

Chapter 3

The nature of supply

The previous chapter introduced you to the demand curve. The other key component of the demand and supply model is, of course, supply. For any market transaction, there are two parties, buyers and sellers. The question this chapter considers is what determines the quantity that sellers wish to supply to the market.

Learning outcomes

After studying this chapter, you should:

- ▶ be familiar with the notion of the supply of a good or service
- ▶ be aware of the relationship between the supply of a good and its price in a competitive market
- ▶ understand what is meant by the supply curve and the factors that influence its shape and position
- ▶ be able to distinguish between shifts of the supply curve and movements along it
- ▶ be aware of the effect of taxes and subsidies on the supply curve
- ▶ understand what is meant by the price elasticity of supply

Supply

In discussing demand, the focus of attention was on consumers, and on their willingness to pay for goods and services. In thinking about supply, attention switches to firms, as it is firms that take decisions about how much output to supply to the market. It is important at the outset to be clear about what is meant by a 'firm'. A **firm** exists to organise production: it brings together various factors of production, and organises the production process in order to produce output.

Key term

firm: an organisation that brings together factors of production in order to produce output

There are various forms that the organisation of a firm can take. A firm could be a *sole proprietor*: probably a small business, such as a newsagent, where the owner of the firm also runs the firm. A firm could be in the form of a *partnership* – for

example, a dental practice in which profits (and debts) are shared between the partners in the business. Larger firms may be organised as private or public *joint stock companies*, owned by shareholders. The difference between private and public joint stock companies is that the shares of a public joint stock company are traded on the stock exchange, whereas this is not the case with a private company.

In order to analyse how firms decide how much of a product to supply, it is necessary to make an assumption about what it is that firms are trying to achieve. Assume that they aim to maximise their profits, where 'profits' are defined as the difference between a firm's total revenue and its total costs.

As discussed in Chapter 2, the demand curve shows a relationship between quantity demanded and the price of a good or service. A similar relationship between the quantity supplied by firms and the price of a good can be identified in relation to the behaviour of firms in a **competitive market** – that is, a market in which individual firms cannot influence the price of the good or service that they are selling, because of competition from other firms.

In such a market it may well be supposed that firms will be prepared to supply more goods at a high price than at a lower one (*ceteris paribus*), as this will increase their profits. The **supply curve** illustrates how much the firms in a market will supply at any given price, as shown in Figure 3.1. As firms are expected to supply more goods at a high price than at a lower price, the supply curve will be upward sloping, reflecting this positive relationship between quantity and price.

A movement along the supply curve

A change in the price of a good will induce firms to change their supply decision. For example, consider Figure 3.2. Suppose that initially the price of the good is at P_0 . Firms will choose to supply the quantity Q_0 of the good. If the price then falls to P_1 , firms will find it less profitable to supply the good, and will reduce their supply, causing a movement along the supply curve to a new quantity at Q_1 .

Key terms

competitive market: a market in which individual firms cannot influence the price of the good or service they are selling, because of competition from other firms

supply curve: a graph showing the quantity supplied at any given price

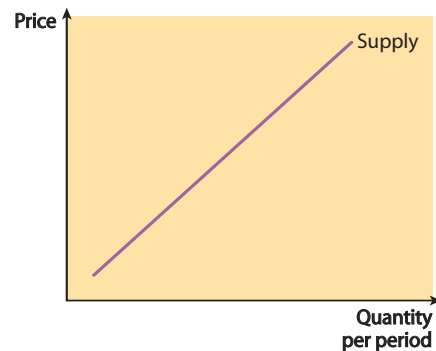


Figure 3.1 A supply curve

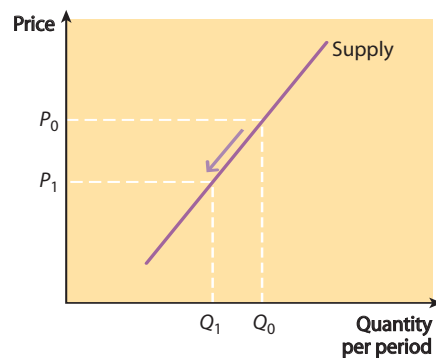


Figure 3.2 A movement along the supply curve

Exercise 3.1

The following table shows how the supply of oojits varies with their price. Draw the supply curve.

Price	Quantity
100	98
90	95
80	91
70	86
60	80
50	70
40	60
30	50
20	35
10	18

Table 3.1 The supply of oojits

Notice that the focus of the supply curve is on the relationship between quantity supplied and the price of a good in a given period, *ceteris paribus* – that is, holding other things constant. As with the demand curve, there are other factors affecting the quantity supplied. These other influences on supply will determine the position of the supply curve: if any of them changes, the supply curve can be expected to shift.

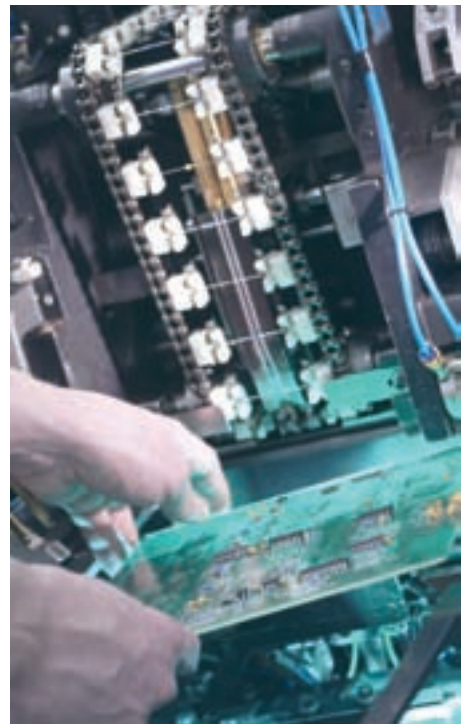
What influences supply?

We can identify five important influences on the quantity that firms will be prepared to supply to the market at any given price:

- production costs
- the technology of production
- taxes and subsidies
- the price of related goods
- firms' expectations about future prices

Costs and technology

If firms are aiming to maximise profits, an important influence on their supply decision will be the costs of production that they face. Chapter 1 explained that in order to produce output, firms need to use inputs of the factors of production – labour, capital, land etc. If the cost of those inputs increases, firms will in general be expected to supply less output at any given price. The effect of this is shown in Figure 3.3, where an increase in production costs induces firms to supply less output at each price. The curve shifts from its initial position at S_0



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Improved technology means firms can produce more cost-effectively

to a new position at S_1 . For example, suppose the original price was £10 per unit; before the increase in costs, firms would have been prepared to supply 100 units of the product to the market. An increase in costs of £6 per unit that shifted the supply curve from S_0 to S_1 would mean that, at the same price, firms would now supply only 50 units of the good. Notice that the vertical distance between S_0 and S_1 is the amount of the change in cost per unit.

In contrast, if a new technology of production is introduced, which means that firms can produce more cost-effectively, this could have the opposite effect, shifting the supply curve to the right. This is shown in Figure 3.4, where improved technology induces firms to supply more output at any given price, and the supply curve shifts from its initial position at S_0 to a new position at S_1 . Thus, if firms in the initial situation were supplying 50 units with the price at £10 per unit, then a fall in costs of £6 per unit would induce firms to increase supply to 100 units (if the price remained at £10).

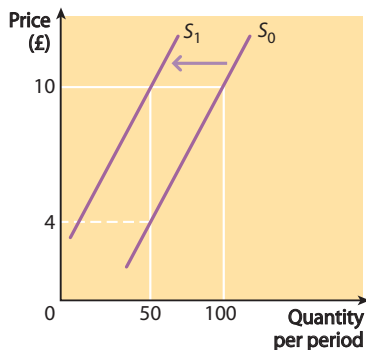


Figure 3.3 The supply curve shifts to the left if production costs increase

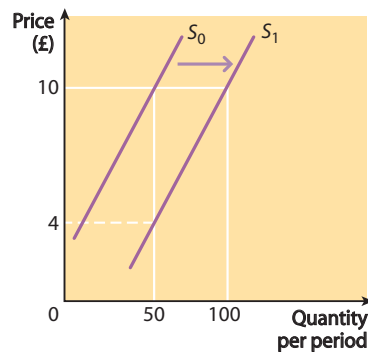


Figure 3.4 The supply curve shifts to the right if production costs fall

Taxes and subsidies

Suppose the government imposes a sales tax such as VAT on a good or service. The price paid by consumers will be higher than the revenue received by firms, as the tax has to be paid to the government. This means that firms will (*ceteris paribus*) be prepared to supply less output at any given market price. Again, the supply curve shifts to the left. This is shown in panel (a) of Figure 3.5, which assumes a fixed per unit tax. Such a tax is known as a specific tax, and will be discussed in more detail in Chapter 5. The supply curve shifts, as firms supply less at any given market price. On the other hand, if the government pays firms a subsidy to produce a particular good, this will reduce their costs, and induce them to supply more output at any given price. The supply curve will then shift to the right, as shown in panel (b).

Prices of other goods

It was shown earlier that from the consumers' perspective, two goods may be substitutes for each other, such that if the price of one good increases, consumers may be induced to switch their consumption to substitute goods. Similarly, there may be substitution on the supply side. A firm may face a situation in which there

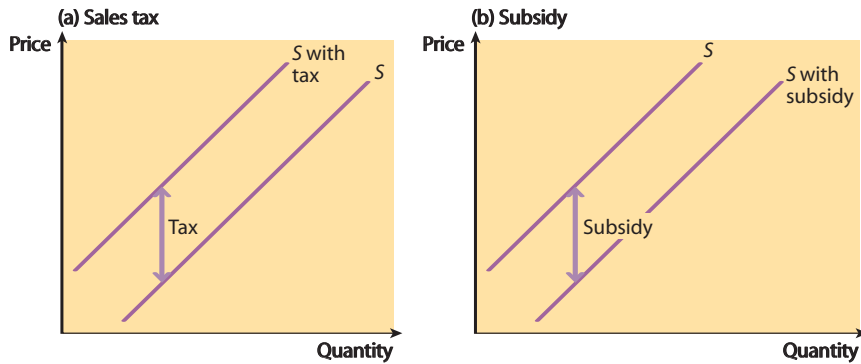


Figure 3.5 The effects of taxes and subsidies on supply

are alternative uses to which its factors of production may be put: in other words, it may be able to choose between producing a range of different products. A rise in the price of a good raises its profitability, and therefore may encourage a firm to switch production from other goods. This may happen even if there are high switching costs, provided the increase in price is sufficiently large. For example, a change in relative prices of potatoes and organic swedes might encourage a farmer to stop planting potatoes and grow organic swedes instead.

In other circumstances, a firm may produce a range of goods jointly. Perhaps one good is a by-product of the production process of another. An increase in the price of one of the goods may mean that the firm will produce more of both goods. This notion of joint supply is similar to the situation on the demand side where consumers regard two goods as complements.

Expected prices

Because production takes time, firms often take decisions about how much to supply on the basis of expected future prices. Indeed, if their product is one that can be stored, there may be times when a firm will decide to allow stocks of a product to build up in anticipation of a higher price in the future, perhaps by holding back some of its production from current sales. In some economic activities, expectations about future prices are crucial in taking supply decisions because of the length of time needed in order to increase output. For



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Wine producers have to take supply decisions based on expected future prices

example, a firm producing palm oil, rubber or wine needs to be aware that newly planted trees or vines need several years to mature before they are able to yield their product.

In some markets, firms may be able to use market power in order to influence the supply of a commodity. For example, think about the oil industry. Here, the oil-exporting nations work together as a **cartel** to influence the quantity supplied. One motivation for this is to influence price and hence the profits of the members of the cartel.

Key term

cartel: an agreement between firms in a market on price and output with the intention of maximising their joint profits

Movements along and shifts of the supply curve: a reminder

As with the demand curve, it is important to remember that there is a distinction between movements *along* the supply curve, and *shifts of* the supply curve. If there is a change in the market price, this induces a movement along the supply curve. After all, the supply curve is designed to reveal how firms will react to a change in the price of the good. For example, in Figure 3.6, if the price is initially at P_0 firms will be prepared to supply the quantity Q_0 , but if the price then increases to P_1 this will induce a movement along the supply curve as firms increase supply to Q_1 .

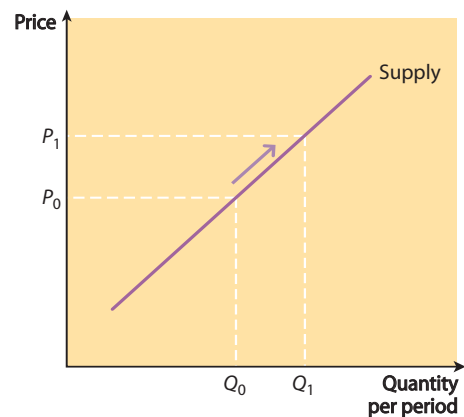


Figure 3.6 A movement along a supply curve in response to a price change

In contrast, as seen in the previous section, a change in any of the other influences on supply will induce a shift of the whole supply curve, as this affects the firms' willingness to supply at any given price.

Exercise 3.2

For each of the following, decide whether the demand curve or the supply curve will move, and in which direction:

- Consumers are convinced by arguments about the benefits of organic vegetables.
- A new process is developed that reduces the amount of inputs that firms need in order to produce bicycles.
- There is a severe frost in Brazil that affects the coffee crop.
- The government increases the rate of value added tax.
- Real incomes rise.
- The price of tea falls: what happens in the market for coffee?
- The price of sugar falls: what happens in the market for coffee?

Summary

- Other things being equal, firms in a competitive market can be expected to supply more output at a higher price.
- The supply curve traces out this positive relationship between price and quantity supplied.
- Changes in the costs of production, technology, taxes and subsidies or the prices of related goods may induce shifts of the supply curve, with firms being prepared to sell more (or less) output at any given price.
- Expectations about future prices may affect current supply decisions.

Price elasticity of supply

In the previous chapter, the concept of elasticity was introduced as a way of measuring the sensitivity of quantity demanded to any of the components that affect demand. As elasticity is a measure of sensitivity, its use need not be confined to influences on demand, but can also be turned to evaluating the sensitivity of quantity *supplied* to a change in its determinants – price in particular.

It has been argued 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:

$$PES = \frac{\% \text{ change in the quantity supplied}}{\% \text{ change in price}}$$

Key term

price elasticity of supply (PES): a measure of the sensitivity of quantity supplied of a good or service to a change in the price of that good or service

An example

Suppose that the price of a good increases from £10 to £12, and that in response, firms increase the quantity supplied from 2,000 units to 2,200 units. What is the price elasticity of supply? First, calculate the percentage changes in price and quantity. Price has changed by $100 \times 2/10 = 20\%$; the quantity supplied has changed by $100 \times 200/2,000 = 10\%$. The price elasticity of supply is therefore $10/20 = 0.5$.

The interpretation of the elasticity is straightforward. If the *PES* is 0.8, an increase in price of 10% will encourage firms to supply 8% more. As with the *PED*, 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 *PES* 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. This may depend partly on the technology of the industry, and whether firms have spare capacity that allows them to increase production readily. It may also depend on whether the firm expects the change in price to be permanent or temporary.

The short run and the long run

It is important to realise that it may be more feasible for firms to change their supply decision in the long run than in the short run. 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 3.7 illustrates this. In the short run, firms may be able to respond to an increase in price only in a limited way, and 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 . When analysing the theory of the firm, economists define the short run and the long run in this way, seeing the short run as a period in which the firm is not able to vary its inputs of all factors of production, and the long run as the period in which this becomes possible. In particular, it is often supposed that capital inputs are relatively difficult to vary in the short run, whereas firms may be more able to vary the amount of labour input.

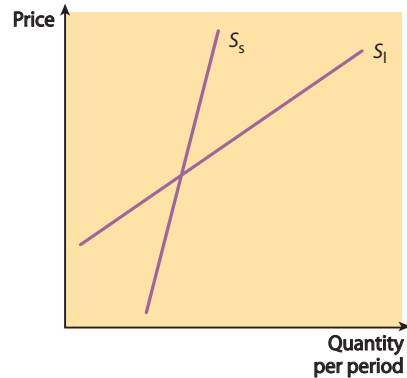


Figure 3.7 Short- and long-run supply

Two special cases

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, supply is perfectly inelastic. At the other extreme is perfectly elastic supply, where firms would be prepared to supply any amount of the good at the going price.

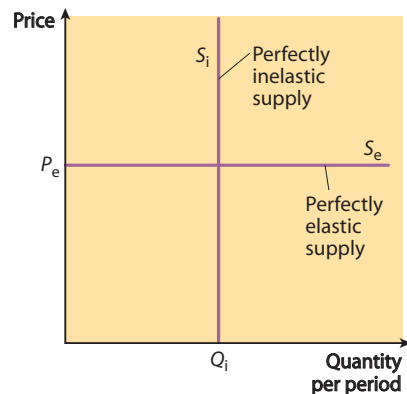


Figure 3.8 Perfectly elastic and inelastic supply

These two possibilities are shown in Figure 3.8. Here S_i represents a perfectly inelastic supply curve: firms will supply Q_i whatever the price, 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 3.3

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? Do 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 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.