

Demand and Supply

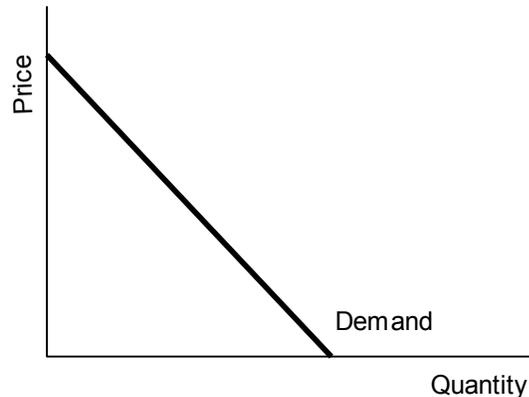
I. Demand Defined

A. Demand is defined as follows: demand shows how much a consumer or consumers are willing and able to buy (known as quantity demanded) given the price, ceteris paribus.

B. The law of Demand

The law of demand simply acknowledges that price and Q_D are inversely related. That is, as price increases then Q_D decreases, ceteris paribus, and the reverse. Hence, the relationship is as shown in Graph 1.

It is not too surprising to most of us that consumers, people like you and I, buy less of a good, all else equal, as the good's price increases and the reverse. That is because we observe ourselves acting in this manner when we make purchases.



Graph 1

Although unsurprising, it tends to be more difficult for us to identify exactly why consumers respond by increasing their purchases of a good when its price falls. There exist two reasons:

- Substitution effect

When the price of a good falls, ceteris paribus, individuals tend to buy more of that good because the price has become less expensive relative to that good's *substitutes*. A good is a substitute in consumption for another good if the goods fulfill the same basic purpose. Hence, when the price of apples falls, then people tend to buy more apples and fewer of apples' substitutes, such as oranges and bananas. The reverse is true as well for a price increase of a good.

- Income Effect

When the price of a good falls, ceteris paribus, individuals tend to buy more of that good because they have more money. They don't have more money directly, since other effects, such as their actual income, are being held constant, but they do have more money indirectly. That is, with the lower price, the individual consumer can afford to buy exactly the same amount of all goods as before and have money remaining. Then, with the remaining money the consumer will buy more of all goods, including the good whose price fell. (This assumes that the good is a "normal" good, defined in more detail below.) The reverse would happen for a price increase.

Another question to address is whether or not the price being referred to in the law of demand is the absolute or the relative price of the good. Recall that these two types of prices were defined in the first chapter on [scarcity and other terms](#). The absolute or monetary price just equals the actual dollars paid for the good. The relative price, on the other hand, equals the price of the good relative to prices for other goods or resources.

As we found out previously, even though the absolute price of a good increases, the relative price of the good does not necessarily also increase. For example, if the price of a good like apples doubled, but all other prices also doubled, then the price of apples relative to all other goods would remain constant. For relative price to change, then, either (1) the absolute price of the good must change while other absolute prices remain constant or (2) the absolute price of the good must change more or less than other absolute prices.

Recall that the law of demand states that when the price of a good rises (or falls) that the quantity demanded of that good will fall (or rise), *ceteris paribus*. Also recall that *ceteris paribus* means that everything else, including the prices for other goods, is held constant. Hence, when the price of apples rises, and prices for other goods like oranges remain constant, quantity demanded for apples decreases because the price of apples has changed relative to other goods like oranges. Hence, it is relative and not the absolute or monetary price that matters here. If relative prices remain constant then consumers would not change their consumption patterns. You can see this by simply asking yourself if your consumption patterns would change if your income doubled at the same time that prices for all the goods you consume also doubled.

C. Market Demand

Recall that a market is a place, whether geographically defined or otherwise, where exchange occurs. Market demand for a good, then, refers to the demand by not just a single consumer but by all consumers in the given market. Hence, the definition is similar to that given above for demand generally: how much are all consumers in the market willing and able to buy (quantity demanded) given the price, *ceteris paribus*.

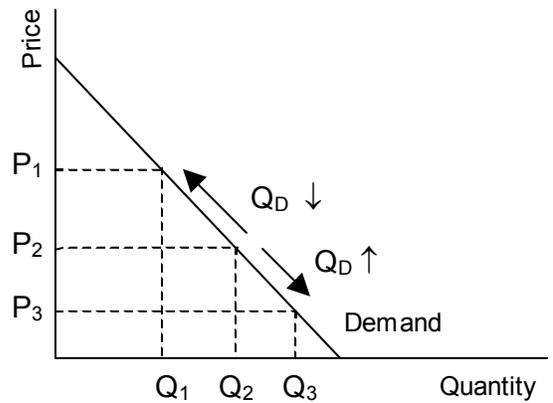
It is also important to note that one can also obtain market demand by looking at the individual consumer demand curves for those consumers in the given market. If three people, say, are in the market and at the price of \$10, these three people individually demand 4, 8, and 15 units of the good respectively, then market quantity demanded at a price of \$10 equals 27 ($4 + 8 + 15$). Hence, market demand can be found by summing up the individual consumers' quantities demanded at each possible price.

II. Other Influences on Demand

In section I we identified the important role that a good's price has upon demand for that good by an individual consumer or consumers as a whole in a market. In that section, we looked only at the impact of price upon demand by holding other impacts constant in both our definition of demand and in our discussion of the law of demand. However, other variables obviously do influence consumers' decisions on how much of a good

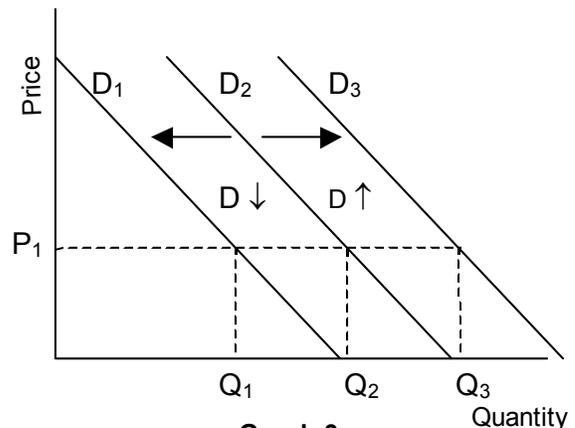
they are willing and able to buy. This section discusses each of the other types of variables that generally have an impact on demand.

Although the price of the good and the other variables, to be discussed below, both have an impact upon demand, the impact is not exactly the same. The demand curve itself is defined, as noted above, in terms of the relationship between the price of the good and quantity demanded. Hence, a change in the price of the good simply causes a movement along an existing demand curve. For example, in graph 2, when the price falls from P_2 to P_3 then the quantity demanded rises from Q_2 to Q_3 on the same demand curve. As a result, changes in the price of the good, representing a move along a given demand curve, are referred to as a change in quantity demanded. An increase in quantity demanded is caused by a decrease in price while a decrease in quantity demanded is caused by an increase in price.



Graph 2
Change in Quantity Demanded

However, when something else besides the price of the good changes the quantity that consumers are willing and able to buy then the demand curve itself must change. In this case even though the price of the good remains constant then the quantity will either rise or fall as shown in Graph 3. When the other factor causes the Demand to shift to the right, as it does when the demand moves from D_2 to D_3 , then this is referred to as an increase in Demand. This is because, at the same price of P_1 the quantity that consumers will buy increases from Q_2 to Q_3 . Likewise, when the other factor causes the Demand to shift to the left, as it does when the Demand moves from D_2 to D_1 , then this is referred to as a decrease in Demand. This is because, at the same price of P_1 the quantity that consumers will buy decreases from Q_2 to Q_1 .



Graph 3
Change in Demand

A. Tastes and Preferences

Tastes and Preferences refer to the fact that individuals have different likes and dislikes. Some, like the professor, simply do not like some goods like peanut butter often because of highly subjective reasons. However, such preferences can change either individually or collectively for the market as a whole (although such change for markets tends to occur only slowly over time.) Hence, if one were to say that preferences for a good increased then, ceteris paribus, this would tend to cause demand for that good to increase (shift right) and the reverse were preferences for the good to fall.

B. Income

What is the impact that a change in income, either rising or falling, have upon the quantity that a consumer is willing and able to purchase, given the price? Actually, no consistent impact occurs because empirically consumers behave differently dependent upon the type of the good.

- Normal Goods

For a normal good as income increases then the consumer ends up buying more of the good at the same price and, hence, Demand increases (shifts right.)

- Inferior Goods

However, for some goods consumers respond to an increase in income by actually decreasing their consumption of the good, all else equal. Most of us can think of a few goods for which we would, or have, respond to changes in income in this manner. These goods are known as inferior goods and for those goods, an increase in income leads to a decrease in Demand (shifts left.)

What makes a good normal or inferior? That is an individual choice for consumers. However, there are some goods that are viewed by a large number of people as either normal or inferior. For example, when asked in class, students commonly mention raman noodles as an inferior good for them. In any event, the true test of whether a given consumer regards a good as normal or inferior lies in his or her actual behavior – does their demand increase or decrease when their income rises?

C. The Prices of Related Goods

As mentioned above during our discussion of the law of demand, goods are often related to each other for consumers. There are two ways in which goods may be related in consumption.

- Substitutes in Consumption

Two goods are substitutes in consumption if they fulfill the same basic purpose for the consumer. For many consumers apples and oranges are examples of goods that are substitutable. This does not mean that the goods must have no real differences, however, for them to be substitutes. Two goods may be good substitutes or poor substitutes. In fact, sometimes two goods are considered to be perfect substitutes. For perfect substitutes, even though the goods may have different attributes, the consumer simply does not care at all about those differences. Take, for example, the pens that I use to write on the board (or overhead). I use a number of different colors, black and blue being the most common colors. To me, as a consumer, I don't care about the color. My main purpose is to convey information to the student. In this case, black and blue pens are, for me, perfect substitutes.

- Complements in Consumption

Two goods are complements in consumption if they are generally consumed together. For many consumers, cars and gasoline are goods that are consumed together. Like substitutes, two goods may be either good or poor complements. If they are perfect complements this means that the two goods are always consumed together, usually in some fixed proportion. For most consumers, right shoes and left shoes are examples of perfect complements. They are so often consumed together that it is difficult to buy the two goods separately.

The decision as to whether goods are substitutes, complements, or unrelated is, again, a decision made by each consumer individually. Consider now the impact of the change in the price of one good upon the Demand for another good. That impact depends upon how the goods are related in consumption.

- Unrelated in Consumption

When two goods are unrelated in consumption, that is neither substitutes nor complements in consumption, then the change in the price of one good will have no impact on the demand for the other good.

- Substitutes in Consumption

When two goods are substitutes in consumption, then a rise in the price of one good will increase Demand (shift right) for the other good and the reverse for a decrease in the price of the first good. This happens because the consumer(s) can substitute from the consumption of one good to the consumption of the other. If, for example, apples and oranges are substitutes, then a rise in the price of apples will cause oranges to become more desirable because of their lower price relative to apples. As a result, the consumer will buy more of the relatively cheaper oranges, increasing the demand for oranges.

- Complements in Consumption

When two goods are complements in consumption, then an increase in the price of one of the goods will decrease the Demand (shift left) for the other good and the reverse for a decrease in the price of the first good. This happens because the two goods are consumed together. Hence, an increase in the price of the first good causes the consumer(s) to decrease their consumption of the first good. However, since the goods are consumed together, this also leads to a decrease in demand for the second good as well.

Students often find it difficult to differentiate between the opposite impact that changes in prices of substitutes and complements in consumption have upon demand. However, since we all are consumers, we actually know more about how consumption works than we often think. The easiest way to differentiate between the two impacts is to apply that experience in understanding the differences. For example, to understand the impact of the change in the price of a substitute good on another good, think of two goods that are substitutes for you. Then ask yourself how you would respond if the price for a good rose or fell in the quantity you would buy of that good's substitute. Do the same thing for complements.

D. The Number of Demanders (Buyers) in the Market

Recall that market demand is found by summing up all of the quantity demanded by individuals in the market at the various prices. Clearly, then, if the number of individuals in the market increases, then this sum will also increase, thereby increasing market demand (shift right.) A decrease in the number of demanders in the market would have the opposite impact of decreasing demand (shift left.)

E. Expectations About the Future

Expectations about the future by the individual consumers can have a powerful impact upon their willingness to buy a given good in the present. Although we will focus upon the impact that expectations about future prices for the good have upon current demand, other types of expectations could also have an impact upon current demand.

If consumers expect that the price of a good will rise in the future, then demand now will increase (shift right.) Likewise, when consumers expect that the price of the good will decrease in the future, then demand now will decrease (shift left.)

To understand this phenomenon, consider the possibility that you, or any other consumer, can forego consumption of a good today in favor of consumption of the same good in the future. That is, consumption of the good in the future is a substitute for consumption of the good now. Suppose that you expect that the price of the good will rise in the future. In that case, consumption now has become cheaper relative to the future. As a result, you will tend to consume more now, when it is cheaper, and less in the future. Hence, your demand now will increase (shift right).

The reverse would be true if you expect that the price of the good will decrease in the future. Now the good has become relatively more expensive in the present, as compared to the future. As a result, you would tend to buy less now in favor of the less expensive future consumption. Hence, your demand now will decrease (shift left.)

III. Change in Demand vs. Change in Quantity Demanded

Above, we discussed a number of ways in which demand might be changed. We made a distinction between changes in the price of the good, which caused a movement along a given demand curve versus changes in other variables that cause the whole demand curve to change. It is important to be able to make the distinction between the two types of changes. Consider the following question:

Which of the following will not increase the demand for cars:

- A. A decrease in the price of cars.
- B. A decrease in the price of gasoline (a complimentary good).
- C. An increase in the price of city buses (a substitute good).
- D. An expectation that prices of cars will increase in the future.
- E. All of the above will increase the demand for cars.

The correct answer to the question is A – a decrease in the price of cars. However, approximately half of most students when asked this type of question on a test will answer E. This is because the students are not making a distinction between an increase in quantity demanded and an increase in demand. The question, as worded, does not ask, as most students think it does, which of the following will not cause people to buy more cars. If that were the case, then the correct answer is selection E. Regardless of the method by which purchases of cars go up, in each case purchases of cars do rise.

However, the question is asking a much more specific question than just whether or not the purchases of cars rises. Rather, it is asking whether or not the purchases of cars are rising because of a shift right in the demand curve. And, because a decrease in the price of cars does not shift the demand curve to the right, the correct answer is selection A.

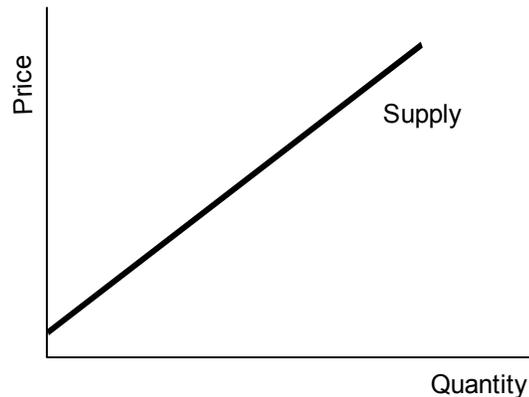
This type of questions highlights the importance of clearly differentiating between movements along a given demand curve, representing changes in quantity demanded, from shifts in the actual demand curve, representing changes in demand. Graphs 2 and 3 above illustrate these two types of changes. Please make sure that you clearly understand the distinction.

IV. Supply Defined

- A. Supply is defined as follows: the supply curve shows how much a firm or firms are willing and able to produce and sell (known as quantity supplied) given the price, ceteris paribus.
- B. The Law of Supply

The law of supply simply acknowledges that price and Q_S are directly related. That is, as price increases then Q_S also increases, ceteris paribus, and the reverse. Hence, the relationship is as shown in Graph 4.

The reason why the supply curve is upward sloping is less obvious than is the explanation for the law of demand. However, its explanation hinges upon two crucial observations about firms and production, previously discussed in our discussion of [the production possibility model](#) and [market systems](#).



Graph 4

First, recall that we assumed in our discussion of the actors in the market that firms' goal is to maximize profits. Second, the law of increasing opportunity cost notes that, as the production of a good increases, so must its cost. Although the discussion of this law was for opportunity cost the same is true for production costs and for similar reasons. Also recall that the cost in question is not total costs of production but the cost of producing one extra unit of output.

Hence, the cost of producing an extra unit of output must rise as production increases. Since the firm is a profit maximizer, the firm would only be willing to produce more output if it receives a higher price to cover the higher costs. Thus, for profit maximizing firms and, given increasing costs, then as price increases so does quantity supplied.

C. Market Supply

Just as with market demand, market supply represents the behavior of all the firms in the market. Hence, market supply measures how much all firms in the market are willing and able to supply (quantity supplied) given the price, ceteris paribus.

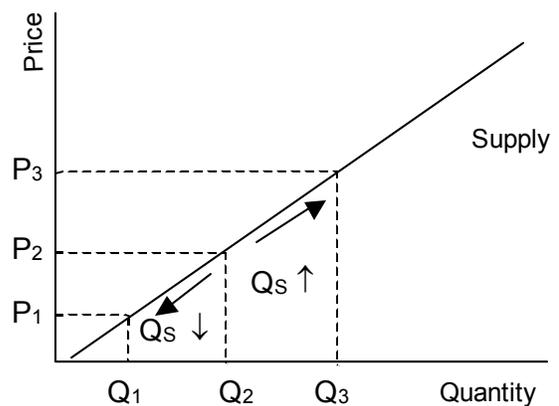
One can obtain market supply by examining the individual firm supply curves for all the firms in the market. If three firms are in the market, one willing to supply 30 units, one 25 units, and one 15 units at a price of ten dollars, then the total market supply at that price would be 70 (30 + 25 + 15). Hence, the market supply is found by summing up the individual firms' quantities supplied at each possible price.

V. Other Influences on Supply

Above, we identified the important role that price has in determining the quantity that a firm or firms are willing and able to supply. Although the price of good is an important determinant of quantity supplied, it is not of course the only variable that has an impact upon supply. This section discusses each of the other types of variables that have an impact upon supply.

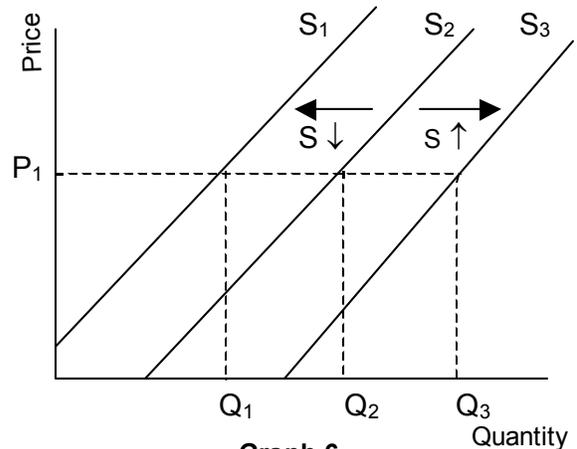
Similar to our discussion of demand, although both price and these other variables have an impact upon supply, the impact is not exactly the same. The supply curve itself, as noted above and shown in graph 4, is defined in terms of the relationship between price and quantity supplied. Hence, a change in the price of a good simply causes a movement along a given supply curve.

For example, graph 5 shows that an increase in quantity supplied represents a movement up a given supply curve, from say price P_2 to price P_3 where quantity supplied increases from Q_2 to Q_3 . A decrease in quantity demanded would be caused by the price decreasing, say from P_2 to P_1 .



Graph 5
Change in Quantity
Supplied

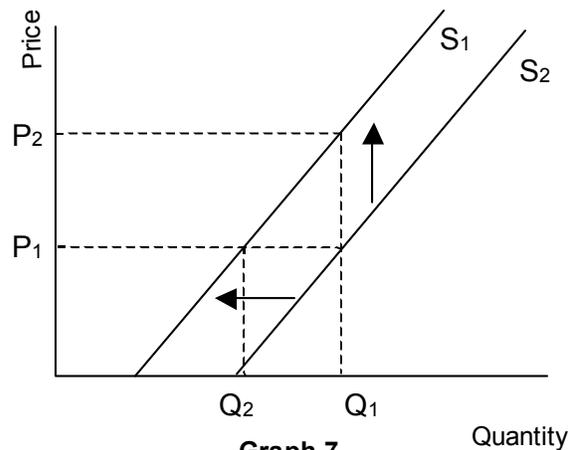
When some other variable, besides the price of the good, changes that affects the supply curve, however, it does so not by a movement along an existing curve but by shifting the curve itself. Similar to demand, in this case the quantity firms are willing and able to supply changes, even though the price itself remains constant. When the other factor causes the supply curve to shift to the right, which causes firms to be willing to increase the amount they supply at the same price, this is called an increase in supply. Thus, at a price of P_1 in Graph 6, when the supply curve shifts right from S_2 to S_3 , then quantity increases from Q_2 to Q_3 . Just the reverse, when the other factor causes the supply curve to shift to the left, to reduce the amount the firms are willing to supply at the same price, this is called a decrease in supply. This occurs in the graph when the supply curve shifts left from S_2 to S_1 , where at a price of P_1 , the amount supplied decreases from Q_2 to Q_1 .



Graph 6
Change in Supply

A. Costs of Production

The impact that costs of production have upon a firm's supply curve is relatively straightforward. Recall from our discussion of the law of supply that higher per unit costs (sometimes called "marginal costs") as production increases combined with profit maximization cause supply curves to be upward sloping. Thus, profit-maximizing firms require higher prices to compensate for higher production costs.



Graph 7

This phenomenon is illustrated in Graph 7. At the same quantity, Q_1 , when production costs increase then the firm will require a higher price, P_2 , to compensate. But this move up to a new supply curve, S_1 . But this move up to a new supply curve is the same as a shift left of the supply curve, which as we discussed above represents a decrease in supply. That is, at the same price of P_1 , the firm would respond by reducing the quantity that it supplied from Q_1 to Q_2 .

Thus, we can conclude that an increase in production costs will cause a decrease in supply (shift left). Likewise, a decrease in production costs will cause an increase in supply (shift right).

The next relevant question is to inquire into what will cause production costs for a firm to change. There are two basic reasons why production costs change:

- Changes in the Prices of Inputs

The impact of input prices on production costs is relatively straightforward. An increase in the wage the firm must pay to labor, for example, will all else equal increase production costs. Hence, an increase in input prices will increase production costs, which in turn will decrease supply (shift left). Likewise, a decrease in input prices will decrease production costs, which will in turn increase supply (shift right).

- Changes in Technology

Recall from our discussion of production earlier that an increase in technology means that either production increases with the same level of resources or that fewer resources are needed to produce the same level of output. Clearly, if fewer resources are needed to produce the same level of output when technology increases then production costs will fall causing supply to increase (shift right). Likewise, production costs will rise when technology decreases, causing supply to decrease (shift left.)

B. The Prices of Related Goods

Similar to demand where goods are related in consumption, goods are also often related in production. There are two ways in which goods may be related in production:

- Substitutes in Production

Recall that two goods are substitutes in consumption if they fulfill the same purpose for the consumer. That is, consumers will readily substitute consumption of one good for consumption of its substitute. The idea is similar for substitutes in production with one essential difference – here the focus is production and the producer or the firm. Firms don't consume goods; they produce goods. Hence, the substitution must occur in such a way that it is relatively easy for the firm to stop producing one good and to begin producing its substitute.

Production requires the use of resources and when a firm stops producing one good and begins producing another good it must switch resources from the production of one good to its substitute. Thus, the essential issue involved in whether goods are substitutes is whether it is relatively easy to switch the resources previously used in the production of the first good to the production of the second good. The easier it is to do this, the better substitutes are the two goods.

For example, the resources used to produce wheat and barley are relatively similar. As a result, wheat and barley are substitutes in production. However, because the resources used to produce wheat and cars are not at all similar, these goods are not substitutes in production.

- Complements in Production

Recall that complements in consumption refer to two goods that are generally consumed together by the consumer. Similarly, complements in production refer to two goods that are produced together. However, complements in production specifically refer to goods that are produced together because the production process determines that such is the case and not because the firm chooses to produce two dissimilar goods.

Put another way, complements in production are joint products or byproducts. Either an increase in the production of one good will automatically increase the production of its complement or, at the very least, doing so will decrease the costs of producing its complement. For example, an increase in the production of gasoline will increase the production of other goods, like kerosene and motor oil. This is because gasoline is produced by refining crude oil. The refining process produces a fixed proportion of a number of products including gasoline, kerosene and motor oil.

Students often confuse complements or substitutes in consumption for those in production. For example, while right shoes and left shoes are complements in consumption are they also complements in production? After all, when a firm produces an extra right shoe it always produces an extra left shoe. Although true, this is not because such is an inevitable result of the production process itself but because of consumer demand for whole pairs of shoes. Thus, right and left shoes are not complements in production. Thus, don't confuse goods being related in consumption to the same goods being related in production. The relevant question is whether the firm can easily switch from producing one good to the other (substitutes in production) or produce one good as a byproduct of the production of another (complements in production.)

How does the change in the price of one good impact the supply curve? That impact depends upon how the goods are related in production.

- Unrelated in Production

When two goods are unrelated in production, that is the two goods are neither substitutes nor complements in production, then a change in the price of one good has no impact on the supply for the other good.

- Substitutes in Production

When two goods are substitutes in production, an increase in the price of one good will cause the firm to decrease the supply of its substitute (shift left) and the reverse should the price decrease. This happens because when the price of the good increases, the firm will stop producing its substitute, which has a relatively lower price now, in order to increase its production of that good (law of supply). Thus, when the price of wheat increases, farmers respond by producing more wheat and less barley, so that the supply of barley decreases.

- Complements in Production

When two goods are complements in production, an increase in the price of one good will cause the firm to increase the supply of its complementary good (shift right) and the reverse should the price decrease. This happens because when the price of the good increases, the firm increases the production of that good (law of supply). However, the production of the two goods is complimentary – that is, as the production of one increases, one also produces more of the second good as a byproduct. Hence, when the price of gasoline increases, the firm responds by refining more crude oil to produce more gasoline. But as part of the refining process, the firm must also produce more kerosene, thereby increasing the supply of kerosene.

C. The Number of Suppliers (firms) in the Market

Recall that market supply is found by summing up all of the quantities supplied by the individual firms in the market at the various prices. Clearly, then, if the number of firms in the market increases, then this sum will also increase, thereby increasing market supply (shift right.) A decrease in the number of firms in the market would have the opposite impact, decreasing the market supply.

D. Expectations about the Future

As with demand, expectations about the future can have a powerful impact upon supply. This is especially true of expectations about future prices.

For example, if suppliers expect that the price of a good will rise in the future, then supply now will decrease (shift left.) Likewise, when firms expect that the price of the good will fall in the future, then supply now will increase (shift right.)

Similar to demanders considering buying a good now or in the future, firms are considering the possibility of selling their production now versus the future. Comparing an expected higher price in the future to a current lower price, all else equal, the firm is more likely to sell less now so that supply decreases, in order to sell more in the future for a higher expected price. The reverse would be true for an expected lower price.

VI. Change in Supply vs. Change in Quantity Supplied

Similar to our discussion of the differences between changes in demand versus changes in quantity demanded above, the same distinction holds for supply curves as well. Graphs 5 and 6 illustrate the differences between these two concepts. There are, for example, two separate and different ways in which the quantity that firms are willing and able to sell may increase: (1) the price of the good may increase, causing quantity supplied to increase or (2) the supply curve may increase, shifting the supply curve to the right, causing an increase in the quantity purchased to increase even though the price of the good has remained constant.

Again, consider the following question:

Which of the following will not increase the supply of cars:

- A. An increase in the price of cars.
- B. An increase in technology.
- C. A decrease in the wage rate.
- D. A decrease in the price of trucks (substitutes in production).
- E. All of the above will increase the supply of cars.

The correct answer to this question is A, and not because an increase in the price of cars does not result in an increase in the quantity of cars produced. However, this is not the question. Rather, the question asks which of the following will not increase supply – that is shift the supply curve to the right. And an increase in the price of cars does not shift the curve, but moves us to along a given supply curve.

This is another question that highlights the importance of differentiating between movements along a demand or supply curve (change in quantity demanded or quantity supplied) versus shifts in the entire demand or supply curve (change in demand or supply.) Please make sure that you clearly understand the distinction.

VII. Demand and Supply as Flow Variables (vs. Stock Variables)

A flow variable is any variable that is measured over a period of time, while a stock variable is any variable that is measure at a point in time. For example, a store's inventory is a stock variable since it is measured at a particular point in time. However, sales of that stock in the store, which change the inventory, is a flow variable. This is because sales are measured over a period of time – a day, a week, a month, or longer.

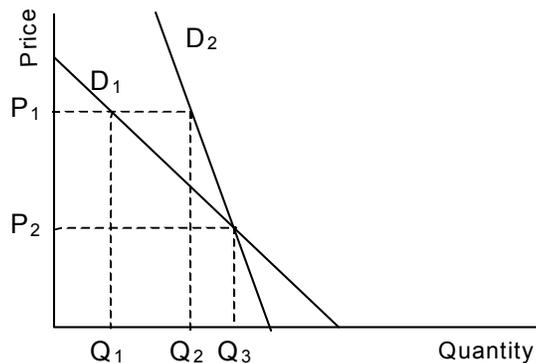
Most flow variables represent changes in a related stock variable. The simplest example of this is the water in a lake or pond. The amount of water in the lake is a stock variable, measured at a point of time – sometimes measured in acre-feet of water (an acre foot of water is the volume of water needed to cover an acre of land to a depth of one foot.) The streams flowing into or out of the lake are flow variables and are measured over a period of time. The streams will, over time, change the stock of water in the lake. One common way to measure stream flows is by measuring how many cubic feet of water pass a given point in a fixed amount of time.

Now that we understand the difference between flow and stock variables, what are demand and supply? Furthermore, why do we care? To understand the answers to both of these questions, focus on the activities underlying both demand and supply. Those activities are consumption for demand and production for supply. Both production and consumption take time to complete, sometimes a great deal of time. For example, the production of a building may take as long as a number of years for a large complicated building. Because both production and consumption take time, they are flow variables and not stock variables. As a result, both demand and supply are flow variables as well.

Why do we care? For flow variables, the amount of time during which we are measuring the variable will affect the outcome. Consider, for example, demand for a good such as gasoline. Suppose the price of gasoline doubles, what will happen to the quantity

demand of gasoline? We know from experience and from the law of demand that the quantity demanded of gasoline will fall and why. Quantity demanded falls, recall, because as the price of gas rises, consumers respond by buying less gas and more of its substitutes. But we don't know how much it falls. How much it falls depends upon the time period in question. When the time period is short, say the consumption occurring in a given day, people do not have as much time to obtain substitutes for gas as its price rises. As a result, quantity demanded would not fall very much. However, as the time period lengthens into a week, a month or longer, people have more opportunities to find other substitutes for their consumption of gas. Perhaps they can move closer to their employment, buy a more fuel-efficient car, etc. All of these things allow the quantity demanded to fall more in the longer-run than it does in the shorter-run.

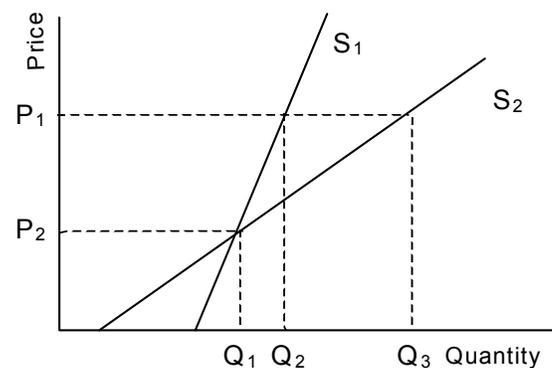
This point is illustrated in Graph 8. Suppose that the price starts at P_2 , but then increases to P_1 . In the short-run, when consumers do not find it as easy to substitute out of the use of the good, then the quantity demanded would only decrease to Q_2 . However, in the longer-run, with more substitutes available, then quantity demanded would decrease to Q_1 . Hence, the short-run demand curve is steeper (demand curve D_2) than the flatter long-run demand curve, D_1 .



Graph 8

Just as time affects demand curves, it also affects supply curves and in a similar way but not for exactly the same reason. Again, consider an increase in the price of good such as fish. When the price of fish doubles, then consider the response by the commercial fisherman. Of course, the firm would want to increase production, but changing production takes time because of the need to increase the use of resources. Some resources would be relatively easy to change in a short period of time. But other resources are more difficult to change. Perhaps it would be easy to hire more workers for the firm's boat, but more difficult to have a new boat built. As a result, the longer the time period the quantity supplied would increase more in the longer-run than in the shorter-run.

This point is illustrated in Graph 9. When the price increases from P_2 to P_1 , then quantity supplied only increases a small amount in the short-run, from Q_1 to Q_2 . However, in the longer-run, as the firm can change more of their inputs in the production process, the quantity supplied increases even more, all the way to Q_3 for the same price increase. As a result the short-run supply curve is steeper (supply curve, S_1) than in the long-run, curve S_2 .



Graph 9