Chapter 3: Price determination in a competitive market

Application of economics in the real world

Application of economics in the real world 3.1: Elasticity and tobacco taxation

1 The formula for price elasticity of demand is:

$$\frac{\%\text{ change in quantity demanded of a good}}{\%\text{ change in the price of the good}}$$

2 Two other types of elasticity of demand are:

- income elasticity of demand
- cross elasticity of demand

3 Cigarettes are addictive. Older smokers have been smoking for many years and their addiction is greater than that of teenage smokers.

Adult smokers in general have higher incomes than teenage smokers. They can better 'absorb' a price increase without it affecting their real income by very much.

4 When a price elasticity of demand statistic is zero, demand is completely inelastic. At all prices, the same quantity is demanded. From a government's point of view, however much sales tax was imposed on the good, the same amount would be demanded. This would make taxing the good highly attractive for the government. Consumers would be completely captive.

When a price elasticity of demand statistic lies between zero and –1, demand is inelastic, but not completely inelastic. When the price rises, there is a less than proportionate fall in demand. In this situation, it may still be tempting for the government to tax sales of the good, but the temptation dwindles the closer the elasticity statistic is to −1. Above that point a rise in price leads to a more than proportionate fall in demand. A government may still be tempted to tax sales of the good, not so much to increase tax revenue, but more to try and switch spending patterns away from the good, especially if it is deemed to be a demerit good.

Application of economics in the real world 3.2: Housing market elasticities in the UK

1 The formula for price elasticity of supply is:

$$\frac{\text{proportionate change in quantity supplied of a good}}{\text{proportionate change in the good's price}}$$

2 The slope of a supply curve is measured by:

$$\frac{\text{absolute change in quantity of a good supplied}}{\text{absolute change in the good's price}}$$

whereas the formula given earlier for price elasticity of supply measures proportionate changes.

3 The main reason why the price elasticity of supply of new houses is lower in the UK than in the USA is that there is much more land available for house building in the USA. As a result, land is much more expensive to buy in the UK and it is more difficult to get planning permission to build new houses. The USA also has a tradition of pulling down existing houses and building new houses in their place, and US construction companies are more experienced and cheaper in replacing old by new.

4 The explanation of this statement stems from the fact that in the UK the demand curve for housing is continually shifting to the right. If the supply curve of housing is inelastic, this leads to a situation in which house prices have to rise to maintain equilibrium in a constantly changing housing market. However, if the supply curve of housing is highly elastic and responsive to a shift of demand, price increases will be lower. It has been calculated that a price elasticity of supply of +10 will stabilise house prices when the demand curve for housing is shifting rightward.

Application of economics in the real world 3.3: Auctions

1 In general parlance, equilibrium means a state of rest, or a balance between opposing forces. Once an equilibrium is reached, it remains, unless an outside force disturbs it. The two opposing forces in a market are demand and supply, or rather the quantity of a good that consumers plan to demand, and the quantity that producers or firms plan to supply. When the two opposing forces are equal, planned demand exactly equals planned supply and the market is in equilibrium.

2 eBay uses ascending-bid or English auctions, in which bidders drop out until only one bidder remains, and that bidder wins the item at this final price.

3 A descending-bid auction is one in which the seller gradually lowers the price from a high initial value until the first moment when a bidder accepts and pays the current price. The case study mentions Dutch flower auctions as an example of descending-bid auctions. Such auctions are sometimes used for selling new offers of shares. The price of the shares offered is lowered until there are enough bids to sell all the shares. All the shares are then sold at that price.

4 Second-hand cars are often sold through advertisements in magazines such as *Autotrader*, which carry private adverts posted by individuals with, say, a family car for sale, and adverts posted by car dealers with many cars for sale.

Application of economics in the real world 3.4: Composite demand and competing supply: biofuels and food

1 Composite demand occurs when a good has more than one use, which means that an increase in demand for one use of the good reduces the supply of the good for an alternative use. Competing supply occurs when inputs into the production process (factors of production) can be used to produce different goods so that an increase in the supply of one commodity from a given amount of the factors of production requires a reduction in the supply of another commodity. The two concepts of composite demand and competing supply both relate to the fundamental economic problem of scarcity.

2 In 2017 the pressure group Forum for the Future published an article titled 'New study suggests demand for biofuel is increasing global food prices', from which the following is an extract:

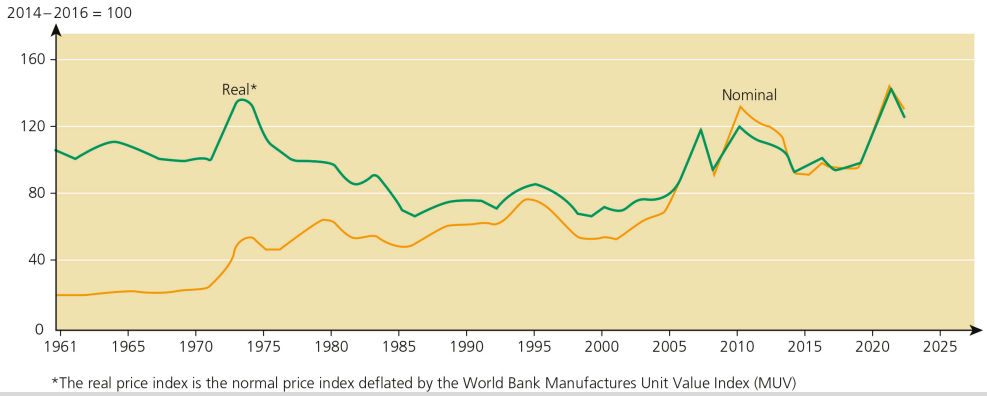
According to a study published in 2017 by Cerulogy — a sustainable policy consultancy based in North America — demand for biofuel made with palm and rapeseed oil is resulting in an increase in global food prices. Initially popularised to curb the use of fossil fuels in the early 2000s, the EU introduced the EU biofuel directive in 2003, but later agreed to cap biofuel use at 7% in 2015 amidst growing concern for biofuel's link to deforestation and environmental degradation.

The increased demand for biofuel is questionably causing more damage than fossil fuels, despite its aim of initially being introduced as a cleaner source of fuel. A report published by the Royal Academy of Engineering said some biofuels, such as diesel made from palm oil,

have led to more emissions than those produced by the fossil fuels they were meant to replace; not to mention the larger environmental effects palm oil production is having in developing countries. Accessibility of food is becoming increasingly more difficult as a result of rising prices, biofuel production is also heavily linked to land grabbing, heavy pesticide use, and deforestation to make room for palm oil plantations.

Not all biofuels compete with food for land: second-generation biofuels come from food crop by-products, such as bagasse from sugarcane, while the source for third-generation biofuels is algae. However, palm oil accounts for an estimated 12% of the feedstock used to produce biofuels within the EU, with 46% of the crop being imported into the EU being used for biodiesel in 2015. Reducing demand in Europe for food-based biofuels would relieve pressure off food commodity markets, create modest reductions in global food prices and poverty rates, ultimately resulting in net global welfare improvements. Palm oil production is in direct conflict with humanity's efforts to combat climate change, and is adding more fuel to the fire of global warming, as well as destroying biodiversity.

3 In February 2023, the United Nations Food and Agriculture Organisation (FAO) published the Food Price Index shown below.



*The real price index is the normal price index deflated by the World Bank Manufactures Unit Value Index (MUV)

Figure AERW3.1 FAO Food Price Index in nominal and real terms

The graph shows food prices rising, both in nominal and in real terms, over the whole of the period from 1961 to 2023, with the peak in 2022, but falling slightly since then. Prices are affected by both demand and supply factors. On the demand side, global population growth and higher incomes cause food prices to rise. On the supply side, as explained in the previous answer, diversion of agricultural output since 2000 into biofuel production has contributed to the rising price of food. After 2009, limits on biofuel production and high crop yields contributed to falling food prices. However, supply issues linked to Brexit and the war in Ukraine led to shortages, which led to record rises in food prices in 2021 and 2022.

4 See the extract in the answer to question 2.

Application of economics in the real world 3.5: Digital downloads and streaming replace CDs and DVDs

1 In 2018 Ted Goslin, a content marketing specialist for the Yamaha Consumer Audio group, wrote an article titled 'Five possible reasons why vinyl is making a comeback'. Here are two of the reasons:

- *Tangibles. Sure, subscription streaming services provide unprecedented access and convenience, but something is lost too: ownership. When you play streamed digital files through an app, you don't own that music. On the other hand, vinyl records are physical items that you can collect, hold in your hands, purchase in person and discuss endlessly with record store clerks and fellow music lovers. Vinyl also offers other tangibles, such as*

album artwork and liner notes; if these things are even offered by streaming services, you better know where to click.

- *Sound quality. Many experts feel that the old-school analog audio provided by vinyl sounds superior to digital audio — especially the lossy (compressed) digital formats used by streaming services. It's true that there are better digital playback formats available, such as FLAC (Free Lossless Audio Codec), but you'll have to search them out specifically (and possibly pay extra for them), whereas vinyl is readily available from online sellers and at your local record store.*

You can access the rest of Ted Goslin's article at https://hub.yamaha.com/five-reasons-vinyl-is-making-a-comeback/.

2 CDs and music streaming are substitute ways of listening to music.

3 The obvious reason, suggested in earlier answers, is the impact of changing technology. The online streaming of music bypasses the need to buy physical objects such as CDs or vinyl records in shops. Other reasons are spiralling rents charged for shops and changing demographics through which young people who buy specialist recorded music move away from the environments surrounding specialist music stores. You can find this explained in an article 'What's happening to New York City's record stores?', accessible at https://thevinylfactory.com/features/new-york-city-record-stores-closing/.

4 Google has had little direct effect on UK retail markets, but it has had significant indirect effects. It has massively reduced search and shoe-leather costs for consumers. Metaphorically, a shoe-leather cost is the time wasted tramping around shops looking for the best prices and availability of goods. Related to this, a search cost is the time and money spent searching the market for a particular good or service. Using search engines such as Google on the internet massively reduces the cost of finding out what is available and then ordering online. Some customers take this a stage further. They visit a store such as Marks & Spencer, try on a good such as a pair of trousers, and then order it online. Stores such as M&S and John Lewis have wised up to this change in shopping habits. They keep minimum stocks of goods in their stores and advise customers to go 'online' to see the full range available. Customers may then buy using a 'click and collect' facility, and thus avoid delivery costs by picking up the ordered goods 'in store'. Small independent retailers such as newsagents and grocery stores may also make money out of this by acting as convenient collection points for goods sold online by much larger retailers.

Although Google has recently diversified into direct online selling of goods such as groceries, this is the specialist territory of Amazon. Amazon has invested in huge warehouses scattered around the country, which stock most of the goods that Amazon sells.

Due to its size and bargaining power with suppliers, Amazon enjoys huge economies of scale, which allow the firm to undercut competitors, including large department stores. However, when accused of 'unfair' competition, Amazon defends itself by stating that it also advertises goods to be sold by much smaller third-party companies such as light-bulb manufacturers.

In France, the government has tried to protect bookshops by preventing Amazon from under-cutting book prices. In 1981 French law fixed book prices, with the result that readers pay the same whether they buy online, from a big high street chain or from a small bookseller. Extensive discounting is banned, though 5% discounts are allowed. The consequence is that there are between 2,500 and 3,000 independent bookshops in France, compared with fewer than 1,000 in the UK. Most small French towns have at least two bookshops and there is a wide choice of books on display.

The French government says that the banning of discounts of more than 5% has saved its independent bookstores from the ravages of free-market capitalism that hit the UK when it abandoned fixed prices. Nevertheless, the owners of French bookshops still argue they cannot

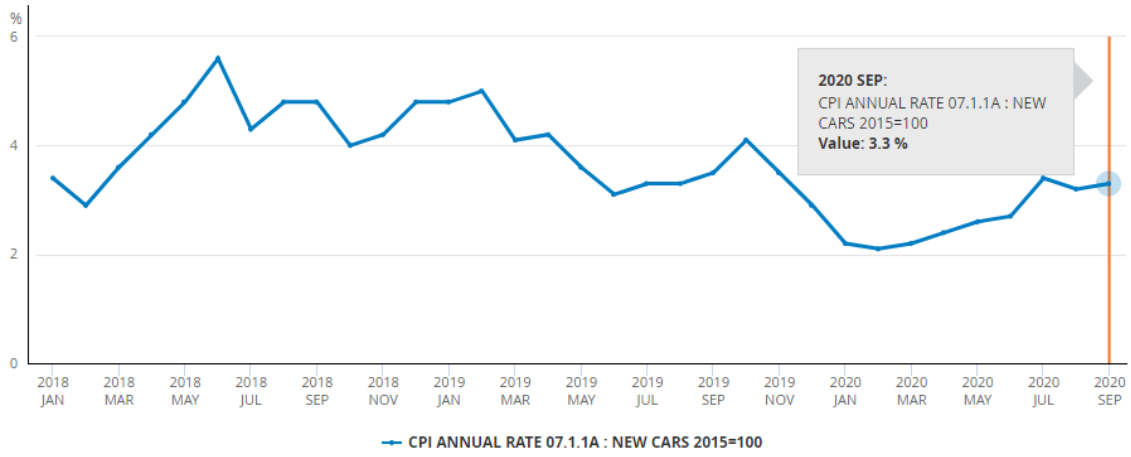
compete with Amazon, even with Amazon's discounts limited to 5%, because the online retailer provides free postage and free fast delivery deals on top of the discount. Consumers can also bypass French law by ordering books online in countries such as Belgium.

The French culture minister recently said: 'Everyone has had enough of Amazon which, by dumping practices, slashes prices to get a foothold in markets, only to raise them as soon as they have established a virtual monopoly…the book and reading sector is facing competition from certain sites using every possible means to enter the French and European book market…it is destroying bookshops.'

Application of economics in the real world 3.6: Markets for new and second-hand cars

1 A consumer durable good is a good bought by consumers which can be used for many months or years before it wears out and has to be replaced. A household refrigerator is an example.

2



Source: ONS, Consumer price inflation time series, October 2020

3 In a physical sense, consumer durable goods deteriorate in that they suffer wear and tear and incur costly repair bills as they are used. In a financial sense, goods deteriorate because accounting rules are applied to lower the yearly book value of the capital goods which firms own. Most cars experience physical depreciation as just described and cars owned by businesses will experience financial deprecation. An exception is classic cars such as old Ferraris, which, due to their rarity and to the demand exercised by collectors, usually appreciate in value as the years go by.

4 Refer back to Application of economics in the real world 2.2 in Chapter 2. On receiving his Nobel Prize, awarded for his paper on 'The market for lemons', George Akerlof said:

From time to time one hears either mention of or surprise at the large price difference between new cars and those which have just left the showroom. The usual lunch table justification for this phenomenon is the pure joy of owning a 'new' car.

We offer a different explanation. Suppose that there are just four kinds of cars. There are new cars and used cars. There are good cars and bad cars (which in America are known as 'lemons'). A new car may be a good car or a lemon, and of course the same is true of used cars.

The individuals in this market buy a new automobile without knowing whether the car they buy will be good or a lemon. After owning a specific car, however, for a length of time, the car owner can form a good idea of the quality of this machine.

An asymmetry of information has developed: for the sellers have more knowledge about the quality of a car than the buyers. But good and bad used cars must still sell at the same price, since it is impossible for a buyer to tell the difference between a good and a bad car.

It is apparent that a used car cannot have the same valuation as a new car — if it did, it would clearly be advantageous to trade a lemon at the price of a new car, at a high probability of the new car being a good car. Most used cars traded will be 'lemons', and good used cars may not be traded at all. The 'bad' cars tend to drive out the good (in much the same way that bad money drives out the good).

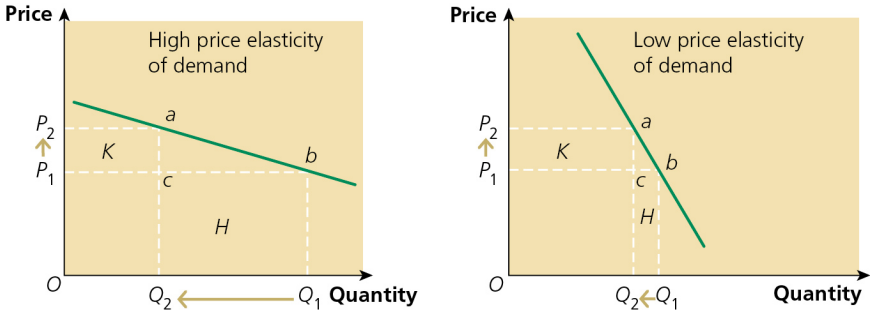
End-of-chapter questions

1 When a word such as *inevitably* is used in a question like this, it is likely to mean that in some cases a fall in a good's price will lead to more demand for the good, but in other cases it will not.

In this question, the deciding factor is the slope of the demand curve. If the demand curve slopes downward to the right, a fall in the good's price will lead to more demand for it, but if the demand curve slopes upward, a fall in the good's price will lead to less demand for the good.

2 A good is a normal good if more of the good is demanded when income increases. Restaurant meals are usually a normal good. A good is an inferior good if less of the good is demanded when income increases. Low-quality food is an inferior good for most people because, as income rises, people tend to switch to higher-quality food.

3



Change in price leads to bigger change in quantity demanded

Change in price leads to smaller change in quantity demanded

Figure A3.1 Effect of price elasticity of demand on consumer spending

Total consumer spending and the total revenue received by firms are, of course, the same thing. When a good's price rises from P_1 to P_2 in Figure A3.1, total consumer spending (and total firms' revenue) increases by the area K, but falls by the area H. In the left-hand graph where demand is elastic, the area H is bigger than the area K, which means that total revenue/consumer spending falls. By contrast, in the right-hand graph where demand is inelastic, the area H is smaller than the area K, which means that total revenue/consumer spending increases.

4 Three possible factors are as follows:

A decrease in income

People have less spending power. This causes their demand curves for all normal goods that they buy to shift to the left.

An increase in the price of a complementary good

A complementary good is a good in joint demand. If the price of one good increases, people buy less of it (if it is a normal good), which shifts the demand curve for the good that goes with it to the left.

A government health warning

This alters people's preferences towards the good, thus shifting the demand curve to the left.

5 Cross elasticity of demand (*XED*) is the responsiveness of demand for one product to a change in the price of another product. Many products are related, and *XED* indicates just how they are related.

The size and sign (positive or negative) of cross elasticity of demand affect how a good's demand curve shifts following a change in the price of another good. For example, a cross elasticity of demand of +0.8 for good A with respect to the price of good B means that, following a 10% increase in the price of good A, demand for the substitute good B increases by 8%. Substitutes have positive cross elasticities of demand, while complementary goods have negative cross elasticities of demand.

6 A supply curve shows how quantity supplied will change as the price rises and falls, assuming no other relevant factors are changing. If other factors relevant to supply do change, then the entire supply curve will shift. A rightward shift in supply means an increase in the quantity supplied at every price.

Three factors which, if they change, cause a supply curve to shift rightward or downward are a fall in costs of production, technical progress and the government cutting the amount of corporation tax that firms have to pay. A reduction in costs of production means that it will now be profitable for a firm to sell goods which would have been unprofitable before the costs of production fell. Technical progress, which makes it cheaper to produce goods, and a cut in the taxes that firms have to pay to the government have a similar effect.

7 The supply of new houses has generally been highly inelastic. This can be illustrated by a near-vertical supply curve, especially in the short run. By contrast, the UK demand for housing has increased steadily, partly due to population growth. A rightward-shifting demand curve, 'sliding' up a near-vertical supply curve, provides the basic explanation of rising house prices in the UK over recent decades.

8

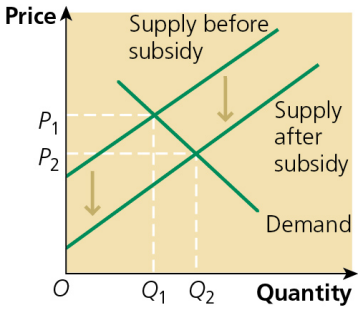


Figure A3.2 Effect of a subsidy on the price of a good

Before the granting of a subsidy to all the firms in the market, the good's price in Figure A3.2 is P_1 and the quantity of the good bought and sold is Q_1. The vertical distance between the two supply curves shows the size of the subsidy per unit of the good being subsidised. However, the price of the good does not fall by the full amount of the subsidy. Instead the new price (P_2) is determined where the new supply curve intersects the demand curve.

Test yourself answers

TEST YOURSELF 3.1

Effective demand means willingness and ability to pay. In this case, there is no ability to pay, so this is not an effective demand.

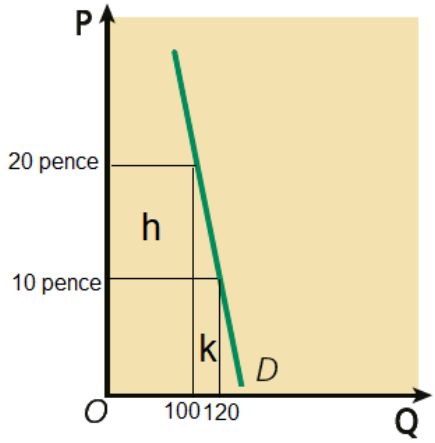
TEST YOURSELF 3.2

A demand curve shows how much is demanded as the good's own price changes. All the other factors which influence demand, such as income, determine the position of the demand curve. If income changes, the demand curve shifts to a new position. If a summer holiday is a normal good, this is an increase in demand.

TEST YOURSELF 3.3

A 33.3% fall in price leads to a 100% increase in demand, which is a more than proportionate increase in demand. This means that demand is price elastic.

TEST YOURSELF 3.4



When the price falls by 100%, demand increases by 20%. Consumer expenditure falls by the area $k - h$.

TEST YOURSELF 3.5

The + sign tells us that a foreign holiday is a normal good and that an increase in income leads to an increase in demand. The number 1.6 tells us that, for example, a 10% increase in income leads to a 16% increase in demand. Demand for foreign holidays is income elastic.

TEST YOURSELF 3.6

We calculate cross elasticity of demand for games consoles with respect to the price of computer games by dividing the proportionate change in demand for games consoles (−10%) by the proportionate change in the price of consumer games (+30%). Thus, the cross elasticity of demand is −33.3, which indicates that the goods are complementary goods, in joint demand, with an inelastic demand relationship.

TEST YOURSELF 3.7

Total revenue is quantity sold × price per unit, which in this case is £2,000. Profit by contrast is total revenue − total cost of production. Assuming costs are incurred before the sheep are sold, total profit must be less than total revenue.

TEST YOURSELF 3.8

In response to excess supply in the market, providing the market is competitive, market forces will cause the price of loaves to fall until the market clears when excess supply has been eliminated.

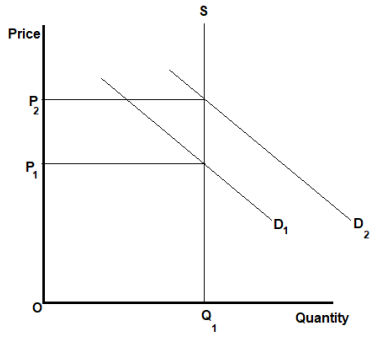
TEST YOURSELF 3.9

Since the subsidy is being given to parents who send their children to private schools, private education becomes more affordable. The demand curve for private education shifts to the right.

TEST YOURSELF 3.10

As the price elasticity of supply is +2.5, the data indicate that a 10% increase in price will lead to a 25% increase in quantity supplied (10 × 2.5 = 25), so the correct answer is B.

TEST YOURSELF 3.11



The equilibrium quantity remains unchanged at Q_1, the equilibrium price increases from P_1 to P_2. A real-world market that the diagram could illustrate is a market for a scarce metal required for industrial use, which can only be mined in a single country such as China.

TEST YOURSELF 3.12

A market is in disequilibrium when:

- planned demand < planned supply, in which case the price falls, or when
- planned demand > planned supply, in which case the price rises

A market is in equilibrium when:

- planned demand = planned supply, in which case the price does not change

TEST YOURSELF 3.13

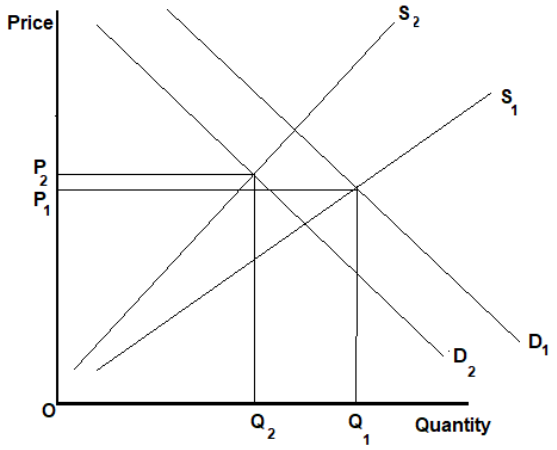
The official ticket provider has control of ticket supply and sells all tickets at £100 each. Because the price ceiling has been imposed below the free-market equilibrium price, it creates excess demand. In a free market, market forces would raise the price and eliminate the excess demand. Rather than rationing by price, households are rationed by quantity. Queues and waiting lists occur, and possibly bribery and corruption, through which favoured customers buy tickets, but others do not. The emergence of an informal or shadow market (sometimes called a black market) occurs, which is a meeting place for 'lucky' customers who bought tickets at £100, but who wish to resell at a higher price, and 'unlucky' customers who failed to buy at £100, but who are prepared to pay more. Ticket touts act as intermediaries in the black market, in which, in this case, the black market price may rise to over £5,000.

TEST YOURSELF 3.14

This is a competitive market in which there are a large number of both buyers and sellers. If only one firm exists in the market (a monopoly) or just a few firms (an oligopoly), the market would be uncompetitive.

TEST YOURSELF 3.15

An income tax is a direct tax imposed on the income of individuals or the income of firms. An expenditure tax is an indirect tax imposed on spending. Provided the good in question is a normal good, by reducing income, an increase in income tax shifts the demand curve for a good leftward, in this case from D_1 to D_2. By contrast, an increase in value added tax shifts the supply curve of the good upward, in this case from S_1 to S_2. Imposing a tax on spending is equivalent to raising firms' costs of production. The diagram shows that, in this example, the combined effect of both tax increases is to raise the price from P_1 to P_2 and to cut quantity from Q_1 to Q_2.



TEST YOURSELF 3.16

An increase in the price of a good in joint demand (or a complementary good) reduces demand for that good, which then has the effect of reducing demand for a complementary good. For example, tennis rackets and tennis balls are in joint demand. Following a significant rise in the price of tennis rackets, demand for them falls, which in turn may slightly reduce the demand for tennis balls.

Composite demand is demand for a good which has more than one use. An increase in demand for one use of the good reduces the supply of the good for an alternative use: for example, provided that land is in short supply, if more land is used for industrial production, less is available for housing.