ECONOMICS

FOURTH EDITION

Peter Smith

with Simon Dyer

OCR A LEVEL

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Elasticity

The previous chapter explored how changes in demand and supply are reflected in a movement to a new equilibrium position. Typically, such a change in the market equilibrium entails a change in the price of the product and in the quantity traded in the market. Whether the change is reflected in price or in quantity depends upon the extent to which demand and supply are sensitive to the change in market conditions. This chapter examines this issue.

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Learning objectives

After studying this chapter, you should be able to:
- explain elasticity
- explain and calculate the price elasticity of demand (*PED*)
- explain and calculate the income elasticity of demand (*YED*)
- explain and calculate the cross elasticity of demand (*XED*)
- explain and calculate the price elasticity of supply (*PES*)
- explain, with the aid of a diagram, different values of *PED*, *YED*, *XED* and *PES*
- explain, with the aid of a diagram, the relationship between the *PED* and a firm's total revenue
- evaluate the factors that determine the value of *PED*, *YED*, *XED* and *PES*
- evaluate the usefulness and significance of *PED*, *YED*, *XED* and *PES*

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Elasticity: the sensitivity of demand and supply

Both the demand for and the supply of a good or service can be expected to depend upon its price as well as other factors. It is often interesting to know just how sensitive demand and/or supply will be to a change in either price or one of the other determinants — for example, in predicting how market equilibrium will change in response to a change in the market environment. The sensitivity of demand or supply to a change in one of its determining factors can be measured by its **elasticity**.

<div>

Key term

elasticity a measure of the sensitivity of one variable to changes in another variable

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The price elasticity of demand (*PED*)

The most common elasticity measure is the **price elasticity of demand (*PED*)**. This measures the sensitivity of the quantity demanded of a good or service to a change in its price.

The elasticity is defined as the percentage change in quantity demanded divided by the percentage change in the price.

We define the percentage change in price as $100 \times \frac{\Delta P}{P}$ (where Δ means 'change in' and P stands for 'price'). Similarly, the percentage change in quantity demanded is $100 \times \frac{\Delta Q}{Q}$.

When the demand is highly price sensitive, the percentage change in quantity demanded following a price change will be large relative to the percentage change in price. In this case, *PED* will take on a value that is smaller than −1. For example, suppose that a 2% change in price leads to a 5% change in quantity demanded — the elasticity is then −5 divided by 2 = −2.5. When the price elasticity is smaller than −1, demand is referred to as being **elastic**.

Quantitative skills 6.1

Describing elasticity

Because the *PED* is always negative, economists sometimes omit the minus sign. Strictly speaking, demand is elastic where the *PED* is smaller than −1 and inelastic if the value is between 0 and −1. Another way of expressing this is that demand is elastic when the *PED* is negative with an absolute value larger than 1, but this is quite clumsy. You may sometimes find people saying that demand is elastic when the *PED* is larger than 1. What they mean is that the *PED* is smaller than −1, that it is negative but with a numerical value greater than 1.

There are two important things to notice about this. First, because the demand curve is downward sloping, the elasticity will always be negative. This is because the changes in price and quantity are always in the opposite direction. Second, you should try to calculate the elasticity only for a relatively small change in price, as it becomes unreliable for very large changes.

When demand is not very sensitive to price, the percentage change in quantity demanded will be smaller than the original percentage change in price, and the elasticity will then be between 0 and −1. For example, if a 2% change in price leads to a 1% change in quantity demanded, then the value of the elasticity will be −1 divided by 2 = −0.5. In this case, demand is referred to as being **inelastic**.

Quantitative skills 6.2

Calculating an elasticity

Figure 6.1 shows a demand curve for pencils. When the price of a pencil is 40p, the quantity demanded will be 20. If the price falls to 35p, the quantity demanded will rise to 30. The percentage change in quantity (%ΔQD) is $100 \times \frac{10}{20} = 50$ and the percentage change in price (%ΔP) is $100 \times \frac{-5}{40} = -12.5$. So, the elasticity can be calculated as $\frac{\%\Delta QD}{\%\Delta P} = \left(\frac{50}{-12.5}\right) = -4$. At this price, demand is highly price elastic.

Quantitative skills 6.2 (continued)
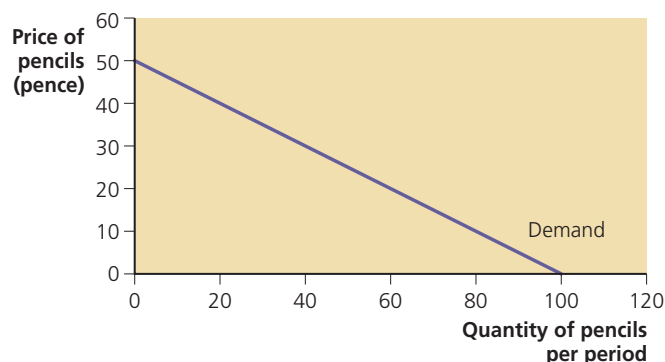
Figure 6.1 A demand curve for pencils

At a lower price, the result is quite different. Suppose that price is initially 10p, at which price the quantity demanded is 80. If the price falls to 9p, demand increases to 82. The percentage change in quantity is now $100 \times \frac{2}{80} = 2.5$, and the percentage change in price is $100 \times \frac{-1}{10} = -10$, so the elasticity is calculated as $\frac{2.5}{-10} = -0.25$, and demand is now price inelastic.

Knowledge check 6.1

Why is the *PED* always negative?

Key term

unit elastic a term used when the price elasticity of demand is equal to 1

This phenomenon is true for any straight-line demand curve: in other words, demand is price elastic at higher prices and inelastic at lower prices. At the halfway point the elasticity is exactly –1, which is referred to as being **unit elastic**.

Why should this happen? The key is to remember that elasticity is defined in terms of the percentage changes in price and quantity. So when price is relatively high, a 1p change in price is a small percentage change, and the percentage change in quantity is relatively large — because when price is relatively high, the initial quantity is relatively low. The reverse is the case when price is relatively low. Figure 6.2 shows how the elasticity of demand varies along a straight-line demand curve.
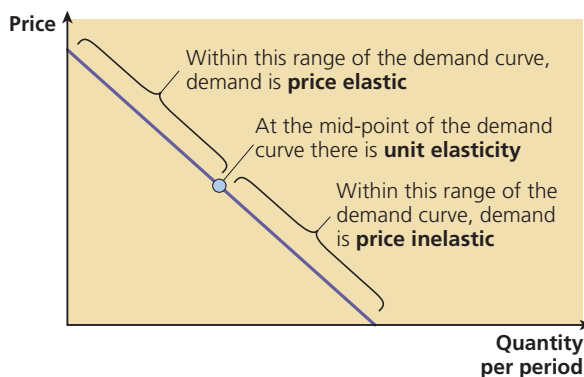
Figure 6.2 The own-price elasticity of demand varies along a straight line

The price elasticity of demand and total revenue

One reason why firms may have an interest in the price elasticity of demand is that if they are considering changing their prices, they will be eager to know the extent to which demand will be affected. For example, they may want to know how a change in price will affect their total revenue. As it happens there is a consistent relationship between the price elasticity of demand and total revenue.
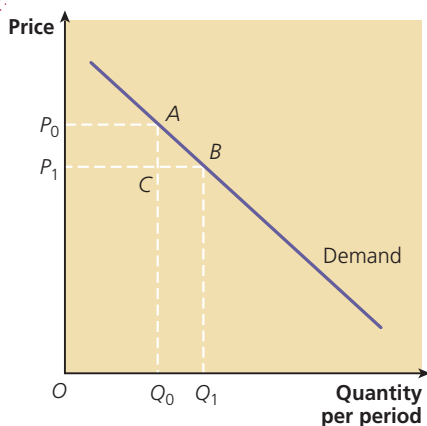
Figure 6.3 Demand and total revenue

Total revenue is given by price multiplied by quantity. In Figure 6.3, if price is at P_0, quantity demanded is at Q_0 and total revenue is given by the area of the rectangle OP_0AQ_0. If price falls to P_1 the quantity demanded rises to Q_1, and you can see that total revenue has increased, as it is now given by the area OP_1BQ_1. This is larger than at price P_0, because in moving from P_0 to P_1 the area P_1P_0AC is lost, but the area Q_0CBQ_1 is gained, and the latter is the larger. As you move down the demand curve, total revenue at first increases like this, but then decreases — try sketching this for yourself to check that it is so.

Quantitative skills 6.3

Elasticity and total revenue

Quantitative skills 6.1 showed how to calculate the price elasticity of demand at different points along a demand curve for pencils. When the price of a pencil fell from 40 to 35, the quantity demanded rose from 20 to 30, and elasticity was calculated to be −4.

Total revenue before and after the price change can be calculated. Total revenue is equal to price multiplied by quantity, so at the original price revenue was $40 \times 20 = 800$. At the new lower price, total revenue was $35 \times 30 = 1{,}050$. We can therefore see that when the price elasticity of demand is elastic, a fall in price leads to a rise in revenue.

When the price of a pencil fell from 10 to 9, and quantity demanded rose from 80 to 82, demand was inelastic (−0.25). At the original price, revenue was $10 \times 80 = 800$, and at the lower price it was $9 \times 82 = 738$. This time, total revenue has fallen with a fall in price and inelastic demand.

A mathematical note: because the elasticity varies along most demand curves, we would ideally like to measure the elasticity at a particular point on the curve. When calculating using percentage changes we are measuring the elasticity along a segment of the curve (an arc), so we may sometimes get misleading results. We should therefore try to calculate for as small a change as can be measured. For those taking A Level maths, you may realise that calculus would enable us to measure elasticity at a point if we knew the formula for the demand curve.
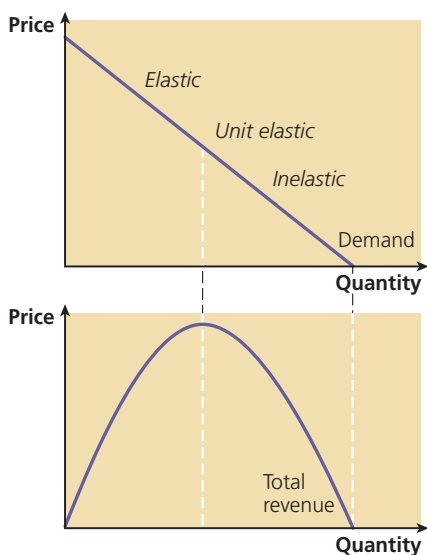
Figure 6.4 Elasticity and total revenue

For the case of a straight-line demand curve the relationship is illustrated in Figure 6.4. Remember that demand is price elastic when price is relatively high. This is the range of the demand curve in which total revenue rises as price falls. This makes sense, as in this range the quantity demanded is sensitive to a change in price and increases by more (in percentage terms) than the price falls. This implies that as you move to the right in this segment, total revenue rises. The increase in quantity sold more than compensates for the fall in price. However, when the mid-point is reached and demand becomes unit elastic, total revenue stops rising — it is at its maximum at this point. The remaining part of the curve is inelastic: that is, the increase in quantity demanded is no longer sufficient to compensate for the decrease in price, and total revenue falls. Table 6.1 summarises the situation.
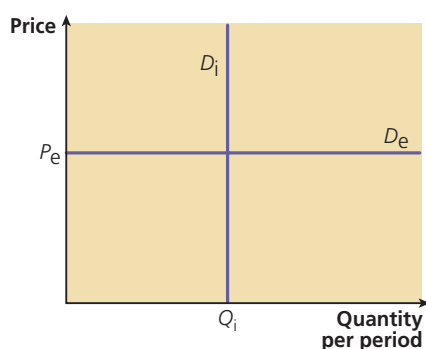
Table 6.1 Total revenue, elasticity and a price change

Price elasticity of demand	For a price increase, total revenue...	For a price decrease, total revenue...
Elastic	falls	rises
Unit elastic	does not change	does not change
Inelastic	rises	falls

So, if a firm is aware of the price elasticity of demand for its product, it can anticipate consumer response to its price changes, which may be a powerful strategic tool.

One very important point must be made here. If the price elasticity of demand varies along a straight-line demand curve, such a curve cannot be referred to as either elastic or inelastic. To do so is to confuse the elasticity with the *slope* of the demand curve. It is not only the steepness of the demand curve that determines the elasticity but also the point on the curve at which the elasticity is measured.

Perfectly elastic and perfectly inelastic demand

Two extreme cases of the price elasticity of demand should also be mentioned. Demand may sometimes be totally insensitive to price, so that the same quantity will be demanded whatever price is set for it. In such a situation, demand is said to be *perfectly inelastic*. The demand curve in this case is vertical — as in D_i in Figure 6.5. In this situation, the numerical value of the price elasticity is zero, as quantity demanded does not change in response to a change in the price of the good.

The other extreme is shown on the same figure, where D_e is a horizontal demand curve and demand is *perfectly elastic*. The numerical value of the elasticity here is infinity. Consumers demand an unlimited quantity of the good at price P_e. No firm has any incentive to lower price below this level, but if price were to rise above P_e, demand would fall to zero.

Figure 6.5 Perfectly elastic and inelastic demand

An example

A study by the Institute for Fiscal Studies for the UK found that the price elasticity of demand for wine was −1.69. This means that demand for wine is elastic. If the price of wine were to increase by 10% (ceteris paribus), there would be a fall of 16.9% in the quantity of wine demanded.

Factors that influence the price elasticity of demand

A number of important influences on the price elasticity of demand can now be identified. The most important is the availability of substitutes for the good or service under consideration. For example, think about the demand for cauliflower. Cauliflower and broccoli are often seen as being very similar, so if the price of cauliflower is high one week, people might quite readily switch to broccoli. The demand for cauliflower can be said to be price sensitive (elastic), as consumers can readily substitute an alternative product. On the other hand, if the price of all vegetables rises, demand will not change very much, as there are no substitutes for vegetables in the diet. So, goods that have close substitutes available will

tend to exhibit elastic demand, whereas the demand for goods for which there are no substitutes will tend to be more inelastic.

Associated with this is the question of whether an individual regards a good or service as a necessity or as a luxury item. If a good is a necessity, then demand for it will tend to be inelastic, whereas if a good is regarded as a luxury, consumers will tend to be more price-sensitive. This is closely related to the question of substitutes, as by labelling a good as a necessity one is essentially saying that there are no substitutes for it.

A further influence on the price elasticity of demand is the relative share of the good or service in overall expenditure. You may not notice small changes in the price of an inexpensive item that is a small part of overall expenditure, such as salt or sugar. This tends to mean that demand for that good is relatively inelastic. On the other hand, an item that figures large in the household budget will be seen very differently, and consumers will tend to be much more sensitive to price when a significant proportion of their income is involved.

Finally, the time period under consideration may be important. Consumers may respond more strongly to a price change in the long run than in the short run. An increase in the price of petrol may have limited effects in the short run. However, in the long run, consumers may buy smaller cars or switch to diesel. Therefore, demand tends to be more elastic in the long run than in the short run. Habit or commitment to a certain pattern of consumption may dictate the short-run pattern of consumption, but people do eventually adjust to price changes.

Summary
- The price elasticity of demand measures the sensitivity of the quantity of a good demanded to a change in its price.
- As there is an inverse relationship between quantity demanded and price, the price elasticity of demand is always negative.
- Where consumers are sensitive to a change in price, the percentage change in quantity demanded will exceed the percentage change in price. The elasticity of demand then takes on a value that is smaller than −1, and demand is said to be elastic.
- Where consumers are not very sensitive to a change in price, the percentage change in quantity demanded will be smaller than the percentage change in price. Elasticity of demand then takes on a value that is between zero and −1, and demand is said to be inelastic.
- When demand is elastic, a fall (rise) in price leads to a rise (fall) in total revenue.
- When demand is inelastic, a fall (rise) in price leads to a fall (rise) in total revenue.
- The size of the price elasticity of demand is influenced by the availability of substitutes for a good, whether the good is seen as a luxury or a necessity, the relative share of expenditure on the good in the consumer's budget and the time that consumers have to adjust.

Exercise 6.1

Examine Table 6.2, which shows the demand for Pedro's premium olive oil at different prices.

Table 6.2 Demand for Pedro's olive oil

Price (£)	Quantity demanded (bottles per week)
10	20
8	40
6	60
4	80
2	100

a Draw the demand curve.
b Calculate the price elasticity of demand when the price increases from £8 to £10.
c Calculate the price elasticity of demand when the price increases from £6 to £8.
d Calculate the price elasticity of demand when the price increases from £4 to £6.

The income elasticity of demand (*YED*)

Elasticity is a measure of the sensitivity of a variable to changes in another variable. In the same way as the price elasticity of demand is determined, an elasticity measure can be calculated for any other influence on demand or supply. **Income elasticity of demand (*YED*)** is therefore defined as:

$$YED = \frac{\% \text{ change in quantity demanded}}{\% \text{ change in consumer income}}$$

The *YED* measures the extent to which the demand for a good or service will change in response to a change in consumer incomes. The size and direction of the change in demand will depend upon how consumers perceive the good or service.

Unlike the price elasticity of demand, the income elasticity of demand may be either positive or negative. Remember the distinction between normal and inferior goods? For normal goods the quantity demanded will increase as consumer income rises, whereas for inferior goods the quantity demanded will tend to fall as income rises. So, for normal goods the *YED* will be positive, whereas for inferior goods it will be negative.

Suppose you discover that the *YED* for an economics magazine is 0.7. How do you interpret this number? If consumer incomes were to increase by 10%, the demand for the economics magazine would increase by $10 \times 0.7 = 7\%$. This example of a normal good may be helpful information for the publishers, if they know that consumer incomes are rising over time.

On the other hand, if the *YED* for coach travel is −0.3, that means that a 10% increase in consumer incomes will lead to a 3% fall in the demand for coach travel — perhaps because more people are travelling by car. In this instance, coach travel would be regarded as an inferior good.

superior good one for which the income elasticity of demand is positive, and greater than 1, such that as income rises, consumers spend proportionally more on the good

In some cases the *YED* may be very strongly positive. For example, suppose that the *YED* for digital cameras is +2. This implies that the quantity demanded of such cameras will increase by 20% for every 10% increase in incomes. An increase in income is encouraging people to devote more of their incomes to this product, which increases its share in total expenditure. Such goods are referred to as **superior goods**. Table 6.3 summarises the ranges of the *YED*.

Table 6.3 Values of the *YED*

YED value	Description
Below −1	Elastic inferior good
Between −1 and 0	Inelastic inferior good
0	No relationship between income and quantity demanded
Between 0 and 1	Inelastic normal good
Above 1	Elastic normal good — also known as a superior good

Exercise 6.2

Calculate the income elasticity of demand in each of the following circumstances. In each case, assume that consumer income rises by 5%:

a quantity demanded changes from 150 to 165
b quantity demanded changes from 80 to 78
c quantity demanded changes from 100 to 102
d quantity demanded changes from 400 to 320
e quantity demanded stays at 600

Cross elasticity of demand (*XED*)

Key term

cross elasticity of demand (*XED*) a measure of the sensitivity of quantity demanded of a good or service to a change in the price of some other good or service

Another useful measure is the **cross elasticity of demand (*XED*)**. This is helpful in revealing the interrelationships between goods. Again, this measure may be either positive or negative, depending on the relationship between the goods. It is defined as:

$$XED = \frac{\% \text{ change in quantity demanded of good X}}{\% \text{ change in price of good Y}}$$

If the *XED* is seen to be positive, it means that an increase in the price of good Y leads to an increase in the quantity demanded of good X. For example, an increase in the price of apples may lead to an increase in the demand for pears. Here apples and pears are regarded as substitutes for each other — if one becomes relatively more expensive, consumers will switch to the other. A high value for the *XED* indicates that two goods are very close substitutes. This information may be useful in helping a firm to identify its close competitors.

On the other hand, if an increase in the price of one good leads to a fall in the quantity demanded of another good, this suggests that they are likely to be complements. The *XED* in this case will be negative. An example of such a relationship would be that between coffee and sugar,

which tend to be consumed together. If the *XED* were seen to be zero, this would indicate that the goods concerned were unrelated — neither substitutes nor complements.

Table 6.4 summarises the *XED* values.

Table 6.4 Values of the *XED*

XED value	Description
Below −1	Strong complement
Between −1 and 0	Weak complement
0	No relationship between the two goods
Between 0 and 1	Weak substitute
Above 1	Strong substitute

Extension material

The *XED* and the real world

Does this notion of the cross elasticity of demand have any relevance in the real world? One part of government policy that you will meet later in your study of economics is competition policy. The Competition and Markets Authority has the responsibility of safeguarding consumer interests by ensuring that firms do not exploit excessive market power. An important part of its investigations entails an evaluation of whether firms face competition in their markets. The cross elasticity of demand can reveal whether or not two products are regarded as substitutes for each other. If they are shown to be, then this implies that the firms do face competition. This is an important application of this concept, as it can affect the judgement of whether a firm is in a position to exploit its market position.

Examples

Knowledge check 6.5

If the *XED* between two goods is negative, would this suggest that the goods are substitutes or complements?

A study by the Institute for Fiscal Studies using data for the UK estimated that the cross elasticity of demand for wine with respect to a change in the price of beer was −0.60, whereas the cross elasticity with respect to the price of spirits was +0.77. These estimates are not precise and are subject to a ceteris paribus assumption, but they give us some feel for the real world. The negative cross elasticity with beer suggests that wine and beer are complements: a 10% increase in the price of beer would lead to a 6% fall in the quantity demanded of wine. In contrast, the cross elasticity of demand for wine with respect to the price of spirits is positive, suggesting that wine and spirits are substitutes. An increase in the price of spirits leads to an increase in the quantity demanded of wine.

Exercise 6.3

Calculate the cross elasticity of demand in each of the following circumstances. In each case, assume that the price of another good rises by 15%:
a quantity demanded changes from 200 to 260
b quantity demanded changes from 400 to 310
c quantity demanded changes from 500 to 560
d quantity demanded changes from 50 to 47
e quantity demanded stays at 300

Price elasticity of supply (*PES*)

As elasticity is a measure of sensitivity, its use need not be confined to influences on demand, but it can also be turned to evaluating the sensitivity of quantity *supplied* to a change in its determinants — in particular, price.

It was argued in Chapter 4 that the supply curve is likely to be upward sloping, so the price elasticity of supply can be expected to be positive. In other words, an increase in the market price will induce firms to supply more output to the market. The **price elasticity of supply (*PES*)** is defined as:

$$PES = \frac{\% \text{ change in the quantity supplied}}{\% \text{ change in price}}$$
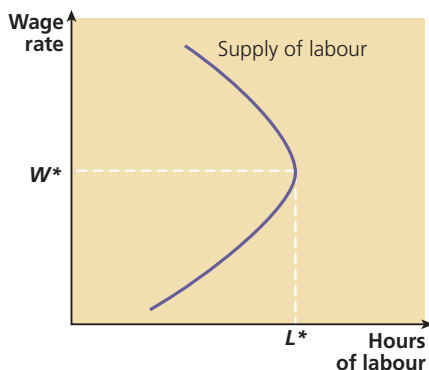
So, if the price elasticity of supply is 0.8, an increase in price of 10% will encourage firms to supply 8% more. As with the price elasticity of demand, if the elasticity is greater than 1, supply is referred to as being elastic, whereas if the value is between 0 and 1, supply is considered inelastic. *Unit elasticity* occurs when the price elasticity of supply is exactly 1, so that a 10% increase in price induces a 10% increase in quantity supplied.

The value of the elasticity will depend on how willing and able firms are to increase their supply. For example, if firms are operating close to the capacity of their existing plant and machinery, they may be unable to respond to an increase in price, at least in the short run. So here again, supply can be expected to be more elastic in the long run than in the short run. Figure 6.6 illustrates this. In the short run, firms may be able to respond to an increase in price only in a limited way, so supply may be relatively inelastic, as shown by S_s in the figure. However, firms can become more flexible in the long run by installing new machinery or building new factories, so supply can then become more elastic, moving to S_l.

Figure 6.6 Short- and long-run supply

There are two limiting cases of supply elasticity. For some reason, supply may be fixed such that, no matter how much price increases, firms will not be able to supply any more. For example, it could be that a certain amount of fish is available in a market, and however high the price goes, no more can be obtained. Equally, if the fishermen know that the fish they do not sell today cannot be stored for another day, they have an incentive to sell, however low the price goes. In these cases, there is **perfectly inelastic supply**. At the other extreme is **perfectly elastic supply**, where firms would be prepared to supply any amount of the good at the going price.

These two possibilities are shown in Figure 6.7. Here S_i represents a perfectly inelastic supply curve: firms will supply Q_i whatever the price,
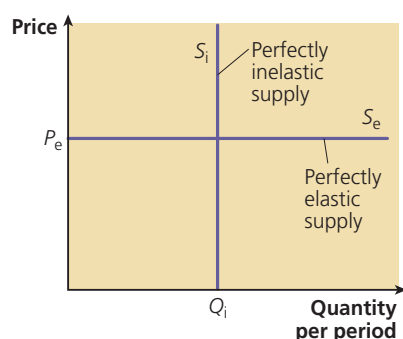
Figure 6.7 Perfectly elastic and inelastic supply

perhaps because that is the amount available for sale. Supply here is vertical. At the opposite extreme, if supply is perfectly elastic then firms are prepared to supply any amount at the price P_e, and the supply curve is given by the horizontal line S_e.

> **Exercise 6.4**
>
> Calculate the price elasticity of supply in each of the following circumstances. In each case, assume that the price of the good rises by 20%.
> a Quantity supplied changes from 500 to 800.
> b Quantity supplied changes from 200 to 220.
> c Quantity supplied stays at 750.

The usefulness and significance of elasticities

The various elasticity measures can be useful to firms and to the government as part of their decision making. For example, suppose you are responsible for choosing the price to charge for a product sold by your firm. The *PED* will be informative about how buyers of the good are likely to respond to a price change. If you know they will be sensitive to a price increase, you might hesitate about raising price because this would affect revenues.

The significance of the *PED* turns partly on the difficulty of obtaining an estimate of it. This is beyond the means of even a medium-sized firm. It may be that in some industries the market *PED* is known (although a Google search does not reveal many of these). For the firm wanting to change its price, the market elasticity may not be meaningful anyway, as much will depend upon the actions of other firms in the market.

This does not mean that firms do not have a sense of how consumers will react to a change in the price of their product, which may be helpful in setting price.

The *YED* will help to forecast changing demand if real incomes are increasing, or if the economy is heading into a recession. Knowing whether a good is normal or inferior is significant in this situation.

The *XED* helps in anticipating changes in demand if the prices of other products are changing. A firm needs to know who its competitors are when devising its own strategy, so it may be important to be aware of whether another firm's products are close substitutes, or whether they are complements. Knowing the *PES* of rival firms would be useful, but estimating a precise value is not easy.

From the government perspective, imposing an indirect tax will raise the price and lead to a fall in demand, so knowing the *PED* helps to forecast the tax revenues expected. This is explored in Chapter 10. Introducing a subsidy would reduce the selling price of a good, and knowing the *PED* allows the government to assess the impact of such a move.

It may not always be straightforward to obtain estimates of the various elasticities. However, if economic agents know about the factors that influence the elasticities and if they understand their significance, they may be able to take better decisions.

> **Synoptic link**
>
> The way in which firms in a market may react to each other's actions is discussed in Chapter 15.

Imagine the following scenario. You are considering a pricing strategy for a bus company. The economy is heading into recession, and the company is running at a loss. Your local rail service provider has announced an increase in rail fares. How (if at all) do you use the following information concerning the elasticity of bus travel with respect to various variables to inform your decision on price? Would you raise or lower price?

- Price elasticity of demand   −1.58
- Income elasticity of demand   −2.43
- Cross-price elasticity of demand with respect to rail fares   +2.21
- Your price elasticity of supply   +1.15

Summary
- The income elasticity of demand (*YED*) measures the sensitivity of quantity demanded to a change in consumer incomes. It serves to distinguish between normal, luxury and inferior goods.
- The cross elasticity of demand (*XED*) measures the sensitivity of the quantity demanded of one good or service to a change in the price of some other good or service. It can serve to distinguish between substitutes and complements.
- The price elasticity of supply (*PES*) measures the sensitivity of the quantity supplied to a change in the price of a good or service. The price elasticity of supply can be expected to be greater in the long run than in the short run, as firms have more flexibility to adjust their production decisions in the long run.

Case study 6.1

Rice

In 2007–08, food prices hit the headlines. There were riots on the streets of cities in many countries around the world, with protestors demonstrating against massive increases in the prices of some staple foods, especially wheat and rice.

The increases affected some countries especially severely. In much of Southeast Asia, rice is a staple commodity, forming a part of most people's daily diet. For some countries, such as the Philippines, much of the rice consumed has to be imported, so the price rises caused particular difficulties. The demonstrators wanted governments to intervene to control the prices and protect the poor.

It was reported that in some countries, poor households were coping with the price rises by changing their eating habits, by consuming less meat, or by finding other ways of cutting down. The United Nations called for worldwide action to prevent hunger and malnutrition from spreading.

Case study 6.1 (continued)

People in Southeast Asia were severely affected by the rise in the price of rice in 2007–08

Follow-up questions
a Would you expect the demand for rice to be price elastic or inelastic?
b Explain your answer to part (a), referring to the passage to provide evidence to support your explanation.
c Do you think that government intervention to control prices would be an effective answer to the problem?

Case study 6.2

Bicycles

If you had visited Shanghai in the early 1990s, one thing that would have struck you is that the roads were dominated by bicycles. Cars were relatively few in number, and in busy streets in the city centre, cars had to thread their way through the mass of bicycles.

Now, things are different. True, there are still many more bicycles on the streets than you would find in the UK but they have their own part of the road. This still causes mayhem at junctions, when cars need to turn across the cycle tracks, but things are more orderly. The number of cars has increased significantly.

Since the early 1990s, China's economy has gone through a period of rapid economic growth and transformation. As part of this process, real incomes have risen and many households have become much better off, especially in the urban areas where much of the change has been concentrated.

Follow-up questions
a What reasons might help to explain the change in the pattern of traffic between cars and bicycles in China over the period described in the passage?
b What would you expect to be the nature of the income elasticity of demand for bicycles in China?
c What would you expect to be the nature of the income elasticity of demand for cars in China?

Case study 6.3

Fish

Imagine a remote island in the South Seas. Some of the islanders own canoes, which they use to go fishing, selling their catch on the beach when they return each day. Some islanders only go fishing occasionally, as they find it more worthwhile to spend their time on other activities. The island has no electricity, so there is no way of storing the fish that are caught — if they are not consumed on the day of the catch, they must be thrown away.

The market for fish on the island is limited by the size of the population. Fortunately for the fishermen, the islanders enjoy fish and regard it as an important part of their diet, although they also grow vegetables and raise goats and chickens. Fruit and coconuts are also abundant.

Islanders sell their catch on the beach in Fiji

Follow-up questions
a What would you expect to be the nature of the price elasticity of supply in the short run (that is, on any given day)?
b Suppose that, on one particular day, fishing conditions are so good that all fishermen return with record catches. How would this affect the price of fish?
c How might the situation in (b) affect the supply of fish on the following day?
d How would you expect the supply of fish to be affected by the invention of a new style of canoe that makes it easier to catch fish?
e How would the market be affected if this new-style canoe also enabled fish to be traded with a neighbouring island?

CHAPTER 6 QUESTIONS

A Multiple-choice questions

1 Price elasticity of demand is:

  a The responsiveness of demand to a change in price

  b The responsiveness of supply to a change in price

  c The responsiveness of quantity demanded to a change in price

  d The responsiveness of quantity supplied to a change in price

2 If a firm increases price by 10% and the sales decrease by 50% then the price elasticity of demand will be:

  a −5

  b −0.2

  c 5

  d 0.2

3 A taxi firm has estimated that the income elasticity of demand for its service is +2.5. The service would be classed as:

  a An inelastic inferior service

  b An elastic inferior service

  c An inelastic normal service

  d A superior service

4 If the price elasticity of supply for a good is +0.1 then a 20% increase in the price of a product will lead to which effect on quantity supplied?

  a An increase in quantity supplied of 2%

  b A decrease in quantity supplied of 2%

  c An increase in quantity supplied of 200%

  d A decrease in quantity supplied of 200%

B Knowledge and understanding questions

5 Calculate the price elasticity of demand if a business decreases its price from £5 to £4 and sees an increase in sales from 400 units to 500 units.   **[2 marks]**

6 A shop has estimated the price elasticity of demand for chocolate bars to be −0.5. It currently sells 200 chocolate bars a week.

Calculate the **change** in weekly sales revenue if the firm increases the price of its products from £0.60 to £0.63 per chocolate bar.   **[4 marks]**

7 Explain **two** factors that may affect the price elasticity of supply for a hairdresser.   **[4 marks]**

C Stimulus response question

8 Most manufacturers of mobile phones bring out a new model each year. New phones often include new features, such as a better camera.

Most customers only purchase one mobile phone and must make a choice between the different manufacturers' products. Table 1 shows some market research data about the cross elasticity of demand for two mobile phones.

Table 1 Cross elasticity of demand for the Banana and Nova mobile phones

Sales of Banana mobile phone	Price of the Nova mobile phone
100,000	£900
80,000	£800
60,000	£700
40,000	£600

a   Explain what is meant by 'cross elasticity of demand'.   [2 marks]

b   Calculate the estimated cross elasticity of demand for the Banana mobile phone if the price of the Nova mobile phone is reduced from £800 to £600 in a sales promotion.   [2 marks]

c   Nova has launched a new contract service for its mobile phone. It estimates that the cross elasticity of demand between the price of the contract and the quantity demanded of the phone is −2. Explain what this estimate may mean for Nova.   [2 marks]

D Essay question

9   Holidays overseas are often considered to be a luxury purchase.

Evaluate the extent to which a fall in income will always lead to lower sales of holidays overseas.   [20 marks]

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