2 COMPETITIVE MARKETS: DEMAND AND SUPPLY

2.1 The nature of markets

Learning outcomes
- Outline the meaning of the term 'market'.

Direct exchange of cash for goods in a meat market.

In most languages, the term 'market' has connotations of a direct and tangible experience. One imagines buying fruit from a local grocery, or meat from a nearby butcher. These are markets in the traditional sense, but in the modern world a market can be defined more broadly as any instance where buyers and sellers come together for the exchange of goods and services.

A market is any place, physical or virtual, where the buyers and sellers of goods and services meet.

These interactions can happen at any time or place. Direct buying and selling usually happens in a specific place, such as when trading your cash for a farmer's fresh eggs. But markets can also operate indirectly, when buyers and sellers communicate remotely. In commodity markets, buyers can purchase massive amounts of basic goods like coffee or wheat at international meetings with representatives of the coffee farmers, but never meeting the actual producers. This indirect buying and selling may also happen online – for example, when a share trader buys a stock that you have offered up for sale; in this case, the buyer and seller have no contact at all.

Markets can be local, where buyers and sellers come from the surrounding area. They can be national, where the participants are from within the market country. And they can be international, where the market participants come from any country in the world. While the distinction between these can be blurred at times, some obvious examples of each can be noted. A corner shop like a bakery or dairy, selling locally produced goods, would qualify as

a local market. National markets tend to be those limited by the laws and customs policies of national governments. Labour markets, as governed by labour laws, make a reasonable example. Healthcare in the US is largely overseen by national regulation and would also fit the national market profile. The markets for commodities such as steel, oil, gas, corn, wheat or cotton may have local producers with international buyers. Likewise, the corner shop in New York city may well be selling imported English biscuits, while the vast national market for healthcare devices may see the production of goods from China, India or Europe.

EXERCISES

The great virtue of a free market system is that it does not care what colour people are; it does not care what their religion is; it only cares whether they can produce something you want to buy. It is the most effective system we have discovered to enable people who hate one another to deal with one another and help one another.

Milton Friedman

1 Assess the validity of Friedman's statement.

2 Cite examples where Friedman's assertion could be true, and others where it is not.

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Another way to think of markets is to distinguish between product markets and resource markets. Economists view product markets as the purchase of consumer goods and services directly from producers (Figure 1.1, page 8). In the resource market, businesses make payments to the owners of resources such as land, labour, capital and entrepreneurship. In a market economy, the recipients of these payments are private individuals or households.

Competitive markets

Markets are considered free or competitive to the extent that private individuals and firms can openly attempt to win business away from each other in the hopes of earning greater profits. Free markets have a long history. Ever since labour has been divided within groups, there has been an incentive to trade the products of specialization. While early forms of exchange were done by bartering goods, eventually societies found that exchanging money was often more convenient. All the while, the jobs performed by the individual have grown more specific.

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Improvements in agriculture, the growth of colonialism, and eventually the development of industrialization further expanded the depth and breadth of economic activity. A move away from government intervention in the economy occurred in the 18th century, as enlightenment ideas of reason and liberalism were applied to economics by philosophers such as Adam Smith (Chapter 1). With greater rewards at stake, this move provided greater incentives for private business to compete on the basis of innovation and productivity, as well as market dominance. Today's sophisticated global markets rest on this foundation, and on the general principle that competitive markets bring diversity of goods, efficiencies, and generally greater wealth for all.

The competitive market is the market for a good with large numbers of buyers and sellers, where the single seller has very little or no market power.

Market structures

When examining the nature of competitive markets, it is helpful to keep in mind the categories of actors who interact in the market. A *firm* is an individual or organization that combines the factors of production to create and sell goods and services on the market.

An *industry* is made up of all the firms engaged in the same market activity. For example, a number of firms such as Toshiba, Hewlett-Packard, Dell and Lenovo sell their products in the personal-and-business-computing industry.

Industries have identifiable and distinct characteristics that have allowed economists to categorize them into four general market structure groups:

- perfect competition
- monopolistic competition
- oligopoly
- monopoly.

There are four criteria by which an industry is categorized as a particular market structure.

- **The number of firms in the industry**. This tells us how many competitors are fighting for the same customers. It is logical to assume that more firms mean more competition, more consumer sovereignty and less market power exerted by the firm.
- **A firm's level of market power**. This is the ability of the firm to control the price of its product. In other words, to what degree can the firm set ever-increasing prices for its goods? When there are few competitors and few substitutes, a firm will have quite a lot of market power. Consumers may well have less power or sovereignty as a result.
- **The degree of product differentiation between goods offered by different firms**. This can tell us something about the nature of the competition in the industry. Where the items offered are identical (homogeneous) and completely substitutable, firms often have little choice but to sell at the market price and therefore seek profit by lowering costs. When firms can convince consumers that their product is actually better in important ways, it successfully differentiates itself from competitors.
- **The ease of exit and entry**. This can tell us important things about the nature of competition. When an industry grows profitable and can prevent other firms from joining in, it is enjoying the benefits of some kind of barriers to entry. Barriers to entry such as high entry costs or major technological impediments will reduce competition entering the market and stop the erosion of profits.

Perfect competition

Perfectly (or purely) competitive markets have the following traits.

- There are very many firms in the industry; no individual firm's decisions can influence the market to any significant degree.
- An individual firm's decisions about output reflect only a tiny portion of the overall market. Therefore, firms in the perfectly competitive market do not influence overall supply. This reduces their power to influence the market price.
- Firms in the industry produce completely identical products. These goods act as perfect substitutes for each other. So, from the consumers' perspective, the seller is unimportant, and adds no value to the good itself. As a result, as well as being responsible for only a tiny portion of the overall market, the individual firm has no real market power, and exerts no influence on the price set by the market.
- Firms can enter or exit the market very easily, with effectively no barriers to entry or exit.

A market is perfectly competitive if there are a large number of firms producing identical products facing identical production costs and in which there are no barriers to entry or exit.

Perfect competition has always been considered highly theoretical, although some markets approach perfect competition and have many of these qualities. Such markets include international markets for commodities: rice, coffee, corn, and wheat; metals like gold and iron; financial instruments such as bonds, stocks, and currencies. In most of these cases, the standards of perfect competition apply: there are many small firms, selling homogeneous products with almost no power to set the price in the market.

Coffee, for example, is the single most valuable traded commodity in the world. However, a single coffee grower in Brazil is one among tens or even hundreds of thousands of other producers. As a commodity, coffee is assumed to be basically the same product wherever it is produced. The market price is determined by the interaction of buyers and sellers at commodity exchanges in New York. This means that individual growers in, say, Brazil are producing coffee beans whose price they cannot control, and which are considered perfectly substitutable for someone else's coffee beans. They have no impact on the supply or price of coffee. In these respects, a coffee grower has many of the attributes of a perfect competitor.

Monopolistic competition

Monopolistic competition fits the criteria in the following ways.

- There are many firms in the industry, though not as many as in perfect competition.
- Any firm's decisions about output will have little influence on the overall market. Changes in output will not influence the market price.
- Firms produce relatively differentiated products. While the goods are fundamentally similar, producers can alter aspects of service, quality, and packaging. These differences can be accentuated by advertising.
- There are relatively low barriers to entry, so firms can enter or exit the industry without incurring major costs.

Examples of monopolistic competition seem to be everywhere: restaurants, jewellers, furniture stores, clothing stores, bakeries, and nail salons. Perceptions of product differentiation give firms the power to charge higher than the usual price for better-than-standard versions of the same good. For monopolistic competitors, the power of the company's brand reflects the market power they hold in the market.

A market is monopolistically competitive if there are many firms producing differentiated products and in which there are no barriers to entry or exit.

A trip down Madison Avenue in New York or Oxford Street in London would showcase the power of branding to differentiate one seller's good from another in the fashion industry. Essentially similar goods like T-shirts can command wildly different prices depending on whether the seller is Sweden's H&M ($18), America's Brooks Brothers ($40), or Italy's Gucci ($215). To different degrees, all of these firms have been able to increase their market power, increasing the price they are able to charge for their goods. At the same time, their power is not limitless. They still face competition from an abundance of significantly less expensive substitutes.

Oligopoly

Again using the criteria for market structures, oligopolies can be identified by the following traits.

- There are only a few firms in the industry, and these firms tend to dominate the market.
- Because only a few firms are selling to most of the market, these firms have significant control over price, especially if they cooperate in pricing and output decisions.
- Products are can be homogeneous or heterogeneous, depending on the industry.
- Barriers to entry are high. High industry profits can be protected and maintained through these barriers to competition.

The fewer the competitors, the more likely they are to command significant market power in their industry. Economists have established standards for determining the degree of market power for oligopolistic industries. These are called concentration ratios, which measure the market share of the top few firms. A CR4, for example, would measure how much of the market was controlled by the top four firms. The higher the percentage,

the greater the concentration of market power between those four firms. The higher the concentration of market power, the greater is the temptation to work together on price and output decisions.

With even a small number of firms, nearly all oligopolies tend towards this kind of interdependence in their pricing and output decisions. The industry will often earn significantly higher profits if acting together and limiting supply, rather than competing on price and producing more. This interdependence can lead to blatant collusion, an anti-competitive activity that is often considered illegal. Furthermore, oligopolies differ from the other forms of competition in that firms will act strategically, weighing the actions and reactions of the other firms.

In the case of differentiated goods, oligopolies exist in industries such as breakfast cereal, car rental, airline, and pharmaceutical companies. For relatively undifferentiated goods, oligopolies exist in some metal industries like copper and aluminium, or cement production. These oligopolies can be local (e.g. cement production). They can be national (e.g. breakfast cereal and car rental). And they can be international (e.g. copper and aluminium).

An oligopoly is a market where a few sellers dominate the market for an identical or differentiated good, and where there are significant barriers to entry.

People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices.

Adam Smith, *The Wealth of Nations*, 1776

Monopoly

Monopolies fit the criteria as follows.

- There is only one firm in the industry, so that firm dominates the market.
- The firm sells to the entire market. It has exceptional power to control output and price, although this power is constrained by the limits of consumer demand.
- The goods produced by the monopolist have no substitutes. It is not possible to buy them from anyone else.
- High barriers to entry exist, protecting the monopolist from competition and ensuring long-term profits.

Monopolies appear in a variety of forms. Sometimes the barriers to entry are legal barriers that recognize the need for monopolies to exist as a means of lowering costs. For example, local monopolies on water and power might exist because giving each residence the choice of different providers could be dramatically more expensive. (Imagine that a city's water system offered several providers for each home. In theory, each company would require separate pumping facilities and its own distinct distribution system of pipes throughout the city.)

A major national industry can be a monopoly. The sugar, steel, and oil monopolies of the late 19th century in the US are famous examples. More recently, in the 1990s Microsoft was found guilty of monopolizing the market for operating systems by the US and European Union (EU) courts. More recently still, the predominance of Google in the market for internet searching has led to concerns among EU investigators. Table 2.1 summarizes the criteria used to determine market structures.

A monopoly is a market where one firm dominates the market for a good that has no substitutes and where significant barriers to entry exist.

TABLE 2.1 CRITERIA AND MARKET STRUCTURES

	Number of firms	Market power	Level of differentiation	Barriers to entry	Examples
Perfect competition	very many	none	homogeneous; no substitutes	none	agricultural commodities (e.g. wheat, coffee)
Monopolistic competition	many	varies, generally little	differentiated or heterogeneous	relatively insignificant	mechanics, restaurants, books
Oligopoly	few, interdependent	significant	heterogeneous or homogeneous, depending on industry	significant	airlines, breakfast cereal, cell phone networks
Monopoly	one	exceptional	none, no close substitutes	major	local utilities

Market structure and market power

We can attempt to summarize some of the characteristics of market structure types with regard to the power each individual firm can wield on the market. This concept is illustrated in Figure 2.1, where the industries are ranked on the amount of power an individual firm has in relation to the industry. On the bottom are the most competitive industries, perfect competition, where there's theoretically no market power over price. At the top, with the most market power, is monopoly, where the firm constitutes the entire industry, and where firms have extraordinary power over the price of their product.

It is no coincidence that competition is inversely related to market power. Where firms have to fight each other for business, profits are likely to be driven down. Where firms stand alone, or together against the consumer, the desire to maximize profits compels firms to exert their market power.

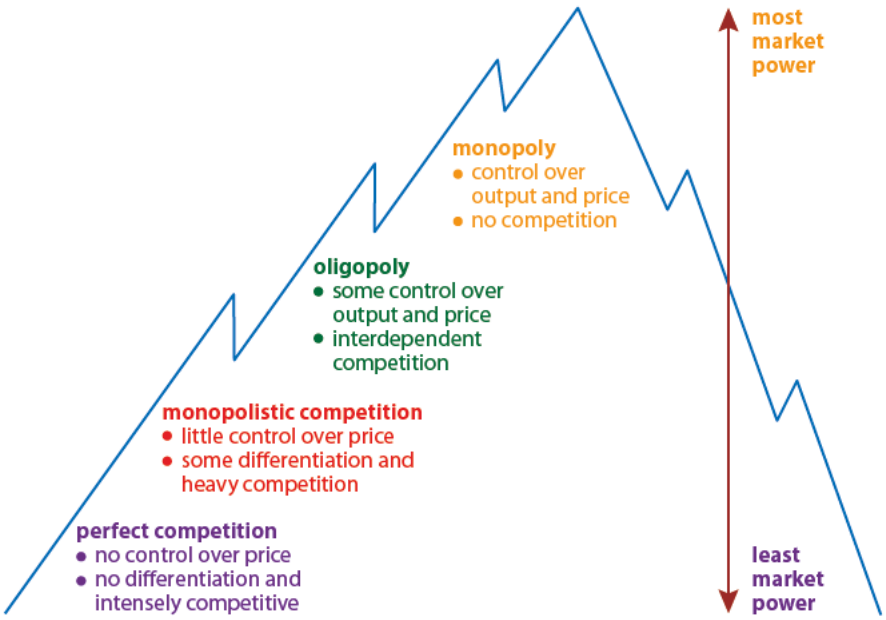

Figure 2.1
Degrees of market power of firms in different market structures.

EXERCISES

You can always get sympathy by using the word 'small'. With little industries, you feel as you do about a little puppy.

Frances Perkins, US Secretary of Labor 1933–45

Consider the quote above. Using the terms and concepts you have just read about and your own ideas, answer the following questions.

3 Do you believe that, in business, bigger is always better?

4 Based on what you've learned so far, do you think smaller businesses provide better products and services to consumers?

5 To what extent do you agree with Perkins, that the public has too much sympathy for small business?

2.2 Demand

Learning outcomes

- Explain the negative causal relationship between price and quantity demanded.
- Describe the relationship between an individual consumer's demand and market demand.
- Explain that a demand curve represents the relationship between the price and the quantity demanded of a product, *ceteris paribus*.
- Draw a demand curve.

Every market transaction involves a buyer and a seller. The economic concept of demand takes the consumer perspective, examining what motivates and limits buyers in any given market. More specifically, consumers can be private households in the market for end-user consumer goods and services in the product market. Businesses also act as consumers in the product and resource market. Demand is defined as the quantity of a good or service that a consumer or group of consumers are willing and able to purchase at a given price, during a particular time period. Note that the quantity of demand is limited to those who are both willing and able to buy the good.

Demand is the quantity of a good or service that consumers are willing and able to buy at a given price during a specific time period.

Individual demand

Let's start with the individual consumer. We can determine one person's demand for potato chips in a given year. A *demand schedule* is a list of prices and quantities that show the amount demanded at each price for a given time period. Table 2.2 shows the individual potato chip demand schedule for one week. For example, at a price of $2.50, five bags would be purchased.

These can be plotted as a graph to give us an individual *demand curve* (Figure 2.2).

TABLE 2.2 DEMAND SCHEDULE: POTATO CHIPS

Price of potato chips (*P*) / $	Quantity of potato chips demanded per week (*Q*)
2.50	5
2.00	10
1.50	15
1.00	20
0.50	25

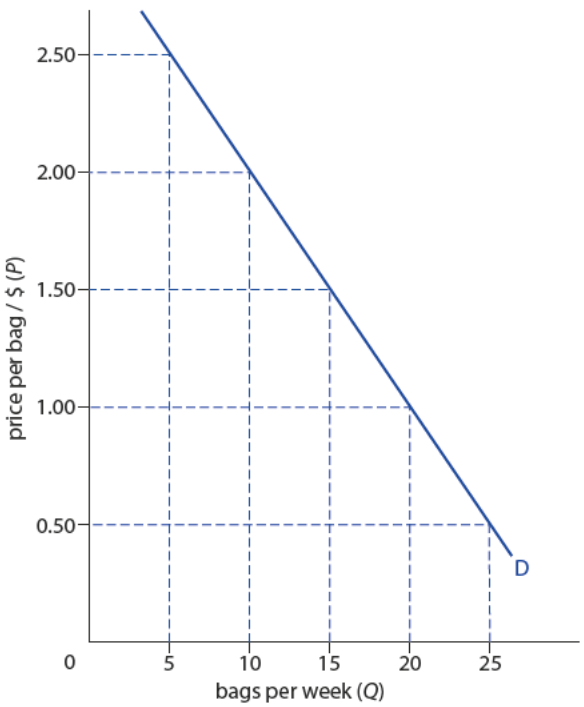

Figure 2.2
Demand curve: potato chips.

The law of demand

There appears to be a distinct pattern between the changes in price and the changes in quantity. As price declines, the quantity demanded for chips increases. This demonstrates one of the most important concepts of economics, the *law of demand*. The law of demand states that as price increases, less of a good is demanded. At the same time, as price decreases, more of a good is demanded.

The law of demand states that as the price of a good increases, the quantity demanded of the good decreases. The converse is also true: as the price of a good decreases, the quantity demanded of that good increases.

The term *ceteris paribus* is a Latin term meaning that we are holding all other variables constant or frozen, while we examine how different prices change the amount demanded (Chapter 1, page 11). Many other things can influence any decision to buy goods. Holding those factors constant permits us to isolate one variable (price) and quantify the effect a change in price has on another variable (the quantity demanded).

For example, consider a school selling potato chips at a weekend sports championship tournament, priced at $1 per bag. When the tournament is over, 300 bags have been sold. So, we can say the demand for potato chips for this period was a quantity of 300 at $1 per bag, *ceteris paribus*. If we were graphing the overall demand for potato chips, this price and quantity would mark one of the points of the demand curve.

The law of demand implies a negative or indirect relationship between the two variables of price and quantity demanded. As a result, most demand curves have a downward sloping shape. This concept rises to the level of a 'law' in economics because it conforms closely to everyday reality. As individuals, we are less likely to buy any good as the price rises (exempting, for the moment, speculative goods like gold or company stocks, which may be bought with the expectation that they could be re-sold at a higher price). As the price goes up, our common sense (and budgets) generally tell us to economize and buy less. And the reverse tends to be true as well. When the price of something declines, we grow less concerned about the price and may buy a little more of it as a result, and perhaps others will start to switch to it also, increasing the amount demanded.

The following are some of the factors that underlie the law of demand.

- **The income effect**. Real income refers to income that is adjusted for price changes, and implies the actual buying power of a consumer. As the price of a good decreases, the quantity demanded increases because consumers now have more real income to spend. With more buying power, they sometimes choose to buy more of the same product.
- **The substitution effect**. As the price of a good decreases, consumers switch from other substitute goods to this good because its price is comparatively lower.
- **The law of diminishing marginal utility**. This law states that as we consume additional units of something, the satisfaction (utility) we derive for each additional unit (marginal unit) grows smaller (diminishes).

The law of diminishing marginal utility does *not* state that extra consumption causes a decline in total satisfaction. It merely states that, in this instance, a second or third bag of potato chips will be less satisfying than the first bag. It may still be delicious and add to one's total level of benefit, but the *rate* at which it satisfies has dropped from the first to the second and third bags.

For example, if satisfaction were measured in units of utility, one might say that the first bag was 10 utils, but the second bag only 8 utils. Still satisfying, but not as much as the first bag. The third consumed would provide the consumer with a smaller number of utils, and so on. In an extreme case, it is possible that a consumer eating repeated bags would find that some future bag would produce negative satisfaction, making them ill.

Why, then, would consumers buy extra bags? It is logical that a consumer would only buy a second or third unit of a good when the price was lower, reflecting their lower utility for extra units of the good. So at lower prices, more are demanded.

Figure 2.3 shows how a graph can reflect the law of diminishing marginal utility, and how the relationship mirrors that shown in the demand curve in Figure 2.2. The theory of marginal benefit says that the price we are willing to pay for a good is a reasonable approximate measure of our satisfaction of the good – that is, our benefit. If we are willing to buy 10 bags of chips at a price of $2, then we are signalling to the world that our benefit is at least $2 from the 10th bag.

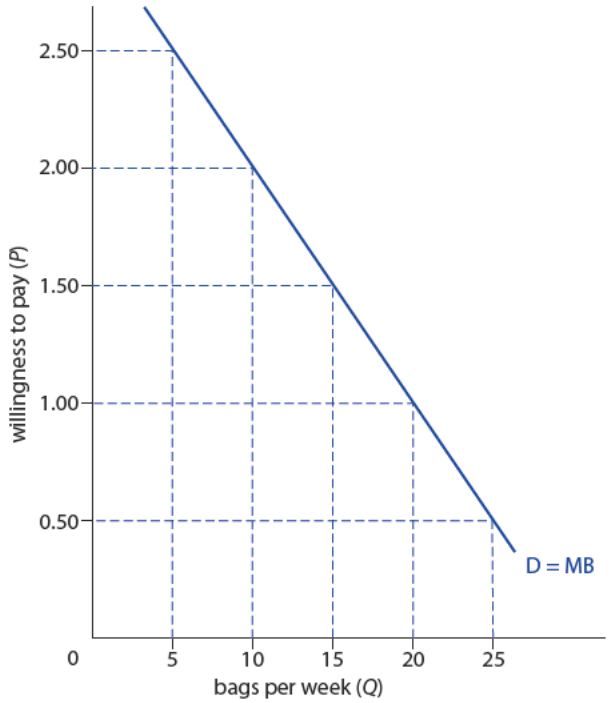

Figure 2.3
Willingness to pay, marginal benefit.

The marginal benefit is the additional utility or satisfaction derived by an increase or a decrease in the amount of an item consumed or an activity enjoyed.

Because a demand curve reflects what we are willing to pay for a good, it is an approximate reflection of the marginal benefit (MB) we receive from consuming additional units of a good. If our consumer were to consume an 11th bag of chips, we would have to assume that his or her satisfaction from it would be less than $2-worth, and that the only way he or she would buy more than 10 bags is if the price were lowered to something below $2. Thus we see the concept of diminishing marginal utility at work in the everyday demand curve.

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EXERCISES

6 Create a table showing the demand schedule for a product you consume. Using the figures from that table, create a demand curve.

7 Explain an example where you would demand more (or less) quantity of the product as a result of the income effect. Show this on your diagram as a movement from an original point A, to a new point B on the curve.

8 Explain an example where you would demand more (or less) quantity of the product as a result of the substitution effect. Show this on your diagram as a movement from an original point A, to a new point C on the curve.

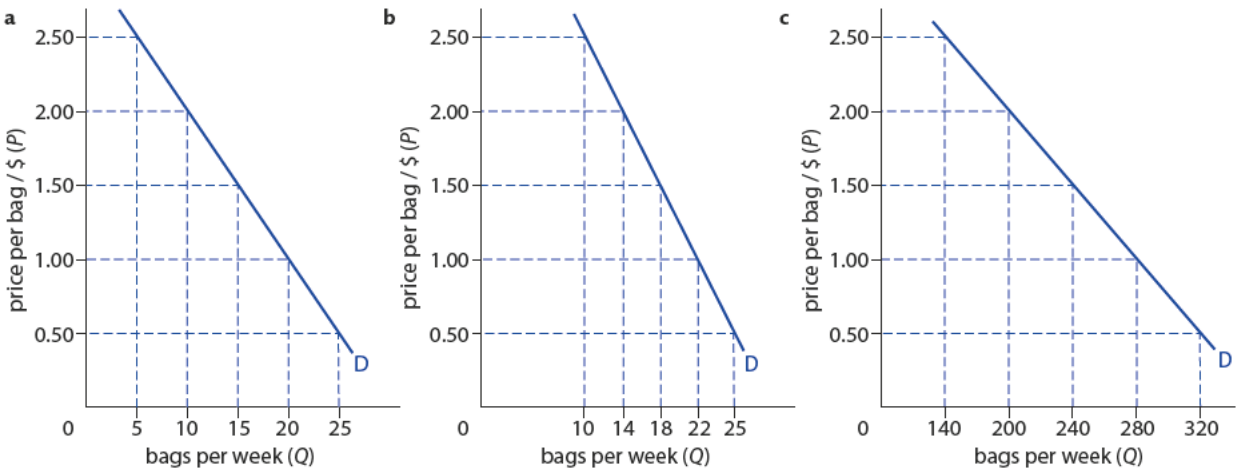
9 Write an explanation of your downsloping demand curve in terms of the law of diminishing marginal utility.

Individual demand and market demand

If what we have seen so far is merely the demand of one person for potato chips over a single week, then what would the demand for a whole group look like? To get the total market demand for a good we take the sum of all the individual demand curves for the same good. Therefore, if we started with the demand for consumer X, and added it to the demand for an additional consumer Y, we would have the market demand for potato chips between those two people (Figure 2.4).

If consumer X were to buy 5 bags at $2.50 as shown on Figure 2.4a, and consumer Y were to buy 10 at $2.50 as shown on Figure 2.4b, then the market demand together would be 15 bags at a price of $2.50. At a price of $2.00, consumer X would buy 10, consumer Y would buy 14, and the market demand would be 24. This summation continues at every price until the market demand for potato chips is complete (Figure 2.4c).

Figure 2.4
Individual demand to market demand: **a** consumer X; **b** consumer Y; **c** consumers X + Y + all others.



Note that the demand curve for consumer Y is steeper than that for consumer X. (This is because each has a different elasticity, a concept covered in Chapter 4.) However, the slope is still downwards, reflecting the law of demand.

2.3 Determinants of demand

Determinants of demand are the non-price variables that influence the demand for a product.

Learning outcomes

- Explain how factors including changes in income (in the cases of normal and inferior goods), preferences, prices of related goods (in the cases of substitutes and complements) and demographic changes may change demand.
- Distinguish between movements along the demand curve and shifts of the demand curve.
- Draw diagrams to show the difference between movements along the demand curve and shifts of the demand curve.

Until now, we have held constant (*ceteris paribus*) all of the other factors (variables) that could influence the demand for goods so that we could exclusively examine the effect of price changes on the amount of demand. All of those other factors can be referred to as the non-price determinants of demand, the variables that will cause demand for a good to increase or decrease.

Shift in demand and movement along a demand curve

One significant difference between changes in price and changes in the determinants of demand is that a change in price will cause only *a movement along* the demand curve. In Figure 2.5a, a change in the market price from $1.50 to $2.50 causes a movement along the demand curve and a decrease in the *quantity demanded* from 15 to 5.

However, when the non-price determinants of demand change, there is a *shift* of the entire demand curve. The quantity demanded will change at each price. In Figure 2.5b, the initial demand is indicated by curve D. If one of the determinants of demand were to change and cause an increase in demand, the new demand curve would be D_1, a shift outwards or to the right. More is being demanded at every price. For example, at $1.50, where once only 15 were demanded, now a quantity of 20 are demanded. The same is true at all prices, all because of a change in the *ceteris paribus* variables for potato chip demand. The same process works in reverse as well. If demand were to decrease, then there would be smaller quantities demanded at each price and a shift of the demand curve backwards or left would occur.

A change in price causes a change in *quantity demanded*, with the corresponding movement along the curve, not an *increase or decrease in demand*. We use this latter phrase when referring to a shift of the demand curve, to right or left.

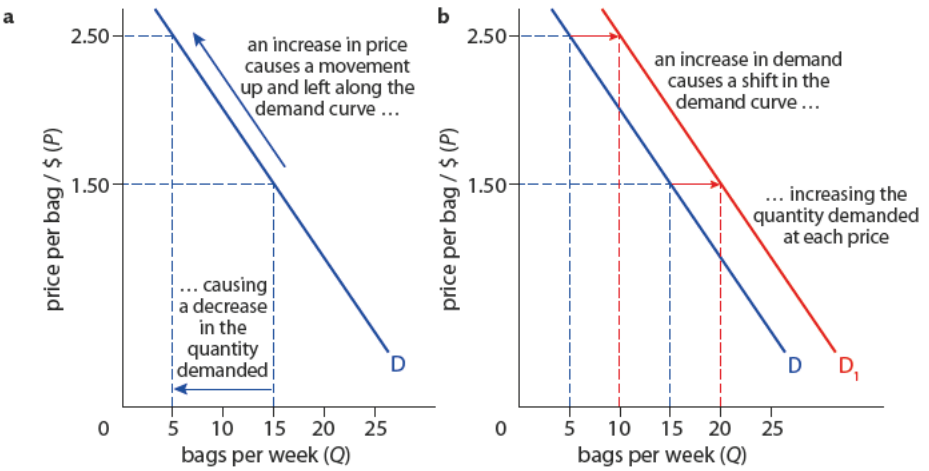


Figure 2.5
a Movement along the demand curve; **b** shift of the demand curve.

Figure 2.6 shows the general cases of movements along the demand curve and changes in overall demand.

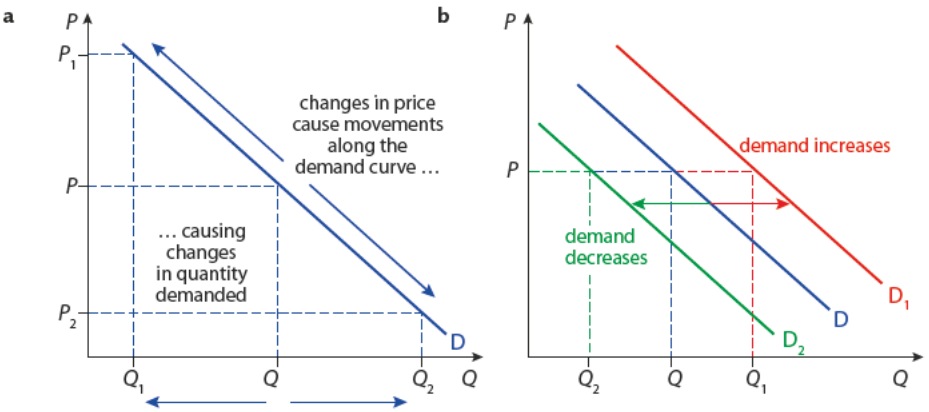


Figure 2.6
a Movements along a demand curve; **b** shifts of demand.

Non-price determinants of demand

The most important determinants of demand include:

- income
- price of related goods

- taste and preferences
- expectations of future prices and income
- number of potential buyers.

Lesser but still noteworthy determinants include:

- demographic change
- government policy
- seasonal change.

All these determinants are discussed below.

Income

People tend to increase their spending when their income improves. But whether an increase in income actually increases demand for any particular good depends on whose income rises, and on their relationship to that good.

A normal good is a good for which the demand increases as consumer income increases, and for which demand decreases as consumer income decreases.

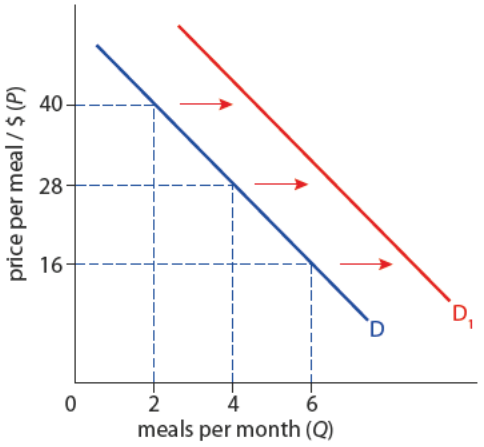
Normal goods

These are goods for which demand increases as income rises and falls as income falls. Examples of normal goods would be automobiles, cinema tickets and restaurant meals.

This principle is dependent on the income for a particular population. The relatively poor, given in increase in incomes, may view bicycles as a normal good, while richer populations would not.

The demand for restaurant meals is shown in Figure 2.7: an increase in income for normal goods shifts the demand curve to the right. This increases the demand for restaurant meals at every price.

Figure 2.7
Normal goods: restaurant meals.



To learn more about normal goods, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 2.4.

An inferior good is one for which the demand decreases as consumer income increases, and for which the demand increases as consumer income decreases.

Inferior goods

These are goods for which demand decreases as income rises and increases as income falls. Inferior goods are generally considered to be a cheaper alternative to higher quality goods. Examples of inferior goods could be, for middle income and richer populations, bicycles and bus tickets. Other typical examples include raw food ingredients like baking flour and millet, since richer consumers are more likely to buy the finished product. Previously used goods like used cars and clothing are also good examples. In these cases, an increase in income would result in a shift of the demand curve backwards or to the left.

To learn more about inferior goods, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 2.5.

Price of related goods

Goods may be substitutes for each other, complementary to each other, or not related at all.

Substitute goods

These are goods that one might easily use in place of another. Because they are so similar, an increase in the price of one may lead consumers to switch consumption to the substitute. Therefore, the price of one good and the demand for a substitute have a positive relationship. As the price of one increases, demand for the other increases. There are many examples among branded goods such as fizzy drinks, or fast-food hamburger stores. Other examples include margarine and butter, buses and train travel, and chicken and beef.

Figure 2.8 shows how an increase in the price of fizzy drink C (Figure 2.8a) causes an increase in the demand for its substitute, fizzy drink P (Figure 2.8b). The demand curve for the latter moves to the right, increasing the amount demanded at every price.

A substitute good (demand) is one for which demand will increase when the price of another good increases. Demand for a substitute good will decrease when the price of its substitute decreases.

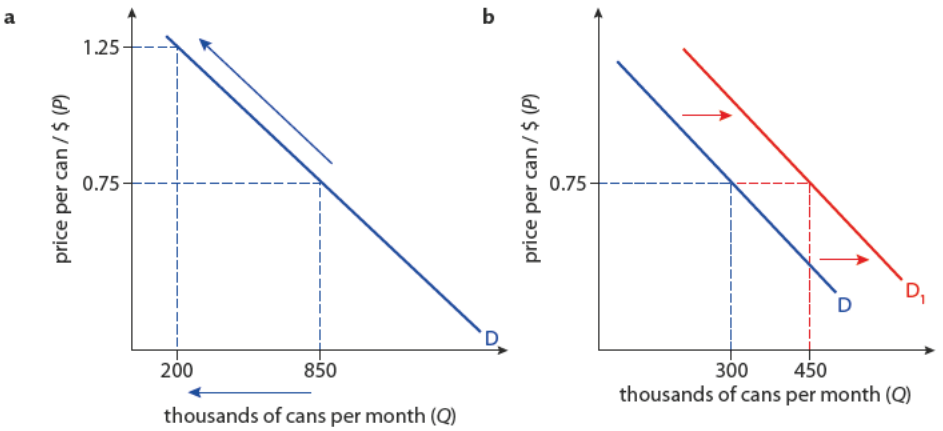


Figure 2.8
Price of related goods: demand substitution. **a** Fizzy drink C; **b** Fizzy drink P.

To learn more about substitutes, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 2.6.

Complementary goods

These are goods that are typically purchased and consumed together. Therefore an increase in the price of a complementary good will appear to the consumer as an increase in the price of enjoying the combined experience of both goods. As a result, the demand for the complementary good will decrease. Examples include goods such as DVD players and DVDs, computers and printers, cameras and memory cards.

In Figure 2.9, a decrease in the price of digital cameras, shown as a movement along the curve (Figure 2.9a), causes an increase in the demand for memory cards (Figure 2.9b). The demand curve for memory cards shifts forwards, or to the right, reflecting an increase in the amount of demand for memory cards at every price.

Complementary goods are typically consumed together, so the demand for one is decreased by the price increase of the other.

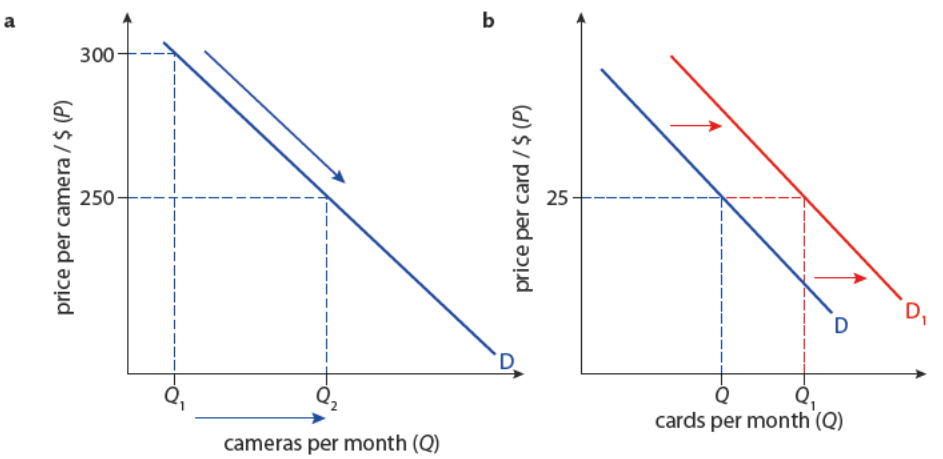


Figure 2.9
Price of related goods: complementary goods. **a** Digital cameras; **b** memory cards.

To learn more about complements, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 2.7.

Taste and preferences

Demand changes with consumer tastes and preferences. Goods become more or less popular because of fashion, current events, and word-of-mouth recommendations between friends or co-workers.

Expectations of future prices and income

Consumers think and act according to the information they receive about the world. Sometimes consumers believe that the price of a good, or their own income, will change in the near future. This can influence their decisions about buying particular goods.

Expectation of future prices

If consumers believe that the price of a good is likely to climb rather quickly, they will be inclined to purchase more immediately. This means that an expectation of higher future prices will cause consumers to buy more now (an increase in demand now, a shift to the right). An expectation that prices will decline soon is likely to cause consumers to defer their purchases until the product becomes cheaper (a decrease in demand now, a shift to the left).

Expectation of future income

If consumers are buying in an economic climate of high growth, steadily rising wages, surging business investment, and relatively low unemployment, they may reasonably conclude that their future incomes will rise, and thus consume more. This would shift demand for most goods to the right. The reverse can be true, of course, as a recession with rising unemployment and decreasing wages can create an atmosphere of pessimism, discouraging consumers from buying goods. This is called a lack of consumer confidence. In this case, demand for most goods is likely to shift to the left.

Number of potential buyers

All businesses hope to market their goods to the widest audience possible. New markets increase potential demand. In the last two decades, many companies have relocated major operations to China partly because they hope to sell their product in the world's largest newly opened market. All of these companies are attempting to increase the number of potential buyers, because more buyers means more demand and a shift to the right of the demand curve for their goods. Correspondingly, a decrease in the potential number of buyers shrinks demand. For example, if a trade restriction were to prevent the importing of Japanese electronics into China, demand for the Japanese electronics would drop.

Demographic change

Demand can change with major shifts in the age structure, income distribution or other demographic traits. For example, a spike in birth rate creates a disproportionately large number of people in a similar age bracket, so the national demand may be skewed towards producing goods and services for that group. When the US baby-boomer generation (born between 1946 and 1964) grew to be of parenting age, a vast increase in childcare-related products flooded the market. As the same population grows into retirement and old age, it is likely that the product market will respond with more products servicing their age group (e.g. healthcare services, prescription drugs).

Demand can also be affected by the distribution of income. If the share of national income shifts towards the rich, the sellers of luxury goods will see their demand increase. Another

example of demographic change is immigration patterns. If immigration increases, so will the demand for goods associated with that population, most obviously food items and other products with strong cultural ties to the immigrant population.

Government policy

Changes in taxation and subsidy policies can have an impact on demand. For example, if the government were to increase income taxes, it might cause a decrease in overall consumption as households have less income available to spend. Other policy changes, like restriction and regulation of behaviour and product safety, can also affect demand. Bar owners in many countries feared that government restrictions on smoking in public would reduce their business (although it may also possibly improve it). In Ireland, introducing a tax on plastic shopping bags increased demand for cloth reusable bags.

Seasonal change

Changes from one season to another may increase demand for particular goods. Snow recreation equipment, from snowmobiles to snowboards, is likely to increase in demand during the winter months, while swimsuits and sandals sell more during the summer.

To access Worksheet 2.1 on luxury goods, please visit www.pearsonbacconline.com and follow the onscreen instructions.

To access Worksheet 2.2 on demand, please visit www.pearsonbacconline.com and follow the onscreen instructions.

To learn more about the determinants of demand, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 2.8.

EXERCISES

10 Consider these headlines:

i A summer heatwave affects the market for electric fans.

ii The price of toy airplanes increases.

iii A formerly communist country is now eligible to buy cars from the rest of the world.

iv Consumers are expecting the price of beef to rise significantly in the coming weeks.

v Diamond sellers are worried about the impact of the recession.

vi The price of toothpaste drops unexpectedly.

vii As population grows older, the market for bicycles is changing.

For each headline:

a state whether there is a shift or a movement along the demand curve

b state the kind of shift

c create a diagram to demonstrate the shift

d identify the determinant that caused the shift.

2.4 Linear demand functions (HL only)

Learning outcomes

- Explain a demand function (equation) of the form $Q_D = a - bP$.
- Plot a demand curve from a linear function (e.g. $Q_D = 60 - 5P$).
- Identify the slope of the demand curve as the slope of the demand function $Q_D = a - bP$, that is $-b$ (the coefficient of P).
- Outline why, if the a term changes, there will be a shift of the demand curve.
- Outline how a change in b affects the steepness of the demand curve.

Demand for a good can be expressed using mathematical functions. These functions are simplifications of real-world relationships. In reality, there are likely to be many other factors that influence the demand for any particular good. However, these functions provide a more detailed understanding of how demand theory works. Demand functions demonstrate a negative relationship between price and quantity and are graphically represented by downward sloping lines, reflecting the inverse relationship between price and quantity observed by the law of demand.

Typical demand function

A typical demand function looks like this:

$$Q_D = a - bP$$

Where:

Q_D represents the quantity demanded

a represents the autonomous level of demand or the quantity demanded if the price were zero

b represents the change in quantity demanded resulting from a change in price – it is negative, which reflects the fact that quantity demanded changes inversely with the price

P represents the price of a single item

For example, take the demand for cappuccinos in a small town in a single day. The demand function for cappuccinos can be expressed as:

$$Q_D = 600 - 50P$$

The a value in this function is 600. This is called the autonomous level of demand, because it represents the number of cappuccinos demanded irrespective of the price. In other words, even if the price were zero, 600 cappuccinos would be demanded in this town. The a value will change if any of the determinants of demand for cappuccinos changes.

For instance, if the price of tea (a substitute for cappuccino) rises, consumers will demand more cappuccinos irrespective of the price, and the a value will increase. The demand curve shifts to the right, or 'up', when the a value rises; it shifts to the left, or 'down', when a decreases.

As the coefficient of P, the b value (50 in our demand function above) tells us the change in quantity demanded resulting from a change in the price of cappuccinos; b will therefore determine the slope of the demand curve. In our case, an increase in the price of cappuccinos to $1 would lead to a decrease (notice the negative sign!) in the quantity demanded by 50 drinks. A change in the value of b will change the steepness of the demand curve.

If the price were 0, 600 cappuccinos would be demanded. This tells us the x-intercept, the point where the demand curve meets the x-axis. It can also be called the Q-intercept for demand, because quantity is always on the x-axis for both supply and demand. So, for this demand function, the Q-intercept for demand is 600.

Let's now assume the price of a cappuccino is $10. (An expensive cup, but some consumers may be addicted.) At this price, the quantity demanded is:

$$Q_D = 600 - 50(10) = 600 - 500 = 100$$

At the high price of $10, consumers will demand only 100 cappuccinos. According to the law of demand, a decrease in the price should lead to an increase in the quantity of cappuccinos demanded. To test this, see what happens when cappuccinos sell for only $8:

$$Q_D = 600 - 50(8) = 600 - 400 = 200$$

When the price falls to $8, consumers demand more cappuccinos. For every $1 fall in the price, 50 additional drinks were sold, evidence that the price coefficient of 50 determines the responsiveness of consumers to a change in the price. At lower prices, more cappuccinos are demanded. At $4, the quantity demanded is:

$$Q_D = 600 - 50(4) = 600 - 200 = 400$$

Remember, the *a* value in the demand function (600 in this case), tells us the *autonomous level of demand*, or the quantity demanded when the price is zero. It changes with changes to the determinants of demand. Meanwhile, *b* demonstrates the law of demand, which says that there is an inverse relationship between the price of a good and the quantity demanded by consumers. As the price of cappuccinos falls from $10 to $0, the quantity demanded increases from only 100 drinks to 600 drinks.

It is possible to construct both a demand schedule and demand curve from this demand function. Table 2.3 shows a list of possible prices and the corresponding quantities, as calculated through the above function. Figure 2.10 illustrates a demand curve for cappuccinos based on the same prices and quantities.

TABLE 2.3 LINEAR DEMAND SCHEDULE: CAPPUCCINOS, $a = 600$

Price of cappuccinos (*P*) / $	Quantity demanded per day (Q_D)
10	100
9	150
8	200
7	250
6	300
5	350
4	400
3	450
2	500
1	550
0	600

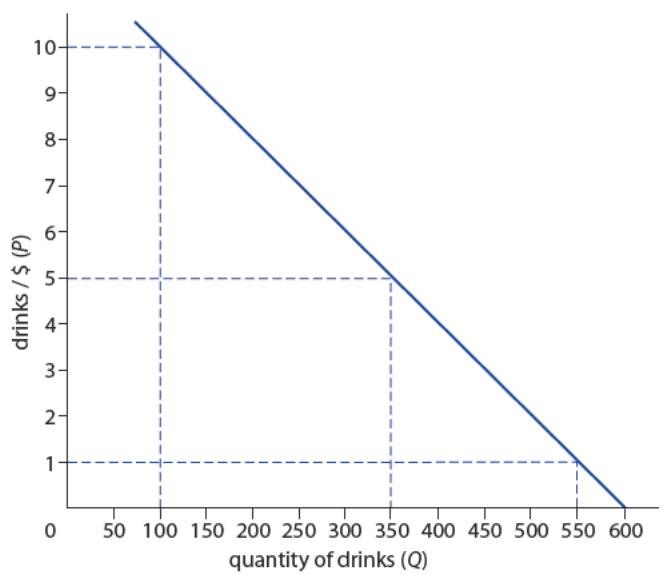


Figure 2.10
Linear demand curve: cappuccinos, $a = 600$.

Figure 2.10 shows various quantities of cappuccinos demanded (Q_D) at prices ranging from $0 to $10. A movement along the demand curve will occur any time the price of

cappuccinos increases or decreases. At lower prices, more are demanded; at higher prices, fewer cappuccinos are demanded by consumers.

Changes in *a*

If any of the determinants of demand change, then the *a* value in the demand function will change and the demand curve will shift either inwards or outwards (down or up graphically). For instance, if a recession causes the incomes of consumers to fall and, therefore, the *autonomous level of demand* falls, then there are fewer people willing and able to buy cappuccinos at each price. The demand function may change to:

$$Q_D = 500 - 50P$$

Notice that the *a* value has decreased from 600 to 500 drinks. The *b* value, or the price coefficient, has not changed so the slope of our new demand curve will be the same as our original curve.

The quantities demanded resulting from the new demand function are shown in Table 2.4 and Figure 2.11.

TABLE 2.4 LINEAR DEMAND SCHEDULE: CAPPUCCINOS, $a = 500$

Price of cappuccinos (P) / $	Quantity demanded per day (Q_D)
10	0
9	50
8	100
7	150
6	200
5	250
4	300
3	350
2	400
1	450
0	500

Each of the quantities demanded has decreased by the amount of the change in *a* (i.e. 100 units). As a result, there is a new demand curve, shown in Figure 2.11 as D_1. Lower incomes caused *a* to decrease, causing a shift in demand to the left by exactly 100 units. The *Q*-intercept for demand is now at 500 not 600.

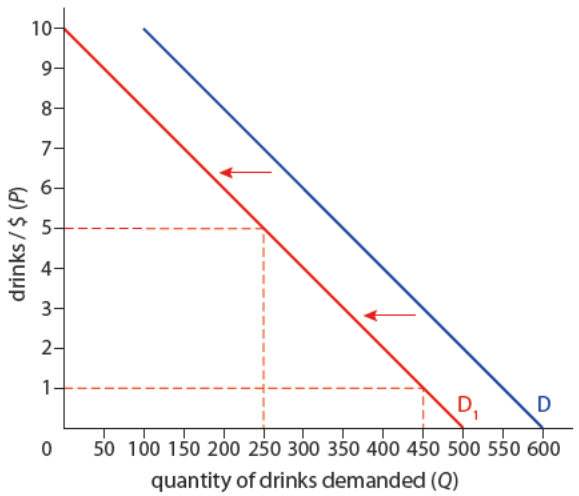


Figure 2.11
Linear demand curve: cappuccinos, $a = 500$.

As shown above, a change in the determinants of demand cause a change in and shift of demand. In this case, demand shifts left, or 'down' by 100 units at every price.

Changes in *b*

Changes to the price coefficient *b* will change the steepness of the demand curve. Assume that consumers become less responsive to a change in the price of cappuccinos: instead of demanding 50 fewer drinks each time the price rises by $1, consumers now demand only 30 fewer drinks. The price coefficient *b* in our demand function changes from 50 to 30. So the new demand function is:

$$Q_D = 600 - 30P$$

The resulting values for price and quantity demanded are shown in Table 2.5 and Figure 2.12.

TABLE 2.5 LINEAR DEMAND SCHEDULE: CAPPUCCINOS, $b = 30$

Price of cappuccinos (P) / $	Quantity demanded per day (Q_D)
10	300
9	330
8	360
7	390
6	420
5	450
4	480
3	510
2	540
1	570
0	600

The prices are the same as before. However, the range of quantities is smaller, from 300 units to 600, instead of 100 to 600. We can also observe the change in the slope of the demand curve. Figure 2.12 shows that the linear demand for cappuccinos becomes steeper when the *b* value changes from 50 to 30. A decrease in price of $1 increases the quantity demanded at a slower rate (30 drinks) than it did in the previous demand function where the price coefficient was 50.

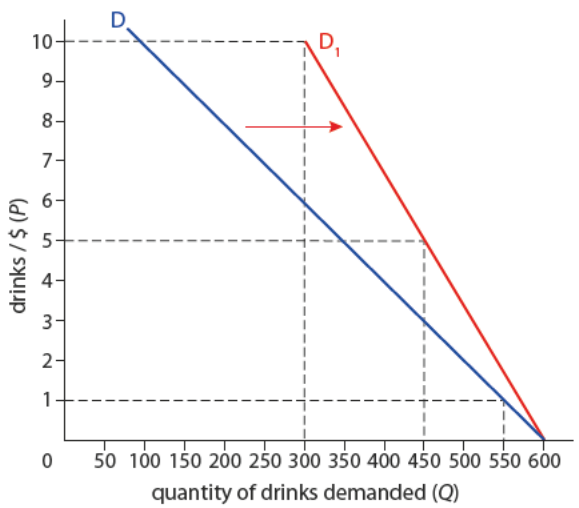


Figure 2.12
Linear demand curve: cappuccinos, $b = 30$.

A change in the price coefficient of cappuccinos from –50 to –30 represents a decrease in the responsiveness of cappuccino consumers to changes in the price. Previously, a $1 increase in price led to 50 fewer drinks being sold. Now it reduces the quantity demanded by only 30 drinks. The demand curve has become steeper, indicating that consumers are less sensitive to price changes than previously.

The overall demand for cappuccinos has now become what economists call more inelastic. Elasticity refers to the responsiveness of consumers to changes in price. Price elasticity of demand, as well as several other types of elasticity, is explored in detail in Chapter 4.

HL EXERCISES

Use the linear demand function: $Q_D = 300 - 30P$

11 Create a demand schedule with prices of $0, $3, $5, $7, and $9.

12 Create a demand curve, plotting the points from your demand schedule.

13 Decrease the value of *a*, the autonomous element of demand, by 30 units. Create a new demand schedule, with adjusted values for Q_D.

14 On your previous diagram, show the new demand curve.

15 Now change the value of the price coefficient in the original demand function to –10. Calculate the prices and quantities demanded, and list them on a demand schedule.

16 Create a new demand curve.

2.5 Supply

Learning outcomes

- Explain the positive causal relationship between price and quantity supplied.
- Describe the relationship between an individual producer's supply and market supply.
- Explain that a supply curve represents the relationship between the price and the quantity supplied of a product, *ceteris paribus*.
- Draw a supply curve.

Supply is the quantity of a good or service that producers are willing to offer for sale at a given price during a specific time period.

Any market transaction requires two parties, *buyers* and *sellers*. Demand explores the buyers' side of things, while supply takes the perspective of the sellers. Supply is defined as the quantity of goods that producers will produce and sell at a given price over a particular time period, *ceteris paribus*. So in this case, a supply curve shows us the relationship between the price of the good and how much producers will send to market at that price. Again, all other variables are held constant, *ceteris paribus*, so that we may clearly see that relationship between price and quantity supplied. When the other, non-price variables change, there will be a shift of the entire curve.

Like demand, the relationship between price and quantity supplied can be shown with a table or *supply schedule*, as well as with a *supply curve*. Table 2.6, a supply schedule for potato chips, shows that as price decreases from $2.50 to $0.50, the quantity supplied decreases as well. This is consistent with the positive relationship explained by the law of supply. Figure 2.13 shows the supply curve for the schedule in Table 2.6.

TABLE 2.6 SUPPLY SCHEDULE: POTATO CHIPS	
Price of potato chips (*P*) / $	**Quantity of potato chips supplied per week (*Q*)**
2.50	25
2.00	20
1.50	15
1.00	10
0.50	5

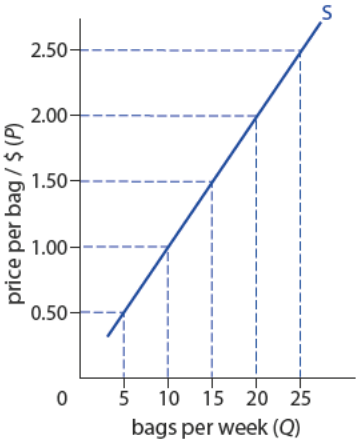


Figure 2.13
Supply curve: potato chips.

The law of supply

The law of supply states that as price increases, more of a good is supplied by firms. As price decreases, less of a good is supplied. In Figure 2.13, the supply of potato chips reflects how output increases as price rises with an upward sloping supply curve. As price increases from $0.50 to $2.50, the quantity offered for sale rises from 5 to 25. This causes a movement upwards along the supply curve. Thus, there is a positive relationship between price and quantity supplied. Why do economists generally hold this to be true? Indeed, why is it held to be so true as to be considered a law of economics?

The law of supply states that as price increases, more of a good is offered for sale by firms. As price decreases, less of a good is offered for sale.

The profit incentive

Firms exist to maximize profits. If we hold everything else equal, a firm would prefer to sell a product at a higher price than a lower one because that will increase profits. Therefore, it is safe to say that a firm would produce more if it believed it could get higher prices for its good because it is more likely to earn extra profit as a result.

Figure 2.13 above depicts the law of supply with regard to potato chips. At $0.50 per bag, the incentive to produce is lower because the expected profits would be relatively low. However, should the price rise to $1.00, the firm has twice the incentive to supply it. This would motivate the firm to produce more. At the same time, in many instances there are additional costs to providing more of the good, so the higher prices will help to cover those costs. Generally speaking, from the firm's perspective, at higher prices greater profits are more likely, and thus firms supply more to the market.

Individual supply and market supply

As with demand, to get the overall market supply for a good is to take the sum of all the individual supply curves for the same good. Therefore, if we started with the supply for producer X and added it to the supply for an additional producer Y, we would have the market supply for potato chips, although a very narrowly defined one of just those two firms.

If producer X sells 25 bags at $2.50 (Figure 2.14a, overleaf), and producer Y sells 32 bags at the same price (Figure 2.14b), then the market supply is 57 bags at $2.50. At $2.00 per bag, producer X would sell 20, producer Y would sell 25, and the market demand would therefore be 45. This summation continues, along with all other suppliers' quantities, at every price until the market supply for potato chips is complete. Total market supply is shown in Figure 2.14c. Note that the supply curve for firm Y is not as steep as that for firm X. (This is because each has a different elasticity, a concept covered in Chapter 4.) However, the slope is still upwards, reflecting the law of supply.

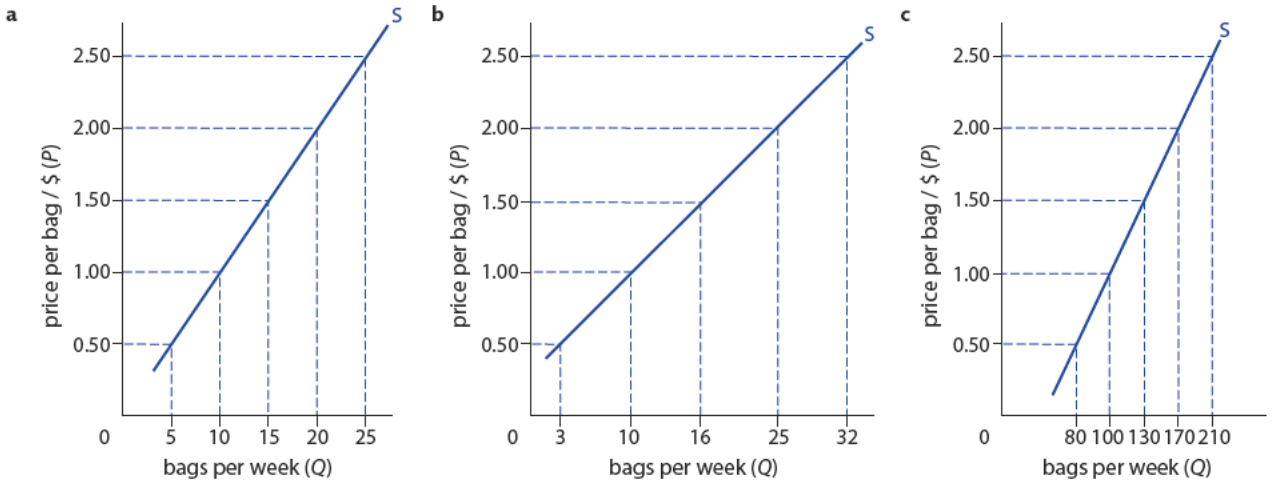


Figure 2.14
Individual supply to market supply. **a** Producer X; **b** producer Y; **c** producers X + Y + all others.

To learn more about the law of supply, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 2.9.

EXERCISES

17 In your own words, explain the law of supply.

18 Select an example product, perhaps something you use frequently. Explain how the law of supply could apply to this product.

19 With the example product you selected for exercise 18, speculate as to number of suppliers for this good. Do you think this is a local, national or international market for the good?

20 Apply your understanding: imagine and draw what the supply curve would look like if the supply of something were completely fixed.

2.6 Determinants of supply

Learning outcomes

- Explain how factors including changes in costs of factors of production (land, labour, capital and entrepreneurship), technology, prices of related goods (joint/competitive supply), expectations, indirect taxes and subsidies and the number of firms in the market can change supply.
- Distinguish between movements along the supply curve and shifts of the supply curve.
- Construct diagrams to show the difference between movements along the supply curve and shifts of the supply curve.

Determinants of supply are the non-price factors that influence the supply of a good offered for sale.

Aside from price changes, a variety of non-price factors can also affect supply. These non-price factors are called determinants, as in demand theory. They will cause the supply curve to shift outwards and inwards to reflect a change in the market at every price.

Shift in supply and movement along a supply curve

For supply (as with demand), a change in product price will cause only *a movement along* the supply curve. In Figure 2.15a, a change in the market price from $1 to $2 leads to a

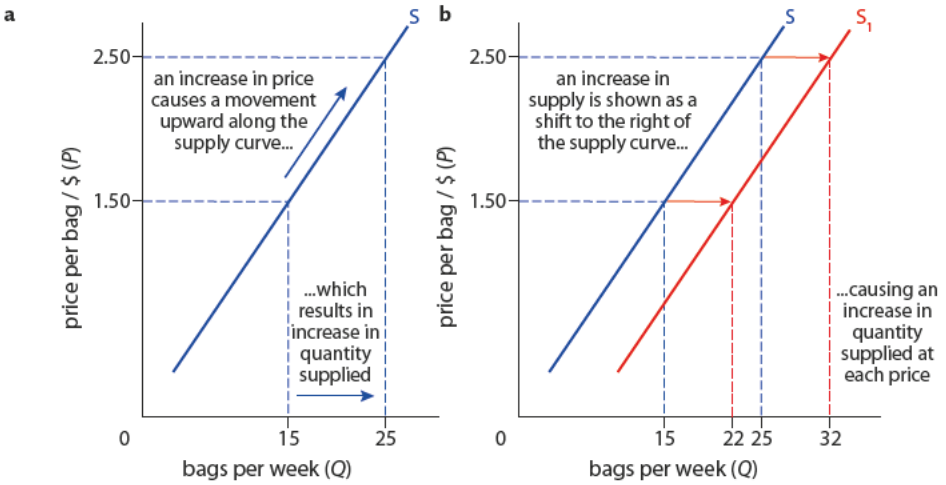
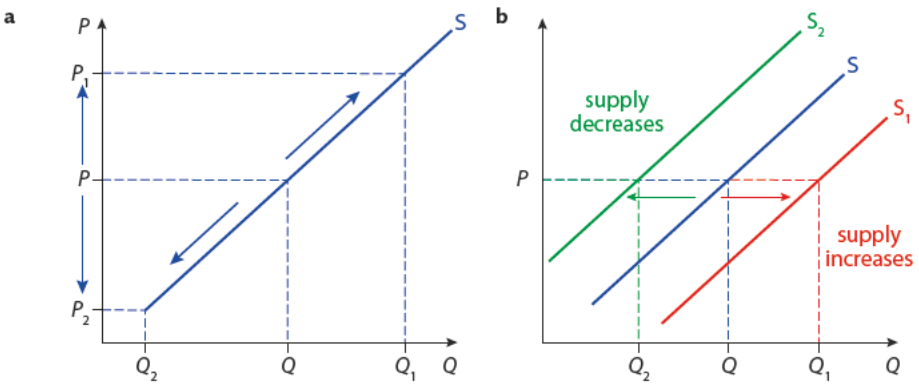


Figure 2.15
a Movement along a supply curve for bags of potato chips; **b** shift of supply.

movement along the supply curve and an increase in the *quantity supplied* from 10 to 20 bags.

However, when the non-price determinants of supply actually change, there is a *shift* of the entire supply curve. All quantities of supply are changed for each price. Consider the market supply for potato chips in Figure 2.15b, where the initial supply is indicated by S. If one of the determinants of supply were to change and cause an increase in supply, the new supply curve would be S_1, a shift outwards or to the right. Price does not necessarily change at all, but more is being supplied at every price. For example, at $1.50, where previously 15 bags were supplied, now 22 bags are supplied. The same is true at all prices, because of a change in the previously *ceteris paribus* factors for potato chip supply. The process also works in reverse. If supply were to decrease, then there would be smaller quantities supplied at each price and a shift of the supply curve backwards would occur.

Figure 2.16 shows the general cases of movements along the supply curve and changes in overall supply.



Non-price determinants of supply

The most important determinants of supply include:

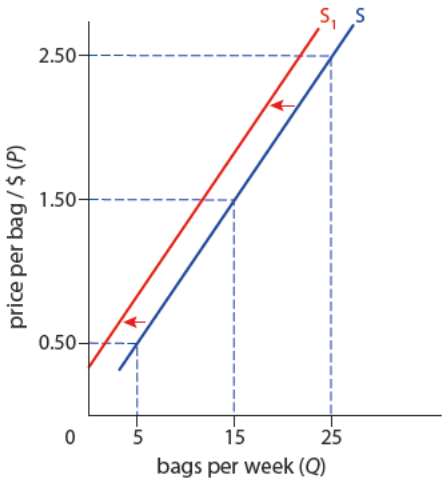
- costs of production
- productivity
- government intervention
- price of related goods
- supply shocks.

Costs of production

The ability of a firm to produce is intimately related to the costs of production. Higher costs obviously make it more difficult to earn profits, all other things being equal. If firms are selling potato chips for $2 per bag and costs rise from $1.50 to $1.75, profits per bag will fall by $0.25. This reduction in profits may provoke some producers to quit production, or to simply produce fewer potato chips and shift resources to the production of something else that is more profitable.

What causes the costs of production to change? Most generally, the price and availability of the factors of production will influence costs. As discussed in Chapter 1, the broad categories of the factors of production are land or natural resources, labour, financial and productive capital, as well as entrepreneurship or management. For example, if the amount of potatoes on the market shrinks, it will become more expensive to buy them. This increased resource cost will make potato chip production less profitable and the supply curve will shift left, as shown in Figure 2.17.

Figure 2.17
Costs of production, decreased supply: bags of potato chips.



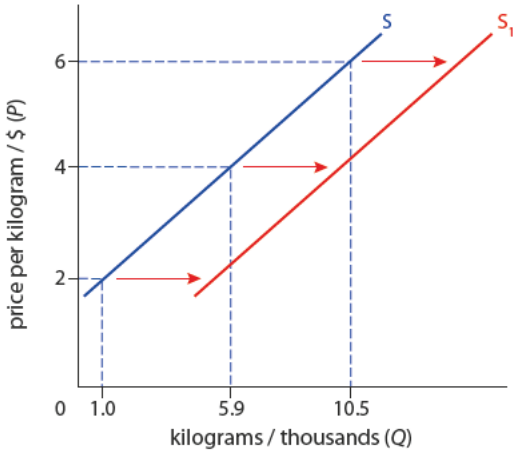
Furthermore, if the other factors of production for chips were to become less available or more expensive, supply would again shift left. For example, if the workers' wages or machine rental fees begin to rise, the profitability of chip production is diminished. Supply will therefore shift left. This would mark a decrease in the quantity supplied at every price. At all prices, firms would produce fewer bags of potato chips.

Productivity

Productivity is a concept closely related to production costs. Productivity is the amount of output per unit of input. If a firm is able to use fewer factor resources in the production process, it will spend less on those resources. If it can get more out of its resources while still getting the same prices, then it will earn more profits on each unit.

Productivity can be enhanced in different ways. Managerial insight can lead to better *methods of production*. This can also happen via the creation of better incentives for workers, changing production schedules, or adding new and specialized jobs to increase efficiency. Increased productivity can also come from *technological improvements*. For example, robotic systems can replace expensive labour. Data management can reduce accounting costs and find new ways of marketing products. Both methods and machines play an important role in reducing costs and improving efficiency.

Figure 2.18 shows productivity for a strawberry-farming business. The business has created and instituted a new incentive programme for its pickers. The goal is to improve the quantity and quality of the berries picked. The new programme proves effective, and the resulting increase in efficiency shifts supply to the right, increasing the supply of strawberries at every price.



Using our initial example, if potato chip producers reorganized their workforce to improve worker efficiency, supply would shift to the right, meaning more bags would be produced at every price. This would be productivity enhanced by improved methods of production. An example of a technological improvement would be if the chip-maker retooled their processing facility with new chip fryers and bagging machines. As a result, more chips could be produced more quickly, lowering costs and shifting supply to the right.

Government intervention

So far, we have assumed that firms are operating in a purely free market, without an intrusion from government policies or rules. Even in the freest markets, however, governments intervene on some level. Government intervention, as suggested by the discussion of economic systems in Chapter 1, is when the government makes decisions regarding the essential questions of economics: what to produce, how to produce, and who should receive the benefits of production. The effect of intervention depends on the type of action the government takes.

Regulation

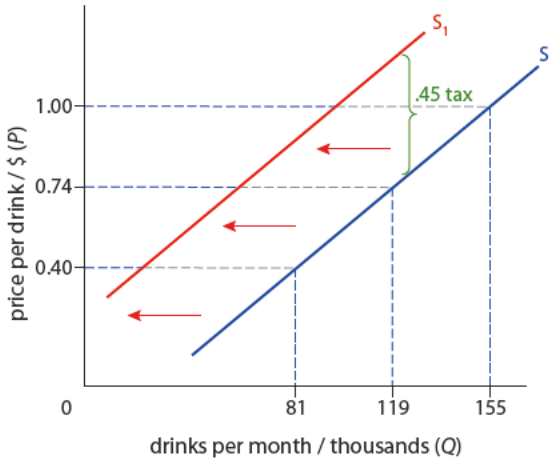
In any modern society, government is likely to apply some rules and regulations to even the most basic of products. This may be in the interests of protecting consumers from harm or deception. It may also be done to protect workers' health and safety. Whatever the motivation, the application of these rules is expected to cause extra costs.

Taxes and subsidies

Taxes and subsidies can also strongly influence supply decisions. Businesses view an indirect tax on their product as an increase in the cost of production. Indirect taxes are taxes on goods or services that are collected at the point of sale, and then transferred by the seller to the government. Because firms will earn smaller profits, they are likely to decrease production of the product when the taxes on it increase. Supply decreases, shifting the supply curve to the left and reducing the amount produced at every price.

More specifically, *taxes* will move the supply curve upwards by the amount of the tax. As shown in Figure 2.19 (overleaf), a tax on soft drinks of $0.45 will lift the supply curve up by the amount of the tax. This has the effect of shifting supply back, a reduction in supply determined by the size of the tax.

Figure 2.19
Government intervention, taxes: soft drinks.



Subsidies, on the other hand, have the opposite effect. A subsidy is when the government pays a producer to make more of the good. While there are different ways to subsidize production, we will focus on per-unit subsidy. This type of subsidy pays the firm for each unit produced. This has the effect of reducing production costs. Therefore, an increase in subsidies will have the effect of shifting supply to the right, successfully encouraging more supply of the product at every price.

Price of related goods

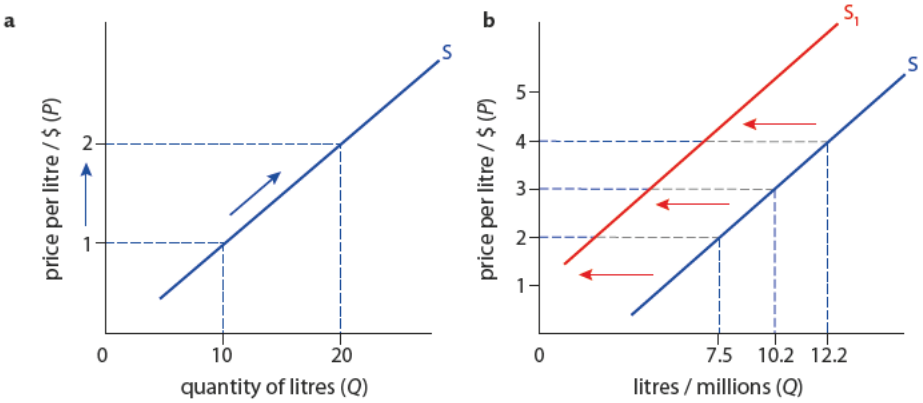
A supply substitute is a good that can be produced in a similar way, with similar inputs and processes, as another good.

From the producer perspective, firms have a choice as to what to produce. Firms can substitute the supply of goods from those earning lower prices to those getting better ones. This is most clearly demonstrated by goods that offer joint supply. Joint supply occurs when two or more goods are derived from the same product. Animal products are an example. The various parts of an animal can be sold for different purposes, such as skin for leather and meat for consumption.

Another example of joint supply is corn. Corn can be used to produce a variety of goods, including corn syrup and ethanol (alcohol) for fuel. Should the price of ethanol increase, corn producers may choose to sell more corn on the ethanol market and reduce the amount supplied for corn syrup.

Figure 2.20a shows an increase in the price of ethanol, perhaps in response to concerns about fuel supplies. The quantity supplied increases in accordance with the law of supply. This is shown as a movement along the supply curve for ethanol from 10 litres to 20 litres. To farmers, ethanol is relatively more profitable than before, and they switch their supply from other corn-based products to ethanol. As a result, in Figure 2.20b, the supply of corn syrup shifts to the left as producers substitute corn from the corn syrup market to the market for ethanol.

Figure 2.20
Price of related goods: producer substitutes.
a Ethanol; **b** corn syrup.



To take the potato chip example, a shift by consumers to more health-conscious living has increased the popularity (and price per gram) of 'baked' potato chips, which contain less fat. As a result, producers are shifting production to those products, and away from comparable goods like frozen French fries.

Supply shocks

Supply shocks are random events that can disrupt the normal supply of goods and services. Rarely, such events can improve supply situations, but we most typically associate random events with natural disasters like earthquakes, tsunamis, and floods. Clearly, the flooding of a great river like China's Yangtze, or Europe's Danube, can destroy significant aspects of a community's wealth: crops, homes, and infrastructure are all swept away. This kind of destruction obviously reduces the supply of certain foods or housing in that area. In the mildest sense, even bad weather can diminish agricultural production in any given year.

Events, my dear boy, events.

Harold Macmillan, UK Prime Minister 1957–63, when asked what posed the greatest challenge to a statesman.

Many random destructive events are man-made. Environmental disasters (e.g. the Union Carbide accident in Bhopal, India, the Gulf of Mexico oil spill and the more recent Fukushima nuclear power plant explosion in Japan) have devastating effects on the supply of many goods and services. Conflict also tends to wreck the everyday business plans of most firms as well as destroying human and capital resources.

In Figure 2.21, the output of tea from Sri Lankan tea-growers is reduced by the tsunami of 2004. The effect of salt water flooding large areas of land is to destroy crops and render the land useless for agriculture.

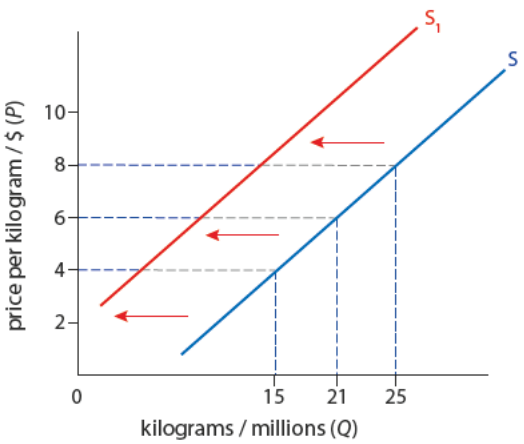


Figure 2.21
Supply shock: effect of the tsunami on tea output from Sri Lanka.

Of course, random events need not always be negative. Indeed, on a small scale, good weather can dramatically improve crop yields. More dramatically, a country may discover that it possessed large deposits of minerals or fossil fuels that would improve the supply of those goods. In these instances, supply would shift to the right.

To learn more about the determinants of supply, visit www.pearsonhotlinks.com, enter the title or ISBN of this book and select weblink 2.10.

EXERCISES

21 Consider these headlines:

- **i** Airlines expect more rules in response to increased accident rates.
- **ii** New teacher robots are expected to revolutionize teaching at major universities.
- **iii** Shortage of apples expected to influence the apple juice industry.
- **iv** To save money, the government eliminates subsidies for sugar producers.
- **v** Cotton growers relieved that peace talks are successful in war-torn country.

For each headline:

- **a** state whether there is a shift or a movement along the supply curve
- **b** state the kind of shift
- **c** create a diagram to demonstrate the shift
- **d** identify the determinant that caused the shift.

2.7 Linear supply functions (HL only)

Learning outcomes

- Explain a supply function (equation) of the form $Q_S = c + dP$.
- Plot a supply curve from a linear function (e.g. $Q_S = -30 + 20P$).
- Identify the slope of the supply curve as the slope of the supply function $Q_S = c + dP$, that is d (the coefficient of P).
- Outline why, if the c term changes, there will be a shift of the supply curve.
- Outline how a change in d affects the steepness of the supply curve.

Supply for a good can also be expressed using mathematical functions. A supply function will demonstrate a positive relationship between price and quantity, and will be shown diagrammatically as upward sloping lines, in accordance with the law of supply.

Typical supply function

A typical supply function might look like this:

$$Q_S = c + dP$$

Where:

Q_S represents the quantity supplied

c represents the autonomous element of supply or the quantity that would be produced at a price of zero

d represents the rate at which a change in price will cause the quantity supplied to increase – in a supply function, d is always positive, in keeping with the law of supply

P represents the price of a single item

In this function, c represents the non-price factors that determine supply and indicates the quantity of output produced by the firms in a market at a price of zero. If any of the non-price determinants of supply change, then c will change, and the supply curve will shift inwards or outwards.

For example, if the number of firms in an industry increases, then the autonomous level of supply will increase, and the supply curve will shift outwards, or to the right. The corresponding value of Q_S will increase by the same amount as c at each price along the supply curve. In short, changes in c result in shifts of the supply curve.

The value of d affects the degree to which a price change will affect the quantity supplied. If d has a value of 5, for example, an increase in price of \$1 will increase the quantity supplied by 5 units. Thus, d is the price coefficient for the linear supply function, determining the slope of the supply curve and therefore the responsiveness of producers to a change in the price of the good.

Returning to the market for cappuccinos, assume the following linear supply function describes the supply of cappuccinos across a small town for one day:

$$Q_S = -200 + 150P$$

If the price were \$0, –200 cappuccinos would be supplied; in other words, no producers would be willing and able to sell cappuccinos at a price of zero. To determine the price at which producers would begin considering producing and selling cappuccinos (known as

the *P*-intercept, since it signifies where the supply curve intersects the price axis), we set the quantity to zero and solve for *P*.

$0 = -200 + 150P$

$200 = 150P$

$P = 1.33$

At a price of $1.33, producers begin to consider selling cappuccinos. This is where the supply curve begins. At any price greater than $1.33, there is a direct relationship between the quantity supplied and the price. For example, if the price of cappuccinos were to rise to $3, we would expect more sellers to be willing to make and sell cappuccinos.

$P = 3$

$Q_S = -200 + 150(3) = -200 + 450 = 250$

At $3, 250 cappuccinos are produced and made available to consumers. The direct relationship between quantity and price continues at higher prices. Assume demand rises and the price increases to $5.

$P = 5$

$Q_S = -200 + 150(5) = -200 + 750 = 550$

At $5, 550 drinks are produced.

Of course, if the price were to decline, fewer drinks would be produced and sold. At $4, the quantity supplied is 400.

$P = 4$

$Q_S = -200 + 150(4) = -200 + 600 = 400$

With our supply function of $Q_S = -200 + 150P$, it is possible to construct both a supply schedule and supply curve. Table 2.7 shows a list of possible prices and the corresponding quantities computed using this supply function.

TABLE 2.7 LINEAR FUNCTION SUPPLY SCHEDULE: CAPPUCCINOS, $c = -200$

Price of cappuccinos (P) / $	Quantity supplied per day (Q_S)
10	1300
9	1150
8	1000
7	850
6	700
5	550
4	400
3	250
2	100
1	-50
0	-200

There is a direct relationship between the price and the quantity supplied. As price falls, producers are willing to provide fewer drinks to the market. Figure 2.22 shows a supply curve for cappuccino drinks based on these prices and quantities. The *P*-intercept is where the price equals $1.33, the price at which firms begin making cappuccinos.

As the price of cappuccinos changes, the quantity supplied changes at a rate established by the value of *d* in the original supply function (150 units). These would be seen as movements along the supply curve.

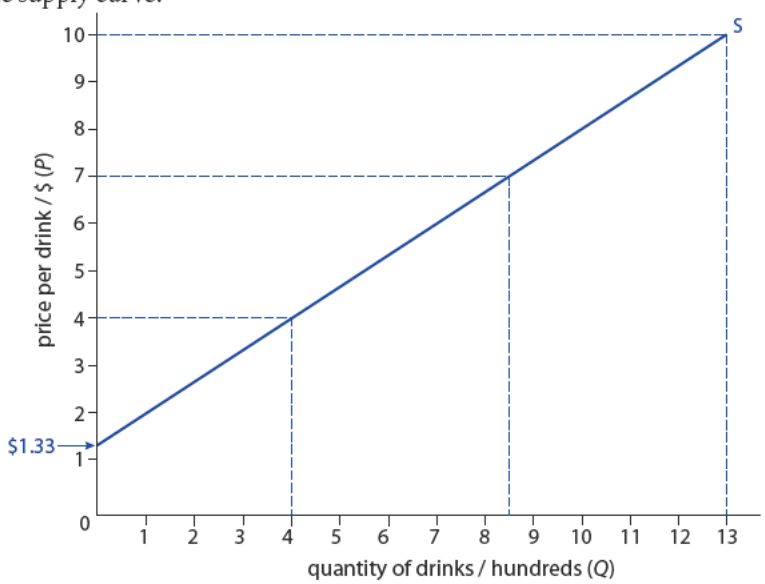


Figure 2.22
Linear supply curve: cappuccinos, $c = 200$.

Changes in *c*

In the above supply function, *c* with a value of –200 is known as autonomous level of supply. Any change in the determinants of supply will lead to a change in *c*, and will give us a new supply function.

Take, for instance, an increase in the number of firms selling cappuccinos in the market. More competition increases the level of supply, and the new supply function is:

$$Q_S = -100 + 150P$$

With more competition in the market, the price at which firms are willing to start producing cappuccinos falls. We can set the quantity to zero to find the new *P*-intercept, or the price at which firms will begin producing drinks.

$$0 = -100 + 150P$$
$$100 = 150P$$
$$P = 0.75$$

Now, at only \$0.75, firms will begin thinking about making and selling cappuccinos, whereas before the new firms entered the market, a price of \$1.33 was required to stimulate production.

With the new supply function, at every price we looked at previously, a greater quantity of cappuccinos is produced. For example, at a price of \$3:

$$P = 3$$
$$Q_S = -100 + 150(3) = -100 + 450 = 350$$

And at a price of \$4:

$$P = 4$$
$$Q_S = -100 + 150(4) = -100 + 600 = 500$$

At a price of \$5:

$$P = 5$$
$$Q_S = -100 + 150(5) = -100 + 750 = 650$$

TABLE 2.8 LINEAR SUPPLY SCHEDULE: CAPPUCCINOS, $c = -100$

Price of cappuccinos (*P*) / \$	Quantity supplied per day (Q_S)
10	1400
9	1250
8	1100
7	950
6	800
5	650
4	500
3	350
2	200
1	50
0	-100

Clearly, an increase in the *c* value of the supply function increases the quantity of cappuccinos produced at every price. Using the new function, Table 2.8 shows how the change in the number of suppliers has increased the quantity demanded by 100 units at every price.

These prices and quantities can be plotted on a new supply curve. Figure 2.23 shows supply shifting to the right. Because *c* represents all the *non-price* determinants of supply, a change in any one of them shifts supply outward or to the right. As a result, the *P*-intercept for supply is now at \$0.75, not \$1.33. Increased competition means producers are willing to sell cappuccinos at a lower price.

Besides an increase in the number of producers, other factors that could have caused the supply of coffee to increase include a fall in the price of inputs (cheaper coffee beans, cheaper milk, or lower wages for baristas) or a government subsidy to cappuccino producers.

On the other hand, factors that could shift supply to the left include an increase in input costs, a decrease in the number of producers, or a per unit tax levied on cappuccinos. If

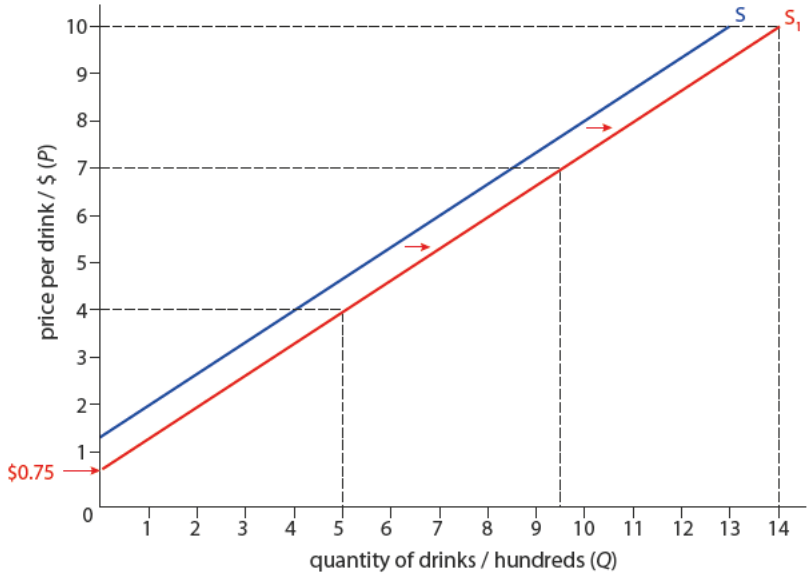


Figure 2.23
Linear supply curve: cappuccinos, $c = -100$.

any of these occur, c will decrease and the supply curve will shift to the left, reducing the quantity supplied at each price. For example, assume the new supply function is:

$$Q_S = -300 + 150P$$

Now, at every price, the quantity of drinks sold is lower. In fact, it would take a price of $2 per drink just to get firms interested in making cappuccinos (you can calculate this by setting the Q at zero and solving for P, in other words, by finding the P-intercept). This would shift supply to the left.

Thus, if any of the determinants of supply were to change, then c would change and the number of cappuccinos supplied at each price would change as well, a shift of supply to the right or left.

Changes in d

As with linear functions for demand, it is possible for the price coefficient d to change. Changes to d change the steepness of the supply curve, and thus either increase or decrease the responsiveness of producers to a change in the price. Assume, for instance, that the price coefficient increases from 150 to 200. Now, for every $1 change in price, the quantity supplied changes by 200 drinks instead of just 150. The new supply function would be:

$$Q_S = -200 + 200P$$

Quantity supplied changes for every price. These changes are shown in Table 2.9.

Having changed the price coefficient in the supply function, we can observe the change in the slope of the supply curve. In Figure 2.24, the linear supply for cappuccinos has become a less steep slope. A $1 increase in the price of cappuccinos now leads to a larger increase in the quantity supplied than in the original supply function: 200 drinks rather than just 150. The new P-intercept is:

$$0 = -200 + 200P$$
$$200 = 200P$$
$$P = 1$$

The new supply curve begins at a price of $1 as shown in Figure 2.24 (overleaf).

TABLE 2.9 LINEAR SUPPLY SCHEDULE: CAPPUCCINOS, $d = 200$

Price of cappuccinos (P) / $	Quantity supplied per day (Q_S)
10	1800
9	1600
8	1400
7	1200
6	1000
5	800
4	600
3	400
2	200
1	0
0	-200

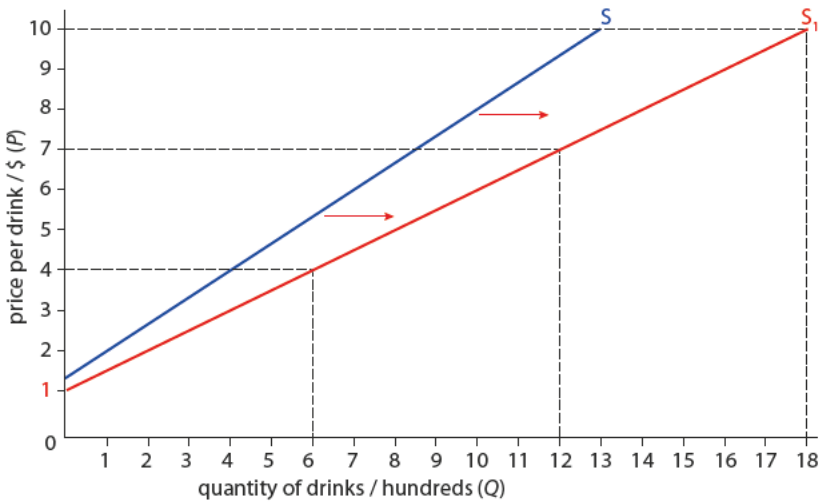


Figure 2.24
Linear supply curve: cappuccinos, d = 200.

The overall supply for cappuccinos has now become what economists call *more elastic*. You will recall that elasticity refers to the responsiveness of producers to changes in price. When the price coefficient was 150, the quantity supplied increased at a slower rate following increases in the price. But with a coefficient of 200, the quantity supplied increases more rapidly over the same range of prices.

Now, for every $1 increase in the price, producers are much more responsive and will produce 200 more drinks compared to just 150. Likewise, if the d value of the supply function were to decrease, the responsiveness of producers to price changes would decrease, and the supply curve would become steeper.

Price elasticity of supply, along with several other types of elasticity, is explained in detail in Chapter 4.

To access Worksheet 2.3 on linear supply and demand functions, please visit www.pearsonbacconline.com and follow the onscreen instructions.

HL EXERCISES

Use the linear supply function: $Q_S = -100 + 10P$

22 Create a supply schedule with prices of $10, $20, $30, $40, and $50.

23 Create a supply curve, plotting the points from your supply schedule.

24 Increase the value of c, the autonomous element of supply, by 50 units. Create a new supply schedule, with adjusted values for Q_S.

25 On your previous graph, show the new supply curve.

26 Now change the value of the price coefficient in your original supply function to +30. Calculate the prices and quantities supplied, and list them on a supply schedule.

27 Create a new diagram showing the new supply curve with its new slope.

To access Quiz 2, an interactive, multiple-choice quiz on this chapter, please visit www.pearsonbacconline.com and follow the onscreen instructions.

PRACTICE QUESTIONS

1 Explain the difference between a movement along the demand curve and a shift in the demand curve. (10 marks) [AO2], [AO4]

2 Using an appropriate diagram and your knowledge of the determinants of demand, explain why the demand for meat might increase. (10 marks) [AO2], [AO4]

3 Explain the difference between a movement along the supply curve and a shift in the supply curve. (10 marks) [AO2], [AO4]

4 Using an appropriate diagram and your knowledge of the determinants of supply, explain why the supply of rice might decrease. (10 marks) [AO2], [AO4]