

# 6 A CLOSER LOOK AT SUPPLY: PRICE ELASTICITY OF SUPPLY

## REAL WORLD ISSUE:

How do consumers and producers make choices in trying to meet their economic objectives?

### By the end of this chapter, you should be able to:

- Define and calculate price elasticity of supply (PES)
- Illustrate different values of price elasticity of supply using supply curves
- Explain the determinants of price elasticity of supply
- HL** Explain the likely differences in price elasticity of supply for primary commodities and manufactured goods

If the price of a product increases, producers will want to increase the quantity they supply in order to increase their profits. However, the ability of the producers to increase the quantity supplied in response to higher prices depends on the *price elasticity of supply* for their product.

### What is price elasticity of supply (PES)?

Price elasticity of supply is a measure of how much the supply of a product changes when there is a change in the price of the product. It is usually calculated by using the equation below:

$$\text{PES} = \frac{\text{Percentage change in quantity supplied of the product}}{\text{Percentage change in price of the product}}$$

Key concept



CHANGE



For example, a publishing firm realises that they can now sell their monthly magazine for \$5.50 instead of \$5.00. In light of this, they increase their supply from 200,000 to 230,000 magazines per month. With this information, we can calculate the price elasticity of supply of the magazine in question.

1. The price has risen by 50¢ from an original price of \$5, which is a change of +10%. This is calculated by the equation:

$$\frac{+50}{500} \times 100 = +10\%$$

2. The quantity supplied has increased by 30,000 from an original supply of 200,000, which is a change of +15%. This is calculated by the equation:

$$\frac{+30,000}{200,000} \times 100 = +15\%$$

3. If we put the two values above into the equation for PES, we get 15%/10%, which gives a value of 1.5.

### What is the range of values of price elasticity of supply?

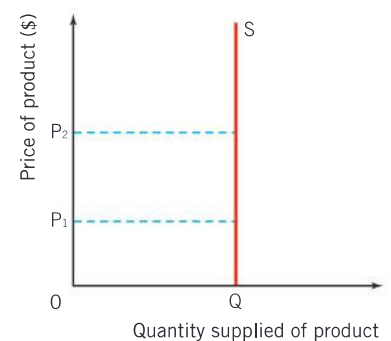
The possible range of values for price elasticity of supply usually goes from zero to infinity. Unlike PED, we will come across examples of both extreme values as we continue our study of economics.

If PES is equal to zero, then a change in the price of a product will have no effect on the quantity supplied at all. Thus the percentage change in quantity supplied would be zero and so would the value on the top of the PES equation. Since zero divided by anything is zero, no matter what the percentage change in price, the PES value will be zero. A supply curve with a value of zero is shown in Figure 6.1 and, in this case, supply is said to be perfectly inelastic – it is completely unresponsive to price changes. Whether price is  $P_1$ ,  $P_2$  or any other price, the quantity supplied will be  $Q$ .

In the very short run, sometimes known as the immediate time period, it is impossible for firms to increase their supply straight away, no matter what happens to price, and so the supply curve would look like the one in Figure 6.1, until new factors of production could be employed. Thus, a perfectly inelastic supply curve is a possibility.

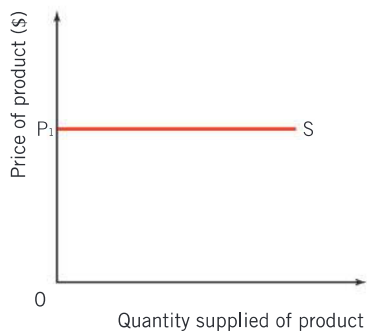
An example of perfectly inelastic supply would be the number of tickets available for a sporting or entertainment venue with a maximum capacity. For example, Manchester United plays its home soccer games at Old Trafford stadium, which (currently) has 74,944 seats. Therefore, the supply is perfectly inelastic at a quantity of 74,944 seats. No change in price could affect the quantity supplied.

A PES value of infinity is best explained by using a diagram and the situation is shown in Figure 6.2. In this case, supply is said to be



▲ **Figure 6.1** A perfectly inelastic supply curve





▲ **Figure 6.2** A perfectly elastic supply curve

### Note

We will deal with this in more detail in Chapter 24.

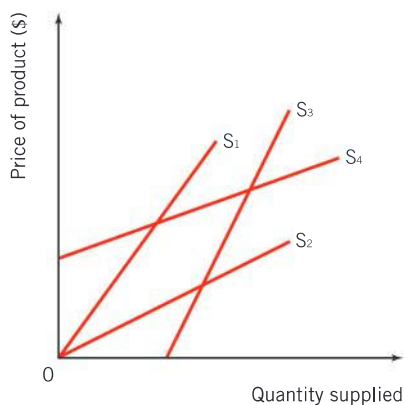
perfectly elastic. At the price  $P_1$ , the supply curve goes on forever and so the quantity supplied is infinite. However, if price falls below  $P_1$ , even by the smallest amount, supply will fall to zero, an infinite change. Because of this, the value on the top of the PES equation would be infinity. Since infinity divided by anything is infinity, no matter what the percentage change in price, the PES value will be infinity.

In international trade, it is often assumed that the supply of commodities, such as wheat, available to a country for import is infinite. The consumers in the country can have all that they want as long as they are prepared to pay the current world market price. Thus, the market in the country will have a “world supply” curve that is perfectly elastic at the current world market price.

Normal products have PES values between zero and infinity and we will now look at those values. The range of values of PES is normally split into three categories:

1. *Inelastic supply*: The value of PES is less than one and greater than zero. If a product has inelastic supply, then a change in the price of the product leads to a less than proportionate change in the quantity supplied of it, and so the value of PES is greater than zero and less than one.
2. *Elastic supply*: The value of PES is greater than one and less than infinity. If a product has elastic supply, then a change in the price of the product leads to a greater than proportionate change in the quantity supplied of it, and so the value of PES is greater than one and less than infinity.
3. *Unit elastic supply*: The value of PES is equal to one. If a product has unit elastic supply, then a change in the price of the product leads to a proportionate change in the quantity supplied of it and so the value of PES is equal to one.

Examples of supply curves with different values of PES are shown in Figure 6.3.



▲ **Figure 6.3** Supply curves with different values of PES

In Figure 6.3, curves  $S_1$  and  $S_2$  have a PES value equal to one along their entire length. This is because the percentage change in price is always equal to the percentage change in quantity supplied. For mathematical reasons, it is correct to say that any straight-line supply curve, passing through the origin, has an elasticity of supply of one.

Curve  $S_3$  has a PES value of less than one along its entire length. This is because the percentage change in price is always greater than the percentage change in quantity supplied. For mathematical reasons, it is correct to say that any straight-line supply curve starting from the  $x$ -axis has a PES value less than one.

Curve  $S_4$  has a PES value of greater than one along its entire length. This is because the percentage change in quantity supplied is always greater



than the percentage change in price. For mathematical reasons, it is correct to say that any straight-line supply curve starting from the  $y$ -axis has a PES value greater than one.

### What are the determinants of price elasticity of supply?

Different products will have different values for PES. For example, the supply of cans of a soft drink may have a PES value of 2, ie the supply is elastic, whereas the supply of electricity may have a PES value of 0.5, which is inelastic. What actually determines the value of PES for a product? There are a number of determinants:

1. *How much costs rise as output is increased:* If total costs rise significantly as a producer attempts to increase supply, then it is likely that the producer will not raise the supply and so the elasticity of supply for the product will be relatively inelastic. It would take large price rises to make increasing the supply worthwhile.

If, however, total costs do not rise significantly, then the producer will raise the quantity supplied and take advantage of the low increase in costs to benefit from the higher prices, thus making more profits. Total costs will not rise significantly if the costs of factor inputs do not increase quickly as the firm uses more of them.

There are a number of factors that assist in preventing a significant rise in costs, such as:

**a. The existence of unused capacity**

If a firm has a lot of unused capacity, ie if it has significant productive resources that are not being fully used, then it will be able to increase output easily and without great cost increases. In this case the elasticity of supply for the product will be relatively high.

If a firm is producing at capacity, then it is difficult to increase supply without a significant increase in productive resources, which will be expensive. It is therefore unlikely that the firm will increase supply. PES will be relatively inelastic.

**b. The mobility of factors of production**

If factors of production are easily moved from one productive use to another then PES will be relatively elastic. For example, assume that it is easy to shift production from manufacturing one-litre plastic bottles to manufacturing two-litre plastic bottles. If the price of two-litre bottles goes up, then the extra cost of switching to the larger bottles will not be great and it will be easy for the producer to increase the quantity of two-litre bottles.

2. *The time period considered:* The amount of time over which PES is measured will affect its value. In general terms, the longer the time period considered the more elastic the supply will be.

In the immediate time period, firms are not really able to increase their supply very much, if at all, if price increases, since they cannot

### Exercise 6.1

ATL Thinking and Communication

A firm producing stuffed toys experiences an increase in the demand for its main product, a cuddly dog, because of an increase in its popularity. The price of the toy rises from \$15 to \$18. In response, the firm increases its output of the toy from 5,000 per week to 5,500 per week.

1. Calculate the price elasticity of supply for the toy dog.

Key concept



EFFICIENCY

## EXAMINATION QUESTIONS

**Paper 1, part (a) questions**

1. Explain the determinants of price elasticity of supply. [10 marks]
2. Explain the likely value of price elasticity of supply for primary commodities. [10 marks]

**Paper 1, part (b) question – HL**

Contrast the price elasticities of demand and supply for primary commodities with those of manufactured goods.

**Key concept****SUSTAINABILITY**

immediately increase the number of factors of production that they employ. The value of PES will be very inelastic.

In the short run, firms may be able to increase the quantity of some of the factors that they employ, such as raw materials and labour, but they may not be able to increase all of their factors, such as the number of machines that they use or the size of their factory. The value of PES will be more elastic than the immediate time period.

In the long run, firms may be able to increase the quantity of all of the factors that they employ and so the value of PES will be much more elastic. We will look at time periods and production in much more detail in Chapter 8.

3. *The ability to store stock:* If a firm is able to store high levels of stock (inventories) of their product, then they will be able to react to price increases with swift supply increases and so the PES for the product will be relatively elastic.

### Is there a difference in the price elasticity of supply for primary commodities and manufactured products?

We have already discovered in Chapter 4 that primary commodities is another word for raw materials, and that they tend to have inelastic demand as they are necessities to the consumers who buy them and they have few or no substitutes. But what about the price elasticity of supply of primary commodities?

Commodities tend to have inelastic supply as a change in price cannot lead to a proportionately large increase in quantity supplied. For example, if there were to be an increase in the demand for cocoa, and therefore an increase in the price of cocoa, producers would be unable to respond with a proportionate increase in the quantity as it takes time to grow the cocoa. It would take time to re-allocate resources to the production of cocoa or it might not be possible or desirable to re-allocate resources to the production of more cocoa. Similarly, if there were to be a fall in the price of cocoa then the quantity supplied would not adjust accordingly as the cocoa crop might already have been harvested.

On the other hand, the supply of manufactured goods tends to be more elastic as it is easier to increase or decrease quantity supplied in response to a change in price. This relates to the earlier determinants of PES. With manufactured goods, it is likely that there may be unused capacity in the industry, factors of production are more mobile, and it is relatively easy to store high levels of stock. If any, or all, of these determinants is fulfilled, then supply will tend to be relatively elastic.