections it is worth elaborating a little on the concept of equilibrium in economics. You will find that this concept is central in economic theory (whether it is observable in practice raises further issues which we do not address here) although it has many interpretations; even in a basic course such as this you will encounter more than one version. In microeconomics we are about to look at the concept of equilibrium market price, later when we introduce game theory we will encounter the concept of a Nash equilibrium and in macroeconomics we will define equilibrium in terms of aggregate supply and demand (as opposed to the supply and demand in the market for a particular good or service), in terms of simultaneous goods and money market equilibrium (IS-LM equilibrium) and in terms of the so-called 'steady state' (where capital, investment and output per worker are constant) in growth theory. What is common in all these examples is that the system being analysed is in some sense 'at rest' – there are no forces at work generating further changes to the system. In the demand and supply

model, an equilibrium price is one where, simultaneously, consumers want to buy just the amount that firms want to sell. At any other price one or other of these groups would want to change the amount they buy or sell. Usually when an economic system is not in equilibrium, there will be incentives for the actors or agents in the model to change their behaviour in ways that move the system towards equilibrium.<sup>1</sup>

<sup>1</sup> In more advanced analysis, questions can arise as to whether an equilibrium exists in the first place and, if it does, whether it is stable in the sense that, out of equilibrium, forces arise driving the model being analysed back to equilibrium. We do not examine these issues further on this course.

## Demand and supply curves

### Activity SG2.1

Use the data in the following table to draw for yourself a demand curve, a supply curve, and the whole market – where demand and supply interact. Be careful to put price on the vertical axis and quantity on the horizontal axis. What are the equilibrium price and quantity?

Price of a Small Table (£)	Quantity Demanded (thousands)	Quantity Supplied (thousands)
0	90	0
10	75	15
20	60	30
30	45	45
40	30	60
50	15	75
60	0	90

Demand Curve	Supply Curve	Demand and Supply

(Note: Although these lines are straight, they are still called demand and supply curves).

► **BVFD: read Maths box 3.1.**

Maths box 3.1 introduces a simple mathematical way of describing the demand and supply curves and finding equilibrium price and quantity. You need to be familiar with this algebraic approach where the constants in the supply and demand curves are given letters (here  $a$ ,  $b$ ,  $c$ ,  $d$ ) and where they are expressed as numbers, as in the following activity.

### Activity SG2.2

The direct demand function and direct supply function can be used to easily find the equilibrium quantity and price. Use the following curves to find the equilibrium price and quantity for noodles:

$$Q^D = 30 - 3/4P$$

$$Q^S = 5 + 1/2P$$

Equilibrium Price = \_\_\_\_\_ Equilibrium Quantity = \_\_\_\_\_

Although people generally talk about quantity as a function of price, when it comes to drawing the graph, price is always drawn on the vertical axis, so it is easier to work with the inverse demand function, where price is expressed as a function of quantity demanded. For example:

Inverse Demand:  $P = 20 - Q^D$

Inverse Supply:  $P = -6 + Q^S$

These equations are very useful for us to graph the demand and supply curves, because we can easily read the key characteristics of the curves straight off the relevant function. To graph the inverse demand function  $P = a/b - 1/b \cdot Q^D$  (using the notation from Maths box 3.1), we can use the fact that the intercept on the price axis is  $a/b$  and the gradient is  $1/b$ . Similarly, for the inverse supply function  $P = c/d + 1/d \cdot Q^S$ , the intercept is  $c/d$  and the gradient is  $1/d$ .

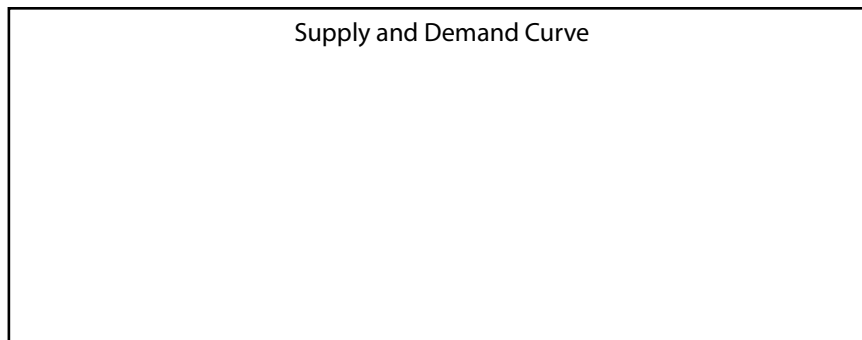
For example, if the inverse demand curve is  $P = 12 - 4Q^D$ , the demand curve touches the vertical axis at  $P = 12$  and slopes downward with a slope of  $-4$ .

**Activity SG2.3**

Find the inverse demand and supply functions using the direct demand and supply functions in the table below.

	Demand/Supply Function	Inverse Demand/Supply Function
<b>Demand</b>	$Q^D = 30 - \frac{3}{4} \cdot P$	
<b>Supply</b>	$Q^S = 5 + \frac{1}{2} \cdot P$	

and graph these in the following box:



**Shifts in the demand and supply curves**

► **BVFD: read sections 3.4–3.7, including cases 3.1 and 3.2.**

Activity 3.1 is important, since it distinguishes between movements along a curve and shifts in the curve itself. Complete the activity.

**Activity SG2.4**

For each event in the following table, identify whether this relates to demand or supply, in what direction the curve would shift, and the effect on price and quantity. If you draw a graph for each example, you will also see the movement along the other curve, resulting in the new equilibrium price and quantity. The first line has been completed for you.

**The market for sushi**

Event	Which curve shifts? Supply or demand?	Direction?	Effect on price?	Effect on quantity?	Movement along the other curve – which direction?
The price of salmon increases	<i>Supply</i>	<i>Left</i>	<i>Higher</i>	<i>Lower</i>	<i>Demand, left</i>
Sushi becomes more popular in Europe					
The price of similar alternatives rises					
Sushi sellers expect the price of sushi to rise in the future					
New evidence reveals sushi is not as healthy as people had thought					
New sushi machines make production more efficient					

---

## Consumer and producer surplus

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- ▶ BVFD: read section 3.8 and concept 3.1 on consumer and producer surplus.
- 

Imagine the following scenario:

The current price for a two-litre bottle of orange juice in my local grocery store is 70p. That's good news to me, because I was prepared to pay £1.20. The store manager is happy to see me loading some cartons into my trolley, because she knows the store would have been happy to sell them for just 45p.

I'm thinking: 'This is great! I'm coming out 50p ahead on each carton!'

She's thinking: 'Fantastic! I'm coming out 25p ahead on each carton!'

So we are both enjoying a surplus.

The equilibrium price is set by the marginal consumer and producer who were only willing to buy/sell for exactly 70p. Consumers who would have been willing to pay more still just pay the equilibrium price and enjoy a surplus. Producers who would have been willing to sell it for less can still ask the equilibrium (market) price and also enjoy a surplus. The efficient market outcome occurs where consumer and producer surplus are maximised. We will come back to this later.

**Activity SG2.5**

**Multiple choice questions**

1. The only four consumers in a market have the following willingness to pay for a good:

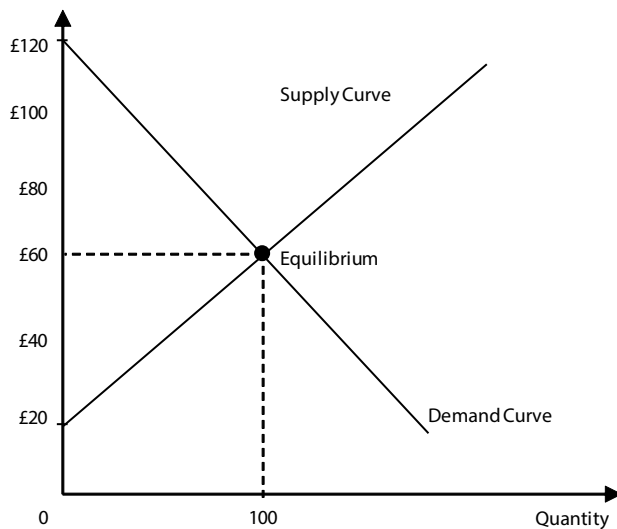
Buyer	Willingness to Pay
Sally	£15
Simon	£25
Susan	£35
Shaun	£45

If there is only one unit of the good and if the buyers bid against each other for the right to purchase it, then the consumer surplus will be:

- a. £0 or slightly less
- b. £10 or slightly less
- c. £30 or slightly less
- d. £45 or slightly less.

NB: It may help to calculate the price first. Assume it is an open auction where each bidder calls the price out aloud.

2. Examine the diagram below:

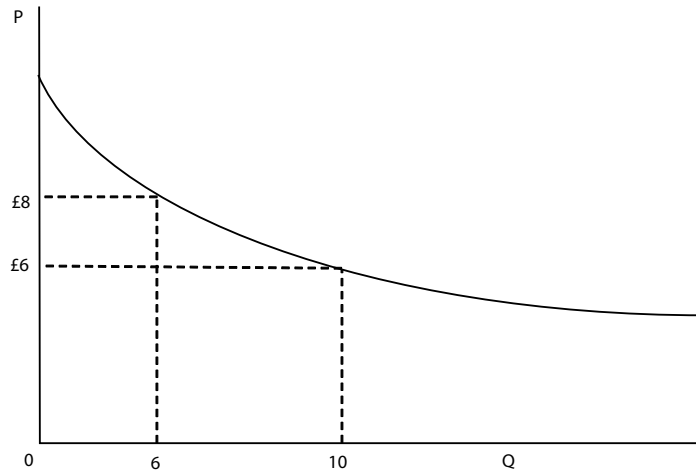


**Figure 2.1: Supply and demand.**

At the equilibrium price, the producer surplus is equal to:

- a. £2,000
- b. £4,000
- c. £6,000
- d. £10,000.

3. Here you see Anthony's demand curve for football matches (you can treat the demand curve as being approximately linear).



**Figure 2.2: Anthony's demand for football matches.**

When the price per match falls from £8 to £6, his welfare:

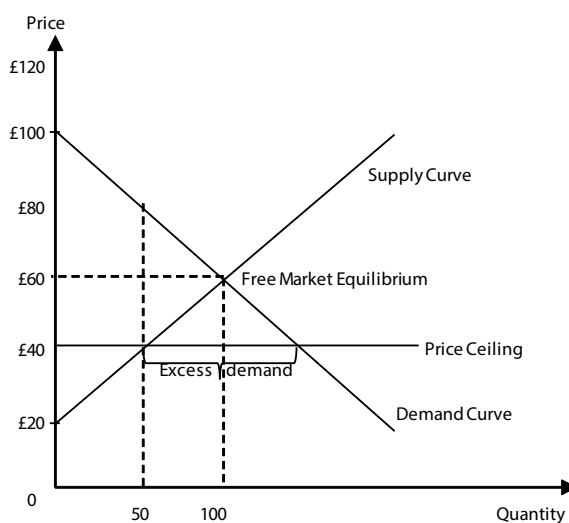
- Rises by £16
- Falls by £16
- Rises by £12
- Falls by £12.

► **BVFD: read sections 3.9 and 3.10 as well as cases 3.3–3.5.**

These sections will further develop your understanding of demand, supply and equilibrium. You should read them carefully and try to think each point through. Can you think of another market where price floors or ceilings have been imposed?

**Activity SG2.6**

Price floors and ceilings result in a loss of consumer and producer surplus, this is called a **deadweight loss**. Can you calculate how much consumer and producer surplus is lost due to the price ceiling in the diagram below? Has there also been a transfer of surplus between consumers and producers?



**Figure 2.3: Loss of producer and consumer surplus due to a price ceiling.**

► **BVFD: read the summary and work through the review questions.**

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## Overview

Buyers and sellers come together in a market and exchange goods and services. Demand (from buyers) and supply (from sellers) are key concepts of economic analysis. Demand curves display the quantity that buyers wish to buy at each price and generally slope downwards – demand is higher when the price is lower. Supply curves display the quantity that sellers wish to sell at each price and generally slope upwards – sellers are prepared to sell more when the price is higher. The market clears (and equilibrium is achieved) at the point where the demand and supply curves intersect. Understanding what demand and supply curves represent and what makes them shift is the most fundamental lesson from this block. Price changes are represented by a movement along a curve, shifts in the curves indicate changes in other factors, such as the price of complements or substitutes or changes in consumers income (for demand curves) and changes in technology and input prices (for supply curves). Shifts in the demand or supply curves change the equilibrium price and quantity. Inverse demand and supply curves (where price is expressed as a function of quantity) can be useful for graphing the curves. The block also introduces consumer and producer surplus and the fact that price controls lead to a reduction in consumer and producer surplus, whereas free markets optimise consumer and producer surplus. You need to be able to calculate consumer and producer surplus and the loss involved due to price controls.

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## Reminder of learning outcomes

Now go back to the list of learning outcomes at the start of the block and be sure that they have been achieved.

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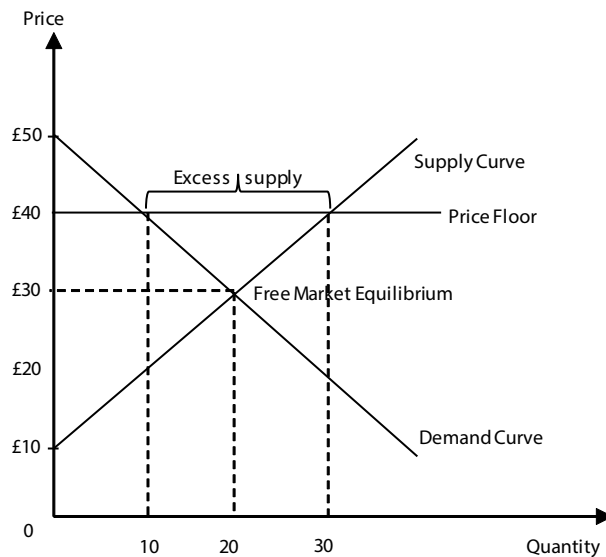
## Sample examination questions

### Multiple choice questions

For each question, choose the correct response:

1. An increase in consumer incomes would result in:
  - a. a decrease in demand for bread
  - b. a decrease in demand for diamonds
  - c. a decrease in demand for low-quality cars
  - d. an increase in demand for inter-city bus travel (compared to flying or taking the train).
2. An increase in the price of chilli would lead to:
  - a. an increase in demand for Mexican food
  - b. a decrease in supply of Mexican food
  - c. an increase in the supply of Mexican food
  - d. a decrease in demand for other spices.
3. From the diagram below, the loss in consumer surplus due to the price floor is:
  - a. £50
  - b. £100
  - c. £150
  - d. £200.





**Figure 2.4: Loss of consumer surplus due to a price floor.**

4. Given the following inverse demand and supply curves:

$$P = 8 - Q^D/2$$

$$P = 2 + Q^S$$

and assuming that price is fixed below the equilibrium price at £5, the loss in producer surplus due to the price ceiling is:

- £3.50
  - £4.50
  - £8
  - £9.
5. The demand curve for good A is given by:

$$Q_A^D = a - bP_A + cP_B$$

Where  $P_A$  is the price of good A,  $P_B$  is the price of good B, and  $a, b, c$  are positive constants. The supply curve for good A is also linear and is upward sloping:

- Goods A and B are complements.
  - Goods A and B are substitutes.
  - Goods A and B are unrelated in consumption.
  - The demand curve for good A is upward sloping.
6. The demand curve for good A is given by:

$$Q_A^D = a - bP_A + cP_B$$

Where  $P_A$  is the price of good A,  $P_B$  is the price of good B, and  $a, b, c$  are positive constants. The supply curve for good A is also linear and is upward sloping. When the price of good B increases:

- The quantity of A purchased falls and the price of A falls.
  - The quantity of A purchased increases and the price of A increases.
  - The quantity of A purchased increases and the price of A falls.
  - The quantity of A purchased increases and the price of A stays the same.
7. Suppose that the price of Porto wine was £20 per litre in 2010 and £25 per litre in 2011. Ingrid observes that Margaret's consumption of wine rose from 1 litre per month in 2010 to 1.2 litres per month in 2011.

Ingrid concludes that Margaret's demand for Porto wine has to be upward sloping:

- a. Ingrid is wrong: given the above information Margaret's demand for Porto wine has to be downward sloping.
- b. Ingrid is right: given the above information Margaret's demand for Porto wine has to be upward sloping.
- c. Ingrid is wrong: the above information is not enough to conclude that Margaret's demand for Porto is necessarily upward sloping.

### Long response question

Suppose that the inverse demand and supply schedules for rental apartments in the city of Auckland are as given by the following equations:

$$\text{Demand: } P = 2700 - 0.12Q_D$$

$$\text{Supply: } P = -300 + 0.12Q_S$$

- a. What is the market equilibrium rental price per month and the market equilibrium number of apartments demanded and supplied?
- b. If the local authority can enforce a rent-control law that sets the maximum monthly rent at \$900, will there be a surplus or a shortage? Of how many units will this be? And how many units will actually be rented each month?
- c. Suppose that the government decides to implement a policy to keep out the poor. It declares that the minimum rent that can be charged is \$1,500 per month. If the government can enforce that price floor, will there be a surplus or a shortage? Of how many units will this be? And how many units will actually be rented each month?
- d. Suppose that the government wishes to decrease the market equilibrium monthly rent to \$900 by increasing the supply of housing. Assuming that demand remains unchanged, find the new equilibrium quantity and the new inverse supply curve.

# Block 3: Elasticity

## Introduction

The concept of elasticity is very important in microeconomics – here we devote a whole block to it! Elasticity has to do with responsiveness, for example: how much does the quantity demanded of a good respond to a change in the price of that good? For some goods, such as life-saving medicine, people's demand will not fall much even if the price increases substantially, while for other goods, such as a particular chocolate bar, the demand will respond to price much more, since if the price of one chocolate bar goes up, people will generally be quite happy to purchase another one (or a different kind of snack) instead. This chapter uses many examples to make the concepts more intuitive, and also relies on graphs and simple equations. Make use of the exercises in this block and in the textbook to really master this concept and its applications.

## Learning outcomes

By the end of this block and having completed the Essential reading and activities, you should be able to:

- describe how elasticities measure the responsiveness of demand and supply
- define and calculate price elasticity of demand
- indicate the determinants of price elasticity
- describe the relationship between demand elasticity and revenue
- recognise the fallacy of composition
- describe how cross-price elasticity relates to complements and substitutes
- define and calculate income elasticity of demand
- use income elasticity to identify inferior, normal and luxury goods
- define and calculate elasticity of supply
- describe how supply and demand elasticities affect tax incidence.

## Essential reading

Begg, Vernasca, Fischer and Dornbusch (BVFD), Chapter 4.

## Further reading

Lipsey and Chrystal (L&C) international edition, Chapter 2; UK edition, Chapter 3.

Witztum (AW), Chapter 2 section 2.4.

## Synopsis of this block

This block will explore the reasons why demand for certain goods responds more or less to a change in price. Furthermore, we will also explore how demand for a good changes in response to a change in the price of another good, and also how it responds to a change in consumers' income. As well as the elasticity of demand, we will also examine the elasticity of supply (i.e. how much producers' supply decisions change in response to a change in price). The implications of elasticity for a firm's total revenue, and for the effects of taxation shall also be examined.

## Price elasticity of demand

► BVFD: read section 4.1 of Chapter 4.

The formula for calculating price elasticity of demand (PED) is important and also quite intuitive:

**Price elasticity of demand = [% change in quantity] / [% change in price]**

As explained in Maths 4.2 this can be expressed using delta notation as:

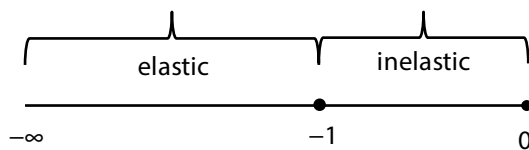
$$PED = \frac{\Delta Q}{\Delta P} \frac{P}{Q}$$

where Q refers to quantity demanded and P to price. Δ always means ‘change in’, such that ΔQ means ‘change in quantity’.

If the quantity demanded changes a lot in response to a change in price, we say demand is **responsive** (or **sensitive**) to the price change, and the demand is **elastic**. If the price can change a lot without really affecting the quantity demanded, we say that demand is **unresponsive** (or **insensitive**) to the change in price and demand for that product is **inelastic**.

- Demand is elastic if the elasticity is more negative than -1.
- Demand is inelastic if the price elasticity lies between -1 and 0.

This is represented in the sketch below:



**Figure 3.1: Defining elastic and inelastic demand.**

When PED=0 demand is said to be perfectly inelastic and when PED=-∞ we say demand is perfectly elastic.

While economists often discuss the absolute value of the elasticity (so if this is between zero and 1, demand is said to be inelastic, and if it is greater than 1, demand is said to be elastic) we recommend you not to lose track of the sign of the elasticity. As we shall see below for other elasticities (cross-price elasticity, income elasticity), the sign has important implications. Nonetheless, you will often see positive numbers for own-price demand elasticities – this is a shorthand and does not necessarily imply that the law of demand has been violated.

The Greek letter eta (ε) is often used to denote elasticity. For example, ε = 0 means that the price elasticity of demand is equal to zero and quantity demanded will not change at all in response to a change in price.

### Activity SG3.1

Consider your own buying habits. Rank the items below in terms of how responsive your demand for these goods is to a change in their price:

Product	Rank of responsiveness
A nice pair of trousers	
Rice	
Bananas	
Medicine	
Holidays abroad	

---

► **BVFD: read Maths 4.1 and Maths 4.2.**

---

There are various ways of calculating elasticity. Arc elasticity (Maths 4.1) is used to find the elasticity between two different points of a demand curve, in such a way that it is equal whether you analyse the change in price as an increase or a decrease.

Point elasticity, on the other hand, describes the elasticity at a certain point on the demand curve. Maths 4.2 on point elasticity uses calculus, however, it also explains that the derivative of the direct demand function gives the slope of the direct demand function at a given point. If the function is linear, the slope is constant for the whole curve, and corresponds to  $\frac{\Delta Q}{\Delta P}$  in the PED

formula above. The slope of a curve is straightforward and something you can easily use without any knowledge of calculus.

One thing to be careful of is whether you are using the direct or the inverse demand function (remember Block 2). For an inverse demand function, use the inverse of the slope. For a direct demand function, you can use the slope directly. That should be easy to remember!

That means that for an indirect demand function, the point elasticity is:  $PED = 1/s * (P/Q)$ , where  $s$  is the slope. For example:  $P = 20 - Q/2$  is an indirect (or inverse) demand function. The slope of this is  $dP/dQ = -1/2$ . In this case, you would use  $PED = (1/-0.5) * (P/Q) = -2*(P/Q)$ .

On the other hand,  $Q = 40 - 2P$  is a direct demand function. The slope of this is  $dQ/dP = -2$ . (To check that the slope of the direct demand function is equal  $\frac{\Delta Q}{\Delta P}$  to note that if  $P = 5$ ,  $Q = 30$ . If  $P = 10$ ,  $Q = 20$ . Therefore

$\frac{\Delta Q}{\Delta P} = \frac{-10}{5} = -2$ ). In this case you would use  $PED = -2*(P/Q)$ .

If you want to express the elasticity as a positive number, you will need to use the absolute value (or just multiply the negative number by the minus one, which is the same thing).

---

**Activity SG3.2**

Part A: Calculating an arc elasticity

Given the following information, calculate the elasticity of demand for the following goods, expressing the elasticities as positive numbers

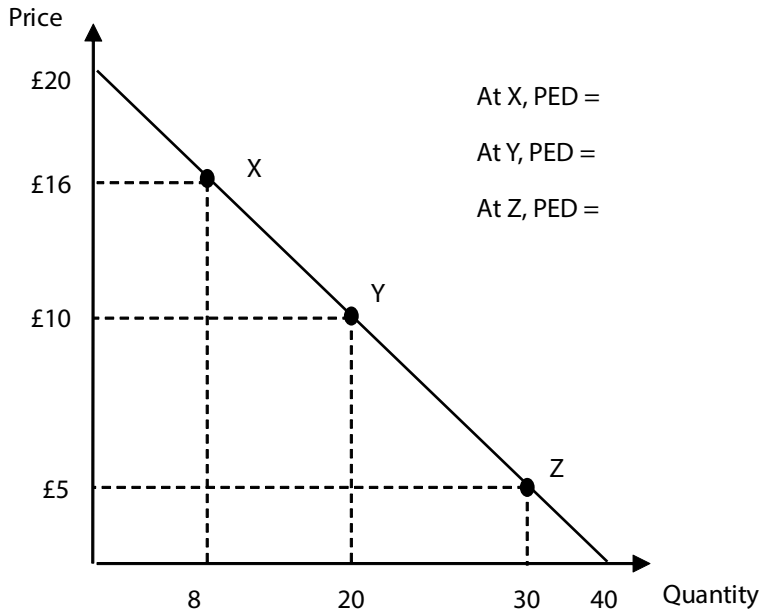
	Good A	Good B	Good C	Good D
Initial Price and Quantity	$P_0 = 4$ $Q_0 = 10$	$P_0 = 4$ $Q_0 = 10$	$P_0 = 5$ $Q_0 = 4$	$P_0 = 12$ $Q_0 = 13$
New Price and Quantity	$P_1 = 5$ $Q_1 = 7$	$P_1 = 5$ $Q_1 = 9$	$P_1 = 2$ $Q_1 = 10$	$P_1 = 11$ $Q_1 = 15$
PED: value				
PED: category				

Part B: Calculating a point elasticity

Given the following information, calculate the elasticity of demand for the following goods, expressing the elasticities as positive numbers:

$$PED = -1/s * (P/Q)$$

Slope = \_\_\_\_\_



**Figure 3.2: Calculating point elasticities on a demand curve.**

► BVFD: read sections 4.2–4.4 and cases 4.1 and 4.2.

**Activity SG3.3**

The following table identifies some factors which act as determinants of demand elasticity. Fill in the fourth column, which has been left blank, with a concrete example.

Factor	Example	Effect on demand elasticity	Good/Service
Necessity	People depend on this	Demand is inelastic	
Substitutes	There are many similar products available	Demand is elastic	
Definition	Good defined very narrowly	More elastic (because there are more possible substitutes)	
Time-span	Tastes change/more drastic adjustments become feasible	Demand becomes more elastic	
The share of your budget	Small items	Demand is inelastic	

**Activity SG3.4**

Use the boxes below to draw demand curves appropriate to each heading:

<p style="text-align: center;">Perfectly inelastic demand</p>          <p style="text-align: center;"><math>\epsilon =</math> _____</p>	<p style="text-align: center;">Perfectly elastic demand</p>          <p style="text-align: center;"><math>\epsilon =</math> _____</p>
---	---

**Activity SG3.5**

Total spending is the same as the firm's revenue. Use the data below to decide, if you were a manager, whether or not to make the price change in the following cases (you can ignore costs for the purposes of this activity and just assume that an increase in revenue is a good thing and a decrease in revenue is bad). For each case, calculate the demand elasticity (using the arc method), decide whether or not to make the change, and then check your answer by calculating total revenue before and after the price change.

- Increasing the price from £6 to £7 will lead to a fall in sales from 10,000 to 8,000.
- Increasing the price from £8 to £10 will lead to a fall in sales from 15,000 to 12,500.
- Decreasing the price from £20 to £18 will lead to an increase in sales from 6,000 to 8,000.

This activity emphasises the relationship between elasticity and total revenue. This is clearly explained in the textbook, but if you are not afraid of a bit of algebra we can derive a useful formula linking the two:

$$TR = P * Q$$

$$\Delta TR \approx Q\Delta P + P\Delta Q$$

(This approximation depends on  $\Delta P$  and  $\Delta Q$  being small so that the product  $\Delta P\Delta Q$  is very small, or what is known as 'second order small')

Dividing by  $\Delta P$

$$\frac{\Delta TR}{\Delta P} = Q + P \frac{\Delta Q}{\Delta P}$$

but the second term is Q times PED so

$$\frac{\Delta TR}{\Delta P} = Q (1 + PED)$$

Remember that PED is negative and  $\Delta P$  is positive for a price increase and negative for a price decrease. So, for example if demand is elastic, say  $-2$ , and price falls, then the sign of  $\Delta TR$  is positive. If it is inelastic, say  $-0.3$ , and price falls, then the sign of  $\Delta TR$  is negative.

---

## Cross-price elasticity of demand

► BVFD: read section 4.5.

In Block 2, we discussed how a change in own-price leads to a movement along the demand curve, while a change in the price of a related good leads to a shift in the demand curve. An increase in the price of a substitute good will shift the demand curve to the right; an increase in the price of a complement will shift the demand curve to the left. Section 4.5

discusses the responsiveness of quantity demanded of a good (let's call this good *i*) to a change in the price of a related good (which we can call good *j*) – this is known as **cross-price elasticity of demand**. The formulas for calculating this are the same as for own-price elasticities, except that you will use the original and new price of good *j*, and the original and new quantity of good *i*. For example, using delta notation the cross-price elasticity for good *i* with respect to the price of good *j* is:

$$\frac{\Delta Q_i}{\Delta P_j} \frac{P_j}{Q_i}$$

Unlike the case of a downward sloping demand curve where PED was always negative, the cross-price elasticity can be positive or negative depending on how the goods are related in consumption (whether they are substitutes or complements). The cross-price elasticity of demand is negative for complements and positive for substitutes. If the price of good *i* increases, people will demand less of good *j* if it is a complement to good *i*, and more of good *j* if it is a substitute for good *i*. What would be the value of the cross-price elasticity between two goods if they were completely unrelated?

**Activity SG3.6**

**Multiple choice question**

A Bordurian lawyer explains: 'Smoking is a Bordurian tradition. If you had coffee, you had cigarettes; if you had cigarettes, you had coffee'. According to this statement, the cross-price elasticity of the demand for coffee with respect to the price of cigarettes in Borduria is:

- a. positive
- b. negative
- c. zero.

## Income elasticity of demand

► **BVFD: read section 4.6 and case 4.3.**

**Activity SG3.7**

Classify the following goods, based on their (hypothetical) income elasticity:

Good	Income elasticity	Type of good
Car	2.98	
Food	0.5	
Margarine	-0.37	
Vegetables	0.9	
Public transportation	-0.36	
Books	1.44	

Would you expect income elasticities for given goods to be broadly similar in different countries? For example, would you expect the income elasticity of demand for public transport to be similar in the USA and in Mali? Think about why or why not.

The formula for calculating income elasticity of demand is:

Percentage change in quantity demanded of good X divided by the percentage change in real consumers' income.

Using the delta notation and letting Q represent quantity of the good



demand and  $M$  represent real consumer income, income elasticity of demand (IED) is given by the formula:

$$\frac{\Delta Q}{\Delta M} \frac{M}{Q}$$

---

## Price elasticity of supply

---

► BVFD: read sections 4.7 and 4.8 as well as Maths 4.3.

### Activity SG3.8

For the following direct supply function, calculate and interpret the PES when  $Q = 10$  and  $P = 2.5$ .

Direct Supply Function:  $Q^s = 5 + 2P$

PES =

---

### Activity SG3.9

Initially, the price of a tennis racket is £20. Demand is 30 and supply is 50. If the price falls by £5, the quantity demanded rises to 40, the quantity supplied rises to 40, and the quantity demanded of white cotton t-shirts rises from 70 to 100. Using the arc method, calculate the own-price demand elasticity and the elasticity of supply for tennis racquets; and the cross-price demand elasticity for white cotton t-shirts. Are white cotton t-shirts a complement or substitute to tennis racquets?

Own price elasticity =

Cross-price elasticity =

Elasticity of supply =

Substitute or complement?

---

► BVFD: Examine Table 4.11 – this provides a simple but helpful summary of the chapter up to section 4.8.

Make sure that you also understand section 4.7 which brings together own-price, cross-price and income elasticities with reference to inflation.

---

## Incidence of a tax

---

► BVFD: read section 4.9.

The key point of this section is that the incidence of the tax is not related to the person who physically pays the money to the government. Rather, whichever party (consumers or producers) is less price sensitive (either in demand or supply) will bear the greater share of the burden of the tax.<sup>1</sup> Suppose demand were perfectly inelastic, how would the burden of a sales tax be shared between consumers and producers?

It is important to realise that a sales tax drives a wedge between the price paid by consumers (sometimes called the demand price) and the price received by producers (the supply price). In a simple supply and demand diagram in the absence of taxes these two prices are, of course, the same.

Another point to consider is why goods such as cigarettes and fuel are taxed so heavily. This isn't only a question of improving health or reducing pollution – consider the PED of these goods and the implications for government tax revenues of taxing goods such as these.

---

► BVFD: read Maths 4.4.

<sup>1</sup> This is summed up in an expression which holds for small taxes, but which we do not prove here:

$$\frac{\Delta P^D}{\Delta P^S} = \frac{PES}{PED}$$

In words, the ratio of the change in the price the consumer pays (the demand price) to the change in the price that the producer receives (the supply price) is equal to the ratio of the price elasticity of supply to the price elasticity of demand.

**Activity SG3.10**

Let's put Maths box 4.4 into practice using a numerical example. If:

$$Q^D = 30 - 4P$$

$$Q^S = -6 + 8P$$

$t = 0.375$  where  $t$  is a specific tax that has to be paid by suppliers.

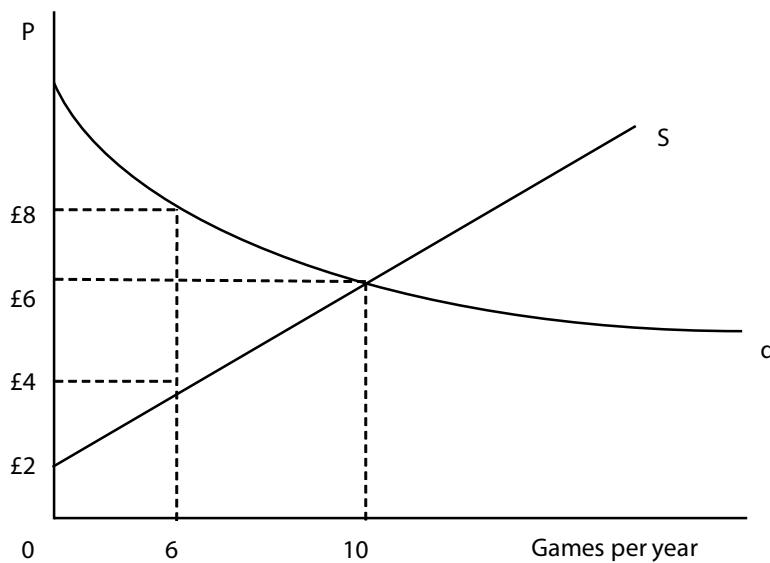
Calculate

- i. the equilibrium quantities with and without the tax
- ii. the increase in the price paid by consumers and the fall in consumer surplus
- iii. the fall in the price received by suppliers and the fall in producer surplus
- iv. the tax revenue received by the government
- v. the deadweight loss of the tax.

**Activity SG3.11**

**Multiple choice question**

Here you see the football fans' demand curve  $d$  for televised football matches together with the Football Association's (FA) supply curve  $s$  for such matches. The market for televised matches clears where the two curves cross, hence when 10 matches are televised for £6 each. Suppose now that the Government introduces a tax of £4 per televised match. The figure shows that the number of televised matches falls from 10 to 6. For these 6 matches fans pay £8 but the FA earns only £4 as the difference goes into the government's coffers.



**Figure 3.3: Demand and supply of televised football matches.**

As a result of the tax:

- a. The welfare of fans increases and the welfare of the FA decreases.
- b. The welfare of fans decreases and the welfare of the FA increases.
- c. Both fans and the FA lose welfare but the government raises enough tax revenues to compensate them.
- d. Both fans and the FA lose welfare and the government does not raise enough tax revenues to compensate them.
- e. Both fans and the FA gain welfare.

► BVFD: read the summary and work through the Sample examination questions.

## Overview

This block describes the concept of elasticity, explores how to calculate elasticities and discusses the implications. Conceptually, elasticity has to do with responsiveness, usually how much demand or supply responds to a change in price or income. You need to know how to calculate arc and point elasticities. The type of elasticities you need to be familiar with are as follows: own-price demand elasticity (elastic if more negative than  $-1$ , unit elastic if  $-1$ , inelastic if between  $-1$  and  $0$ ; though in practice these are often expressed as positive numbers using the absolute value), cross-price demand elasticity (generally positive for substitutes and negative for complements), income elasticity of demand (negative for inferior goods, larger than  $1$  for luxury goods) and supply elasticity (positive since the supply curve slopes upwards). Elasticity has implications for total spending on a product (which from the company's perspective is simply revenue): If demand is elastic, a fall in price leads to an increase in revenue. It also has implications for tax incidence – the more price insensitive side of the market (be it buyers or sellers) will bear a greater burden of the tax.

## Reminder of learning outcomes

Now go back to the list of learning outcomes at the start of the block and be sure that they have been achieved.

## Sample examination questions

### Multiple choice questions

For each question, choose the correct response:

1. If demand for pork is given by:  $Q^D = 200 - 6P + 2Y$ , when the price of pork is £8, a rise in consumers' income from £100 to £150 leads to:
  - a. a fall in demand and an income elasticity of  $-0.14$ , pork is an inferior good
  - b. a rise in demand and an income elasticity of  $0.14$ , pork is a normal good and a necessity
  - c. a rise in demand and an income elasticity of  $7.08$ , pork is a luxury good
  - d. a fall in demand and an income elasticity of  $-7.08$ , pork is an inferior good.
2. Suppose that a firm currently charges a price of £100 per unit and at this price its total revenue is £70,000. Suppose also that at this price, demand is elastic. Now the firm raises its price by £2 per unit. Explaining your answer, state which of the following quantities the firm might sell after the price increase
  - a. 300
  - b. 600
  - c. 900
  - d. 1,200.

3. In Côte d'Ivoire the own-price elasticity of demand for beef is 1.91. If the price of beef rises by 10 per cent, the quantity demanded of beef:
  - a. rises by more than 10 per cent
  - b. falls by less than 10 per cent
  - c. falls by more than 10 per cent
  - d. rises by less than 10 per cent.
  
4. When price elasticity of demand is greater than unity (in absolute value), revenue will:
  - a. increase with an increase in price
  - b. decrease with a fall in price.
  - c. decrease with an increase in price.
  - d. remain unchanged with any change in price.
  
5. An estimation of demand facing a particular firm produced the following information with regard to the elasticities of the demand function for  $x$ :  
 Own price:  $-2$ ; income:  $1.5$ ; cross price,  $y$ :  $0.8$ ; cross price  $z$ :  $3$ .  
 Where  $x$ ,  $y$  and  $z$  are goods and  $M$  is income. Therefore:  
 Select one:
  - a. If the price of  $x$  rose, your sales would fall but your total revenues would increase.
  - b. If the price of  $x$  fell, your sales would increase and so would your total revenues.
  - c. If the price of  $x$  fell, your sales would increase but your revenues would fall.
  - d. If the price of  $x$  rose, your sales would increase and so would your revenues.
  
6. With reference to the same information as in question 5:  
 Select one:
  - a. Commodities  $x$  and  $z$  are complements while  $x$  and  $y$  are gross substitutes.
  - b. Commodities  $x$  and  $z$  are complements and so are  $x$  and  $y$ .
  - c. Commodities  $x$  and  $z$  are gross substitutes and so are  $x$  and  $y$ .
  - d. Commodities  $x$  and  $z$  are gross substitutes but  $x$  and  $y$  are complements.

**Long-response question:**

1. a. Discuss the meaning of elasticity and the various types. What determines the price elasticity of demand for a certain good? Who is likely to find this information useful?
- b. Assume that the market demand for barley is given by:

$$Q = 1,900 - 4P_B + 0.1M + 2P_W$$

Where  $Q$  is the quantity of barley demanded,  $P_B$  is the price of barley,  $M$  is income (say per capita income of consumers) and  $P_W$  is the price of wheat. The prices of wheat and barley are each 200 (say £s per tonne) and  $M$  is 1,000. The slopes for barley demand, wheat demand and income are  $-4$ ,  $2$  and  $0.1$  respectively.

Calculate the own price elasticity of demand, the income elasticity of demand and the cross-price elasticity of the demand for barley with respect to the price of wheat.

- c. Calculate and illustrate graphically the impact on welfare of a specific tax of 37.5p per unit to be paid by suppliers when  $Q^D = 30 - 4P$  and  $Q^S = -6 + 8P$ . How do the welfare implications change if the tax is paid by consumers instead of suppliers?

2. Interpret the following elasticities for petrol:

Demand elasticity:  $-0.39$

Income elasticity:  $1.2$

Supply elasticity:  $0.7$

- a. Do there appear to be good substitutes for petrol in the preferences of buyers?
- b. Does petrol appear to be a luxury or a necessity in the preferences of buyers?
- c. Do firms appear to have excess capacity in the petrol industry?

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## Notes

# Block 4: Consumer choice

## Introduction

This block introduces another two fundamental concepts in microeconomics: indifference curves and the budget constraint. Indifference curves illustrate a consumer's preferences, while the budget constraint shows what it is possible for them to consume, given a limited budget and the prices they face. Put together, these concepts are used to determine the consumer's consumption decisions. In this way, we can see how the demand curves you learned about in Block 2 are derived.

After studying the demand curve in Block 2, it is important to realise that this curve is the direct result of the assumptions of rationality and individual decision making as discussed in Block 1. This block, on consumer choice, draws on the idea of opportunity cost as well as individual preferences to derive the demand curve.

You will need a good understanding of the intuition behind the models in this block. It is important that you gain a good grasp of them, because we use an equivalent set of concepts in analysing how firms make their production decisions (Block 5), and they are also used to determine household's labour supply (Block 10). As well as this, you will also need to practise drawing the graphs in this chapter, since they will help to understand the concepts, and since you may need to be able to reproduce them for your exam. In particular, practise drawing the income and substitution effects for normal and inferior goods, since many of the key concepts are summarised in these graphs.

## Learning outcomes

By the end of this block and having completed the Essential reading and activities, you should be able to:

- define the relationship between utility and tastes for a consumer
- describe the concept of diminishing marginal utility
- describe the concept of diminishing marginal rate of substitution and calculate the marginal rate of substitution (MRS)
- represent tastes as indifference curves
- derive a budget line
- explain how indifference curves and budget constraints explain consumer choice
- describe how changes in consumer income affect quantity demanded
- describe how a price change affects quantity demanded
- define income and substitution effects
- show how the market demand curve relates to the demand curves of individual consumers.

## Essential reading

Begg, Vernasca, Fischer and Dornbusch (BVFD), Chapter 5 including the appendix.

## Further reading

Lipsey and Chrystal (L&C) international edition, Chapter 3; UK edition, Chapter 4.  
Witztum (AW), Chapter 2.

## Synopsis of this block

The chapter starts by introducing the concept of utility, and the assumptions that are commonly made by economists about utility. It then explains indifference curves and the budget constraint and shows how these are combined to determine the consumer's choices. The impact of changes in the consumer's income and changes in price are examined in detail, including the decomposition of the effects of price changes into income and substitution effects. The chapter also demonstrates how these ideas are used to derive the individual demand curve, and then the market demand curve. The relationship to elasticity, particularly cross-price elasticity, is also discussed. Finally, the chapter explores whether the consumer benefits more from cash transfers or transfers in kind.

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## Consumer choice and demand decisions

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► **BVFD: read section 5.1 and concepts 5.1 and 5.2 of Chapter 5.**

---

### Utility

The concept of 'utility' was introduced by Jeremy Bentham, in his 1789 book *Principles of morals and legislation*. He defined it as follows: 'By utility is meant that property in any object, whereby it tends to produce benefit, advantage, pleasure, good, or happiness, (all this in the present case comes to the same thing) or (what comes again to the same thing) to prevent the happening of mischief, pain, evil, or unhappiness to the party whose interest is considered.' The philosophy of 'utilitarianism' (the 'greatest happiness principle') was invented by Bentham and has been very influential. The textbook defines utility much more simply as 'the satisfaction consumers get from consuming goods' (p.84). As you can read in the appendix to Chapter 5, in the 19th century, economists believed that utility levels could be measured, and used a unit of measurement called 'utils'. Nowadays, economists assume that utility is not measurable in this way, however, utility is still a useful concept that underlies much of microeconomics.

### Marginal utility

As discussed in Block 1, consumers and firms make decisions at the margin. This idea is very important in relation to utility. The marginal utility of a good or service is the extra utility a person gains from consuming one more unit of that good or service.

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#### Activity SG4.1

Linking the shape of the indifference curves to the assumptions regarding consumer tastes.

The various assumptions that lie behind indifference curves are reflected in certain aspects of the shape of the curve. Match the assumption to the characteristic of the curve and explain why.

Diminishing marginal rate of substitution	Lines never cross
Consumers prefer more to less (non-satiation)	Any bundle is on some indifference curve
Completeness	Indifference curves convex to the origin (ICs look like 'smiles' when seen from the origin)
Transitivity	Downward sloping

The meaning and representation of preferences and hence the assumptions behind indifference curves are discussed in detail in AW section 2.2.2.

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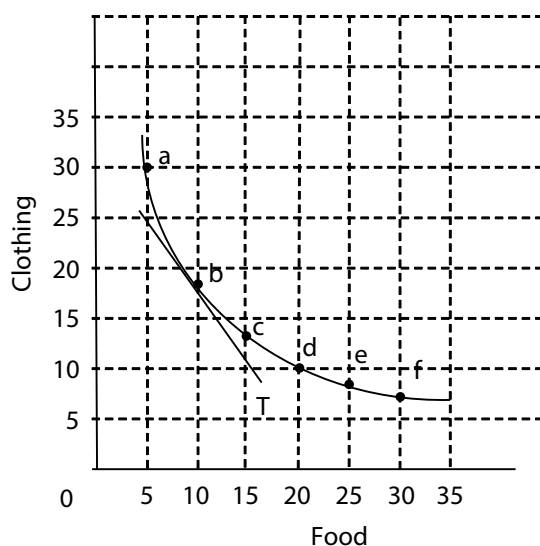


## The slope of the indifference curve is the marginal rate of substitution

The marginal rate of substitution (MRS) between two goods, as you know from the definition on p.86, measures the quantity of a good the consumer must sacrifice to increase the quantity of the other good by one unit without changing total utility. On p.88, in the paragraph discussing how the slope of a typical indifference curve gets steadily flatter as we move to the right, there is an important gem of information: ‘The marginal rate of substitution ... is simply the slope of the indifference curve’. On the graph below, the tangent T shows the slope of the indifference curve and the MRS at point b.<sup>1</sup>

The figure and table below are analogous to L&C international edition: Figure 3.2 and Table 3.2; UK edition: Figure 4.2 and Table 4.2, where you can also find a good explanation of these concepts. The MRS is the absolute value of the ratio of the change in clothing to the change in food. Since these two changes always have opposite signs, the MRS (slope of an indifference curve) is obtained by multiplying  $\Delta C/\Delta F$  by  $-1$ .

<sup>1</sup> Some textbooks define the MRS as the slope of the indifference curve, that is as a negative quantity, others as the ‘absolute value’ of the slope (i.e. as a positive quantity). This is simply a matter of convention and it doesn’t matter which convention is followed, as long as one is consistent.



**Figure 4.1: The marginal rate of substitution is the slope of the indifference curve.**

Movement	Change in clothing	Change in food	Marginal rate of substitution
From a to b	-12	5	$(-12/5)^* -1 = 2.4$
From b to c	-5	5	$(-5/5)^* -1 = 1.0$
From c to d	-3	5	$(-3/5)^* -1 = 0.6$
From d to e	-2	5	$(-2/5)^* -1 = 0.4$
From e to f	-1	5	$(-1/5)^* -1 = 0.2$

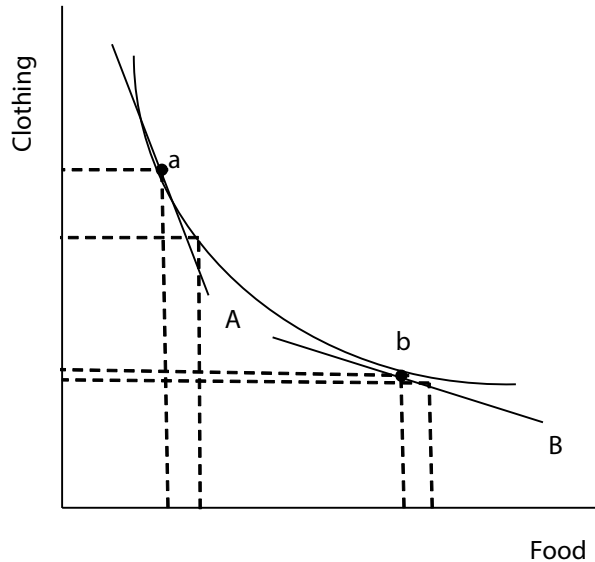
**Table 4.1**

You should remember from Block 3 that  $\Delta$  (delta) means **change**. Examining the movement from a to b and b to c etc. gives us a good approximation of the slope of various sections of the curve. An even more accurate way is to examine the change in utility due to a one unit change in either of the goods: this gives us the marginal utility of each good at a point on the curve. In fact, the MRS is given by  $-MU_C/MU_F$ , (i.e. the marginal utility of clothing at a certain point on the indifference curve, divided by the marginal utility of food at that point, multiplied by  $-1$ ). We will come back to this again at the end of the block (as it is covered in more detail in the third part of the appendix and Maths A5.1).

Figure 5.5 on p.90 of BVFD also helps to illustrate this idea, showing indifference curves for people with different tastes. The glutton is more willing to substitute films for food than the weight-watching film buff and has a higher MRS. Drawing a tangent to any part of their indifference curves shows that the slope of the gluttons indifference curve is steeper – reflecting his higher MRS between meals and films.

The slope of a typical indifference curve gets steadily flatter as we move to the right, reflecting a diminishing marginal rate of substitution.

For example:



**Figure 4.2: Changes in the slope of an indifference curve reflect a diminishing marginal rate of substitution.**

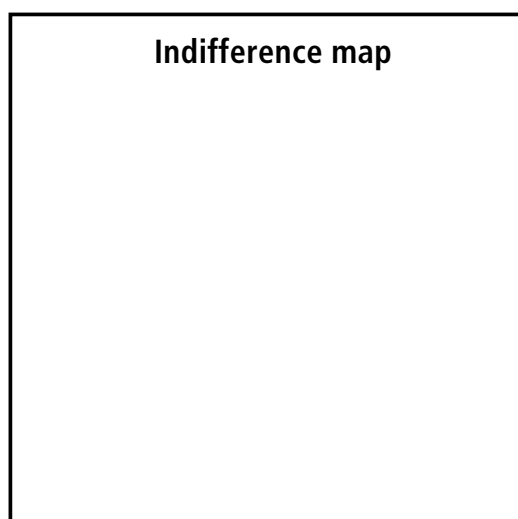
The slope of the tangent A shows the MRS of food for clothing at point *a*. Similarly, the slope of the tangent B shows the MRS at point *b*. We can see that the slope flattens as we move from *a* to *b*, reflecting a diminishing MRS. At point *a*, the person has quite a lot of clothing and is willing to substitute a fair bit of this for a certain amount of food. At point *b*, the person has much less clothing but quite a lot of food and is only willing to substitute a very small amount of clothing to gain the extra amount of food. Going back to table 4.1, you can also see the diminishing MRS, as the amount of clothing the person is willing to substitute for 5 additional units of food continues to fall.

**Activity SG4.2**

Draw a map of indifference curves, marking out bundles and comparing them to each other based on the following story: Mark likes jeans and cowboy boots. He is indifferent between a bundle with 3 pairs of jeans and 2 pairs of cowboy boots (bundle A) and a bundle with 2 pairs of jeans and 4 pairs of cowboy boots (bundle B). However, he would prefer to have a bundle with 4 pairs of jeans and 5 pairs of cowboy boots (bundle C). He is also indifferent between a bundle with 2 pairs of jeans and 1 pair of cowboy boots (bundle D) and a bundle of 1 pair of jeans and 3 pairs of cowboy boots (bundle E), although these last two options are his least preferred options. How do you think he would feel about a bundle with 3 pairs of jeans and 3 pairs of cowboy boots?

Remember:

- An indifference curve shows all the consumption bundles yielding a particular level of utility.
- Any point on a higher indifference curve is preferred to any point on a lower indifference curve.



## Budget constraint

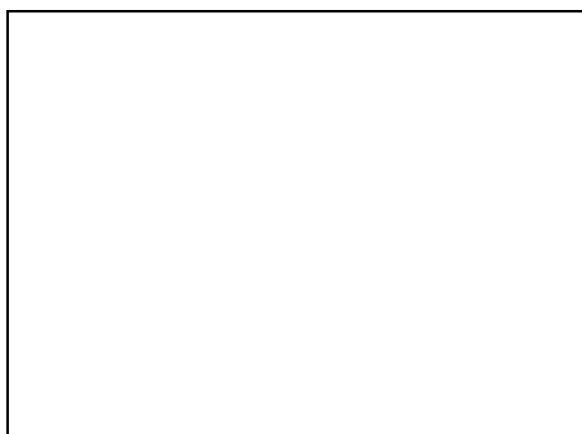
### Activity SG4.3

The slope depends only on the relative prices of the two goods. Draw budget constraints for the following three price combinations, assuming a total income of £120.

A:  $P_x = £12$   
 $P_y = £20$

B:  $P_x = £10$   
 $P_y = £20$

C:  $P_x = £12$   
 $P_y = £15$



What is the interpretation of the slope of the budget constraint? It represents the rate at which the consumer can substitute good  $x$  for good  $y$  in the market, or the opportunity cost of  $x$  in terms of  $y$ . To see this, suppose the consumer wishes to consume a little more  $x$ ,  $\Delta x$ . This will cost her  $\Delta x P_x$ . Assuming she was spending all her income on  $x$  and  $y$  (on her budget line) then she will have to reduce her expenditure on  $y$  by the same amount. So  $\Delta x P_x = -\Delta y P_y$ , (i.e. the slope  $\Delta y / \Delta x = -P_x / P_y$ ).

► BVFD: read Maths 5.1.

You should be familiar with the general form of the budget constraint used in this section, (i.e. where  $p_x$  is the price of good  $X$ ,  $p_y$  the price of good  $Y$ ,  $x$  the quantity of good  $X$ ,  $y$  the quantity of good  $Y$  and  $M$  the money income available to the consumer). Note that the first term on the left-hand side of this equation is the consumer's expenditure on  $X$  and the second term is expenditure on  $Y$ . Since we assume that the consumer spends all her income on these two goods, the amount spent on the two goods sums up to  $M$  which is her income. One important point from this Maths box is that the slope of the budget constraint is given by  $-p_x / p_y$  i.e. the price ratio.

The figure in this Maths box shows how you can represent a general case, where you don't have specific quantities and prices. The intercepts will then be  $M/P_y$  and  $M/P_x$  respectively. This is likely to be how you will draw a budget constraint most often.

## Utility maximisation and choice

Indifference curves and the budget constraint together indicate the choice a consumer will make to maximise their satisfaction. This can be represented by the following diagram:

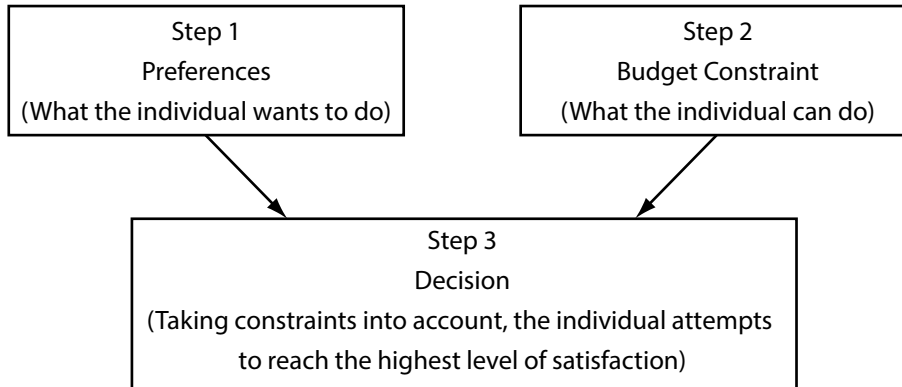


Figure 4.3: Consumer choice and the decision rule.

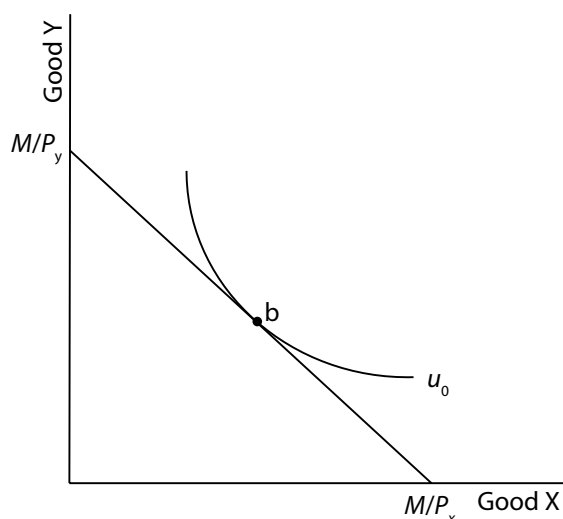
### Decision rule

The point which maximises utility is the point at which the consumer reaches the highest indifference curve that the budget constraint allows. For the 'standard' indifference curves we have been looking at, this decision rule says that the consumer should choose the consumption bundle where the slope of the budget line and the slope of the indifference curve coincide. In other words, it is the point at which the indifference curve is tangent to the budget constraint.

- **BVFD: read the first part of the appendix for Chapter 5 of, the material in the appendix applies whether or not utility can actually be measured.**

We can describe the consumer's optimal decision using equations as follows: At the chosen bundle, the marginal rate of substitution between the two goods must equal their relative price, i.e.  $MRS = -MU_x/MU_y = -P_x/P_y$ . Rearranging this gives  $MU_x/P_x = MU_y/P_y$ .

We can also describe their decision graphically, as follows: The consumer chooses the bundle where the indifference curve is tangent to their budget constraint. The slope of the indifference curve ( $MRS = -MU_x/MU_y$ ) and the slope of the budget constraint ( $-P_x/P_y$ ) must be equal. The tangency thus implies  $-MU_x/MU_y = -P_x/P_y$ . Rearranging this gives  $MU_x/P_x = MU_y/P_y$ .



**Figure 4.4: A budget constraint and an indifference curve.**

$MU_X/P_X = MU_Y/P_Y$  has the intuitive interpretation that the marginal utility derived from the last pound spent on X must be equal to the marginal utility of the last pound spent on Y. Otherwise the consumer would adjust their consumption pattern and increase their utility.

Imagine that  $MU_X/P_X > MU_Y/P_Y$ . This implies that the consumer derives more utility from the last pound spent on good X than the last pound spent on good Y. In this case, by consuming one pound more of good X and one pound less of good Y, they can increase their utility level without spending any more money. The consumer should continue to adjust their spending in this way until  $MU_X/P_X = MU_Y/P_Y$ .

It is important to understand the intuitive explanation of the consumer's decision, as well as being familiar with the relevant equations and graphs.

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#### Activity SG4.4

Jeremy has £M and wants to buy some combination of books and shoes. Books cost  $P_B$  each and shoes cost  $P_S$  per pair. Both of these goods are normal goods to him. Describe graphically and in equations how he will decide on an optimal combination of the two goods which will maximise his total utility. What is the intuition behind this?




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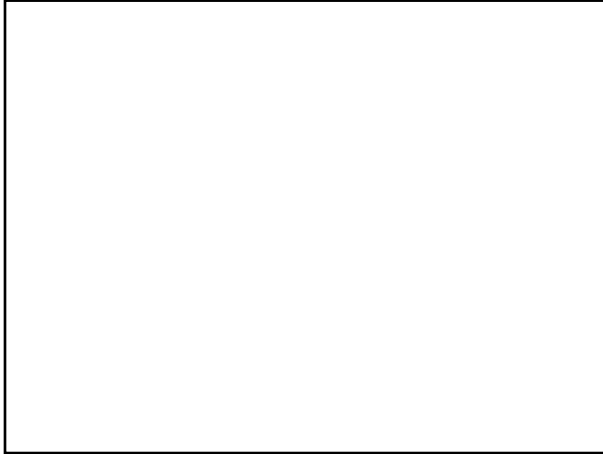
► BVFD: read section 5.2.

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**Activity SG4.5**

Draw budget constraints and possible indifference curves for the following scenario:

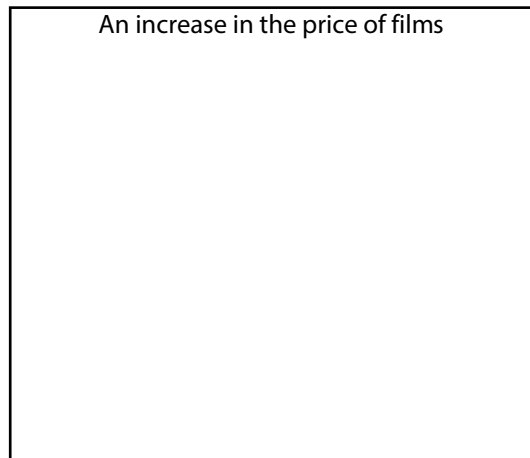
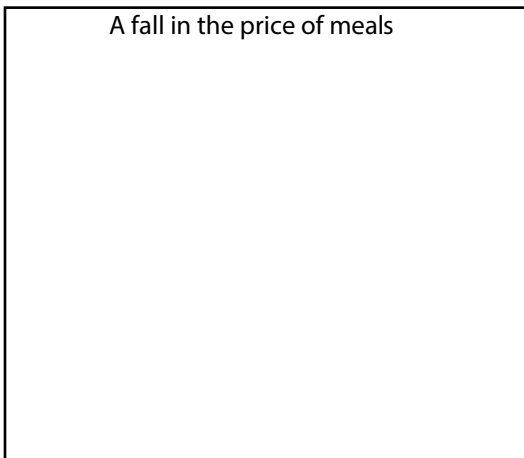
Susan buys cabbages and carrots. Cabbages cost £1 per kilo and carrots cost £0.80 per kilo. Her income falls from £20 to £16. Carrots are a normal good, but cabbages are an inferior good.



► **BVFD: read section 5.3 and cases 5.1 and 5.2.**

**Activity SG4.6**

Page 98 contains a suggestion of two diagrams you should draw to check your understanding, complete this in the boxes below:



**Income and price changes**

**Substitution and income effects**

Decomposing the effects of a price change into income and substitution effects is an important piece of economic analysis with many real world applications. Case 5.1 shows one such application; others relate to the effects of changes in wages on labour supply and changes in interest rates on savings decisions. Remember:

- The substitution effect is always negative.
- The income effect is negative for normal goods and positive for inferior goods.
- For normal goods, the income and substitution effects reinforce each other.

- For inferior goods, the income and substitution effects work in opposite directions.
- For inferior goods, if the income effect dominates the substitution effect, the good is called a Giffen good (in practice, these are very rare).

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### Activity SG4.7

For a choice between Good X and Good Y, complete the graphs below, clearly indicating the income and substitution effects in each case. You will find figures 5.14 and 5.16 helpful for this activity, and you might want to repeat it a few times on a separate sheet of paper until you are really comfortable with these concepts. The following order is generally best:

1. Draw the original budget line and indifference curve.
2. Draw the new budget line.
3. Draw the hypothetical budget line parallel to the new budget line and tangent to the original indifference curve. This gives you the substitution effect.
4. Draw the new indifference curve (where you place this depends on what type of good it is). This gives you the income effect.

<p style="text-align: center;">Normal goods, price of X rises</p>	<p style="text-align: center;">Inferior good, price of X rises</p>
<p style="text-align: center;">Normal goods, price of X falls</p>	<p style="text-align: center;">Inferior good, price of X falls</p>

NB: The method used in the textbook and in this activity to break a price change into income and substitution effects follows an approach suggested by the economist John Hicks and the effects are known as the Hicksian substitution and income effects. There is also an alternative approach following the economist Eugen Slutsky. If you are interested to know more about this, it is explained in AW 2.3.1. However, you are only required to know the Hicksian approach (as in BVFD) for this course.

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## Deriving demand: 'The individual demand curve'

In Block 2 we introduced demand and supply and learned about the demand curve. Now we are able to derive the individual demand curve from the choices of consumers.

### Activity SG4.8

Derive the individual demand curve from the information in figure A. Can you now explain why the demand curve is downward sloping?

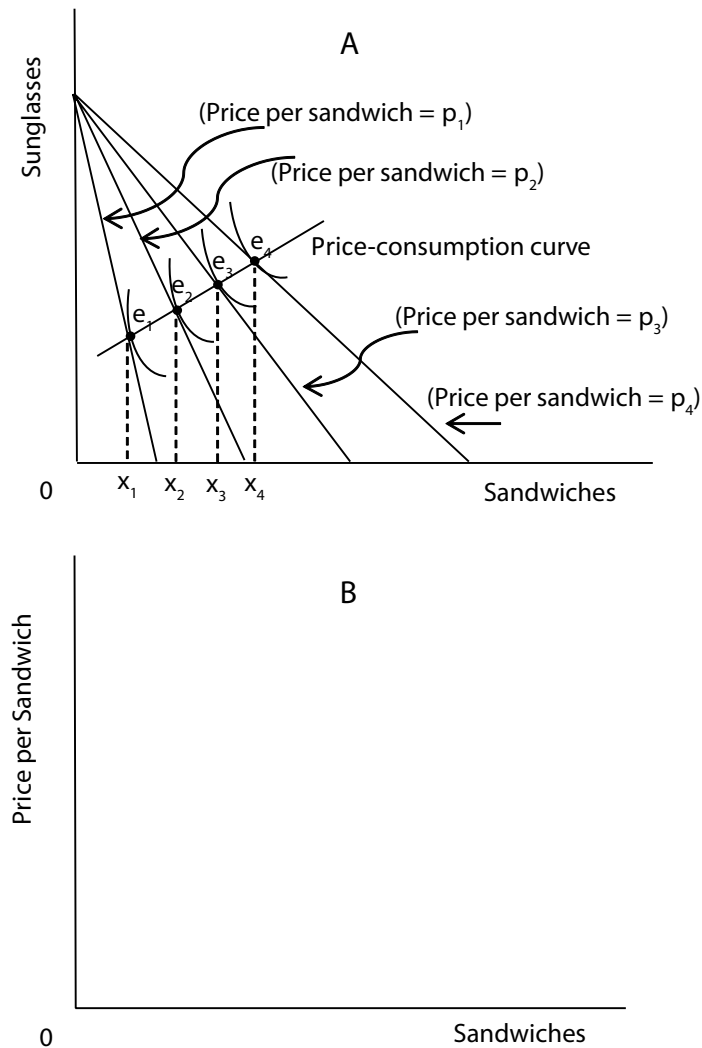


Figure 4.5: Deriving the individual demand curve.

► **BVFD: read the second part of the appendix: deriving demand curves.**

This explains why, for normal goods, a fall in price leads to an increase in quantity demanded, due to both substitution and income effects.

## Demand curves and consumer surplus

We have now shown the theoretical underpinnings of a downward sloping demand curve. In particular we have gone beyond general statements such as 'at lower prices existing consumers want to purchase more and new consumers enter the market' and shown that at each point on the demand curve consumers are maximising their utility by equating their MRS  $(\frac{MU_x}{MU_y})$  with the relative price  $(\frac{P_x}{P_y})$  where  $x$  is the good on the horizontal axis and  $y$  the good on the vertical axis. This enables us to give further intuition to the price at any given quantity and to the whole demand curve.



To do this, we can put some numbers on a given utility maximising point corresponding to a set of prices for  $x$  and  $y$  and a given income. For example, let  $P_x = £4$ ,  $P_y = £2$  and income = 40. This is shown on the diagram below. This diagram shows the consumer's utility maximising combination of  $x$  and  $y$  ( $x_1, y_1$ ) at  $A$  in the upper panel and the demand for  $x$  at  $P_x = £4$ ,  $P_y = £2$ ,  $M = £40$  in the lower panel. How much is an extra unit of  $x$  worth to the consumer at  $A$ ? At  $A$ , due to the tangency,  $MRS = -2$ . This means our consumer would give up 2 units of  $y$  in order to have another unit of  $x$  – that is the meaning of  $MRS = -2$ ; one unit of  $x$  has the same value to her as 2 units of  $y$ . Since  $y$  costs £2 per unit, two units of  $y$  are worth £4, an extra unit of  $x$  must also be worth £4 as an extra unit of  $x$  is worth the same as two units of  $y$  at  $A$ . Another way of saying this is that at  $A$  and  $A'$  the consumer's **willingness to pay** for another unit of  $x$  is £4. So price can be interpreted as the willingness to pay for an extra unit of the good, given income and prices of other goods. Similarly, the demand curve can be interpreted as a willingness to pay curve (its downward slope implying that the more  $x$  the consumer has, the lower her willingness to pay for an extra unit). Although we do not do the mathematics here, you can see intuitively that because price at a given  $x$  represents the willingness to pay for a **marginal** unit of  $x$ , the area under the demand curve up to that level of  $x$  shows the **total** willingness to pay for that amount (the sum of the willingness to pay for each separate unit). This also makes it easier to see that the consumer surplus (a concept introduced in Block 2) at any given price and quantity is the difference between the total willingness to pay for that amount minus what is actually paid – the prevailing price times the quantity.

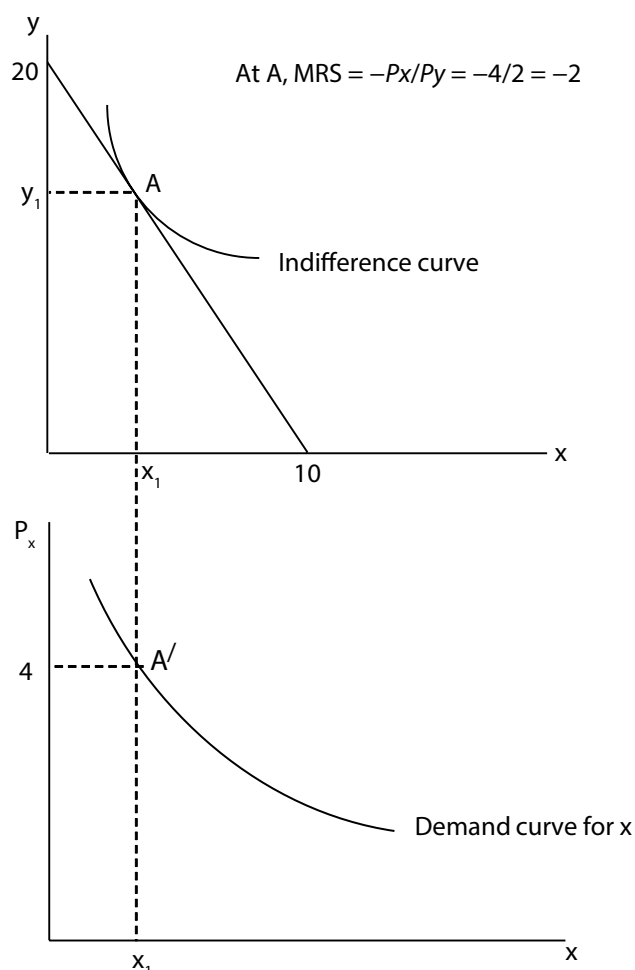


Figure 4.6: Willingness to pay and consumer surplus.

## Deriving demand: 'The market demand curve'

► BVFD: read section 5.4.

The market demand curve is the horizontal addition of the demand curves of all the individuals in that market. In the following activity we assume that there are only three consumers, but the method can be applied to much larger numbers; in such cases kinks in the market demand curve would tend to be smoothed out.

### Activity SG4.9

Complete the fourth graph, showing the market demand curve. Why might the three consumers have different demand curves?

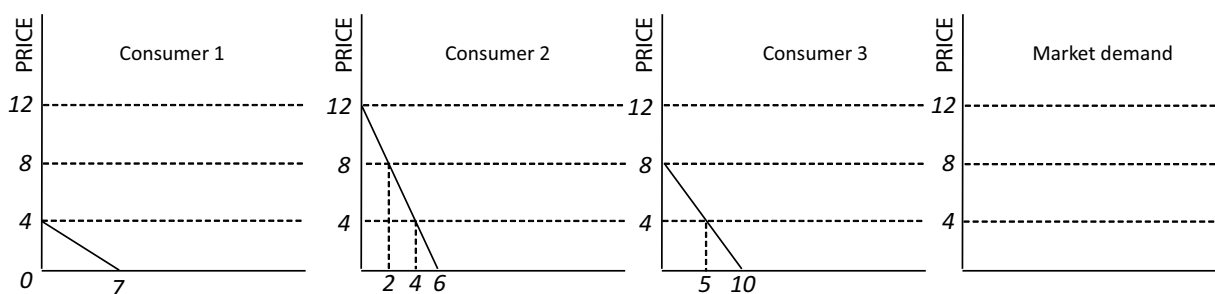


Figure 4.7: Deriving the market demand curve.

## Complements and substitutes

► BVFD: read section 5.5 of and the part of 5.3 which addresses cross-price elasticities of demand.

The section on complements and substitutes (section 5.5) introduces the fact that goods are not always substitutes for each other, but may in fact be complements. This means that if the demand for a good rises, the demand for other complementary goods will rise as well.

You will remember from Block 3 that cross-price elasticities are negative when two goods are complements and positive when two goods are substitutes. The section on cross-price elasticities (in section 5.3) details three factors which impact on income and substitution effects and can make the cross-price elasticity for good Y either positive or negative (responding to a change in the price of good X). These are: whether the two goods are good substitutes for each other; the income elasticity of demand of good Y; and good Y's share of the consumer's total budget.

This section also shows that not all indifference curves are convex to the origin as in Figures 5.2 and 5.3 of BVFD. How well the two goods can be substituted for each other is reflected in the shape of the indifference curves as follows:

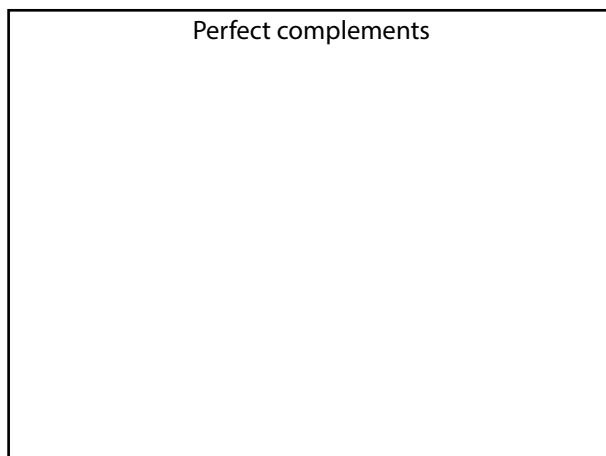
- Figure 5.20, LHS – perfect substitutes – indifference curves are straight lines – full substitution from one to the other if the price of one good falls below the price of the other good.
- Figure 5.18 – good substitutes – indifference curves are quite flat – large substitution effect of a price change.
- Figure 5.17 – poor substitutes – indifference curves are very curved – small substitution effect of a price change.

- Figure 5.20, RHS – perfect complements – indifference curves are perpendicular lines – no substitution effect of a price change, the consumer will consume more (or less) of both in the same proportion.

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#### Activity SG4.10

Draw the indifference curves for perfect complements together with a budget line. Now draw a new budget line for a change in the price of one of the goods. Indicate the income and substitution effects (if any) of the price change.




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#### Activity SG4.11

Barbara likes peanut butter and jam together on her sandwiches. However, Barbara is very particular about the proportions of peanut butter and jam. Specifically, Barbara likes 2 scoops of jam with each scoop of peanut butter. The cost of 'scoops' of peanut butter and jam are 50p and 20p, respectively. Barbara has £9 each week to spend on peanut butter and jam. (You can assume that Barbara's mother provides the bread for the sandwiches.) If Barbara is maximising her utility subject to her budget constraint, how many scoops of peanut butter and jam should she buy?

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#### Activity SG4.12

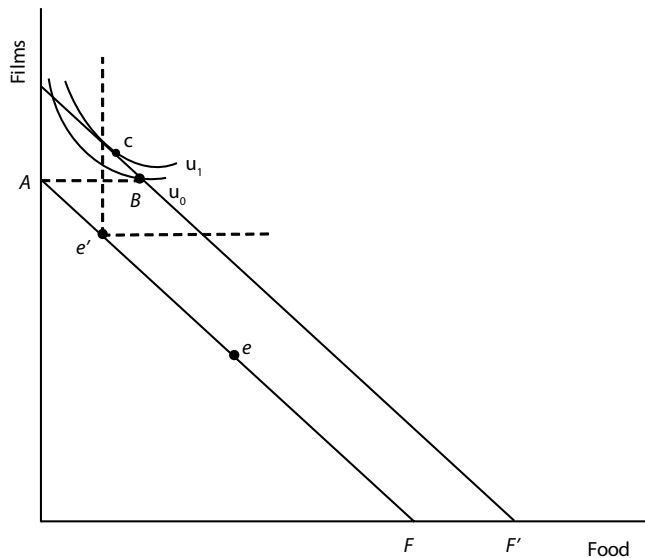
Suppose that a consumer considers coffee and tea to be perfect substitutes, but he requires two cups of tea to give up one cup of coffee. This consumer's budget constraint can be written as  $3C + T = 10$ . What is this consumer's optimal consumption bundle?

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## Cash transfers versus transfers in kind

► BVFD: read section 5.6.

Figure 4.8 below replicates Figure 5.21 from the textbook, but includes indifference curves for the case where the consumer starts at  $e'$ . If the consumer receives a cash transfer, they may move to point  $c$ , where their utility level is indicated by the curve  $u_1$ . However, if they receive food stamps (a transfer in kind), they cannot choose point  $c$ , and may move instead to the feasible point  $B$ . At point  $B$ , their utility level is indicated by the curve  $u_0$ . This is clearly lower than the utility level the consumer could have reached with a cash transfer. Furthermore, point  $B$  is not a tangency solution: the slope of the indifference curve is not equal to the slope of the budget constraint. This shows that non-tangency solutions may sometimes arise from government policy, and also reaffirms the conclusion made by the textbook: 'In so far as people can judge their own self-interest ... people are better off, or at least no worse off, if they get transfers in cash rather than transfers in kind' (p.108).



**Figure 4.8: Transfers in cash and in kind. Figure adapted by author from BVFD.**

► **BVFD: read Appendix part 3 and Maths A5.1.**

The section of the appendix entitled ‘ordinal utility and indifference curves’ introduces utility functions. As is written, although no one really knows anyone’s utility function for any good, expressing utility numerically through a utility function can be very useful. The maths box shows how marginal utility can be found using the delta notation or calculus. If you are familiar with calculus, you may find this makes marginal analysis much easier. However, it is also possible to use the delta notation to find marginal utility, or else this will be given to you, as per the activity below.

#### Activity SG4.13

Calculate the optimal quantity of each of two goods ( $x$  and  $y$ ) and the consumer’s total utility given  $p_x = 1$ ,  $p_y = 2$ ,  $M = 80$ , and  $U(x,y) = xy$ , where  $MU_x = y$  and  $MU_y = x$ . How would you represent this graphically?

► **BVFD: read the summary and work through the review questions in Chapter 5.**

## Overview

This block started by introducing utility and indifference curves, as well as the budget constraint. Indifference curves represent consumer tastes, while the budget constraint shows the possibilities open to the consumer, given their limited budget. Putting these together, we learned the decision rule that determines consumer choice, under the assumption that consumers maximise utility. In particular, we saw that consumers will choose the bundle of goods such that  $MU_x/P_x = MU_y/P_y$ . Expressed graphically, this means that the highest reachable indifference curve is tangent to the budget constraint. We then explored how their choices are affected by changes in income and prices, looking in particular at income and substitution effects of a price change. This helped us identify normal and inferior (and Giffen) goods. We also further examined complements and substitutes. Understanding how consumers make choices lets us see what lies behind the – individual and market – demand curves. Finally, the analysis of budget constraints and indifference curves also made it possible to evaluate the relative benefits of cash transfers versus transfers in kind.

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## Reminder of your learning outcomes

Now go back to the list of learning outcomes at the start of the block and be sure that they have been achieved

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## Sample examination questions

### Multiple choice questions

For each question, choose the correct response:

1. The price of car transport is 30 cents per mile. The price of bus transport is 60 cents per mile. The marginal utility of Mario's last mile of car transportation is 80 utils, and the marginal utility of his last mile of bus transportation is 150 utils. Hence:
  - a. Mario is currently maximising his utility.
  - b. Mario could increase his utility by decreasing his consumption of car transportation.
  - c. Mario could increase his utility by increasing his consumption of car transportation.
2. If an agent has a utility function of the form  $u(x,y)=xy$  then:
  - a. They will be indifferent between (6,4) and (3,8).
  - b. They will prefer (6,4) over (5,5).
  - c. They will be indifferent between (6,4) and (5,5).
  - d. None of the above.
3. The slope of the demand for an inferior good is steeper than that of a normal good because:
  - a. Income and substitution effects enhance each other.
  - b. Substitution effect for a normal good is greater than that of an inferior good.
  - c. Income effect of a normal good is smaller in magnitude (absolute value) than the income effect of an inferior good.
  - d. Income and substitution effects offset each other.
4. Judith spends all her money buying wine and cheese and wants to maximise her utility from consuming these two goods. The marginal utility of the last bottle of wine is 60, and the marginal utility of the last block of cheese is 30. The price of wine is £3, and the price of cheese is £2. Judith:
  - a. is buying wine and cheese in the utility-maximising amounts
  - b. should buy more wine and less cheese
  - c. should buy more cheese and less wine
  - d. is spending too much money on wine and cheese.

## Long-response questions

1. a. Susan buys bread rolls and cheese. One bread roll costs £1 and cheese costs £3 per 500g block. Susan has £12 income to spend on bread and cheese.
  - i. Draw Susan's budget constraint and a possible indifference curve. Explain the assumptions behind the shape of the indifference curve you have drawn.
  - ii. If the price of bread falls to £0.80 per loaf, how will this affect her purchases? Answer in words and graphically, clearly indicating income and substitution effects of the price change.
  - iii. If Susan only enjoys bread and cheese when she has 500g of cheese for every bread roll that she eats, draw her indifference curves. How much bread and cheese should she buy to maximise her utility? Assume Susan has £12, one bread roll costs £0.80 and cheese costs £3 per 500g block.
- b. Now let's assume that Susan grows 100 potatoes each year and all of her income comes from selling them. She spends all of her income each year consuming potatoes and other goods. For Susan, potatoes are a Giffen good, in that if her income is fixed in some way (i.e. ignoring the fact that she sells potatoes and just fixing her income at some value) her consumption of potatoes will rise when their price rises. The price of potatoes falls and she consumes more potatoes. Taking into account the fact that her income actually comes from selling potatoes, explain how the last statement can be consistent with those that precede it.
2. I consume two goods, ice cream and biscuits. I shop once a week, spending £100, at either Sainsbury or Tesco (two well-known UK supermarkets). Interestingly, I've noticed that the bundle I purchase when I visit Tesco costs more at Sainsbury. Similarly, the bundle I purchase when I visit Sainsbury costs more at Tesco. And yet, I find that I get the same utility from shopping at either store (i.e. the Sainsbury shopping bundle gives me the same utility as the Tesco shopping bundle). Explain how it is possible for all of these statements to be true. (Hint: draw a single indifference curve and have me maximise utility given a £100 budget and different prices in the two stores).