

# Law of supply

Producers are people, companies or countries that make, grow or supply goods, services or resources in a market. Producers come in many forms:

- Firms who sell final goods and services or intermediate goods in the product market
- Firms who sell raw materials in the resource market
- Households who offer their services in the labour market
- Governments and other countries that produce and offer goods, services and materials, and supply workers

Supply is defined as the quantity of a good or service that producers are willing and able to offer at various prices during a specific time period, ceteris paribus.

For example, if a street vendor in Delhi sold 1000 portions of pakora in a day at a price of 10 rupees (INR) per portion, then we would say that the quantity supplied of pakora priced at INR 10 is 1000 portions per day.



**Figure 1.** The quantity supplied of pakora depends on the price, *ceteris*

ceteris paribus.

Credit: Shubham Kumbhar Getty Images

As in the case of demand, it is not enough for producers only to be *willing* to produce a good or service, they must have the finances to be *able* to produce it. This is known as effective supply and it is what a supply curve shows.

The supply is what the producer is willing and able to offer considering *only* the price of the good, ceteris paribus. As we did in subtopic 2.1 (<https://app.kognity.com/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-29721/>), for now we will assume that, other than price, all factors affecting supply stay the same, ceteris paribus. We will only focus on the relationship between the price of a good or service and the quantity that a producer is willing and able to offer. Later, we will consider other factors, such as the cost of production and changes in technology, that also affect a producer's supply.

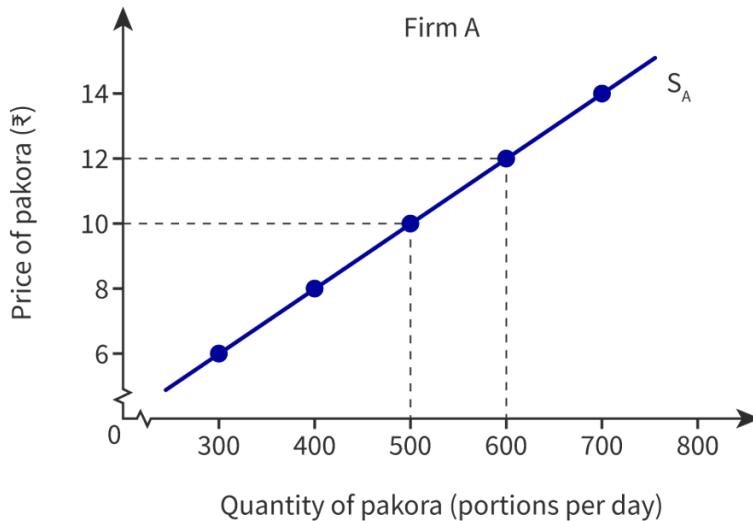
## Individual supply

The individual supply is the supply of one product from one firm at every price.

A firm's supply (firm A) can be presented in a supply schedule as shown in **Table 1**. There you can see, for example, that at a price of INR 10 per portion of pakora, firm A would sell 500 portions of pakora per day. However, if the price is higher, say at INR 12 per portion of pakora, firm A would then be willing and able to offer 600 portions of pakora per day. This data can also be plotted in a graph to give us an **individual supply curve** as shown in **Figure 2**.

**Table 1.** Supply schedule for portions of pakora per day from firm A.

Price of pakora ( INR )	Quantity supplied by firm A (portions per day)
INR 14	700
INR 12	600
INR 10	500
INR 8	400
INR 6	300



**Figure 2.** Individual supply of pakora.

[More information for figure 2](#)

The graph titled "Firm A" illustrates the relationship between the quantity of pakoras supplied and their price. The X-axis represents the quantity of pakoras in portions per day, ranging from 0 to 800. The Y-axis represents the price of pakoras in rupees, ranging from 0 to 14. A blue supply curve (labeled  $S_A$ ) starts at approximately (300, 6) and ends around (700, 14). Data points are marked at (300, 6), (400, 8), (500, 10), (600, 12), and (700, 14), showing a positive correlation, with the price increasing as the supply increases along the curve.

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The law of supply says that as the price of a product increases, the quantity supplied will usually increase, ceteris paribus. This positive relationship between the price of a product and the quantity supplied of it explains the upward slope of the supply curve.

**Figure 2** and **Table 1** both illustrate the effective supply of pakora of firm A. An increase in the price of pakora from INR 10 to INR 12 leads to *an increase in the quantity supplied* from 500 to 600 portions of pakora per day.

One reason behind the law of supply is that firms are profit driven. They seek to make the maximum profit possible. Therefore, if everything else is kept equal, higher prices generally mean that firms can make more profit, and so the firm has an incentive to produce more goods. On the other hand, lower prices may mean lower profitability so producers are motivated to produce less. As a result, there is a positive relationship between the price of the product and the quantity supplied.

### Exam tip

If you are asked on the exam about why the supply curve is upward sloping, it is not adequate to simply state the law of supply. You need to be able to explain WHY firms react to higher prices by increasing the quantity supplied of their product, *ceteris paribus*.

## Market supply

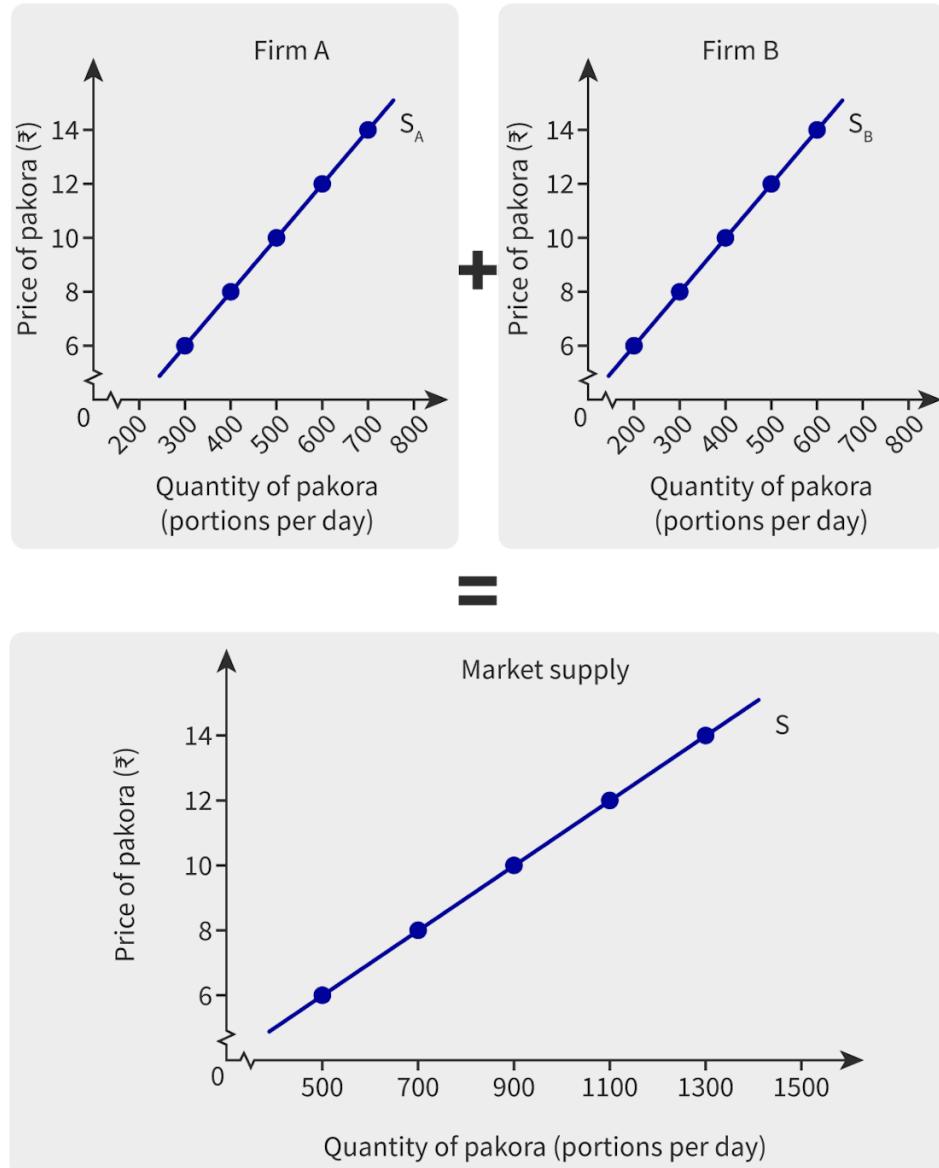
The market supply is the sum of all the individual supplies of a product at every price.

For example, **Table 2** shows the market supply for pakora composed of firms A and B. If firm A sold 500 portions of pakora per day at a price of INR 10 per portion of pakora, and firm B sold 400 portions of pakora per day at that same price, then the market supply for pakora priced at INR 10 is 900 portions of pakora per day, the sum of firm A and firm B's quantities ( $500 + 400$ ). This sum at every price level of pakora will give us the market supply. Remember that, in reality, markets like this are likely to be much larger than only two firms.

**Table 2.** Supply schedule for pakora per day.

Price of pakora (INR)	Quantity supplied by firm A (portions per day)	Quantity supplied by firm B (portions per day)	Market supply of pakora (portions per day)
INR 14	700	600	1300
INR 12	600	500	1100
INR 10	500	400	900
INR 8	400	300	700
INR 6	300	200	500

The market supply of any good can be constructed from individual supply data shown in a supply schedule such as **Table 2** or from individual supply graphs as shown in **Figure 3**.



**Figure 3.** Market supply as the sum of individual supply curves.

[More information for figure 3](#)

The image contains three graphs depicting the concept of market supply as the sum of individual supply curves, specifically two firms, Firm A and Firm B.

The first graph represents Firm A's supply curve ( $S_A$ ): - The X-axis is labeled 'Quantity of pakora (portions per day)' with values from 0 to 800 in increments of 100. - The Y-axis is labeled 'Price of pakora (₹)' ranging from 0 to 14 in increments of 2. - A linear upward trend is shown with data points marked at (200, 6), (400, 9), (600, 12), and (700, 14).

The second graph represents Firm B's supply curve ( $S_B$ ): - The axes are similar to Firm A. - A linear upward trend is shown with data points marked at (200, 6), (400, 9), (600, 12), and (700, 14).

The third graph shows the combined market supply curve (S): - The X-axis now ranges from 0 to 1500, and the Y-axis remains the same. - A linear upward trend is shown with data points at (500, 6), (900, 10), and (1300, 14), demonstrating the summation of the individual supply curves. This graph depicts the overall market supply.

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# Assumptions underlying the law of supply (HL)

As with the law of demand, there are a number of key assumptions behind the law of supply. It is important to understand these assumptions, because if there are circumstances where they do not hold true, this could affect the validity of the law of supply in some cases.

You are already familiar with one assumption behind the law of supply: *ceteris paribus*. When we claim that price increases cause an increase in quantity supplied of a good or service, we assume that all other factors that might affect supply do not change.

Two other assumptions are the law of diminishing marginal returns and increasing marginal costs of production, which are related to one another. Both of these concepts are explored in much greater detail in [subtopic 2.11](#) (<https://app.kognity.com/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-29858/>), but here we will introduce them.

## The law of diminishing marginal returns (output/product)

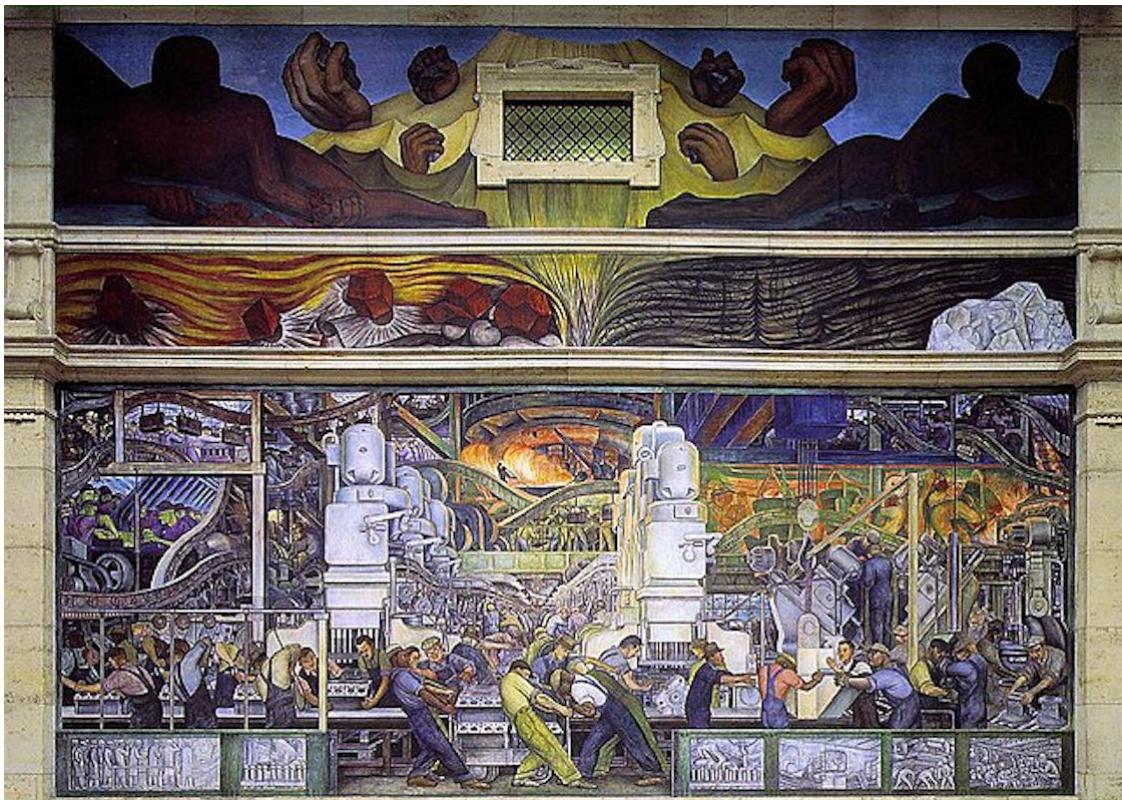
Marginal returns refers to the additional output gained from adding an additional unit of input to a production process. The law of diminishing marginal returns states that adding more of one factor of production, while holding at least one other factor of production constant, will at some point yield lower marginal returns (output/product).

For example, if a factory with fixed capital (like the building and machinery) continues to add labour resources, eventually the additional output gained with each additional worker will start to decline. This is because the additional labour resources will essentially use up the machinery and additional workers will not be as productive as previous workers. Thus, marginal returns (output/product) decline. You can see why this might be the case if you look at the Diego Rivera mural in **Figure 1**. Adding another worker to the factory would not yield as much output as previous additional workers.

## Be aware

When marginal returns (output/product) decline, this does not mean that total output is declining. It simply means that an additional unit of input (such as one worker) produces a *lower increase in output* than the previous worker. The total returns (output/product) will continue to increase until marginal returns (output/product) are zero. When marginal returns (output/product) are negative, then total returns (output/product) decline. This could happen, for example, when an additional worker gets in the way of other workers, resulting in lower *total output*.

These relationships between total and marginal values will be explored in greater depth in [subtopic 2.11 \(https://app.kognity.com/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-29858/\)](https://app.kognity.com/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-29858/).



**Figure 1.** The Diego Rivera mural.

Source: "Rivera Detroit Industry North

([https://commons.wikimedia.org/wiki/File:Rivera\\_detroit\\_industry\\_north.jpg](https://commons.wikimedia.org/wiki/File:Rivera_detroit_industry_north.jpg))".

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([https://commons.wikimedia.org/wiki/Commons:Hirtle\\_chart](https://commons.wikimedia.org/wiki/Commons:Hirtle_chart))

If marginal returns (output/product) decline, then more and more inputs will be needed to increase output. This will increase the marginal costs of production.

# Increasing marginal costs of production

Marginal cost refers to the cost of producing one more unit of a good. In perfectly competitive markets in the short run, we assume that marginal costs for a firm and for an industry increase as output increases and marginal returns decrease. A producer will therefore only want to increase the quantity supplied if she can receive a higher price in the market for selling the product. Thus, there is a positive relationship between price and quantity supplied, represented by the upward sloping supply curve. This would mean that the pakora vendor from the example in [section 2.2.1 \(https://app.kognity.com/study/app/pp/sid-186-cid-754025/book/law-of-supply-id-29868/\)](https://app.kognity.com/study/app/pp/sid-186-cid-754025/book/law-of-supply-id-29868/) would only sell more pakora if she could receive higher prices to cover the higher marginal costs of production.

The video below uses the example of oil production to illustrate the impact of increasing marginal costs of production on the quantity supplied.

The Supply Curve



## 2.2 Supply

# Movements along the supply curve and shifts in the supply curve

So far, we have examined the behaviour of producers when the price of the good or service they offer changes, and all other factors affecting supply stay constant (*ceteris paribus*). The price itself is a determinant of the quantity of a product supplied.

All other factors that influence supply are called non-price determinants of supply. These are variables that will cause the supply of a good or service to increase or decrease.



**Figure 1.** Eggs on a production line.

Credit: agnormark Getty Images

## Be aware

It is not the same to say 'supply' and 'quantity supplied'.

The term **supply** is usually used to refer to the entire supply curve of a good or service. In mathematical terms, it is a function, a set of relationships between the variables price and quantity.

**Quantity supplied** refers to a specific quantity offered by producers at a specific price. It is a number, represented by Q on the horizontal axis of a market graph.

However, you should be aware that in the media the term ‘supply’ is used more loosely. Thus, when preparing your internal assessment commentaries, you may need to pay close attention to terminology.

## Movements along the supply curve

Before going into the non-price determinants of supply, it is important to distinguish between a *movement along* the supply curve and a *shift* of the supply curve.

Whenever the price of a good changes, *ceteris paribus*, it leads to a movement along the supply curve of that good. In the interactive diagram **Figure 2**, you can observe a movement from point A on the curve to point B. When the price of e-scooter rentals in New Zealand increases from  $P_1$  to  $P_2$  NZD, the quantity supplied of e-scooter rentals increases from  $Q_1$  to  $Q_2$ , *ceteris paribus*. This is a *movement along the supply curve* from A to B. This movement shows an *increase* in the quantity supplied. On the other hand, a decrease in price from  $P_2$  to  $P_1$  would produce a *decrease* in the quantity supplied from  $Q_2$  to  $Q_1$ , and a movement from point B to point A.



**Figure 2:** A movement along the supply curve of e-scooters in New Zealand caused by a change in price.

 More information for figure 2

The interactive graph represents the relationship between price and quantity supplied for e-scooters. It includes a supply curve labeled S, showing how the quantity supplied changes in response to price. There is a slider labeled B that moves along the supply curve, demonstrating changes in quantity supplied when the price changes. The vertical axis represents the price of e-scooter rentals in New Zealand (NZD), while the horizontal axis shows the quantity of e-scooters supplied (in units).

When slider B is positioned lower on the curve, at price P<sub>2</sub> and quantity Q<sub>2</sub>, the graph shows a decrease in quantity supplied. This is illustrated by a movement down the supply curve from point A to point B.

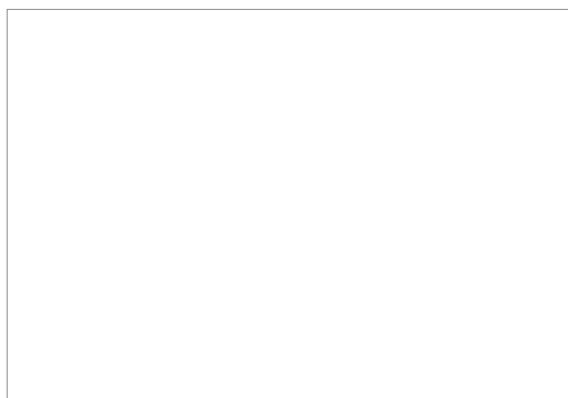
When slider B is positioned higher on the curve, at price P<sub>2</sub> and quantity Q<sub>2</sub>, the graph shows an increase in quantity supplied. This is represented by a movement along the supply curve from point A to point B.

The graph visually explains how changes in price affect the quantity of e-scooters that suppliers are willing to provide, following the law of supply.

# Shifts in the supply curve

However, a change in any other factor that is not the price of the good itself will result in a *shift* of the entire supply curve. The factor will change the entire relationship between price and quantity, represented by the supply curve.

The interactive diagram **Figure 3** shows a *shift* (change) in supply. It shows that if there is an improvement in production technology, the supply of e-scooters will increase. The supply curve shifts outwards, to the right, from  $S_1$  to  $S_2$ . This is an *increase in supply* because, at every rental price of e-scooters, firms will be willing and able to produce more of it because production technology improvements have made it easier and less expensive to produce the e-scooters.



**Figure 3.** An increase in supply of e-scooters due to improvements in production technology.

 More information for figure 3

The interactive graph represents the relationship between price and quantity supplied of e-scooters in New Zealand. The supply curve is labeled, and slider B allows movement between two different positions, showing changes in supply. The vertical axis represents the price of e-scooter rentals in New Zealand (NZD), while the horizontal axis displays the quantity supplied of e-scooters (in units).

In one position, the slider B is on the original supply curve  $S_1$  at point A, corresponding to a higher quantity  $Q_1$  at price  $P_1$ . When the slider moves to the left, it shifts to point B

on a new supply curve  $S_2$ , which represents a decrease in supply. At the same price  $P_1$ , the quantity supplied is now lower in  $Q_2$ .

In the other position, the slider B moves to the right, shifting from point A to point B on a new supply curve  $S_2$ . This represents an increase in supply, where at the same price  $P_1$ , the quantity supplied rises from  $Q_1$  to  $Q_2$ .

The graph visually demonstrates how supply changes when external factors influence the market, shifting the entire supply curve rather than just moving along it.

On the other hand, if governments decide to tax e-scooter rentals, the supply of e-scooters will decline. The interactive diagram **Figure 3** demonstrates this. The supply curve shifts inwards, to the left, from  $S_2$  to  $S_1$ . This is a *decrease in supply* because, at every rental price of e-scooters, firms will be less willing and able to produce them because taxes have added to the cost of production.

## Theory of Knowledge

Ceteris Paribus is a Latin phrase commonly used in Economics to mean “all else being equal.” We use it to indicate that only one variable can change (for example, price) while we assume that all other variables remain constant.

The assumption of ceteris paribus can simplify our study of economics ↗ (<https://www.intelligenteconomist.com/what-is-economics/>). Through ceteris paribus we can explore the relationship between price and quantity supplied while ignoring all the other factors which might complicate our research. However, in the real world, we cannot assume everything else will remain constant because we can't isolate other variables. All variables constantly change. We live in a world where technology, oil prices, wages, and many other factors are constantly changing and adjusting.

Read this article ↗ (<https://www.cnet.com/news/are-tvs-really-cheaper-than-ever-we-go-back-a-few-decades-to-see/>) to explore the falling price of TVs over the past 70 years. One of the earliest colour television sets sold in 1954 cost USD 11 875. The TV screen was a tiny 15 inches!

As the price of TVs have fallen, the quantity supplied of TVs has increased! Why do you think this might be the case?

**Knowledge question:** To what extent can economic models with extreme assumptions such as ceteris paribus represent real-life situations?

## Be aware

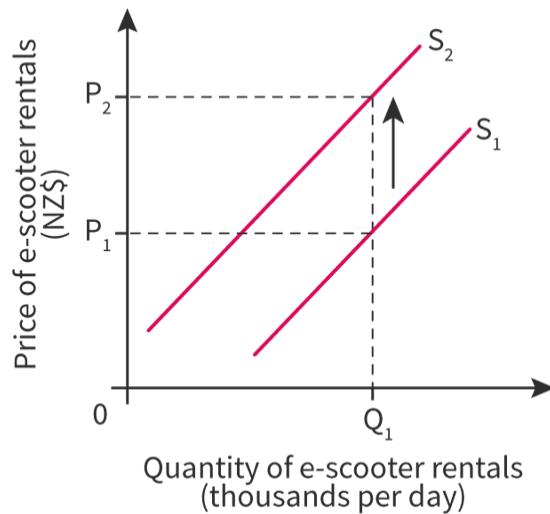
At this point in the course, you might find it challenging to show a decrease in supply graphically.

When there is a decrease in supply, it means that a firm now offers a smaller quantity of a good whose price remains the same: **Figure 4**. Alternatively, they can supply the same amount of a good as before, but now at a higher price: **Figure 5**. Both are correct ways of understanding an inward (leftward or upward) shift of the supply curve.



**Figure 4.** A decline in supply. Firms supply a lower quantity of a good,  $Q_1$  to  $Q_2$ , at the same price  $P_1$ .

ⓘ More information for figure 4



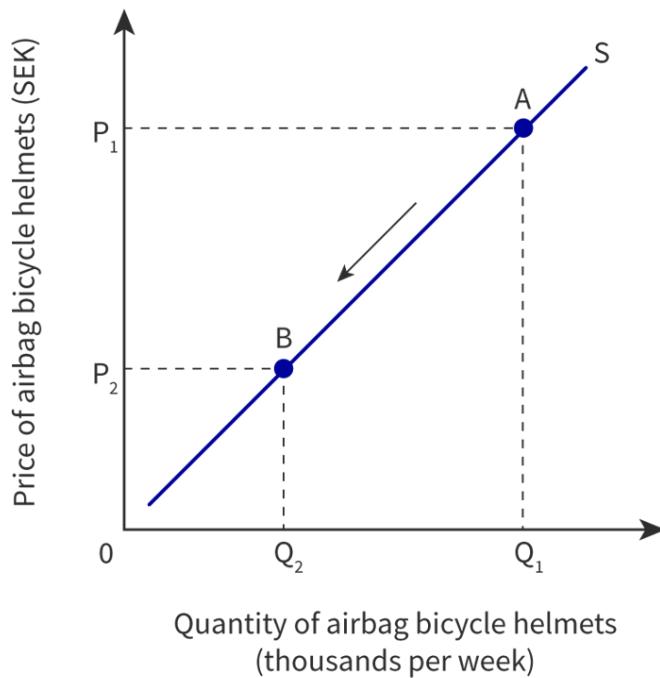
**Figure 5.** A decline in supply. Firms supply the same quantity of e-scooters  $Q_1$ , at a higher price,  $P_1$  to  $P_2$ .

ⓘ More information for figure 5

## Worked example 1

1. Draw an appropriate diagram to explain how a decrease in the price of airbag bicycle helmets in Sweden would affect the quantity supplied. Be sure to label the diagram completely. Then check the example below and compare it to yours.

1. A decrease in the price of airbag bicycle helmets would cause the quantity supplied of the helmets to decline, according to the law of supply, ceteris paribus. This is a movement along the supply curve, as shown in **Figure 4** below:



**Figure 4.** Impact of a decrease in the price of airbag bicycle helmets on quantity supplied in Sweden.



If the price of airbag bicycle helmets in Sweden decreases from  $P_1$  to  $P_2$  Swedish kronor (SEK), the quantity supplied of airbag bicycle helmets declines from  $Q_1$  to  $Q_2$ . This is a movement along the supply curve from point A to point B.

Double check! Have you:

- labelled the axes completely?
- labelled both prices?
- labelled both quantities?
- given the diagram an appropriate title?
- shown the movement from point A to point B on the supply curve?
- explained what happened above the diagram, and described the diagram with specific references to the Ps, Qs and points below it?

## 2.2 Supply

# Non-price determinants of supply: costs of production, technological change, future expectations, number of firms in the market

Any factor that shifts the entire supply curve is called a non-price determinant of supply. Whenever we look at a change in one of these factors, we assume *ceteris paribus* so that we can isolate its effects. This simplifies analysis, because otherwise it is almost impossible to identify the effect of a change in any one specific determinant of supply.

## Making connections

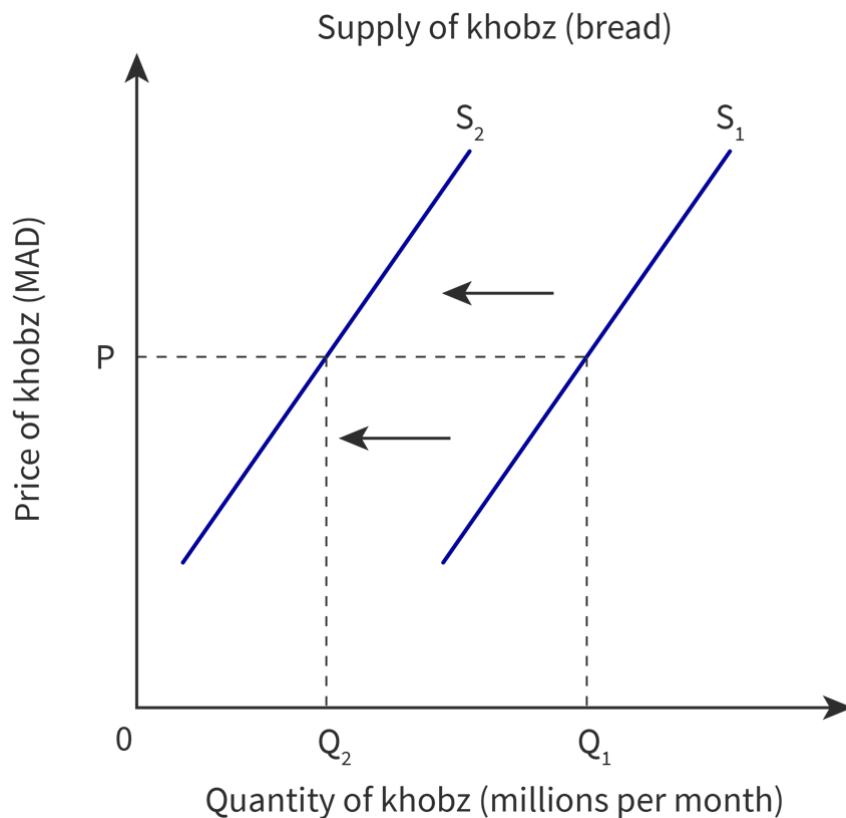
If you are taking the IBDP Business Management course, you may be familiar (or will be soon!) with STEEPLE analysis. These are the external factors (sociocultural, technological, economic, environmental, political, legal and ethical) that frame opportunities and threats for a firm in the SWOT (strengths, weaknesses, opportunities and threats) analysis.

Many of the STEEPLE factors can be considered non-price determinants of supply.

## Costs of production

Change in the cost of factors of production (FOPs) of the goods or services that firms produce is a very important factor influencing the supply.

If there is an increase in the cost of a factor of production of a good or service – for example, the cost of wheat to produce khobz (a type of bread) in Morocco – then the supply will decrease, *ceteris paribus*, shifting the supply curve inwards (to the left) as shown in **Figure 1**.



**Figure 1. Impact of increased wheat prices on the supply of khobz (bread) in Morocco.**

More information for figure 1

The graph depicts the effect of increased wheat prices on the supply of khobz (bread) in Morocco. The x-axis represents the 'Quantity of khobz' in millions per month, starting from 0 to a point beyond  $Q_2$ . The y-axis indicates the 'Price of khobz' in Moroccan Dirhams (MAD). There are two supply curves shown:  $S_1$  initially and  $S_2$  after. Both supply curves slant upwards to the right.

At price level  $P$ , there are horizontal dashed lines showing the quantity supplied at each curve: from the initial quantity  $Q_1$  (on curve  $S_1$ ) to the reduced quantity  $Q_2$  (on curve  $S_2$ ). An arrow between  $S_1$  and  $S_2$  illustrates the inward shift from  $S_1$  to  $S_2$ . This inward shift represents a decrease in supply due to an increase in production costs (wheat prices) that affects the supply of khobz. Even if the price remains at  $P$ , the quantity supplied decreases as indicated by the leftward arrows.

[Generated by AI]

As the cost of wheat increases, producing khobz becomes more expensive for bakeries, at every possible price. Supply of khobz declines from  $S_1$  to  $S_2$ . Even if the price of khobz remains the same at  $P_1$  dirhams (MAD), the quantity supplied of

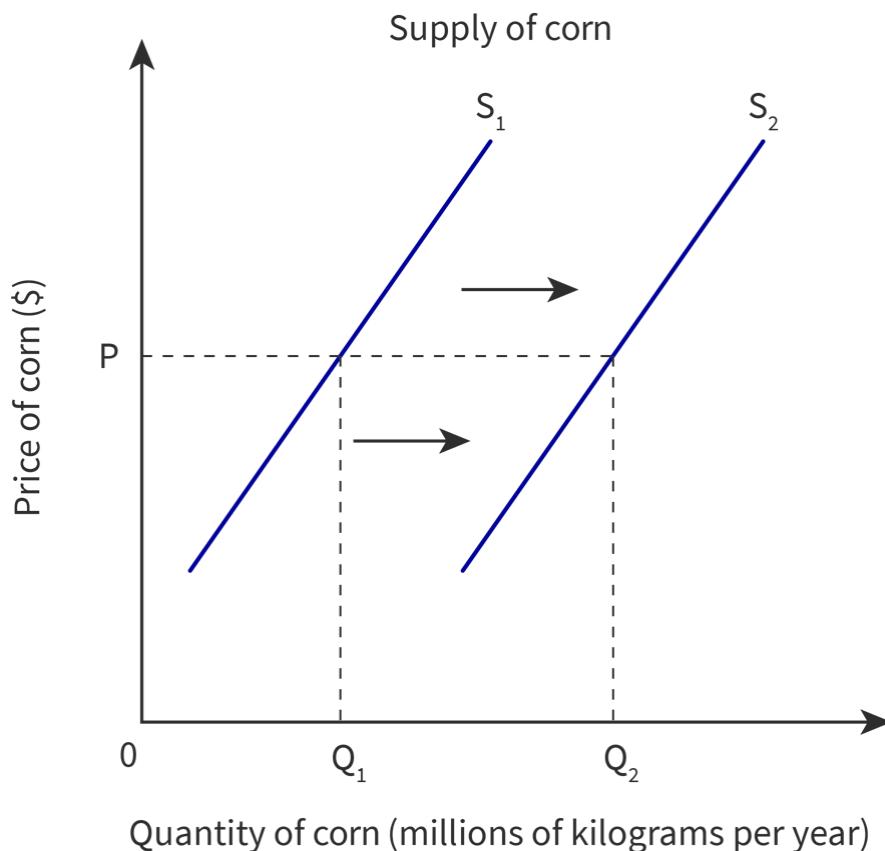
khobz declines from  $Q_1$  to  $Q_2$ .

The opposite will happen if any cost of production decreases: the supply curve shifts outwards (to the right).

## Technological change

Improvements in a firm or industry's technology can increase the supply of a good or service by increasing productivity – the quantity of output per unit of input. This could either allow production of more units of a product with the same amount of resources or production of the same number of units of a product with fewer resources.

As shown in **Figure 2**, with better technology – in this case, genetically modified seeds – the supply of corn increases from  $S_1$  to  $S_2$  at every possible price. Even if the price remains the same at  $P$ , the quantity supplied increases from  $Q_1$  to  $Q_2$ .



**Figure 2.** Impact of improved technology on the supply of corn.

[More information for figure 2](#)

The graph illustrates the impact of improved technology, such as genetically modified seeds, on the supply of corn. The X-axis represents the quantity of corn in millions of kilograms per year, starting from 0 and increasing to the right. The Y-axis represents the price of corn in dollars, increasing upwards. Initially, the supply curve is labeled as S<sub>1</sub>, and after the introduction of better technology, it shifts to S<sub>2</sub>, indicating an increased supply at every price level. For example, at a constant price level denoted as P, the quantity of corn supplied increases from Q<sub>1</sub> to Q<sub>2</sub>. This shift is highlighted with arrows pointing from S<sub>1</sub> to S<sub>2</sub> and Q<sub>1</sub> to Q<sub>2</sub>, showing the progression in supply due to technological advancements.

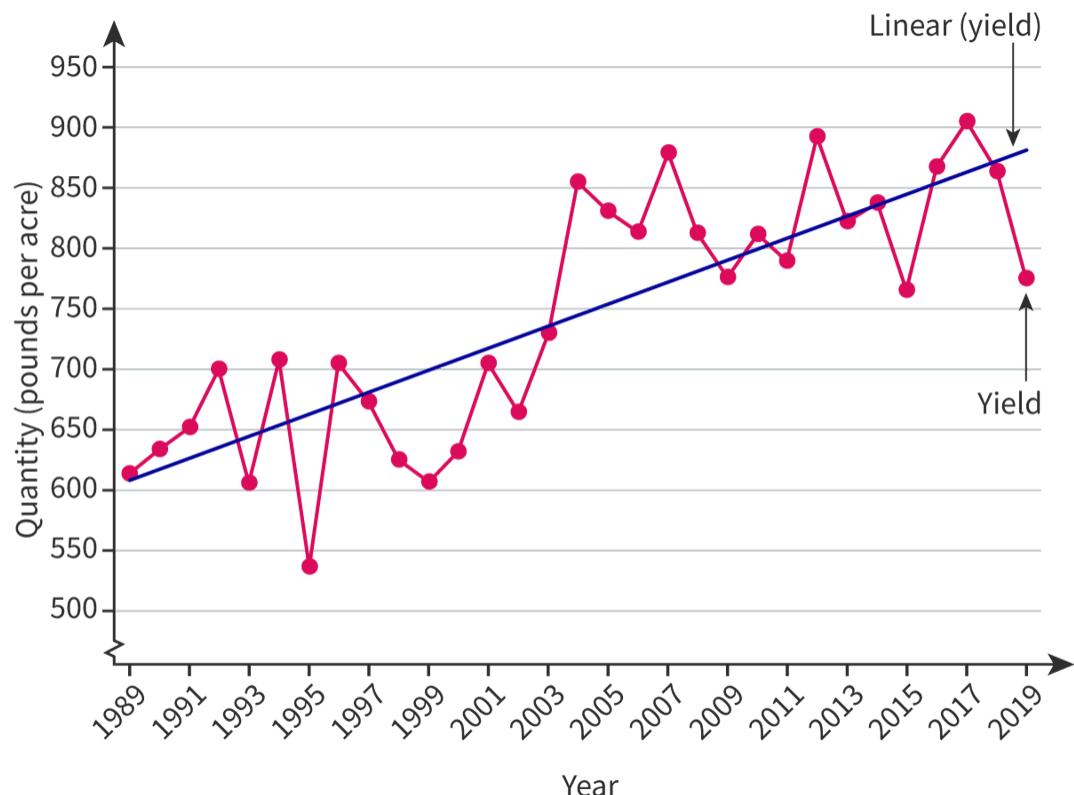
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## Case study

### Technology in the cotton industry

The United States is the third largest producer of cotton, behind China and India, but it is the world's largest exporter. Cotton has long been an important crop in the United States and its history is closely tied to the legacy of slavery.

Since World War II, cotton production in the United States has seen significant improvements in technology. Genetically modified seeds, as well as planting, harvesting and transportation technologies, have improved productive efficiency, increasing yield per acre significantly over time, as shown in Figure 3.



Source: " USDA 

([https://www.nass.usda.gov/Charts\\_and\\_Maps/Field\\_Crops/cotnyId.php](https://www.nass.usda.gov/Charts_and_Maps/Field_Crops/cotnyId.php))  
"

**Figure 3.** Improved productivity in cotton yields in the United States over time, partly due to technological improvements.

ⓘ More information for figure 3

This  (<https://apps.npr.org/tshirt/#/cotton>) short video explains how these technological improvements help one farmer produce an incredible amount of cotton on his farm .

Questions to consider:

- Draw a diagram to show the impact of one of the technologies mentioned in the video on the supply of cotton in the United States. Make sure to fully label all axes and the two supply curves.
- How might the use of these sophisticated technologies in high-income countries like the United States affect the ability of low-income countries to compete in world markets in agricultural goods?

## Future expectations

Expectations about the future can also affect the supply of goods and services.

### Expectations about future prices

If firms expect prices of the products they sell to increase in the near future, they might withhold part of their current production from the market (by not offering it for sale and storing it, also called hoarding) in the hope of being able to sell more at a higher price in the future . However, if firms expect prices of the products they sell to decrease in the near future, they might increase supply to avoid lower prices and revenues in the future.

### Expectations about the future of the economy

Business confidence is another factor that can increase or decrease the supply of goods and services.

If producers expect the economy to do well, they will expect that people will have more money to spend and that the consumption of goods and services will increase. They may increase supply to meet this possible future increase in

demand. The opposite is also true. If firms expect the economy to worsen they may decrease supply to meet the expected decrease in demand.

### Be aware

Producers' supply changes that react to expectations about future prices can actually cause the price changes they expect. For example, if producers reduce supply and hold on to it so they can sell it in the future at higher prices, this can cause price increases to happen in the market. Conversely, if producers supply more of a good in anticipation of lower prices in the future, this may cause prices to decline. Thus, expectations about future prices can be a self-fulfilling prophecy by creating a positive feedback loop. This is explored as part of the Investigation in [section 2.2.8 \(https://app.kognity.com/study/app/pp/sid-186-cid-754025/book/investigation-id-29877/\).](https://app.kognity.com/study/app/pp/sid-186-cid-754025/book/investigation-id-29877/)

## The number of firms in the market

As the market supply is the sum of all the individual supplies of a product, when the number of firms that offer the same good increases, the market supply also increases, shifting the supply curve of that good outwards (to the right).

As with the number of consumers in a market, demographic changes can also change the number of firms in a market. For example, if the population of Dhaka, Bangladesh increases through internal migration, we will likely see more restaurants opening as some of the new residents will provide those services.

# Non-price determinants of supply: prices of related goods

Just as consumers have the choice of what alternative good to purchase when the price of one changes, producers have a choice as to what good to produce.

There are two types of relationships between goods in terms of supply: joint supply and competitive supply.

## Joint supply

Joint supply occurs when two or more goods are derived from the same product, so that it is not possible to produce more of one without producing more of the other. The second good is often called a by-product.

This means that an increase in the price of one leads to an increase in its quantity supplied, according to the law of supply. This would also lead to an increase in supply of the other jointly produced products.

Animal products are an example of joint supply. A number of different animal products can be produced from one animal, such as milk and wool from a sheep. If the price of sheep milk rises and farmers increase the quantity supplied of sheep in response, it is likely that the supply of wool will also increase.



**Figure 1.** Sheep produce milk and wool, in joint supply.

Credit: Ascent Xmedia Getty Images

## Competitive supply

Competitive supply is when the production of two goods use similar resources and processes. When a supplier produces more of one good, it means producing less of the other.

Being able to produce more than one good with similar resources and production methods means that firms are more flexible to react to price changes. When the price of a particular good decreases, firms reduce the quantity supplied of that good (law of supply). In its place, the firm can easily switch to producing the other good. A fall in the price of one good results in an *increase in the supply* of the other, and vice versa.

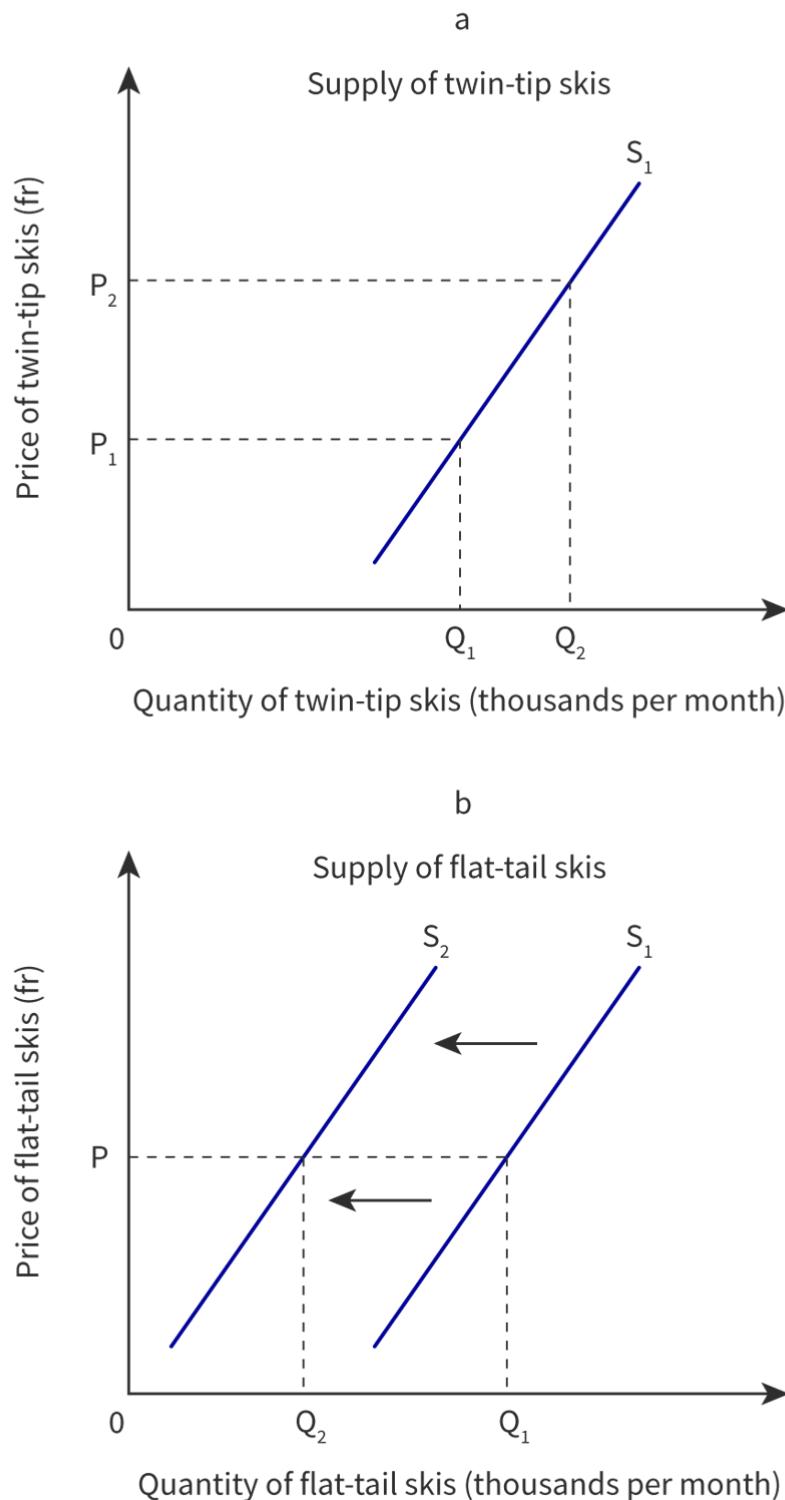
An example of competitive supply is the production of two different types of alpine skis, like twin-tip and flat-tail skis. These can be produced using very similar inputs and production processes.



**Figure 2.** Different types of skis that a producer can make using similar resources and production processes (skis at top are twin-tip, skis at bottom are flat-tail).

Source: "Skis Freeride Allmountain Piste", by Chianti is licensed under the CC BY-SA 3.0 Unported (<https://creativecommons.org/licenses/by-sa/3.0/deed.en>)

As twin-tip skis gain popularity and their prices rise (due to the higher demand for them), producers will probably be attracted by the higher prices they can charge and supply more twin-tip skis, according to the law of supply. This means they will switch their production away from flat-tail skis, causing the supply of them to decline. These related situations are illustrated in **Figure 3**.



**Figure 3.** Different types of skis that a producer can make using similar resources and production processes ((a) skis at top are twin-tip; (b) skis at bottom are flat-tail).

🔗 More information for figure 3

The image contains two graphs depicting the supply curves for twin-tip and flat-tail skis.

Graph (a): - Y-axis represents the price of twin-tip skis in Swiss francs. - X-axis indicates the quantity of twin-tip skis supplied, in thousands per month. - The supply line labeled as S<sub>1</sub> indicates initial supply conditions. The line shifts to the right, indicating an increase in supply, as the price increases from P<sub>1</sub> to P<sub>2</sub>. The quantity supplied moves from Q<sub>1</sub> to Q<sub>2</sub>.

Graph (b): - Y-axis represents the price of flat-tail skis in Swiss francs. - X-axis shows the quantity of flat-tail skis supplied, in thousands per month. - The initial supply line S<sub>1</sub> shifts to the left, showing a decrease in supply. The quantity supplied decreases from Q<sub>1</sub> to Q<sub>2</sub> due to a decrease in demand, while price remains constant at P.

These graphs illustrate the economic principle of supply adaptation in response to market demand changes.

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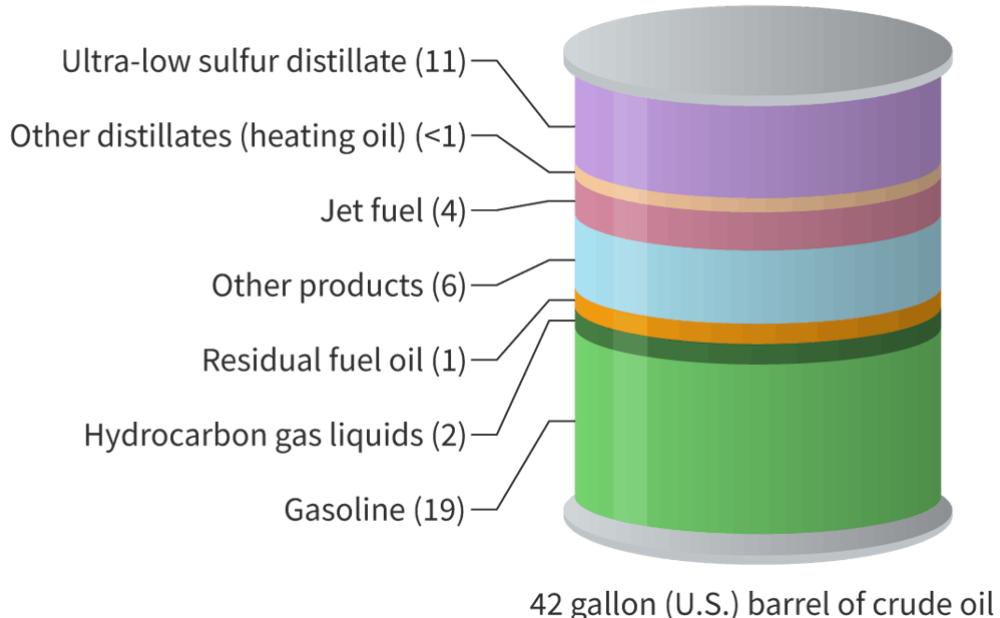
In **Figure 3 (a)**, the price of twin-tip skis in Switzerland has increased from P<sub>1</sub> to P<sub>2</sub> Swiss francs. As a result, ski manufacturers increase the quantity supplied of twin-tip skis from Q<sub>1</sub> to Q<sub>2</sub>.

In **Figure 3 (b)**, as Swiss ski manufacturers produce more twin-tip skis, they will be less willing and able to produce flat-tail skis. Supply of flat-tail skis declines from S<sub>1</sub> to S<sub>2</sub>. Even if the price remains the same at P<sub>1</sub> Swiss francs, the quantity supplied will decline from Q<sub>1</sub> to Q<sub>2</sub>.

### Worked example 1

Crude oil contains hundreds of different types of hydrocarbons all mixed together. You have to separate the different types of hydrocarbons to have anything useful. Oil refining separates the different products.

Different hydrocarbon chain lengths have different boiling points, so they can be separated by distillation. This is what happens in an oil refinery: in one part of the process, crude oil is heated and the different chains are pulled out at their vaporisation temperatures. Each different chain length has a different property that makes it useful in an individual way, producing the various products that come from crude oil, including petrol (gasoline), jet fuel and heating oil.



**Figure 4.** Petroleum products made from a barrel of crude oil, 2018.

 More information for figure 4

This image is a diagram illustrating the different petroleum products derived from a 42-gallon barrel of crude oil. The barrel is divided into sections, each labeled with a type of petroleum product and its corresponding volume in gallons.

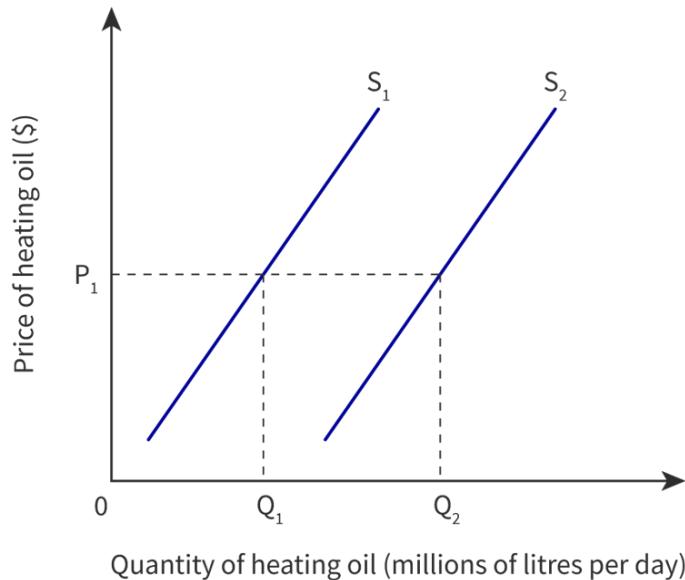
- The bottom section represents gasoline, which accounts for 19 gallons.
- Above it, there is a layer for hydrocarbon gas liquids, making up 2 gallons.
- Next, there is a slim section for residual fuel oil, represented by 1 gallon.
- Other products form a 6-gallon segment above the residual fuel oil.
- The following section is for jet fuel, which accounts for 4 gallons.
- There is also a small section for other distillates (heating oil), less than 1 gallon.
- The topmost segment is for ultra-low sulfur distillate, which is 11 gallons.

The diagram uses different colors to distinguish between these sections, but the colors are not essential for understanding. Lines and labels connect each segment to text outside the barrel, listing the product type and volume.

[Generated by AI]

1. Draw an appropriate diagram and use it to explain what would happen to the supply of heating oil if the price of petrol (gasoline) increased. Make sure to use terminology from this section in your response.

1. If the price of petrol (gasoline) increased, this would cause an increase in the quantity supplied of petrol, ceteris paribus. As firms increase the quantity supplied of petrol, the joint supply of by-products like heating oil will increase. This is shown in **Figure 5**.



**Figure 5. Impact of the increased price of petrol (gasoline) on the supply of heating oil.**



The supply of heating oil increases from  $S_1$  to  $S_2$ . Even if the price of heating oil remains the same at  $P_1$ , the quantity supplied increases from  $Q_1$  to  $Q_2$ .

Double check! Have you:

- labelled the axes completely?

- labelled the original supply curve  $S_1$  and the new supply curve (after price increase for petrol)  $S_2$ ?
- labelled one price?
- labelled two quantities,  $Q_1$  corresponding to  $S_1$  and  $Q_2$  corresponding to  $S_2$ ?
- given the diagram an appropriate title?
- explained what happened above the diagram, and described the diagram with specific references to the Ss, P, and Qs below it?

# Non-price determinants of supply: government intervention

Governments intervene in markets to change supply in order to achieve goals associated with the price or quantity of goods in markets. The most common methods of government intervention are regulations, indirect taxes and subsidies.

## Making connections

Government intervention will be analysed and evaluated in much greater detail in subtopic 2.7 (<https://app.kognity.com/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-29874/>) and subtopic 2.8 (<https://app.kognity.com/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-29875/>). For now, we will just introduce basic concepts to see the impacts on supply.

## Indirect taxes

An indirect tax is a tax imposed on a good or service. It adds to the selling price. It is typically paid to the government by a producer or supplier, though some of the burden of the tax may be paid by the consumer. An example of an indirect tax is the fuel tax imposed by many countries, some of which are shown in **Figure 1**.

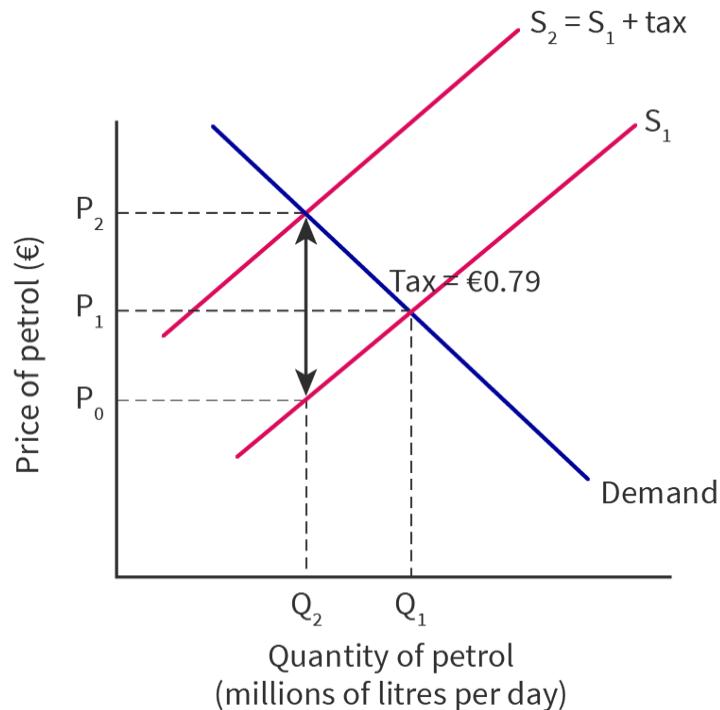


© More information

Source: " Europa.eu ↗ ([https://www.eea.europa.eu/data-and-maps/daviz/road-fuel-excise-duties-6#tab-chart\\_1](https://www.eea.europa.eu/data-and-maps/daviz/road-fuel-excise-duties-6#tab-chart_1)) "

When indirect taxes are imposed or increased, the costs of production for firms increase, causing supply to decline as shown in **Figure 2**. On the other hand, the elimination of a tax, or reduction of an existing tax, results in a decline in production costs and causes an increase in supply. For example Germany has reduced indirect taxes on train travel with the aim of increasing supply and lowering prices for consumers.

**Figure 2** shows the effect of the Netherlands imposing a EUR 0.79 tax per litre of petrol (gasoline). The supply curve shifts back from  $S_1$  to  $S_2$  because the producer/supplier considers the tax to be a cost of production that reduces its willingness and ability to supply fuel. The tax will drive up prices from  $P_1$  to  $P_2$  and induce consumers to use less petrol from  $Q_1$  to  $Q_2$ . The vertical distance between  $S_1$  and  $S_2$ , measures the size of the tax ( $P_0$  to  $P_2$ ) which in this example is EUR 0.79.



**Figure 2.** The impact of an indirect tax on supply of petrol (gasoline) in the Netherlands.

[More information for figure 2](#)

The graph illustrates the effects of a €0.79 tax per litre on petrol in the Netherlands. The X-axis represents the quantity of petrol (measured in millions of litres per day), and the Y-axis indicates the price of petrol in euros (€).

Two supply curves are displayed:  $S_1$ , the initial supply curve, and  $S_2$ , representing the supply after the tax is imposed. The demand curve remains constant.

The initial equilibrium is at the intersection of demand and S1, showing a quantity of Q1 and a price of P1. After the tax is applied, the supply curve shifts to S2, resulting in a new equilibrium with a reduced quantity Q2 and a higher price P2.

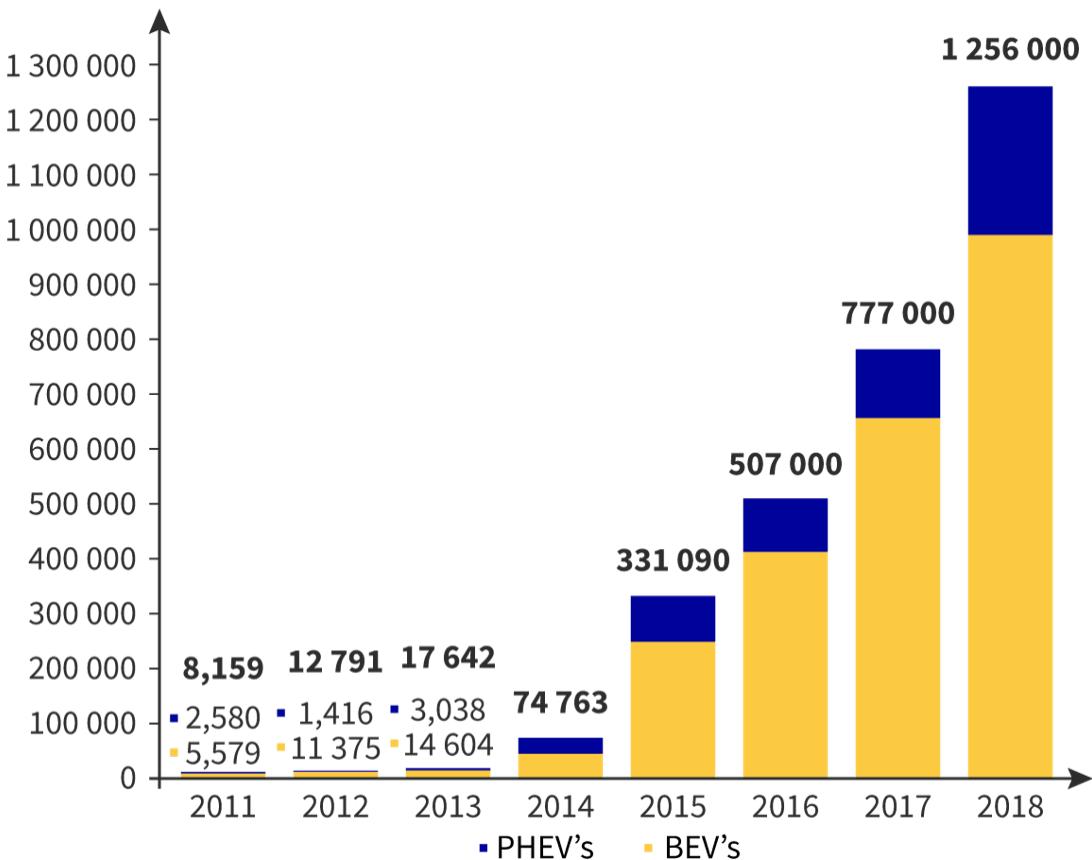
The vertical distance between S1 and S2 measures the size of the tax, which is €0.79. Lines are drawn from these points to the axes to show the changes in quantity and price after the tax is imposed.

[Generated by AI]

## Subsidies

A subsidy is an amount of money granted by the government to a firm or industry. Subsidies have the opposite effect of a tax. When the government gives a subsidy to a firm it reduces the firm's costs of production, increasing the supply of the good or service. The supply curve will shift downwards by the amount of the subsidy.

Governments have many reasons to give subsidies to specific firms. For example, in the case of education and healthcare, a subsidy will reduce the cost of production of these services and reduce the price that consumers have to pay for them, so that more people may have access to these important services. China has been giving subsidies to electric car manufacturers to help them increase production. **Figure 3** shows that the effect on the market has been substantial.



Source: "PEV Registrations China from 2011"

([https://commons.wikimedia.org/wiki/File:PEV\\_Registrations\\_China\\_from\\_2011.png](https://commons.wikimedia.org/wiki/File:PEV_Registrations_China_from_2011.png))

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**Figure 3.** Subsidies have had a substantial impact on the market for battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEV) in China.

More information for figure 3

The image is a bar chart illustrating the number of plug-in electric vehicle (PEV) registrations in China from 2011 to 2018. The X-axis represents the years from 2011 to 2018, and the Y-axis represents the number of PEV registrations in hundreds of thousands. Each bar is split into two segments: a blue section representing PHEVs (Plug-in Hybrid Electric Vehicles) and a yellow section representing BEVs (Battery Electric Vehicles). The data above each bar shows the total number of registrations for that year. - 2011: Total 8,159 (PHEV: 2,580, BEV: 5,579) - 2012: Total 12,791 (PHEV: 1,416, BEV: 11,375) - 2013: Total 17,642 (PHEV: 3,038, BEV: 14,604) - 2014: Total 74,763 (PHEV: 5,377, BEV: 69,386) - 2015: Total 331,090 (PHEV: 87,531, BEV: 243,599) - 2016: Total 507,000 (PHEV: 98,191, BEV: 408,809) - 2017: Total 777,000 (PHEV: 123,702, BEV: 653,298) - 2018: Total 1,256,000 (PHEV: 211,702, BEV: 1,044,298)

The chart indicates a rapid increase in PEV registrations over the years, with significant growth starting in 2014, suggesting that subsidies may have impacted these numbers.

[Generated by AI]

# Regulations

Governments can introduce regulations on goods and services. A regulation is a rule made by the government that requires certain behaviour of individuals, firms or other groups. Regulations can be introduced, for example, to protect consumers, to protect workers' health and safety, or to protect the environment.

These rules and requirements usually increase the costs of production for firms. An example would be a regulation to use air and water filters in a production process in order to avoid harmful pollution. If firms are regulated to produce in a more environmentally friendly way, their costs of production will increase and the supply curve will shift inwards (leftwards/upwards), reducing supply.

## Case study

### Singapore's increased regulation of e-scooter rental firms

E-scooters are electric scooters, powered by batteries that can be recharged. E-scooter rentals have exploded in major cities around the world. The supply of them has increased dramatically. Often governments were unprepared for the e-scooter market and did not have appropriate regulations in place. For example, it was not always clear where the e-scooters could be driven. Should they be allowed on pavements (sidewalks) with pedestrians, or only in roads and/or bike lanes?



**Figure 4. Regulations on e-scooters.**

Source: "Regulations on e-scooters

(<https://www.flickr.com/photos/doctorow/4845896777/>)" by Cory

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Singapore's is one government that has recently increased regulations on e-scooters. After fires blamed on e-scooter charging stations and the death of an elderly cyclist after an accident with an e-scooter, public anger about the devices increased and the government reacted in 2019 with tough new laws that included a ban on e-scooters on all footpaths. Those who break the law could be put in prison for three months and fined.

Source: Adapted from Singapore targets e-scooters after accidents

(<https://theaseanpost.com/article/singapore-targets-e-scooters-after-accidents>), The Asean Post.

Consider this question:

- Economic theory says that increased regulations affect supply. Will that be true of the regulations mentioned above?

## Activity

Now that you know a number of determinants of supply, make yourself a mind map to practise retrieving and organising the information, including appropriate examples.