

Table 2: The demand schedule for Product A

Price (£)	Quantity demanded (Q)	Total revenue (P x Q)
10	6,000	60,000
20	5,000	100,000
30	4,000	120,000
40	3,000	120,000
50	2,000	100,000

Table 3: The demand schedule for Product A

Price (£)	Quantity demanded (Q)	Total revenue (P x Q)	Quantity demanded (+2,000) (Q)	Total revenue (P x Q)
10	6,000	60,000	8,000	80,000
20	5,000	100,000	7,000	140,000
30	4,000	120,000	6,000	180,000
40	3,000	120,000	5,000	200,000
50	2,000	100,000	4,000	200,000

see that a change in price from £30 to £20 has led to a fall in revenue from £120,000 to £100,000, a fall of £20,000.

This process can help a business to identify the point on the demand curve and the price at which revenue is maximised.

This can be seen from Table 2. At prices below £30 the business

### Question 1.

A stationery shop selling fibre tipped pens has estimated the following demand schedule for its products.

Table 4: Demand for fibre tipped pens

Price (£)	Quantity demanded
2	800
3	600
4	500
5	400
6	350
7	300
8	260
9	225
10	200

- (a) Calculate the change in total revenue for fibre tipped pens of:
- an increase in price from £2 to £3;
  - an increase in price from £7 to £10;
  - a decrease in price from £5 to £3.
- (b) Explain why the business might be reluctant to raise prices above £7 per pen.

actually increases the revenue by raising its price. At prices above £40 revenue falls as prices are increased. The business earns most revenue between £30 and £40.

It is also possible to show the effect of changes in demand on revenue. Table 3 shows the effect on Product A's revenue of an increase in demand of 2,000 at each price level.

### Price elasticity of demand

Demand theory suggests that quantity demanded varies with price. The higher the price, the lower the quantity demanded and vice versa. But it doesn't say by **how much** the quantity demanded will fall or rise if there is a change in price. This varies from product to product. The relationship between the effect of a change in price on quantity demanded is known as PRICE ELASTICITY OF DEMAND.

If there is a **large** percentage change in quantity demanded when price changes by a small percentage, there is said to be ELASTIC DEMAND. The word 'elastic' is used to give an idea that there would be a large response. Think of an elastic band. When you pull it, can you easily double its length? Then it is 'elastic'. But if it is thick, it may be difficult to change its length. It is 'inelastic'. This is also the case with price elasticity. If a large percentage change in price brings about only a **small** percentage change in quantity demanded, there is said to be INELASTIC DEMAND.

Take the example of a Mars Bar made by Mars Corporation. If it puts up the price by 10 per cent, and there is a fall in quantity demanded of 30 per cent, then the demand for Mars Bars is elastic. The percentage change in quantity demanded of Mars Bars is much bigger than the percentage change in price which caused it. But if quantity demanded fell only 5 per cent when prices went up by 10 per cent, then there would be inelastic demand. The percentage change in quantity demanded is smaller than the percentage change in price.

It is important to realise that price elasticity compares **percentage** changes in quantity and price. Percentages allow the relative changes to be measured and compared.

### The formula for price elasticity of demand

The exact value of price elasticity of demand can be calculated by using the formula:

$$\text{Price elasticity of demand} = \frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}}$$

For example, say that the price of Mars Bars increases by 10 per cent.

- If the quantity demanded falls by 20 per cent as a result of the 10 per cent price rise, then price elasticity of demand is:

$$\frac{-20 \text{ per cent}}{+10 \text{ per cent}} = -2$$

- If the quantity demanded rises by 5 per cent as a result of

depends on the price elasticity of demand.

### Price elasticity and profit

Price elasticity also has an effect on **profit**. Profit is calculated as sales revenue minus costs. Costs are likely to change with sales. The more that is produced, the higher the costs.

If demand is price inelastic, a rise in price will lead to lower sales but increased sales revenue as explained earlier. But the lower sales will mean lower costs. So profits will increase, not just from higher sales revenue but also from lower costs.

If demand is price elastic, an increase in sales revenue can be achieved by lowering price and raising sales. But higher sales also mean higher costs. In this situation, higher profits will only occur if the increase in sales revenue is greater than the increase in costs.

### Factors affecting price elasticity of demand

The value of price elasticity of demand for a product is mainly determined by the ease with which customers can switch to other similar **SUBSTITUTE PRODUCTS**. A number of factors is likely to determine this.

**Time** Price elasticity of demand tends to fall the longer the time period. This is mainly because consumers and businesses are more likely to turn to substitutes in the long term. For example, fuel oil is highly price inelastic in the short term. If the price of petrol goes up 20 per cent in a week, the fall in quantity demanded is likely to be only a few per cent. This is because car owners have to use their cars to get to work or to go shopping. But over a ten year period, car owners will tend to buy more fuel-efficient cars. Businesses with boilers using fuel oil may replace these with gas boilers. Homeowners with oil-fired central heating systems might install more insulation in their houses to cut running costs or change to gas boilers. As a result, demand for oil in the long run is likely to be price elastic.

**Competition for the same product** Some businesses face highly price elastic demand for their products. This is because they are in very competitive markets, where their product is either identical (i.e. are perfect substitutes) or little different from those produced by other businesses. Farmers, for example, when selling wheat or potatoes are in this position. If they push their prices above the market price, they won't be able to sell their crop. Customers will simply buy elsewhere at the lower market price.

**Branding** Some products are **branded**. The stronger the branding, the less substitutes are acceptable to customers. For example, many buyers of Kellogg's corn flakes do not see own label brands, such as Tesco or Asda cornflakes, as good substitutes for Kelloggs. They will often pay 50 per cent more to buy Kelloggs rather than another brand. Successful branding therefore reduces the price elasticity of demand for the product.

**Product types vs the product of an individual business** Most products are made and sold by a number of different businesses.

Petrol, for example, is processed and sold by companies such as Shell, Esso and Total. The major supermarkets also sell petrol which they have bought from independent refiners. The demand for petrol is price inelastic in the short term. But the demand for Shell petrol or Esso petrol is price elastic. This is because petrol has no real substitutes in the short term. But Esso petrol is a very good substitute for Shell petrol. In general, a product category like petrol, carpets or haircuts has a much lower price elasticity of demand than products within that category made by individual businesses.

However strong the branding and however little the competition that an individual product faces, it is still likely that a business will sell at a price where demand is price elastic. To understand why, consider a product which has inelastic demand. As explained above, raising the price of the product would increase sales revenue. It would also reduce sales and costs of production would fall. So profits would rise. A profit maximising firm should therefore continue raising price until demand is price elastic.

If demand is price elastic, raising price leads to a fall in sales revenue, but also a fall in costs because less is sold. At the profit maximising point, any further increase in price would see the fall in sales revenue being greater than the fall in costs.

This would suggest that even strongly branded goods, such as Coca-Cola or McDonald's meals, have a price elasticity of demand greater than one at the price at which they are sold. It also suggests that luxury brands, such as Chanel or Gucci, also have elastic demand at their current price.

### Problems of measuring price elasticity of demand

There may be problems for small businesses in calculating the price elasticity of demand for their products.

**Collecting data** A business wanting to know about the price elasticity of its products would need to collect data on demand changes in relation to price for its own products to know the price elasticity of demand for these products. This would mean that they would need to experiment with price changes and to monitor consumer reaction. For many small businesses,

#### Question 2.

Kaldor Ltd manufactures reproduction juke boxes which play CDs. Jukeboxes that play old 45 records can cost around £1,000 or a great deal more. Large jukeboxes in pubs can cost thousands of pounds as well. But Kaldor had seen other 'reproduction' jukeboxes that did not cost as much and were far smaller. It decided to manufacture smaller jukeboxes that stand on a table. They sold for £200 and hold three CDs at a time. The jukeboxes have been selling well and so the business raised the price to £240. As a result sales fell from 800 to 600 per month. Kaldor is now questioning the decision to raise the price.

- (a) Discuss whether or not the decision to raise the price was a good choice by the business.

### Question 3.

Bill Finch is a London taxicab driver. Towards the end of 1999, all the talk amongst taxicab drivers was about the new Millennium - whether they were going to drive or be out partying on New Year's Eve. In November 1999, the government, which sets London taxicab fares, announced that London taxis would be able to charge double rate for journeys taken between 8 pm on December 31 and 6 am on January 1st. Those taking journeys long enough to cost more than an ordinary fare of £25 would have to pay a flat rate £25 supplement. This compared to the usual New Year supplement of £3 per journey.

Bill decided he would drive on the Millennium eve, expecting that demand would be highly price inelastic. But he was disappointed with his takings. Many party goers had decided to stay at home because restaurants, pubs and clubs as well as taxis were charging double or more on the night. There was a general feeling amongst the public that they were going to be ripped off if they went out. Where journeys were necessary, many took a private car and agreed in advance which of the party goers would be the non-drinking driver. Bill Finch found that he carried 30 per cent fewer passengers than he typically did on a normal Saturday night in the winter months. None of his journeys on the Millennium eve exceeded the £25 limit.

- Explain what is meant in the passage by 'demand would be highly price inelastic'.
- Explain (i) why it was expected that demand for taxi cab rides would rise on Millennium eve; (ii) how this might have affected the ability of travellers to get a taxi cab ride on that night if fares had NOT risen from their normal levels.
- Using the concepts of price elasticity of demand, revenue and profit, discuss whether Bill made the right decision to drive on Millennium eve.

them to assess the likely demand for their products over a given range of prices. Often this is because of the high cost of collecting

such market information. Such businesses tend to develop a PERCEIVED DEMAND curve. This is a demand curve based upon the 'feel' which managers and owners have for their market. It will involve rough estimations of the likely impact upon demand of upwards or downwards changes in prices.

Some larger businesses with access to detailed market information are in a much better position to develop demand curves which can assist them in making more informed decisions about their prices. However, even for such businesses the demand curve may be of limited value. This is because the demand curve can only provide information about the likely response of consumers to a change in the price of a particular product at a given point in time. In fast changing markets such information may quickly go out of date and will be of limited value unless it is regularly updated.

### Normal and inferior goods

Most products have a positive income elasticity. When income rises, so too does demand for the product. These products are called NORMAL GOODS.

However, for some products, a rise in income leads to a fall in their demand. Their income elasticity of demand is negative (because in the formula there is a plus sign on the top and a minus sign on the bottom or vice versa). These products are called INFERIOR GOODS. Examples of inferior goods might include:

- bread - as incomes rise, consumers eat less bread and more expensive foods;
- bus transport - as incomes rise, travellers tend to use trains or cars;
- sugar - increased income tends to be associated with a better diet and a greater awareness of the problems of having too much sugar.

Most products are normal goods. However, some products have a higher income elasticity than others. For example, over the past 20 years, with rising incomes, the demand for services has increased faster than the demand for goods. Services, such as holidays and meals out, have expanded particularly fast.

## KEY TERMS

**Advertising elasticity of demand** - the responsiveness of demand to a change in advertising expenditure.

**Cross elasticity of demand** - the responsiveness of the demand of one product to a change in the price of another.

**Demand** - the quantity of a product bought over a given time period.

**Income elasticity of demand** - the responsiveness of demand to a change in income.

**Inferior goods** - products which have a negative income elasticity. When incomes rise, the quantity demanded falls and vice versa.

**Normal goods** - products which have a positive income elasticity. When incomes rise, the quantity demanded rises and vice versa.

**Perceived demand** - the demand which businesses believe exists for their products in a particular market.

**Price elasticity of demand** - the responsiveness of quantity demanded to changes in price. It is measured as percentage change in quantity demanded ÷ percentage change in price.

**Price elastic demand** - when price elasticity is greater than 1, which means that the percentage change in quantity demanded is greater than the percentage change in price which caused it.

**Price inelastic demand** - when price elasticity is less than 1, which means that the percentage change in quantity demanded is less than the percentage change in price which caused it.

**Substitute product** - a product which has similar characteristics to another good. For example, gas is a substitute for oil as a fuel in heating systems. Shell petrol is a good substitute for BP Amoco petrol for use as a fuel in cars.

# KNOWLEDGE

1. Explain, without using the formula, what is meant by 'price elasticity of demand'.
2. 'The demand for journeys taken on the London Underground is price inelastic.' Explain what this means.
3. (a) What is the formula for price elasticity of demand?  
(b) How does it differ from the formula for income elasticity of demand?
4. How can a business estimate the price elasticity of demand for one of its products?
5. Explain why a rise in price would lead to higher revenues if demand for the product were price inelastic.
6. Explain the link between price elasticity of demand and profit.
7. Explain why strongly branded goods such as Coca-Cola or Chanel perfumes are likely to be price elastic at the price at which they are currently sold.
8. Why might a business be interested in its advertising elasticity of demand?

## Case Study: Bodyline

Bodyline is a small firm based in the West Midlands which manufactures womens' swimwear. Its products are distributed through four main types of outlet - mail-order catalogues, department stores, womens' clothing chains and independent retailers.

The business was set up in early 2005. The two women, Elaine and Penny, who started up the firm had originally been friends at University. One had studied for a degree in Art and Design, the other in Business Studies.

Their main product was to be a swimsuit, the Californian, which had been designed in a wide range of dazzling colours. Their marketing strategy had been to aim for the bottom end of the market, offering a cheap, but fashionable garment which would be within the reach of a wide number of consumers' pockets. Marketing research into the demand for the Californian showed that sales at different prices were likely to be as in Table 6.

Elaine and Penny found that they were able to sell all of their production at a price of £18. They sold Californians at this price for six months and made a fair profit. The market was fairly stable at this time and few sudden changes were expected in the near future. Penny felt that by reducing the price a little they would be able to capture more of the market. Elaine was not so sure and the two debated the decision over the next six months without taking any action.

By early 2007 a number of rival businesses developed similar product lines using bright colours, having seen the initial success of Bodyline in the market. As Elaine had commented, one of the worst things about the new products was that 'the Californian designs no longer stood out in the shops and are the same as other products now available'. In what had seemed like a short period of time to these two entrepreneurs, their niche in the market had all but disappeared.

After their initial success many of the new businesses had attempted to undercut Bodyline's prices. The effect on the demand curve for the Californian is shown in Table 7.

- (a) What is the relationship between price and demand for Californians shown in Table 6? Use examples in your answer. (6 marks)
- (b) Calculate the elasticity of demand for Californians for a reduction in price from:



- (i) £18 to £16;
  - (ii) £16 to £14. (6 marks)
- (c) Explain whether demand for Californians is elastic or inelastic and how this would affect price and demand. (6 marks)
  - (d) Using Table 7, explain the idea of cross elasticity of demand for Californians. (10 marks)
  - (e) Assess whether you think Penny was right to suggest a reduction in price using your answer to (b) and total revenue calculations. (12 marks)

Table 6: Demand for Californians

Price	Quantity of Californians
£14	18,000
£16	14,000
£18	10,000
£20	6,000

Table 7: Effect of a change in competitors' prices on the demand for Californians

Price of other products	Quantity of Californians
£14	16,200
£12	12,600
£10	9,000
£8	5,400