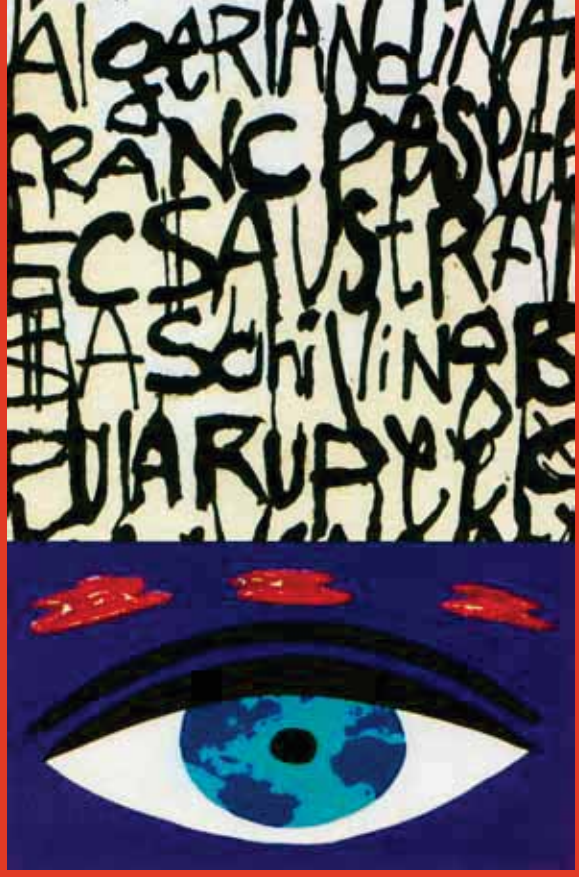

THIRD EDITION

economics from a global perspective

alan glanville
jacob glanville

FOR USE WITH
INTERNATIONAL BACCALAUREATE DIPLOMA

Economics from a global perspective

Third Edition

A TEXT BOOK FOR USE WITH THE IB DIPLOMA ECONOMICS PROGRAMME

Alan Glanville

Jacob Glanville

For my father, Alan

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Brief Contents

The Authors

Alan Glanville was fully involved with the International Baccalaureate Economics programme from 1971, teaching IB Economics full-time for 30 of those years, as Head of Department at the UWC of the Atlantic, Wales; Lester B Pearson UWC of the Pacific, Canada; Sigtunaskolan Humanistiska Laroverket, Sweden; and St. Clares, England. Alan was an IB Examiner from 1981 to 1996, Acting Chief Examiner for one year and a Deputy Chief Examiner for five years. During those years he was involved in all stages of exam setting, marking and moderating and led IB teacher workshops in economics all over the world. From 1994 as an independent author and publisher he produced resource materials for the use of students and teachers. Alan died in March 2010.

Jacob Glanville is a professional economist with 20 years experience of applying economic theory and quantitative methods to help resolve business and public policy issues. Past employers include the consultancy firms LECG and PricewaterhouseCoopers, and UK competition authorities and regulators. His areas of expertise are economic appraisal, competition policy, economic modelling, policy review and economic research. Jacob was co-author and tutor for a postgraduate Competition Policy course set up by the UK's anti-trust authorities and economic regulators from 2000-2007. He was introduced to IB economics by his father, Alan, whilst a student at Atlantic College.

Contents

❖ = HL only

❖ = HL only

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Answers to Questions and Exercises

Preface

Economics From A Global Perspective has been specifically written and designed for the International Baccalaureate (IB) Diploma course in Economics at both Higher and Standard Levels. The first edition, published in 1997 met a long-established need of IB students and teachers. Over 50,000 copies have been sold to date.

This third edition is organised to the syllabus introduced in September 2011, valid for the final examinations in May and November 2013 and beyond. The book is structured almost exactly to the syllabus and almost in the same order, but not completely. In a few instances, *eg* in Section 1.5, some topics are sequenced differently for clearer learning. There are clear and simple explanations for the new mathematical content for Higher Level Students, with corresponding examples and exercises. This text is therefore complete and sufficient for studying the whole course, no supplementary texts are required. Please note that only Sections 1 to 4 are examined and assessed. The first part of the book, *The Foundations of Economics*, introduces 'threshold concepts' that are reinforced as they appear in the four main sections that follow.

The appropriate IB syllabus 'Learning Outcomes' are set out at the beginning of each sub-section, with topics sub-divided into four categories, Knowledge, Analysis, Evaluation and Skills, corresponding to the IB's 'Assessment Objectives' AO1 to AO4 (refer to the IB's *Economics Guide* for more detail). This feature should help students and teachers judge the breadth and depth of study required for the examinations.

The IB Diploma course requires all students to study core topics with Higher Level students studying additional 'extension' topics. *Economics From A Global Perspective* has colour coding of these 'Higher Level Extensions' for ease of recognition and use. The same colour coding has been used to distinguish Higher Level topics in the lists of 'Learning Objectives' preceding each sub-section, and in the expanded Glossary. Standard Level students are required to study the core pages only (white pages), omitting all of the Higher Level Extensions (blue pages). Higher Level students need to study everything in the text. Some teachers may, however, instruct Standard Level students to read particular Higher Level Extensions for additional depth of understanding.

Case studies are used throughout the book to add depth and realism to many of the topics. Some of these studies include questions to test comprehension and reinforce learning, together with answer guidelines. Country profiles are included for Bangladesh, China, Nigeria, South Korea and Venezuela. These aim to add interest and realism to the study of development.

The introductory chapter, and each sub-section of the four main sections, concludes with multiple choice questions. This enables students to test their understanding. Answers to many of the case studies and all of the multiple choice questions are provided. Some questions require a discursive answer, however, and are better left to the teacher. Further questions and answers are available in the course companion workbooks: *Multiple Choice Questions for Economics* and *Data Response Questions for Economics*. Advice on study methods – *A Guide to Study Methods* – is available as a free download from our website. Details at the back of this book, or on our website (www.glanvillebooks.co.uk).

We welcome and encourage suggestions and comments to improve the text in order that it should be the most useful classroom tool possible.

Please e-mail, or use the feedback form on our website (www.glanvillebooks.co.uk).

Forewords

This book is dedicated to my father, Alan Glanville, IB teacher, examiner and founder of Glanville Books, who died in March 2010. He introduced me to economics at Atlantic College, and I am proud to have been one of the many thousands of students from all over the world that he taught to think like an economist. I hope that through this book Alan will continue to inspire and excite future generations of budding social scientists.

Jacob Glanville
Economist

A Foreword by Gareth Rees

Now that there are around a dozen dedicated texts for IB Economics it is indeed timely that the original is revised to meet the needs of the new syllabus for first teaching in September 2011. How wonderful that another Glanville is doing it in Alan's memory! Many of us can remember greeting the first edition enthusiastically with the prospect of no longer having to look through largely irrelevant texts written for other exam systems. Now that the IB Economics syllabus has been revised again to provide much more specific guidance to students and teachers, Alan's book has kept pace thanks to Jacob's professional and clear thinking approach.

Jacob has managed to preserve the echoes of Alan's classroom presence, which was extraordinary. I remember him pretending to auction a cake to hungry students, noting their bids so that as they devoured their slice a demand schedule appeared on the board and a demand curve was derived. It was simply exciting to be in a classroom with Alan, and this book still reflects that.

There seems to be evidence here that the skills of the economist are transferable within families, think Lord Maurice Peston and Robert Peston, J. K Galbraith and James Galbraith, and now Alan and Jacob Glanville. I hope that reading this book will give new generations of students the special way of seeing the world that economists enjoy, confidence to approach the examinations, and perhaps the wish to take the subject further in life or at university as so many of Alan's students did.

Gareth Rees
Chief Examiner, IB Economics

A Foreword by Manuel Fernández Canque

Being a teacher from a less developed country, during the early days of the IB I was under the impression that the Economics syllabus was based mainly on Eurocentric and standard elements of political economy. This ended when Alan Glanville became the guiding figure that ushered the IB into a genuinely international dimension. "*How is it possible* – I remember him telling us at IB Teachers' workshops during the 1980s and 90s – *that while three quarters of the world's population live in poverty we concentrate on economic theory that tends to be centred on just one quarter of our world?*" On noticing afterwards that teachers had the motivation but not the resources, Alan produced the first IB text in 1995 devoted to Development Economics. Two years later the first edition of *Economics from a Global Perspective* finally filled the gap in a growing IB market and indeed it had a strong global perspective.

And so it is today, always embodying the foresight to change and improve with every new edition, but always maintaining a modern didactic approach and its splendid functionality regarding an international teaching environment.

Textbooks help students to pass examinations. Alan always aimed at adding a strong formative value that contributed to a better understanding of our world and helped its readers to become either better students or better teachers. His text took account of the needs of thousands of students and hundreds of teachers whom Alan had met in his professional career. Jacob Glanville has wonderfully built on past strengths and this new edition is a fitting homage to Alan.

Dr Manuel Fernández Canque
IB Economics Teacher and Workshop Leader

A Foreword by Andrew Maclehose

When Alan Glanville produced the first edition of *Economics from a Global Perspective* in 1997, it was the first textbook specially written for International Baccalaureate students in any subject. Alan not only wrote it but paid for the printing, publication, and distribution himself – a very brave enterprise. It quickly became the textbook of choice for IB students all over the world, and even though there has since been a proliferation of IB books in many subjects, it is still a beacon of quality which continues to prove its worth. It has helped thousands of students to succeed in the IB exams, and – just as important – it has sparked an interest in the subject which has changed lives.

Alan was a superb economics teacher, introducing the subject to students across the globe both in the classroom and through his book. I had the privilege of working with him for several years at Atlantic College, and he later came and helped me out in teaching the subject in Geneva and in Pakistan. He always brought the subject alight.

Every subsequent edition has been an improvement on that early pioneering version, and it is a great good fortune that, following Alan's untimely death, his son Jacob, a distinguished practicing economist, has taken on the job of further improving the book and bringing it up to date with the latest developments in the IB syllabus.

I wish all those who use this book not only success in exams but enjoyment of the subject throughout your lives.

Andrew Maclehose
IB Economics teacher 1971–2008

Section 1

Microeconomics

§ 1.1 MARKETS

Learning Objectives

Knowledge

- The nature of markets and the main types of market, *ie* product markets and factor markets.
- The relationship between market demand and an individual consumer's demand, and between market supply and the supply from an individual producer.

Analysis

- The law of demand, demand curves, non-price determinants of demand and the difference between movements along a demand curve and shifts in the demand curve.
- The law of supply, supply curves, non-price determinants of supply and the difference between movements along a supply curve and shifts in the supply curve.
- Market equilibrium and changes to equilibrium.
- The concepts of consumer surplus and producer surplus, and their maximisation at competitive market equilibrium (allocative efficiency).
- The scarcity of resources mean that choices have to be made, each with an opportunity cost. Prices facilitate resource allocation through their signalling and incentive functions.

Skills

- Draw a demand curve and a supply curve.
- Draw diagrams showing the difference between a movement along the demand curve and a shift of the demand curve, and the difference between a movement along the supply curve and a shift of the supply curve.
- Identify consumer surplus and producer surplus on a demand and supply diagram.

HL only

Knowledge

- The impact on a demand curve of a change in the '*a*' and '*b*' terms in a linear demand function, and the impact on a supply curve of a change in the '*c*' and '*d*' terms in a linear supply function.
- With reference to a demand and supply diagram, state the quantity of excess demand or excess supply at specified prices.

Analysis

- Explain a linear demand function (equation) of the form $Q_d = a - bP$, and a linear supply functions of the form $Q_s = c + dP$.

Skills

- Use linear demand and supply functions to plot demand and supply curves, and to identify the equilibrium price and equilibrium quantity.
- Identify the slope of a demand curve as the coefficient of P ('*b*') in the demand function, and the slope of the supply curve as the coefficient of P ('*d*') in the supply function.
- Using linear demand and supply functions, calculate the equilibrium price and equilibrium quantity.

A **market** is a meeting of buyers and sellers. They do not have to physically meet – buying and selling shares in the stock market could be done over the phone or via the internet for example. However there must be both buyers *and* sellers. The absence of one or the other prevents a market forming.

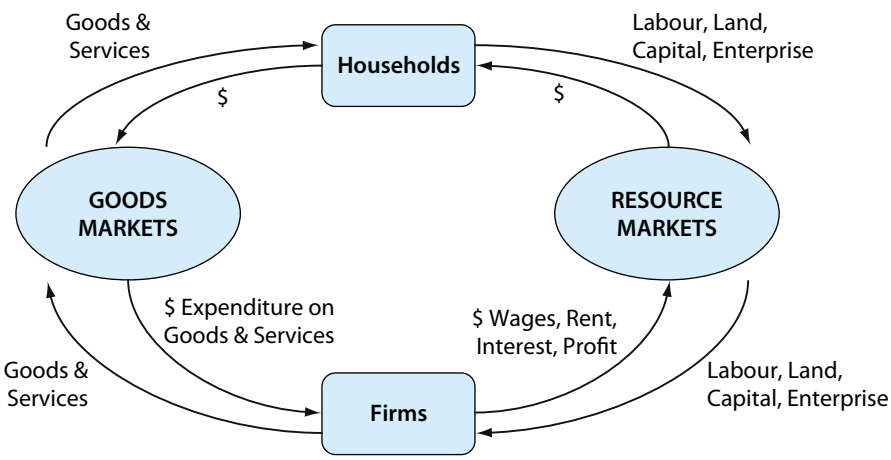
Thus at this time there is a demand to remain young, but there are no sellers, for it is not possible to stop the ageing process. Of course there is a vast market for products that may delay or disguise the symptoms of ageing – face creams, hair dyes, styled clothes, and cosmetic surgery. However, as yet there is no market for stopping time! Similarly a seller of sand in the Sahara Desert is unlikely to find the buyers required to form a market for sand.

Types of Markets

Markets may be local, national or international. The markets for childcare and gardening services are likely to be local. The markets for daily newspapers and train services are likely to be national and the markets for cars and computers global.

Markets can also be divided into **product markets** and **factor markets** (or resource markets). The factors of production (land, labour, capital and enterprise – introduced in the first part of this book, *The Foundations of Economics*) are bought by firms in factor markets, in exchange for rent, wages, interest and profits. Firms combine these resources to produce goods and services, which they sell in product markets. Figure 1.1 shows a simple **circular flow model**. Markets facilitate the transfer of products and factors of production between households (consumers) and firms (producers). Resources, products and services flow clockwise, money payments flow anti-clockwise.

Figure 1.1 – Product and Factor Markets in a Simple Circular Flow Model



Alternative Market Structures

Economists characterise markets by their competitive structure. The degree of competition in turn depends upon the number of buyers and sellers of the product, the type of product and whether there are high or low barriers to a firm setting up in that industry (or market). It is the degree of competition which determines the level of control a firm has over the price of its product. There are four

major models of market structure: **perfect competition**, **monopolistic competition**, **oligopoly** and **monopoly**.

Higher level students will analyse these in detail in Section 1.5. Here just a brief description is offered.

Perfect competition and monopoly are the theoretical extremes of competition. In perfect competition there are very many firms competing and there is freedom of entry to new firms. Firms produce identical (homogenous) products. Each firm is so small compared to the whole industry that it cannot affect the price. It is a **price taker**. Agricultural markets, *eg* for vegetables and fruit, approximate to perfect competition, assuming that governments do not intervene (which they often do).

At the other extreme is monopoly, with a single firm in the industry, and hence no competition at all. The freedom of entry is very restricted or completely blocked and the product is unique.

In the middle of these two extremes monopolistic competition has a lot of firms competing and a freedom for new firms to enter the industry. The firms produce differentiated products and thus have some control over their prices. Examples might include house builders and restaurants. Finally, also between the extremes, there is oligopoly, where there are a few firms and entry of new firms into the industry is restricted. The markets for cars and TV sets are currently oligopolistic.

Demand and Supply

The forces of demand and supply are the two forces or actions in a market. Buyers **demand** things and sellers **supply** things.

Demand is the amount of a good or service that is bought at a particular price over a particular time period. Thus we could say 'the demand for Coca Cola in the school shop on Fridays is 150 cans at 60¢, or the demand is 700 cans at 60¢ in a week', or '30,000 cans at 60¢ in a year'. It makes no sense to say 'the demand for Coca Cola is 560 cans' – as price and time are unspecified – unless of course price and time are implied as given. Do notice that demand is the amount bought. Demand is not the same thing as wish, desire or need. It is the action of buying, the ability and willingness to buy.

Supply often differs from demand in that most supply decisions have to be made ahead of the market transaction. Suppliers have to guess what will be demanded. They might well get it wrong and supply either too little or too much. *Supply* then is defined as the quantity of a good or service which a seller is willing to provide at a particular price over a particular time period.

Demand and supply will now be dealt with in more detail separately. Much of what you learn about demand is very similar to what you need to learn about supply, so having learnt the important points of one, the other is relatively simple.

DEMAND

Individual Demand and Market Demand

Recall from the first section of this book, *The Foundations of Economics*, that a consumer wanting to buy something will need to consider the opportunity costs of his decision, *ie* he assesses the marginal costs and benefits of alternative options (including saving the money instead!). Having made these calculations, the demand of that individual is the quantity of the good or service that he is willing and able to buy for different prices over a particular period of time (*ceteris paribus*). The **market demand** for this good or service is simply the sum of all the individual's demands. If, for example, a fellow

student is selling home made greetings cards for 50p each and you are willing and able to purchase two cards, Student B ten cards and Student C three cards, the market demand, at a price of 50p, would be 2 + 10 + 3 = 15 cards.

The Demand Function

A **function** (or **equation**) expresses a relationship between two or more variables. You will meet many functions whilst studying economics. The demand function is the first.

We need to understand what demand depends upon. What determines the quantity demanded of a good over a particular time period? Certainly the price of the product itself is important and is included in the definition of demand. Thus we can show the quantity demanded of a good x as a function of its own price, the price of x:

$$Q_{Dx} = f(P_x)$$

By convention the variable that appears on the right hand side, P_x in this case, is known as the **independent variable**, whilst the variable on the left (here shown as Q_{Dx}) is known as the **dependent variable**. The quantity demanded is usually taken to be the dependent variable in demand functions because we assume that, for each individual, the price is given. The choice facing that individual is simply how much to purchase at the price offered.

Any study of buying behaviour shows that the price of a product is one of the most important determinants of how much will be bought. However it is not the only determinant, the prices of close **substitutes** to x and the prices of **complements** to x are also important. Thus the price of beef is not the only determinant of demand for beef. The price of substitute meats like lamb, pork, poultry and fish are also important. The price of petrol (gasoline) is important to the demand for motor cars because cars and petrol are complementary goods, that is, goods which are demanded together. The demand function is thus extended to include the prices of close substitutes and complements:

$$Q_{Dx} = f(P_x; P_s ; P_c)$$

Household income is another important determinant of demand. Usually when households have more income they demand more goods. This is also true of a country as a whole. As the total income – the National Income – of Australia has increased over the last 50 years, so has the demand for most goods and services in Australia. If you compare poor households and rich households in your own country you will see that demand is strongly related to the ability to buy, *ie* household income. If you compare rich and poor countries it goes a long way to explain why the demand for goods and services in Japan or Germany is very much higher than the demand for goods and services in Namibia or Ethiopia. In economics it is standard practice to use the letter Y for income (the letter I is reserved for Investment) – thus our function becomes:

$$Q_{Dx} = f(P_x; P_s; P_c; Y)$$

Before looking at the next determinant of demand, it is worth pausing on income a little longer. When income changes, demand for a good usually changes in the same direction, *ie* it is positively correlated. Thus if income increases, demand for the good increases. If income decreases demand for the good decreases. Such goods have a specific name in economics. They are known as **normal goods**. However, there are goods which are inversely related to income. Thus when income increases demand for these goods falls. Conversely when income falls demand increases. These are known as **inferior goods** – another specialised economic term. It does not mean there is anything wrong with the goods. Inferior goods may differ in different societies and at different times. Usually there is a normal substitute. Thus in the UK over the last 25 years the motor car has been a normal good and buses and trains have been inferior goods. In fast growing Pacific Rim countries the diet of rice is giving way to more expensive substitutes, *eg* fish, meat, and fresh vegetables, making rice an inferior good as incomes rise. If household incomes fall, families may be forced to give up meat and resort to rice, showing the income/demand relationship working in the other direction. That is, as incomes fall, demand for rice rises.

In Western Europe 40 years ago the sale of bicycles would suggest that they were an inferior good, for as households earned more, they gave up cycling and travelled by car. However, with a heightened interest in exercise for health, increased traffic congestion and awareness of the contribution of vehicle exhaust emissions to climate change, there has been a resurgence of interest (and spending) on bicycles. This increased spending on bikes, enhanced by innovations such as the mountain bike, is positively correlated with income. Bikes appear to be normal goods again.

There are a number of other factors which affect the demand for a product which are important but harder to quantify. For example, household demand for coffee depends on whether members of the household like coffee, personal demand for beef is related to whether or not one is a vegetarian; demand for cigarettes depends on whether or not members of the household smoke. The current boom in sports equipment sales in many countries is highly related to the current concern to be fit and healthy. All of these psychological factors which affect demand the economist classifies as **taste**. Thus taste goes into the demand function.

Returning to the demand function you may recall that one reason for the demand for goods and services being higher in Japan than in Namibia is due to Japan's higher income. However, you might think of another reason to explain higher Japanese demand. There are more Japanese than Namibians! Thus the size of the population is an important determinant of demand. The demand for eggs is greater in France than it is in the city of Paris alone. The demand for shoes is greater in India than in Sri Lanka.

There are other variables that may also be important in determining demand for a product. If you were to research the demand for a product for your extended essay you would need to look hard for all the possible factors which are important. Thus if you were looking at the demand for ice cream or the demand for umbrellas the weather is obviously important to include in your demand function. Advertising is very important to a number of consumer industries and might also be included. **Expectations** are another factor influencing demand when, for example, a price decrease causes people to delay purchases if they expect there to be further price falls to follow (often applicable to the launch of innovative new consumer gadgets). However, we have already identified the most common important variables for the majority of demand functions. Thus we could write 'the demand

for a product is a function of its own price, the price of substitutes, the price of complements, income, taste, population, advertising, *etc*'. Alternatively the demand function could be written as an equation:

$$Q_{Dx} = f(P_x; P_s; P_c; Y; taste; population; advertising; etc.)$$

Ceteris Paribus – Other Things Equal!

The next stage in understanding demand requires that you have understood '*ceteris paribus*' (other things equal), introduced in *The Foundations of Economics* section, a most important study method used in economics. As we want to see the effect of changing one variable upon the quantity demanded we need to prevent the other variables from changing. But we cannot. It is usually the case that several variables are changing at the same time.

Thus in looking at the effect of price changes upon demand, we assume that '*other things are equal*'. That is, we pretend that we can hold constant the prices of all complementary and substitute goods and prevent them changing, as well as income, taste, population, and anything else which could affect demand.

A Demand Schedule

We can now look at a demand schedule. That is we can show how quantity demanded for a good x will change against its own price, 'other things equal': *ie* $Q_{Dx} = f(P_x)$ whilst all other variables P_s; P_c; Y; *taste*; *population*; *advertising*; *etc*. are assumed equal or constant when P_x changes. When price and quantity are set out as a table, the table is known as a **demand schedule**. A demand schedule is shown in Figure 1.2.

Figure 1.2 – A Demand Schedule

Price of x ($)	Demand for x (units per week)
1.00	100
1.10	95
1.20	90
1.30	85
1.40	80
1.50	75

The direction of change of the quantity demanded as price changes is critical. All observation and experiment shows that if the price of a product changes the quantity demanded changes in the opposite direction. That is, there is an inverse, or negative, relationship. If the price of a product increases (all other things held equal) the quantity demanded will fall. If the price falls then, other things equal, the quantity demanded will rise. This relationship is so strong that it is often known as the **law of demand**.

Whilst laws are common in physics they are rare in the more uncertain world of human behaviour – as in economics. If the law appears to be broken, that is, if quantity demanded increases when price

increases then the explanation is most likely to be that something else is changing, *ie* other things are *not* equal.

Hypothesis, Theory, and Law

A **hypothesis** is a word picture of a possible relationship between two or more variables, *eg* 'making movies about violent crime cause more crime to be committed on the streets'. However, as yet this has not been convincingly shown by testing. Thus it is an equally valid hypothesis that increased violent crime on the streets causes film makers to make more films about violent crime in order to reflect reality.

If an hypothesis is tested and every time it is tested it shows the same result, and if in addition it can be used to predict future events, then it is known as a **theory**.

Where a theory is so strong that is has never shown any exception it may be called a **law**. For example, Newton's Law of Gravity. If I let go of my pen it will fall down, never up.

Applied Economics

An Economist's Joke!

A chemist, an engineer and an economist were cast away on a desert island with no food or water. However, a crate of canned food washed up on the beach. Their delight was dampened when they realised that they had no can-opener. They decided each should use his expertise to find a solution to opening the cans. The chemist searched and found certain minerals that, when mixed and heated, would burn through the metal. The engineer calculated heights and weights to drop rocks from a palm tree to break them open, then collected the rocks and found a suitable tree. The economist sat on the beach, looked at the sea, and pondered, 'Assuming we had a can opener …'

A Demand Curve

If the relationship between price and quantity demanded is plotted on a graph[1] the **demand curve** will always slope downwards from left to right (Figure 1.3). Notice that when price is high quantity demanded is low, when price is low quantity demanded is high.

If price changes, say from p_1 to p_2 in Figure 1.4, then quantity demanded changes from q_1 to q_2. There is a correct way of expressing this and care is needed here to note it. Thus if price changes we say the quantity demanded changes. Alternatively using a diagram we can say there has been a movement along the curve – from A to B in Figure 1.4.

Figure 1.3 – A Demand Curve

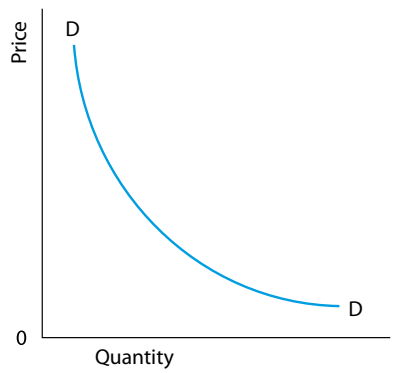


Figure 1.3 illustrates the law of demand: price and quantity are inversely related. When price falls quantity demanded rises. When price rises quantity falls.

Figure 1.4

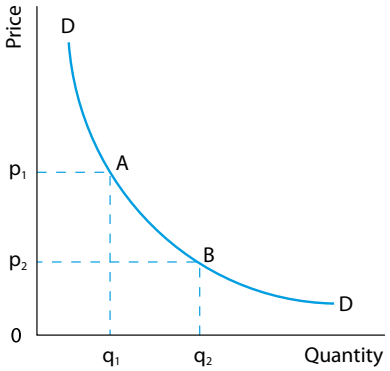
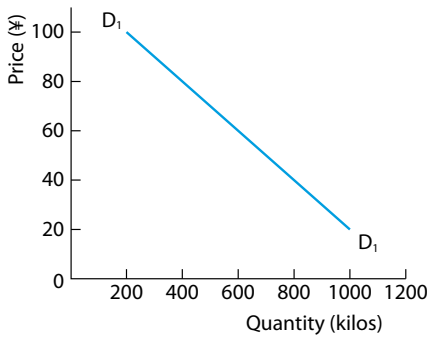


Figure 1.4 illustrates a change in the quantity demanded. When price changes there is a movement along the demand curve.

A Change in Demand

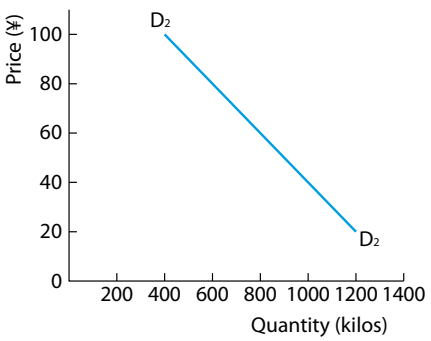
A demand schedule and a demand curve show the relationship between price and quantity demanded when everything else is held constant, *ie* 'other things equal'. If some other variable in a demand function changes, *eg* income, this demand data becomes invalid. A new schedule and a new demand curve must be plotted to show the new situation.

Figure 1.5



Price of *x* (¥)	Demand for *x* (kg)
20	1000
40	800
60	600
80	400
100	200

Figure 1.6



Price of *x* (¥)	Demand for *x* (kg)
20	1200
40	1000
60	800
80	600
100	400

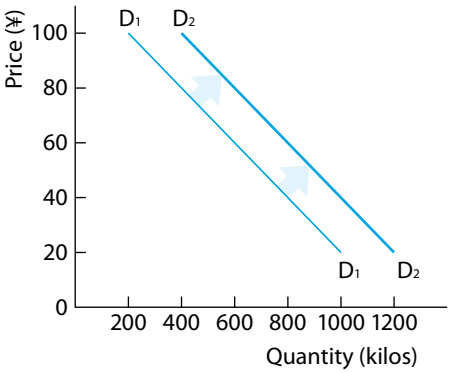
If the original demand schedule and demand curve were as in Figure 1.5 and then incomes increased, the demand data would change. The most likely effect would be a higher demand at each price as shown in the new schedule, and curve in Figure 1.6. Both Figure 1.5 and Figure 1.6 show the quantity demanded against price for the same product in identical conditions – except one. Income is higher in the second case and this has caused demand to increase at every price.

Again the terminology of what has happened is important. There has been a **change in demand** because income has changed and the demand curve has *shifted* to the right.

Compare this to what happened in Figure 1.4 when price changed. When price changes there is a **change in quantity demanded** and a *movement along a demand curve*.

When any other variable changes (other than price that is – the one that is graphed) there is a *change in demand*, a *shift of the curve*. This can be seen more clearly if both demand curves are plotted on the same graph instead of two separate ones – Figure 1.7. The curves are labelled D_1 and D_2 to indicate the direction of the shift.

Figure 1.7 – Rightward Shift of a Demand Curve



A demand curve will shift if any variable other than its own price changes. It will shift to the right if the change increases demand and to the left if the change reduces demand. Thus a rightward shift of the demand curve, from D_1 to D_2 in Figure 1.8 would occur if: taste moved in favour of the product; population increased; the price of a substitute good increased; the price of a complementary good fell; or, a successful advertising campaign was run. In almost all cases, *ie* if the good is a normal good, the curve would also shift to the right if income rose.

The demand curve would shift to the left (Figure 1.9) if taste moved away from the product, or population fell, or the price of substitutes fell, or the price of complements rose, or (in most cases) incomes fell.

Applied Economics

To Smoke or Not to Smoke? That is the Question

The health risk posed by smoking cigarettes has caused governments around the world to respond in different ways.

Taxation – higher cigarette prices reduce smoking and the take-up of smoking by young people (studies show that a 10% increase in cigarette taxes results, on average, in a 4% reduction in consumption). Countries where tax accounts for three-quarters or more of the price of cigarettes include India, Brazil, Thailand and France.

Advertising bans – all television advertising and sponsorship have been banned within the EU since 1991, extended to include print, internet and radio advertising in 2005.

Education – in Canada, manufacturers are required to insert cards in cigarette packs explaining different ways of quitting smoking.

Smoking bans – Norway, Portugal, Singapore, Chile and the UK are examples of the many countries banning smoking in bars, restaurants and other public places.

Source: UN World Health Organisation, '*The Tobacco Atlas 2002*', pp84-85

Question

Use your knowledge of a demand function to explain how these different methods might affect the demand for cigarettes.

Because it is easy to confuse movements along a curve with shifts of a curve it is well worth developing a systematic step by step reasoning process.

Figure 1.8 – Rightward Shift of a Demand Curve

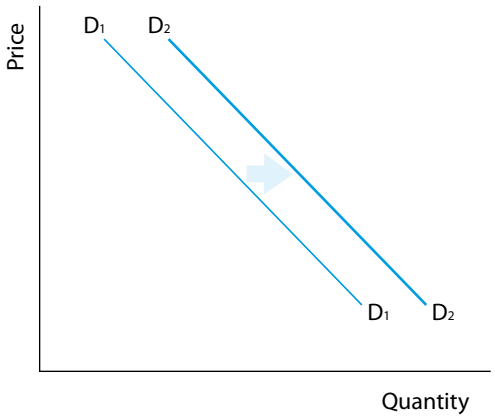
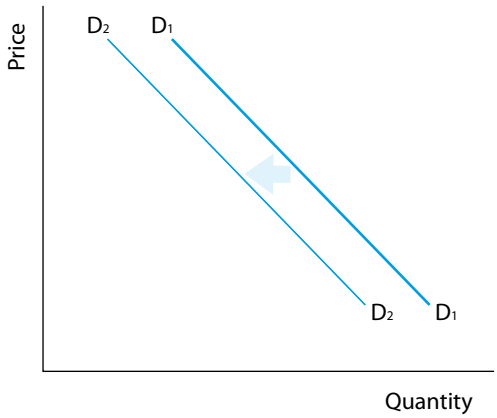


Figure 1.9 – Leftward Shift of a Demand Curve



HL EXTENSION

LINEAR DEMAND FUNCTIONS

Functions are equations specifying a relationship between two or more variables. Variables are the unknown values in an equation. We have already used functions to express the relationship between two such variables – the quantity demanded of a particular good x, and its price:

$$Q_{Dx} = f(P_x)$$

We may, however, wish to be more specific about the nature of this relationship between variables. We need to introduce the idea of given or known values, called **constants** (also known as coefficients or parameters). When discussing a particular function in a general way, *ie* without assigning particular numbers to our constants, the convention is to use letters from the beginning of the alphabet. So, our demand function could be written as:

$$Q_{Dx} = a - bP_x$$

We are now providing much more detail about the nature of the relationship between our two variables Q_{Dx} and P_x, by showing the *form* of the equation – how the equation is constructed. In this example we have shown a **linear equation**. An equation is linear if none of its variables are raised to a power (other than +1).

Examples of Linear and Non-linear Equations

Linear equations	*Non-linear equations*
$Q_{Dx} = a - P_x$	$Q_{Dx} = a - P_x^2$
$S = bY$	$W = a + X^{-1}$
$X = aY + bZ$	$Z = bY^{1/3}$

Simple linear functions are the only form of equation examined in this course, but they are nevertheless useful for describing many different relationships in economics. In this section, you will use them to specify both demand and supply relationships; allowing the calculation of excess demand and supply, and equilibrium demand and price.

Of course, in order to fully specify our demand function, we need to provide precise numerical values of our constants a and b. For example, if we know that $a = 20$ and $b = 4$, then our demand function becomes:

$$Q_{Dx} = 20 - 4P_x$$

We can now determine, for any particular price, the exact level of demand. If $P_x = 2$, then our fully specified equation tells us that $Q_{Dx} = 20 - 4(2) = 12$. But what do our constants a and b represent?

The general properties of these constants, which turn out to provide some useful information about the nature of the linear function, can best be seen by plotting a graph.

Graphing Linear Demand Functions

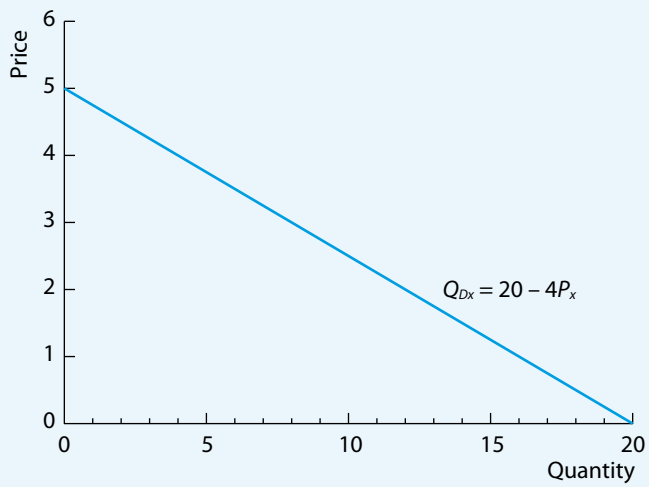
To plot the graph of $Q_{Dx} = 20 - 4P_x$, we begin by assigning a series of values to our independent variable P_x, usually starting with 0 and increasing in appropriate steps. We then calculate for each of these values the corresponding value of our dependent variable Q_{Dx}, such that our equation is satisfied. In this way we construct a demand schedule, with each column of our schedule providing a pair of values for P_x and Q_{Dx} that satisfy our demand equation. So, one such pair of values will be $P_x = 2$, $Q_{Dx} = 12$, as calculated above. Another would be $P_x = 0$, $Q_{Dx} = 20$, and so on. A full demand schedule is shown in Figure 1.10:

Figure 1.10 – A Demand Schedule

P_x	0	1	2	3	4	5
$Q_{Dx} = 20 - 4P_x$	20	16	12	8	4	0

Each pair of values represents a set of coordinates that we can plot on a graph and join up to produce a straight line. This downward sloping straight line is our demand curve, shown in Figure 1.11.

Figure 1.11 – A Demand Curve

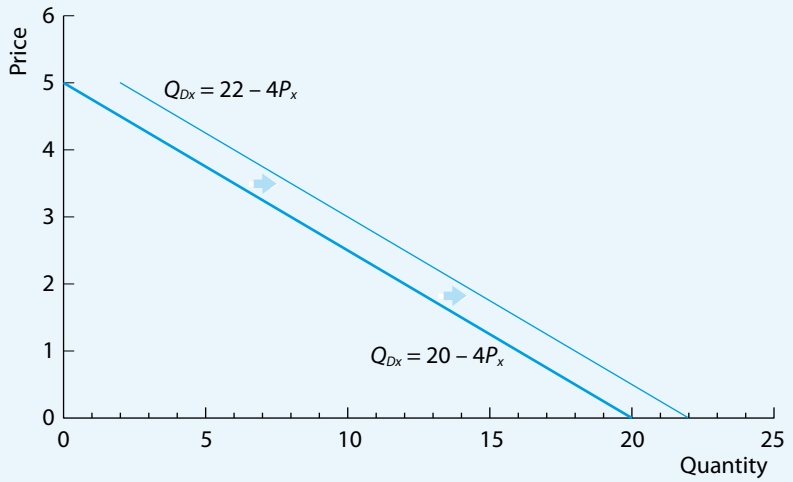


There are two important features of this graph, and indeed of any graph of a simple linear function, that demonstrate the role of the constants *a* and *b*.

1. The constant *a* represents the **intercept** – the value of Q_{Dx} where the curve cuts the horizontal axis, *ie* where P_x equals zero. It is easy to see that by substituting zero for P_x in our general linear demand function $Q_{Dx} = a - bP_x$, $Q_{Dx} = a$, which in our numerical example is 20. Of course the intercept can also be determined by a simple examination of either the graph, or the demand schedule.

The economic significance of the intercept is that it represents the combined influence on demand of all the *non-price* factors: the prices of all complementary and substitute goods, income, taste, population, and anything else which could affect the demand for *x* (remember that $Q_{Dx} = f(P_x; P_s; P_c; Y;$ *taste*; *population*; *advertising*; *etc.*)). The impact on demand of all these non-price variables can be captured using the constant term *a* because of our assumption that '*other things are equal*', *ie* we have assumed that these variables are held constant.

Figure 1.12 – The Impact of a Change in the Intercept '*a*'



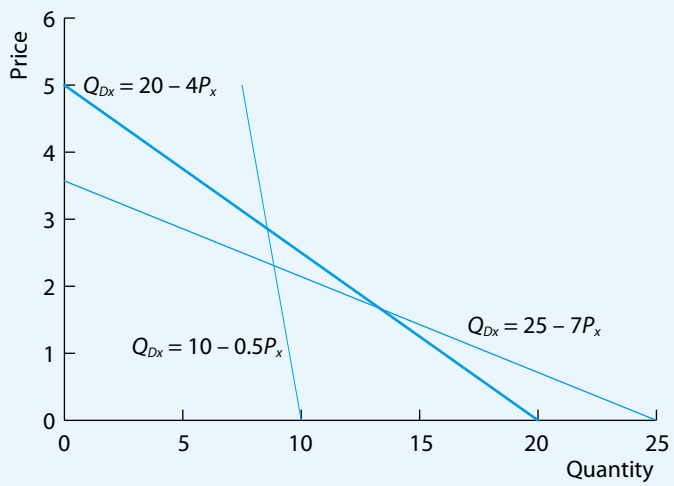
A change in one or more of these non-price factors will therefore result in a change in the value of the constant *a*, and thus a new intercept for the demand curve. As the slope remains unchanged this change in the intercept represents a parallel *shift* in the demand curve. Figure 1.12 shows the impact of a change in the intercept *a* from a value of 20 to a value of 22, as real incomes increase. Demand shifts to the right.

2. The **slope** or gradient of the curve is determined by the increase in the dependent variable, here Q_{Dx}, when the independent variable, P_x in this case, increases by one unit. We can see from the graph (or by looking at the demand schedule) that, as P_x increases by 1 unit, Q_{Dx} decreases by 4 units. The slope is therefore –4 and, because we are dealing with a *linear* demand function with the demand curve a straight line, the slope is the same anywhere on that line. Notice that the slope is apparent from the demand function itself: it is equal to the value of the constant *b*. The larger the constant *b*, the shallower (flatter) the demand curve.

In economic terms, the slope of a linear demand curve tells us how sensitive demand is to changes in price. Demand for fuel for a car used to commute to work is likely to be fairly insensitive to changes in price, and will have a steeply sloping demand curve (in the short run, at least, before other modes of transport, or a more fuel-efficient vehicle can be adopted). The demand for a particular brand of biscuit, however, may be very sensitive to price changes and will therefore display a more gently sloped demand curve. The price sensitivity of demand, properly known as the price elasticity of demand, is covered in Section 1.2.

Figure 1.13 shows demand curves for the equation $Q_{Dx} = 20 - 4P_x$, alongside two other linear demand curves $Q_{Dx} = 25 - 7P_x$, and $Q_{Dx} = 10 - 0.5P_x$.

Figure 1.13 – Some Examples of Linear Demand Functions



SUPPLY

An Individual Firm's Supply and Market Supply

An individual firm's supply is the quantity of a product or service that a firm is willing and able to offer for sale, across a range of different prices and during a particular period of time (*ceteris paribus*). The **market supply** for this good or service is simply the sum of all individual firm's supplies.

The Supply Function

The supply of a good is a function of its own price (it is assumed that sellers operate in a competitive market structure and therefore take prices as given). Other things equal, the higher the price of a product the more sellers will supply. There is a positive relationship between price and quantity supplied. This is the **law of supply**.

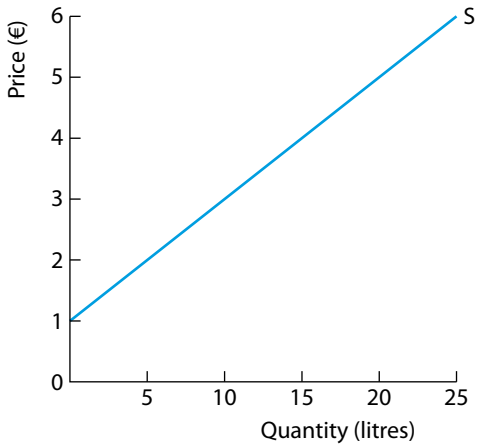
Thus, with other things equal, the **supply schedule** of a good x will look like the one in Figure 1.14 and a **supply curve** like the one in Figure 1.15.

Figure 1.14 – A Supply Schedule

Price of *x* (Euros)	Quantity supplied (units of *x*)
1	0
2	5
3	10
4	15
5	20
6	25

A supply schedule – the law of supply is that price and quantity are positively related. When price rises quantity supplied rises. When price falls quantity supplied falls.

Figure 1.15 – A Supply Curve



A movement along the curve will occur when the price of the good changes. We say there has been a **change in quantity supplied**. For example, in Figure 1.15, an increase in *x*'s price from €2 to €3 will result in a change in quantity supplied from 5 units to 10 units.

A shift of the curve or a **change in supply** will occur if a variable other than price changes. Let us now examine the other major determinants of the supply of a good.

Firstly, the prices of **substitute producer goods** (not to be confused with consumer substitute goods, which are part of the demand function). These are alternative goods the seller might supply. If the owner of a herd of goats supplies goats' milk to the market, then a rise in the price of goats' cheese might cause her to supply less milk. A fisherman supplying crabs to the market is likely to supply less if the price of lobsters rises and he can switch his efforts to catching more lobsters. If the price of beef falls farmers who can switch to sheep or pigs will do so, and the supply of lamb and pork will rise.

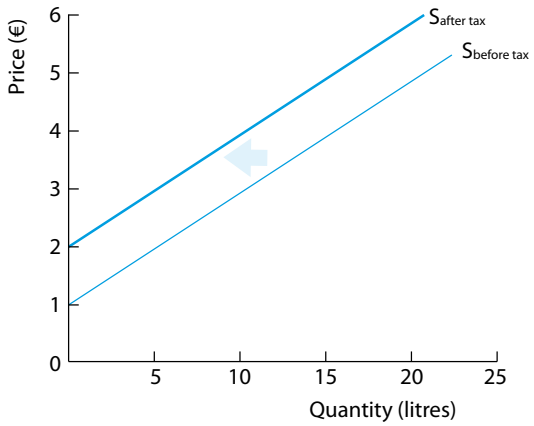
The prices of factors of production, determining a firm's costs of production, will affect the supply of a product. Less newspapers will be supplied at each price if the price of newsprint rises. More newspapers will be supplied if journalists cost less to employ.

Similarly, government action can affect the quantity supplied. One common action is to apply **indirect taxes** to goods thus increasing sellers' costs. Another is to offer **subsidies** to producers thus reducing their costs. These actions will shift the supply curve to the left, Figure 1.16, and to the right, Figure 1.17, respectively. Government intervention is analysed in Section 1.3. Other non-price determinants of supply include more productive technology (although this may be included in the price of capital, one factor of production), firms' expectations about future price trends, and the weather.

In Italy, train travel is subsidised, so more train services are supplied at any given price. In Sweden alcohol is taxed highly, and thus less is supplied at each price.

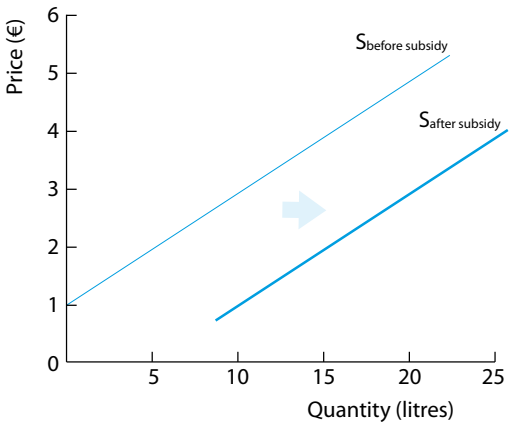
Improvements in **technology** will cause supply to increase *ie* the supply curve shifts to the right. New applications of electronic technology are currently increasing the supply of many goods and services, *eg* MP3 players, smart phones and satellite navigation systems.

Figure 1.16 – Leftward Shift of a Supply Curve



The supply curve of good x shifts to the left when a tax is imposed on good x.

Figure 1.17 – Rightward Shift of a Supply Curve



The supply curve of good x shifts to the right when good x is subsidised.

The **weather** is a very important determinant in the supply of most agricultural products. Good summer weather may increase grain harvests dramatically. A severe frost may wipe out a large part of coffee and citrus fruit crops.

In summary the supply function can be written as:

$Q_{Sx} = f(P_x; P_s; P_f; G; technology; weather; etc)$.

Where P_x is own price; P_s other product substitute prices; P_f factor prices and G government policy.

HL EXTENSION

LINEAR SUPPLY FUNCTIONS

We can express a simple linear supply function (the only type of supply function covered in this course) as:

$$Q_{Sx} = c + dP_x$$

We take quantity supplied (Q_{Sx}) as the dependent variable as we have assumed that an individual producer takes the market price as given. The supplier's sole decision is how much to supply for any given price. In Section 1.5 we look at market structures where producers are also able to set or influence prices.

Notice that we have assigned the letters *c* and *d* to represent the constants, so as to avoid confusion with the demand function constants *a* and *b* examined earlier, particularly as we will need to bring supply and demand together in the next part of this section.

As with our demand function, the constant terms in the supply function provide the intercept ('*c*') and slope ('*d*') of the supply curve. Notice, however, that there is a *positive* sign in front of the constant *d*. Supply curves slope upwards, they have a positive slope, *ie* a producer in pursuit of profit will choose to supply more of the good as the market price of that good increases.

Graphing Linear Supply Functions

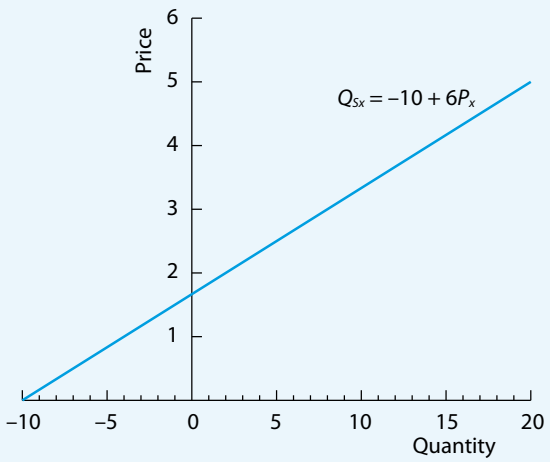
To plot the graph of $Q_{Sx} = c + dP_x$, we use exactly the same method as for linear demand functions described above. We assign a series of values to our independent variable P_x, calculating the corresponding value of our dependent variable Q_{Sx}, such that our equation is satisfied. A full supply schedule for the linear supply equation $Q_{Sx} = -10 + 6P_x$ is shown in Figure 1.18:

Figure 1.18 – A Supply Schedule

P_x	0	1	2	3	4	5
$Q_{Sx} = -10 + 6P_x$	–10	–4	2	8	14	20

The corresponding upward sloping straight line is our supply curve, shown in Figure 1.19.

Figure 1.19 – A Supply Curve



Once again, the constants (*c* and *d*) provide important information about the nature of supply.

1. The constant *c* represents the intercept – the value of Q_{Sx} where the curve cuts the horizontal axis, *ie* where P_x equals zero and, by substitution into our supply equation, $Q_{Sx} = c$. In this case *c* is –10.

Of course firms don't generally supply negative quantities, but we can see from Figure 1.19 that supply will be zero where the curve cuts the vertical axis (in this case at a price of 1.67). We can say that production is zero at prices of 1.67 and below.

As for our linear demand function, the constant c captures the effect on supply of all the non-price factors (such as other product substitute prices, factor prices, government policy, weather and technology). A change in c – due to a change in one or more of the non-price factors affecting supply – is therefore equivalent to a shift in the supply curve. The intercept changes whilst the slope of the curve (determined by the constant d) remains the same.

2. The slope or gradient of the curve is determined by the increase in Q_{Sx} when P_x, increases by one unit. In this particular case we can see from the graph (or the supply schedule) that, as P_x increases by 1 unit, Q_{Sx} increases by 6 units. The slope is therefore +6 anywhere on the supply curve (with linear supply). The slope is equal to the value of the constant d. The greater the value of d, the shallower (flatter) the supply curve.

The slope of a linear supply curve tells us how sensitive supply is to changes in price. In the short-term the supply of apples will be fairly insensitive to changes in price, and will have a steeply sloping supply curve (only in the longer term can new apple trees be planted). On the other hand, the supply of children's plastic dolls may be very sensitive to price changes and will therefore display a more gently sloped supply curve. The price sensitivity of supply, *ie* price elasticity of supply, is covered in Section 1.2.

Figure 1.20 – Some Examples of Supply Curves

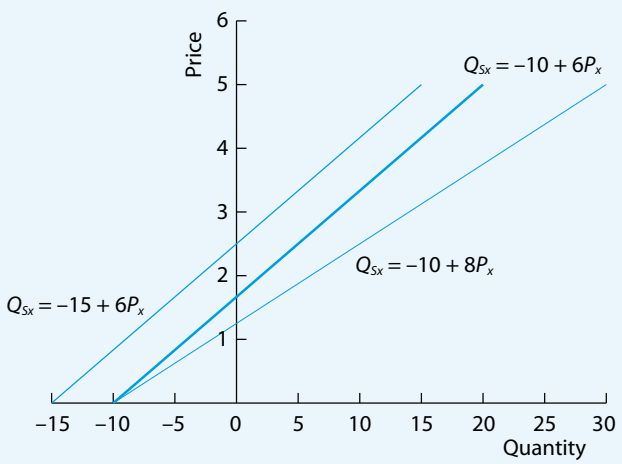


Figure 1.20 shows the supply curve for the equation $Q_{Sx} = -10 + 6P_x$, alongside two other linear supply curves:

(1) $Q_{Sx} = -15 + 6P_x$, a leftward shift in supply as the constant c decreases; and,

(2) $Q_{Sx} = -10 + 8P_x$, a flatter supply curve due to the increase in the value of d.

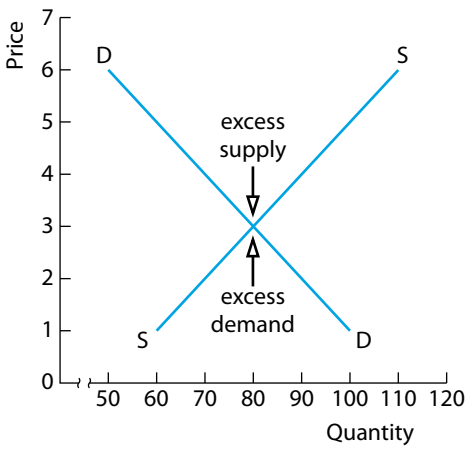
MARKET EQUILIBRIUM: THE INTERACTION OF DEMAND AND SUPPLY

Having initially defined a market we then proceeded to study demand and supply separately. Now we put demand and supply back together again. If we plot the demand and supply schedules for a good x next to each other, as in Figure 1.21, and then plot them on the same graph as in Figure 1.22, we can determine the unique equilibrium price and equilibrium quantity.

Figure 1.21

P_x	Q_{Dx} (kilos)	Q_{Sx} (kilos)		Effect on price
1	100	60	Excess demand	↑
2	90	70	Excess demand	↑
3	80	80	Equilibrium	–
4	70	90	Excess supply	↓
5	60	100	Excess supply	↓
6	50	110	Excess supply	↓

Figure 1.22



In both schedules and diagrams it can be clearly seen that quantity demanded and quantity supplied are equal at a price of \$3: at this price 80 kilos of x are demanded and 80 kilos are supplied. The market clears. This is known as the **market equilibrium** point with \$3 being the equilibrium price and 80 kilos being the equilibrium quantity. The market is at equilibrium, in balance. There is no upward or downward pressure on this price.

At any other point there is **market disequilibrium**. There is either **excess demand**, that is a shortage; or there is **excess supply**, a glut. At any price lower then \$3 there is excess demand. For example, at a price of \$1 the quantity demanded is 100 kilos whilst supply is only 60 kilos. There is excess demand of 100 – 60 = 40 kilos. This shortage in the market will tend to force the price up towards equilibrium. Willing buyers who cannot obtain the good will offer a higher price. Sellers realising they can obtain more than \$1 and still sell all their goods will raise the price. An auction house is a very good place to see excess demand acting quickly to raise prices.

At any price above \$3 there is excess supply in the market. A glut forms. At a price of \$4, for instance, firms supply 90 kilos whilst there is demand for only 70 kilos. With a surplus in the market (90 – 70 = 20 kilos in this case), traders cut prices to get rid of the excess. For example clothes shops and shoe shops have frequent sales to get rid of unsold stock by cutting their prices.

Applied Economics

Who will type your extended essay?

The following advertisements appear in today's Daily Information, a broadsheet published in Oxford (England) each week.

Word processing, including from tapes. Tel. Cathy 779031	**Desk-top publishing.** Quality leaflets, posters, brochures etc. Samples available. Tel. Aaron 510462 (eves) 310011 (day)	**Self-service word processing,** disk transfers, printing, laminating, 7 days a week. PCs and Macs. D.I. Computers, 31 Warnborough Rd Oxford

Questions

1) What have these advertisements to do with the theory of the market?
2) If you want your extended essay typed professionally, what further piece of information will you need to know by telephoning the advertisers?
3) Cathy agrees to type your essay at a rate of £5 per thousand words. How would your request for her to do this be classified in market terms?

Shifts in Demand and Supply

We know that shifts in the demand curve can occur with changes in population, tastes, incomes, and the prices of substitute or complement products. Factors that cause a shift in supply include the level of indirect taxes and subsidies, technology, price expectations, the price of substitute producer goods and the weather. A shift in either the demand or supply curve, or both, will alter market equilibrium. A new equilibrium price and/or quantity will result. Figures 1.23(a) and 1.23(b) illustrate the impact of shifts in demand and supply on market equilibrium prices and quantities.

Figure 1.23(a)

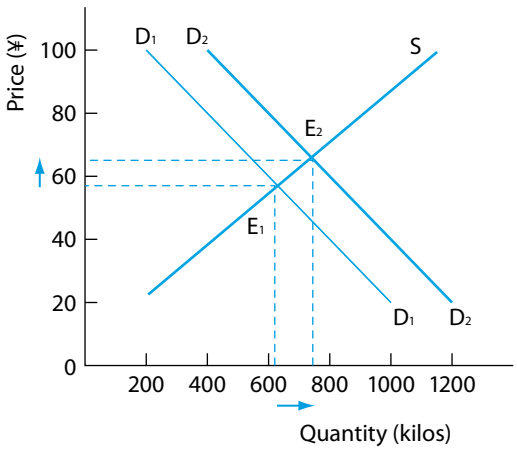
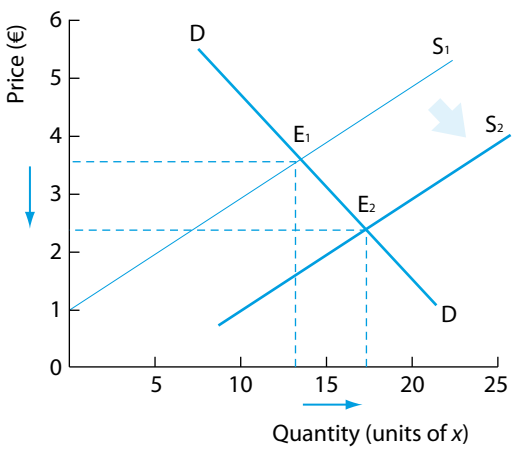


Figure 1.23(b)



The concept of equilibrium in a market is very, very important. A great deal of economic debate centres around whether particular markets do clear in practice. There are often big players in individual markets who can prevent the free interplay of supply or demand by exercising some **market power**. These include government, large companies and labour unions. Thus the European Union sets farm prices higher than a market would, in order to help farmers. They do this by using the force of law. The Sierra Leone and Zambian governments set food prices lower than the market price to help consumers, again using the power of the law. Centrally planned economies like the former USSR overruled the majority of their markets and set their own planned prices. The vast majority of producers of manufactured goods and services in market economies exert some power over the market to prevent their prices fluctuating and to keep them higher than they would otherwise be (market power is examined in Sections 1.4 and 1.5). Labour Unions too are in the business of exerting power. In this case collective power, to keep the price of labour higher than it otherwise would be. However, the forces of demand and supply are themselves very powerful and are a force to be reckoned with, even if the big players do try to control them. This will be highlighted in Section 1.3 on *Government Intervention*.

Applied Economics

Oil Prices: supply and demand

In July 1990 the price of oil fell to $13 a barrel. Iraq badly needed more revenue from its oil exports and repeatedly asked its smaller Gulf neighbour Kuwait to produce less oil. Kuwait refused. Iraq's army invaded Kuwait and closed down the Kuwaiti oil field. A group of countries led by the United States attacked Iraq, effectively closing down its oil production and exports as well. With the oil fields of both Kuwait and Iraq out of action the world supply of oil fell by 4 million barrels a day. Oil prices rose over the next few weeks to over $40 a barrel.

In 2008 oil prices rose to $100–$150 a barrel. The spectacular economic growth of China and India, two huge economies, was driving up demand for oil with oil supply barely increasing.

Labour Markets

One particular type of market that we will discuss at various points in this book is the market for labour. **Labour markets** are a type of factor market as labour is one of the factors of production, alongside land, capital and enterprise. For most people, the labour market provides their main source of income. We supply our labour – *eg* by signing a job contract with an employer, obliging us to perform specified duties for a certain number of hours per week – in return for an agreed wage, or salary (special names for the price of labour). Producers are the source of demand for labour, households the source of supply: a reversal of the usual roles in product markets.

Another difference with markets for goods and services is that the demand for labour is a **derived demand**, so called because it *derives* from the demand for the goods and services that labour helps to produce (rather than for its own sake). A bus company employs bus-drivers in order to be able to supply bus services to its travelling customers; a hospital or health authority employs nurses in order to supply medical care to its patients.

Despite these differences with product markets, labour markets can be modeled in the same way. They have downward-sloping demand curves, as employers are generally willing to take on more

workers at low wages than at high wages. A firm's demand curve for labour is derived from a trade-off between the revenue added by an additional worker and the extra wage costs (although this would be difficult to measure for many occupations, such as police officers or teachers).

Labour supply curves are upward sloping, as higher salaries tend to attract people into the labour market, or induce existing employees to work longer hours. Note, however, that at the level of an individual the supply curve may eventually bend backwards – for high enough wages a particular individual *may* choose to work less and enjoy more leisure time.

As in a product market, a shift in the demand curve or supply curve for labour will result from a change in one or more non-price factors. This could include, on the supply-side, the size of the working-age population, which in turn depends on factors such as birth rates, migration rates and

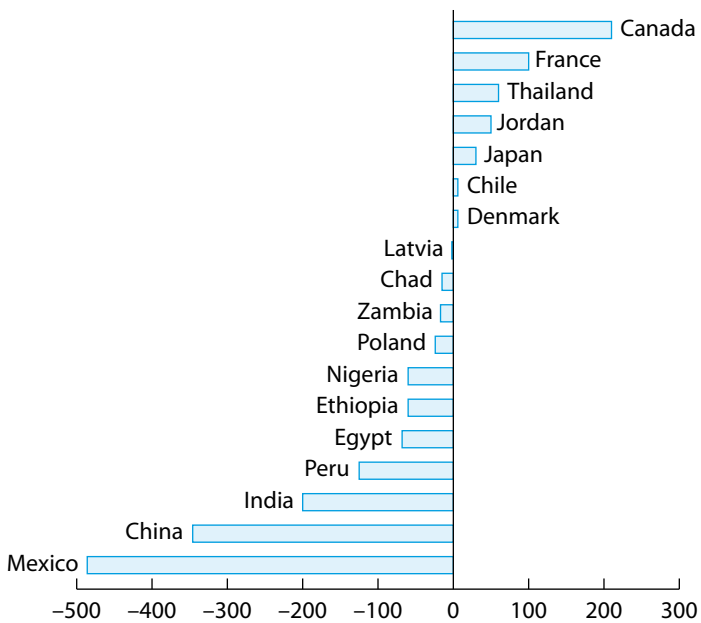
Applied Economics

Labour migration: supply and demand

'Across the world, millions of people are on the move – doing jobs ranging from menial labour, such as harvesting, to computer programming. Combined, their numbers would equal the fifth most populous country on the planet. The number of migrants crossing borders in search of employment and human security is expected to increase rapidly in the coming decades due to the failure of globalisation to provide jobs and economic opportunities.'

Source: UN International Labour Organisation, 2010

Average annual net migration 2005–2010 (immigrants minus emigrants)



Source: United Nations, Department of Economic and Social Affairs, Population Division 2009

labour participation rates (how long young people remain in education; when older people retire). The wages on offer for alternative employment are another factor, with many less developed countries experiencing rural to urban migration as agricultural workers switch to emerging manufacturing jobs. Changes to tax and welfare benefits may also lead to a shift in labour supply (**progressive income tax** rates, for example, may create disincentives to work for some people. See Section 2.3D). Finally, at the level of an individual firm, changes in the nature of the work, working hours, holiday entitlement and locality are possible causes of a shift in the supply of labour.

As the demand for labour is derived from the demand for goods and services produced by the employers, a shift in labour demand may arise from shifts in *product* demand: due to changes in the price of substitute products, the price of complements, the real income of consumers, and consumer tastes for example. Other non-price factors that may lead to a shift in the demand for labour include new employee taxes levied on employers, and changes in production technology (*eg* the substitution of machines for labour on a manufacturing production line).

Labour market equilibrium is not just the product of demand and supply. Many labour markets are also subject to the actions of government and **trade unions** (who aim to increase wages through **collective bargaining**, protect workers and enhance working conditions). One form of explicit government intervention in the labour market – the imposition of a national **minimum wage** – is analysed in Section 1.3.

HL EXTENSION

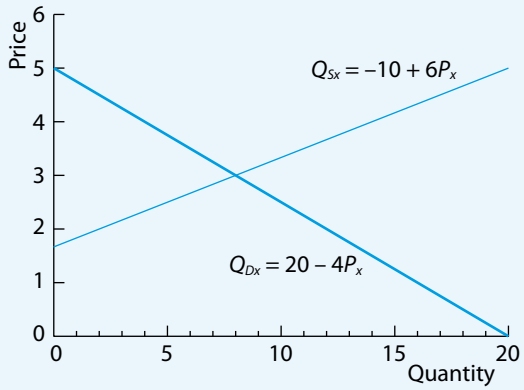
MARKET EQUILIBRIUM WITH LINEAR DEMAND AND SUPPLY

By bringing together the linear demand and supply functions described earlier, we can simply read off the equilibrium price and equilibrium quantity from the combined demand / supply schedule, or from the associated graph. The excess quantity demanded or quantity supplied at any particular price can also be read off from both the schedule and graph. See Figures 1.24 and 1.25.

Figure 1.24

P_x	$Q_{Dx} = 20 - 4P_x$	$Q_{Sx} = -10 + 6P_x$
0	20	–10
1	16	–4
2	12	2
3	8	8
4	4	14
5	0	20

Figure 1.25



We can also, however, calculate the equilibrium price and quantity algebraically. Market equilibrium occurs when the quantity demanded equals the quantity supplied, *ie* when $Q_{Dx} = Q_{Sx}$. By substituting in the full demand and supply equations we can solve for the equilibrium price and quantity.

$Q_{Dx} = 20 - 4\,P_x$

$Q_{Sx} = -10 + 6P_x$

And we know that $Q_{Dx} = Q_{Sx}$ when the market is in equilibrium. So:

$20 - 4P_x = °10 + 6P_x$

Rearranging, we find that $P_x = 3$, the equilibrium price where quantity demanded equals the quantity supplied. To find the corresponding equilibrium quantity, simply substitute the equilibrium price, 3, into either of our linear equations and solve for Q. We find that $Q_{Sx} = Q_{Dx} = 8$.

We can also use simple algebra to calculate the excess demand or supply at a particular price. At a price $P_x = 4$, for example, our demand function tells us that consumers would like to purchase $(20 - 4(4)) = 4$ units. However, from the supply function we know that at this price firms will produce $(-10 + 6(4)) = 14$ units. There is excess supply equal to $(14 - 4) = 10$ units.

THE ROLE OF THE PRICE MECHANISM

Recall from the first section of this book, *The Foundations of Economics*, that scarcity means that choices have to be made, each with an opportunity cost. Choices are needed in order to answer the basic economic question 'What to produce?', *ie* how to allocate scarce resources. We have seen how market prices are formed by the meeting of buyers and sellers. These prices are extraordinarily important because it is prices that allocate resources in a market economy, through their dual functions as **signals**, and as **incentives**, for consumers and producers.

Adam Smith in 1776 likened the function of prices to an *invisible hand* (see the reading on Adam Smith in *The Foundations of Economics* section). It is the invisible hand that determines resource allocation in a market system. By contrast in a centrally planned economy, as in the old Soviet Union, the hand was very visible. It was the hand of government and planning committees that decided answers to the economic questions of what, how and for whom.

A price move is a signal to give consumers and producers the incentive to change their behaviour. For example if the price of a good, say coffee, falls there is an incentive for consumers to buy more coffee and less of other drinks like tea. At the same time the incentive for growers to produce coffee falls. This in turn will reduce the demand for those factors involved in coffee production, and these factors of production will tend to switch to alternative uses. Meanwhile the market price of tea is

Figure 1.26

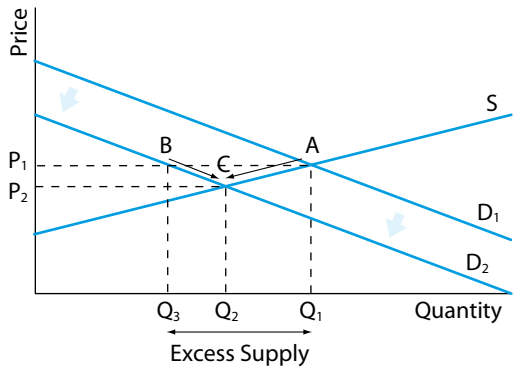
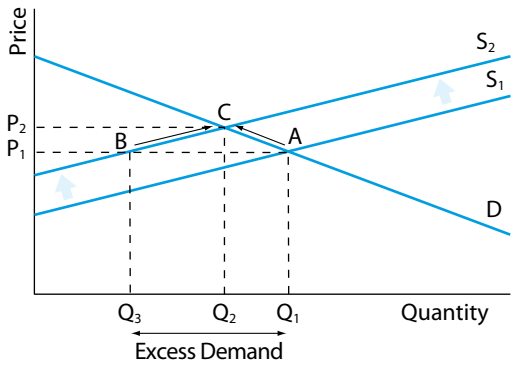


Figure 1.27



affected (Figure 1.26). This changes the behaviour of buyers and sellers in that market. The repercussions spread through many markets and cause adjustments to be made right across the economy.

Figure 1.26 illustrates how a leftward shift in the demand for tea results in a new market equilibrium. The price of a substitute product, coffee, falls causing a leftward shift in the demand for tea (from D_1 to D_2). At the initial price, P_1, there is now excess supply of tea equal to $Q_1 - Q_3$. With falling sales, some tea suppliers reduce prices to induce higher consumer spending on tea. Consumers react to this signal by buying more tea and moving down the demand curve from B to C. The falling tea price also acts as a signal to other tea suppliers that there is a glut, and provides an incentive to cut output, with firms moving down the supply curve from point A to C. Eventually, a new equilibrium is established at price P_2 and quantity Q_2.

Figure 1.27 illustrates a similar process of market adjustment, with price once again acting as a signal and incentive, but in this case following a leftward shift in the supply of air-freight services, due to tighter security measures at airports. At the original price P_1 there is excess demand equal to $Q_1 - Q_3$. Freight companies increase prices, moving consumers up the demand curve from A to C as those unwilling or unable to spend more than P_1 drop out of the market. The rising price also provides an incentive for producers to increase their supply of air-freight services, moving suppliers up the supply curve from B to C. The new equilibrium is at price P_2 and quantity Q_2.

MARKET EFFICIENCY

In the first part of this book, *The Foundations of Economics*, you were introduced to two components of **market efficiency**: productive efficiency and allocative efficiency. Productive efficiency holds when a country produces on its Production Possibility Frontier (PPF) – output is maximised for a given amount of inputs. Allocative efficiency holds when the particular combination of goods produced on the PPF maximises the utility of consumers (i.e. at a *specific point* on the PPF). Productive efficiency relates to the basic economic question 'how to produce' using the scarce resources available, and allocative efficiency to the question of 'what to produce', given the various possible combinations of products and services.

The market mechanism, planning and tradition are ways of allocating resources in answer to these basic economic questions. In this section we have been studying markets, and more particularly,

perfectly competitive markets, where outcomes are determined by the interaction of demand and supply alone, without outside intervention. An important feature of such markets is that they drive an economy to maximise market efficiency.

Productive efficiency occurs within a firm. It is maximised in a competitive market because a firm that fails to produce at the lowest possible cost (i.e. using the fewest possible inputs) will have to charge a higher price. Consumers will naturally choose firms offering the lowest price for a particular product, and so eventually only those firms that are productively efficient will survive in a competitive market. The incentive for firms to be productively efficient, or not waste inputs, is that cutting unnecessary costs increases profit. The price system reinforces this incentive as managers react to the relative prices of factors purchased outside the firm.

Allocative efficiency (the optimal combination of goods and services) occurs outside firms, and will also be maximised in a perfectly competitive market. In order to see this we need to re-interpret our demand and supply curves.

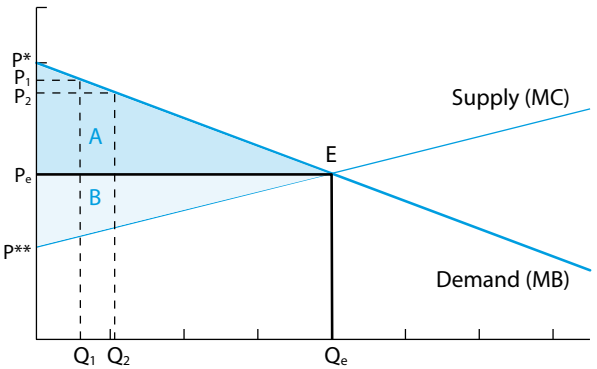
A demand curve measures, in money terms, the value of the alternative goods and services that consumers are willing to forgo in order to obtain one more unit of this particular good. We can therefore think of the demand curve as representing consumers' utility or marginal benefit ('MB') from receiving one more unit of a good or service – as reflected in the price that consumers are willing to pay for it. The price that consumers are willing to pay determines demand. Similarly, in order for firms to bear the additional (or 'marginal') cost of producing one more unit of a particular good, they require an additional sum of money. Our upward sloping supply curve can thus be thought of as a marginal cost ('MC') curve.

Returning to our discussion of market efficiency, we noted that allocative efficiency is maximised in a perfectly competitive market. Equilibrium price and quantity occur where the quantity demanded equals the quantity supplied, where the demand curve intersects with the supply curve. But using our new interpretation of the demand and supply curves, we know that this equilibrium is also the point at which consumers' marginal benefit (MB) equals suppliers' marginal cost (MC). In other words, perfectly competitive markets ensure prices and quantities are set where the extra benefit to society of receiving one more unit of a good exactly equals the extra cost to society of producing it. There is allocative efficiency as society has 'chosen', through individual consumers spending so as to maximise their own utility, the appropriate amount of resources to allocate to the production of that good. This is the process described by Adam Smith as the 'invisible hand' of the market (see the reading in *The Foundations of Economics* Section). There is maximum allocative efficiency in a society if it is impossible to move resources to make people better off without others losing[2].

Measuring Market Efficiency

In Figure 1.28 the demand curve cuts the vertical axis at the price P^*, a price so high that demand is zero. However, at a price just below P^*, say P_1 on our diagram, there is a consumer who values the good very highly, and is willing to purchase the good at this price. At P_2 there is an additional consumer willing to purchase, and as prices drop further, down to zero, more and more consumers are willing to purchase the good. However, we know that in a competitive market the price that consumers actually have to pay is where the quantity demanded and quantity supplied are equal, at P_e on the diagram. Our first consumer, willing to purchase at the much higher price of P_1, is enjoying a net benefit (or

Figure 1.28 – Consumer Surplus and Producer Surplus



utility) equivalent to the difference between what she was willing to pay (P_1), and what she has to pay to get the good (P_e). Similarly, the second consumer benefits, although by slightly less ($P_2 - P_e$). A consumer willing only to pay P_e obtains the desired good but will not receive any additional benefit. Of course, consumers unwilling to pay at least P_e, will not receive the good. The grand sum of all the individual net benefits to consumers able to purchase the good is known as **consumer surplus**, and is shown as the shaded area 'A' on the diagram. Consumer surplus is one possible measure of the **welfare** of consumers.

Whereas consumers derive net benefits when they value a good more than they have to pay for it, producers derive net benefits from selling a good for more than the costs of producing it. Cost measures, in money terms, the resources that firms need to forgo in order to produce a particular good or service. At the equilibrium price, P_e, firms able to supply the product for lower prices (*ie* more than cover their costs) will enjoy additional net benefits represented by the difference between the price the firm needs to cover its costs, and the price actually received. The sum total of these benefits to firms is known as **producer surplus** and is marked on Figure 1.28 as area 'B'.

We already know that, in perfectly competitive markets, market efficiency is maximised at equilibrium prices and quantities. A useful measure of this total efficiency is the sum of consumer and producer surplus (A + B in Figure 1.28), known as the **social surplus** (or **community surplus**). Moving away from equilibrium, to a lower price say, increases consumer surplus, but at the expense of producer surplus. A price higher than the equilibrium price has the opposite effect. In both cases market efficiency – as measured by social surplus – falls as we move away from equilibrium prices and quantities.

Consumer and producer surplus are an important tool of practical economic analysis, allowing policy-makers to consider the impacts of alternative policy options on different interest groups, and on overall welfare. A widely used technique, drawing on the concepts of social welfare, as measured by consumer and producer surplus, is **cost-benefit analysis** (CBA). CBA helps policy-makers with difficult decisions on how best to allocate scarce resources, by comparing the costs and benefits of alternative options over a common timeframe. The option that maximises net social welfare is selected. CBA is used across a wide range of public policy areas, but is particularly associated with big public sector infrastructure decisions, such as whether to build a new railway, school, road *etc*.

Market Efficiency and Perfectly Competitive Markets – Limitations

1. We have described how perfectly competitive markets promote market efficiency by maximising productive and allocative efficiency. They do not, however, provide a satisfactory answer to the third basic economic question: 'for whom to produce'. Issues of equity and the distribution of resources across society are not directly addressed by the market. Government intervention, the subject of Section 1.3, is often aimed at influencing the equity component of welfare.

2. In the real world there are very few markets that could be described as perfectly competitive. **Market failures** may require intervention by governments to ensure optimum efficiency and welfare outcomes. Sources of market failure are examined in Section 1.4. Economists still find it useful to examine models of perfect competition, as they provide a benchmark against which to measure the welfare and efficiency performance of real-world markets.

HL EXTENSION

MEASURING CONSUMER SURPLUS AND PRODUCER SURPLUS

One of the attractions of consumer and producer surplus as a measure of efficiency or welfare is the simplicity of calculation – finding the areas of triangles A and B on Figure 1.28. This is easy, provided the shape of the demand and supply curves are known.

If we can assume linear demand and supply functions, know the equilibrium price (P_e) and quantity (Q_e), and the prices where demand and supply are zero (P^*, P^{**}):

Consumer Surplus = area of triangle $P_eP^*E = ½ \times (P^* - P_e) \times Q_e$ and,
Producer Surplus = area of triangle $P_eP^{**}E = ½ \times (P_e - P^{**}) \times Q_e$

For example, consider the following linear demand and supply functions:

$Q_D = 120 - 2P$

$Q_S = -100 + 20P$

The equilibrium price, P_e = €10, is found by setting $Q_D = Q_S$ and, by substituting we find that $Q_e = 100$. In order to find the price at which demand is zero, set $Q_D = 0$ and solve for P:

$120 - 2P = 0$, so P = €60

Similarly, the price where supply is zero:

$-100 + 20P = 0$, so P = €5

Using our formulae for consumer surplus and producer surplus:

Consumer Surplus = ½ × (60 – 10) × 100 = €2,500
Producer Surplus = ½ × (10 – 5) × 100 = €250

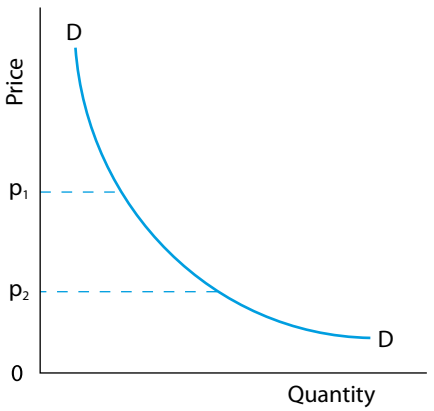
To test your understanding, consider the impact on total consumer and producer surplus of an outward shift in the supply function. The new supply function is Q_S = -78 + 20*P*. You should find an unambiguous increase in consumer surplus as prices fall. Producer surplus also increases in this case, as a result of the additional production.

Higher Level students return to this topic in Section 1.3, when examining the impact of indirect taxes.

MULTIPLE CHOICE QUESTIONS – MARKETS

1 The diagram illustrates the demand curve for desktop printers. If p_1 is the original equilibrium price, a fall in price to p_2 could have been caused by a fall in

A real incomes.
B raw material prices.
C the price of paper.
D advertising expenditure on printers.



2 The table gives the demand and supply schedules for a new video phone. Which of the following is correct?

A The equilibrium quantity lies between 100 and 300 units per month.
B The equilibrium price is $800.
C There is excess demand at prices between $200 and $300.
D There is no market for the product.

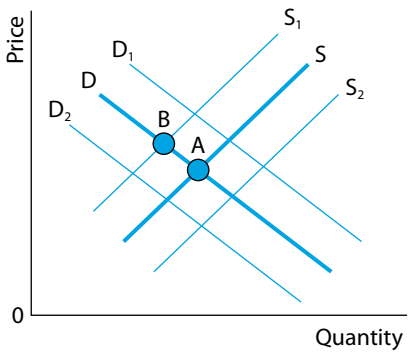
Price ($)	Quantity demanded per month	Quantity supplied per month
1	10000	0
2	5000	0
3	1000	0
4	0	0
5	0	500
6	0	600
7	0	700

3 A good has a downward sloping demand curve and an upward sloping supply curve. Which of the following would result in a rise in both the price and quantity demanded?

A An increase in production costs.
B More efficient production techniques.
C A fall in incomes.
D An increase in the price of a substitute.

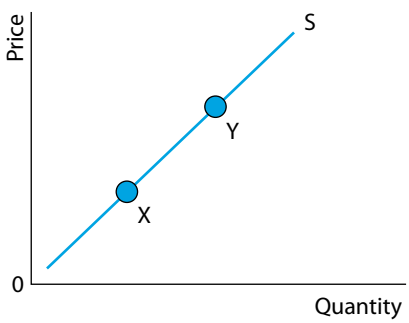
4 Supply and demand curves for DVDs are shown in the figure. A movement from A to B could be caused by

A an increase in wages in the DVD industry.
B an increase in incomes.
C an increase in the availability of inputs used to produce DVDs.
D a removal of tariff barriers on DVDs.



5 The supply curve for eating fish in Canada is graphed right. Which of the following would not cause a movement from X to Y?

A Publication of evidence proving that eating fish reduces heart disease.
B An increase in subsidies to fishermen.
C An increase in the price of beef.
D An increase in the population of Canada.

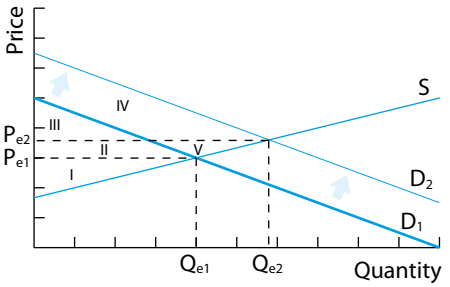


6 The demand curve for a normal good shifts to the right when

A the price of the good itself falls.
B the price of a complement falls.
C the price of substitute falls.
D an indirect tax is imposed on the good.

7 The graph (see right) shows the impact of a rightward shift in the demand curve, from D_1 to D_2, on consumer surplus and producer surplus. The increase in combined consumer and producer surplus is equal to:

A II and I
B (III + IV) and (I + II + V)
C Zero – the gains to consumers and producers cancel each other out
D IV and V



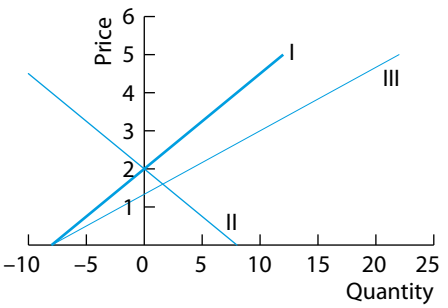
HL ONLY

8 The correct demand schedule for the linear demand function: $Q_D = 145 - 8P$ is:

	P_e	0	5	10	15
A	Q_D	–145	–185	–225	–265
B	Q_D	0	–8	–16	–24
C	Q_D	18.1	17.5	16.9	16.3
D	Q_D	145	105	65	25

9 Which curve on the graph (see right) fits the linear function, $Q = -8 + 4P$?

A I
B II
C III
D None of the curves shown



10 Given the following linear functions, $Q_{Dx} = 16 - P_x$ and $Q_{Sx} = -6 + 2P_x$, choose the correct set of answers for: (i) the slope of the demand curve; (ii) the price at which supply is zero; (iii) the equilibrium price; and, (iv) the equilibrium quantity.

A 16, –6, 10, 14
B 2, 16, 7.5, 8.5
C –1, 3, 7⅓, 8⅔
D –1, –3, 10, 14

Economics from a Global Perspective was the first textbook on IB Diploma economics in the market (originally launched in 1995) helping define the syllabus in terms of breadth and depth for teachers, and constituting the main reference source for students. Over 50,000 copies have been sold to date.

With Forewords by Gareth Rees, Manuel Fernández Canque & Andrew Maclehose

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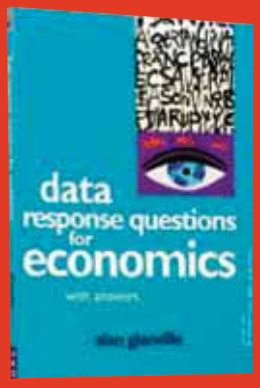
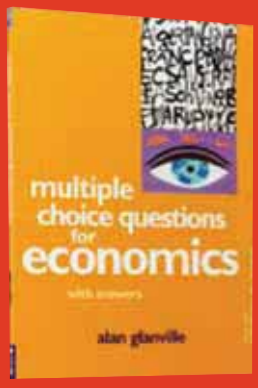
Alan Glanville had 32 years experience as an IB teacher, examiner and author.
Jacob Glanville has 20 years experience as a professional economist.

CONTENTS





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