

## Chapter 3 Lecture - Where Prices Come From: The Interaction of Demand and Supply



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## What Determines the Price of a Smartwatch?

### Demand for smartwatches

- How many smartwatches do *consumers* want to buy?
- Affected by *price of the smartwatches*
- Affected by *other factors*, including prices of other goods

### Supply of smartwatches

- How many smartwatches are *producers* willing to sell?
- Affected by *price of the smartwatches*
- Affected by *other factors*, including prices of other goods

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## Our Model of a Market

To analyze the market for smartwatches, we need a model of how buyers and sellers behave.

The model we use in this chapter is a **perfectly competitive market**, a market with (1) many buyers and sellers, (2) all firms selling identical products, and (3) no barriers to new firms entering the market.

While these assumptions are quite restrictive, the model is still useful for analyzing many markets.

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## The Demand Side of the Market

We list and describe the variables that influence demand.

We begin our analysis of where prices come from by investigating how buyers behave.

- We refer to this as **market demand**, the demand by all the consumers of a given good or service.

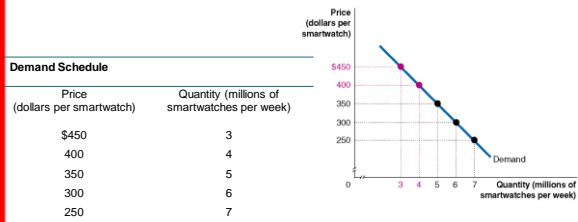


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# Chapter 3 Lecture - Where Prices Come From: The Interaction of Demand and Supply

Figure 3.1 A Demand Schedule and a Demand Curve (1 of 3)



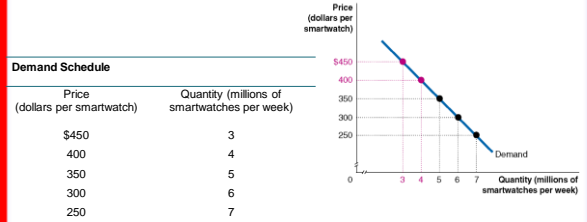
**Demand schedule:** A table that shows the relationship between the price of a product and the quantity of the product demanded.

**Demand curve:** A curve that shows the relationship between the price of a product and the quantity of the product demanded.

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Figure 3.1 A Demand Schedule and a Demand Curve (2 of 3)



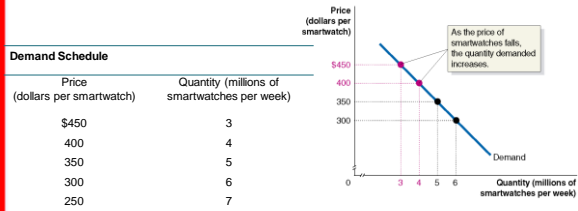
When drawing the demand curve, we assume *ceteris paribus*.

***Ceteris paribus*** (“all else equal”) **condition:** The requirement that when analyzing the relationship between two variables—such as price and quantity demanded—other variables must be held constant.

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Figure 3.1 A Demand Schedule and a Demand Curve (3 of 3)



**Quantity demanded:** The amount of a good or service that a consumer is willing and able to purchase at a given price.

**Law of Demand:** A rule that states that, holding everything else constant, when the price of a product falls, the quantity demanded of the product will increase, and when the price of a product rises, the quantity demanded of the product will decrease.

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## What Explains the Law of Demand?

When the price of a good falls, two effects take place:

1. Consumers *substitute* toward the good whose price has fallen.
2. Consumers have more purchasing power, which is like an increase in *income*.

We call these the *substitution effect* and the *income effect*.

**Substitution effect:** The change in the quantity demanded of a good that results from a change in price, making the good more or less expensive relative to other goods that are substitutes.

**Income effect:** The change in the quantity demanded of a good that results from the effect of a change in the good's price on a consumers' purchasing power.

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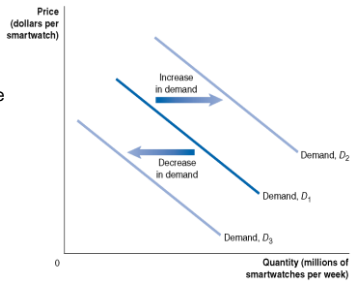
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Figure 3.2 Shifting the Demand Curve (1 of 2)

A change in something other than price that affects demand causes the entire demand curve to shift.

A shift to the right ( $D_1$  to  $D_2$ ) is an *increase in demand*.

A shift to the left ( $D_1$  to  $D_3$ ) is a *decrease in demand*.



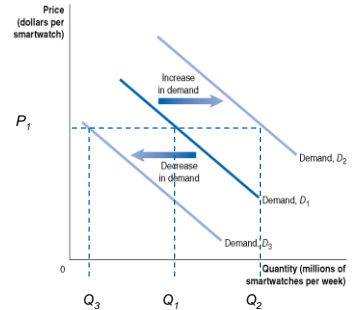
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Figure 3.2 Shifting the Demand Curve (2 of 2)

As the demand curve shifts, the quantity demanded will change, *even if the price doesn't change*.

The quantity demanded changes at every possible price.



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## What Factors Influence Market Demand?

### Income

- Increase in income increases demand if product is *normal*, decreases demand if product is *inferior*.

### Prices of related goods

- Increase in price of related good increases demand if products are *substitutes*, decreases demand if products are *complements*.

### Tastes

### Population and demographics

### Expected future prices

We will discuss how each of these affects demand.

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## Changes in Income of Consumers

**Normal goods:** Goods for which the demand increases as income rises and decreases as income falls.

*Examples:* Clothing  
Restaurant meals  
Vacations

**Inferior goods:** Goods for which the demand increases as income falls and decreases as income rises.

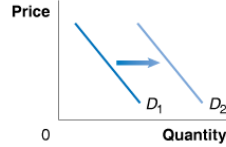
*Examples:* Second-hand clothing  
Ramen noodles

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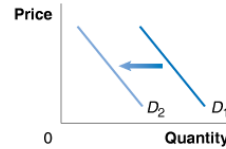
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### Effects of Changes in Income

An increase in income would increase the demand for clothing, *ceteris paribus*.



However the same increase in income would likely *decrease* the demand for second-hand clothing.



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### Changes in the Price of Related Goods

**Substitutes:** Goods and services that can be used for the same purpose.

Examples: *Big Mac and Whopper*  
*Ford F-150 and Dodge Ram*  
*Jeans and Khakis*

**Complements:** Goods and services that are used together.

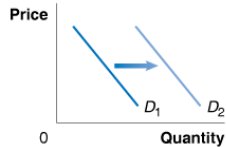
Examples: *Big Mac and McDonald's fries*  
*Hot dogs and hot dog buns*  
*Left shoes and right shoes*

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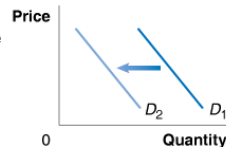
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### Effects of Changes in the Price of Related Goods

An increase in the price of a Big Mac would increase the demand for Whoppers.



However the same increase in the price of a Big Mac would *decrease* the demand for McDonald's fries.



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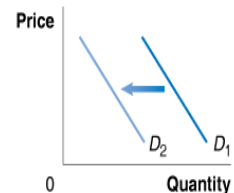
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### Changes in Tastes

**Tastes**

If consumers' tastes change, they may buy more or less of the product.

Example: *If consumers become more concerned about eating healthily, they might decrease their demand for fast food.*



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### Changes in Population/Demographics

**Demographics:** The characteristics of a population with respect to age, race, and gender. Increases in the number of people buying something will increase the amount demanded.

*Example: An increase in the elderly population increases the demand for medical care.*



### Changes in Expectations about Future Prices

Consumers decide *which* products to buy and *when* to buy them.

- Future products are *substitutes* for current products.
- An expected *increase* in the price tomorrow *increases demand today*.
- An expected *decrease* in the price tomorrow *decreases demand today*.

*Example: If you found out the price of gasoline would go up tomorrow, you would increase your demand today.*



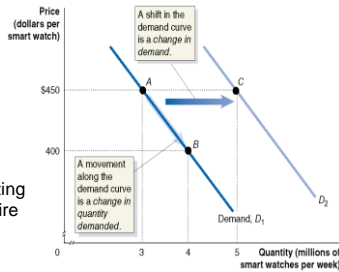
### Be Careful to Distinguish Between a Change in Demand vs. Change in Quantity Demanded

A change in the price of the product being examined causes a movement along the demand curve.

- This is a *change in quantity demanded*.

Any other change affecting demand causes the entire demand curve to shift.

- This is a *change in demand*.



### The Supply Side of the Market

We list and describe the variables that influence supply.

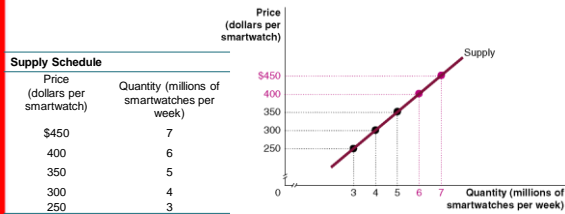
There are some similarities, and some important differences between the demand and supply sides of the market.

In this section we examine the *market supply*, i.e. the decisions of (generally) firms about how much of a product to provide at various prices.



# Chapter 3 Lecture - Where Prices Come From: The Interaction of Demand and Supply

Figure 3.4 A Supply Schedule and Supply Curve (1 of 2)



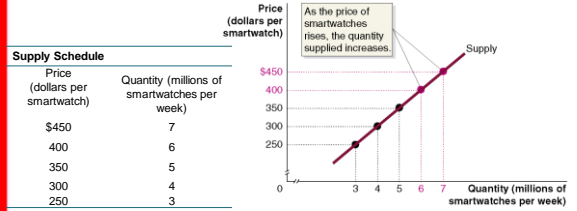
**Supply schedule:** A table that shows the relationship between the price of a product and the quantity of the product supplied.

**Supply curve:** A curve that shows the relationship between the price of a product and the quantity of the product supplied.

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Figure 3.4 A Supply Schedule and Supply Curve (2 of 2)



**Quantity supplied:** The amount of a good or service that a firm is willing and able to supply at a given price.

**The law of supply:** The rule that, holding everything else constant, increases in price cause increases in the quantity supplied, and decreases in price cause decreases in the quantity supplied.

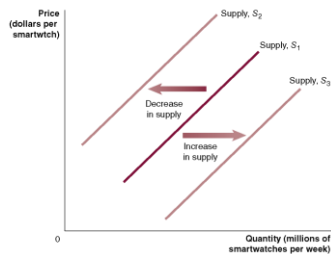
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Figure 3.5 Shifting the Supply Curve (1 of 2)

A change in something other than price that affects supply causes the entire supply curve to shift.

- A shift to the right ( $S_1$  to  $S_3$ ) is an *increase in supply*.
- A shift to the left ( $S_1$  to  $S_2$ ) is a *decrease in supply*.



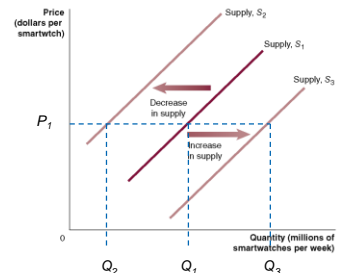
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Figure 3.5 Shifting the Supply Curve (2 of 2)

As the supply curve shifts, the quantity supplied will change, *even if the price doesn't change*.

The quantity supplied changes at every possible price.



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### What Factors Influence Market Supply?

- Prices of inputs
- Technological change
- Prices of substitutes in production
- Number of firms in the market
- Expected future prices

We will discuss how each of these affects supply.

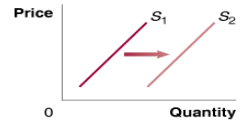
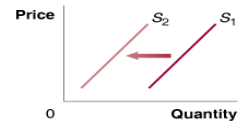
### Change in Prices of Inputs

Inputs are things used in the production of a good or service.

For a smartwatch, inputs include the computer processor, plastic, and labor.

An increase in the price of an input decreases the profitability of selling the good, causing a decrease in supply.

A decrease in the price of an input increases the profitability of selling the good, causing an increase in supply.

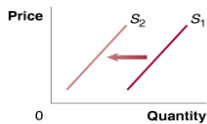
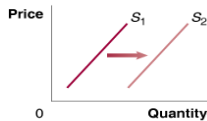


### Technological Change

A firm may experience a positive or negative change in its ability to produce a given level of output with a given quantity of inputs. We call this a **technological change**.

Examples:

- A new, more productive variety of wheat would increase the supply of wheat.
- Governmental restrictions on land use for agriculture might decrease the supply of wheat.



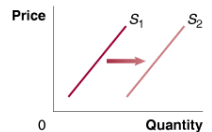
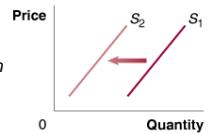
### Prices of Related Goods in Production

Many firms can produce and sell alternative products.

Example: An Illinois farmer can plant corn or soybeans. If the price of soybeans rises, he will plant (supply) less corn.

Sometimes, two products are necessarily produced together.

Example: Cattle provide both beef and leather. An increase in the price of beef encourages more cattle farming, and hence increase the supply of leather.

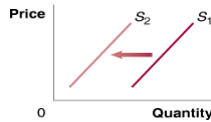
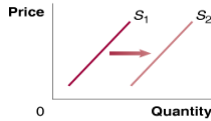


### Number of Firms and Expected Future Prices

More firms in the market will result in more product available at a given price (greater supply).

Fewer firms → supply decreases.

If a firm anticipates that the price of its product will be higher in the future, it might decrease its supply today in order to increase it in the future.



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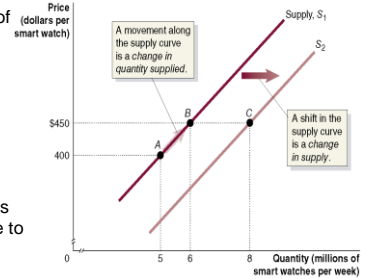
Figure 3.6 A Change in Supply versus a Change in Quantity Supplied

A change in the price of the product being examined causes a movement along the supply curve.

- This is a *change in quantity supplied*.

Any other change affecting supply causes the entire supply curve to shift.

- This is a *change in supply*.



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### Market Equilibrium: Putting Demand and Supply Together

We use a graph to illustrate market equilibrium.

**Market equilibrium** is a situation in which quantity demanded equals quantity supplied.

Recall that markets with many buyers and sellers are perfectly competitive markets; a market equilibrium in one of these markets is called a **competitive market equilibrium**.

There are ~25 firms selling smartwatches; we will assume this is enough to generate competitive behavior in the market for smartwatches.

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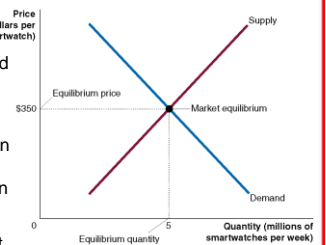
### Figure 3.7 Market Equilibrium

At a price of \$350,

- consumers want to buy 5 million smartwatches, and
- producers want to sell 5 million smartwatches.

We say the *equilibrium price* in this market is \$350, and the *equilibrium quantity* is 5 million smartwatches per week.

Since buyers and sellers want to trade the same quantity at the price of \$350, we do not expect the price to change.



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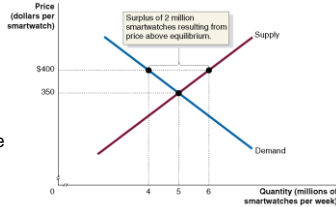
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**Figure 3.8 The Effect of Surpluses and Shortages on the Market Price (1 of 2)**

What if the price were \$400 instead?

- At a price of \$400,
- consumers want to buy 4 million smartwatches, while
  - producers want to sell 6 million.



This gives a **surplus** of 2 million smartwatches; a situation in which quantity supplied is greater than quantity demanded.

Prediction: sellers will compete amongst themselves, driving the price down.

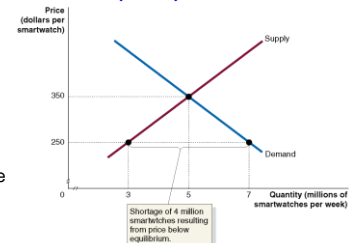
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**Figure 3.8 The Effect of Surpluses and Shortages on the Market Price (2 of 2)**

Now what if the price were \$250?

- At a price of \$250,
- consumers want to buy 7 million smartwatches, while
  - producers want to sell 3 million.



This gives a **shortage** of 4 million smartwatches; a situation in which quantity demanded is greater than quantity supplied.

Prediction: sellers will realize they can increase the price and still sell as many smartphones, so the price will rise.

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## Demand and Supply Both Count

- Price is determined by the *interaction* of buyers and sellers.
- Neither group can dictate price in a competitive market (i.e. one with many buyers and sellers).
- However *changes in supply and/or demand* will affect the price and quantity traded.

We can use demand and supply graphs to predict changes in prices and quantities

- Predictions about price and quantity in our model require us to know supply and demand curves.
- Typically, we know price and quantity but *do not know* the curves that generate them.
- The power of the demand and supply model is in its ability to predict *directional changes* in price and quantity traded.

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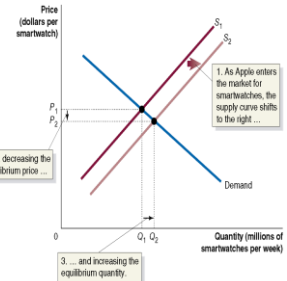
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**Figure 3.9 The Effect of an Increase in Supply on Equilibrium (1 of 2)**

The graph shows the market for smartwatches before Apple enters the market.

When Apple enters, more smartphones are supplied at any given price—an increase in supply from  $S_1$  to  $S_2$ .

- Equilibrium price falls from  $P_1$  to  $P_2$ .
- Equilibrium quantity rises from  $Q_1$  to  $Q_2$ .



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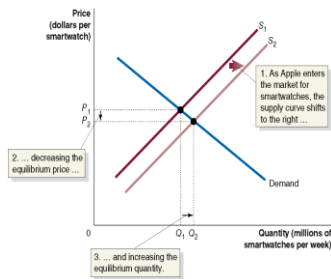
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Figure 3.9 The Effect of an Increase in Supply on Equilibrium (2 of 2)

By how much will price fall? By how much will quantity rise?

We cannot say, without knowing more information.

For now, we can only predict that price will fall and quantity traded will rise.



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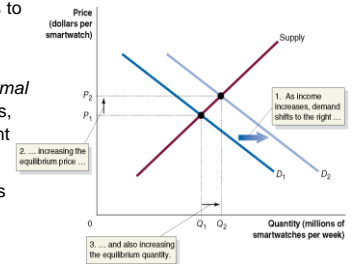
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Figure 3.10 The Effect of an Increase in Demand on Equilibrium

Suppose incomes increase. What happens to the equilibrium in the smartwatch market?

Smartwatches are a *normal good*, so as income rises, demand shifts to the right ( $D_1$  to  $D_2$ ).

- Equilibrium price rises ( $P_1$  to  $P_2$ ).
- Equilibrium quantity rises ( $Q_1$  to  $Q_2$ ).



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Table 3.3 How Shifts in Demand and Supply Affect Equilibrium Price ( $P$ ) and Quantity ( $Q$ )

	Supply Curve Unchanged	Supply Curve Shifts to the Right	Supply Curve Shifts to the Left
<b>Demand Curve Unchanged</b>	$Q$ unchanged $P$ unchanged	$Q$ increases $P$ decreases	$Q$ decreases $P$ increases
<b>Demand Curve Shifts to the Right</b>	$Q$ increases $P$ increases		
<b>Demand Curve Shifts to the Left</b>	$Q$ decreases $P$ decreases		

The table summarizes what happens when the demand curve shifts or the supply curve shifts, with the other curve remaining unchanged.

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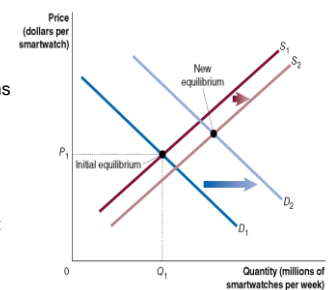
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Figure 3.11 Shifts in Demand and Supply over Time (1 of 3)

Over time, it is likely that *both* demand and supply will change.

For example, as new firms enter the market for smartwatches *and* incomes increase, we expect:

- The supply of smartwatches will shift to the right, *and*
- The demand for smartwatches will shift to the right.



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Figure 3.11 Shifts in Demand and Supply over Time (2 of 3)

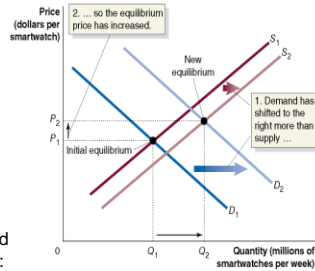
What does our model predict?

$S \uparrow \rightarrow (P \downarrow \text{ and } Q \uparrow)$

$D \uparrow \rightarrow (P \uparrow \text{ and } Q \uparrow)$

So we can be sure equilibrium quantity will rise, but the effect on equilibrium price is not clear.

This panel shows demand shifting more than supply: equilibrium price and quantity both rise.



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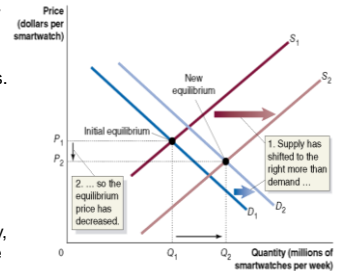
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Figure 3.11 Shifts in Demand and Supply over Time (3 of 3)

This panel shows supply shifting more than demand: quantity rises, but equilibrium price falls.

Without knowing the relative size of the changes, the effect on equilibrium price is ambiguous.

It is possible, but unlikely, that the equilibrium price will remain unchanged.



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Table 3.3 How shifts in demand and supply affect equilibrium price (P) and quantity (Q)

	Supply Curve Unchanged	Supply Curve Shifts to the Right	Supply Curve Shifts to the Left
Demand Curve Unchanged	Q unchanged P unchanged	Q increases P decreases	Q decreases P increases
Demand Curve Shifts to the Right	Q increases P increases	Q increases P increases, decreases, or is unchanged	Q increases, decreases, or is unchanged P increases
Demand Curve Shifts to the Left	Q decreases P decreases	Q increases, decreases, or is unchanged P decreases	Q decreases P increases, decreases, or is unchanged

We can now fill in the rest of Table 3.3.

The cell in red is the example that we just did.

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### Shifts of a Curve vs. Movements along a Curve

Suppose an increase in supply occurs. We now know:

- Equilibrium quantity will increase, and
- Equilibrium price will decrease.

It is tempting to believe the decrease in price will cause an increase in demand. But this is incorrect.

- The decrease in price will cause a movement along the demand curve but *not* an increase in demand.
- Why? The demand curve *already* describes how much of the good consumers want to buy, *at any given price*.
- When the price change occurs, we just look at the demand curve to see what happens to how much consumers want to buy.

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### Method of Determining Changes in Equilibrium Price and Quantity

1. Draw the diagram for the market.
  - Show the initial equilibrium price and quantity. Label the axes. Be sure to indicate the product that goes on the X axis (Check that the D curve has a negative slope and the S curve has a positive slope.)
2. Decide whether the change will affect the demand curve or the supply curve.
  - Does it change how much people will wish to buy at each price or how much they wish to sell? *Usually* only one will shift.
3. Decide whether the change shifts the curve out, or shifts the curve in.
4. Draw the new supply or demand curve and indicate the new equilibrium price and quantity.
5. Write the explanation telling why the curve shifted and gave a new equilibrium.
6. Read your diagram to make sure you are telling a logical story.

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### Examples for the Blueberry Market

**Change:** The price of strawberries rises.

**Change:** The price of cherries, a close substitute of blueberries, falls sharply

**Change:** The price of whip cream, a complement of blueberries, falls sharply

**Change:** The cost of pesticides to control bugs on the blueberry crop falls.

**Change:** Incomes in the US increase.

**Change:** Wage rates paid to blueberry pickers rise.

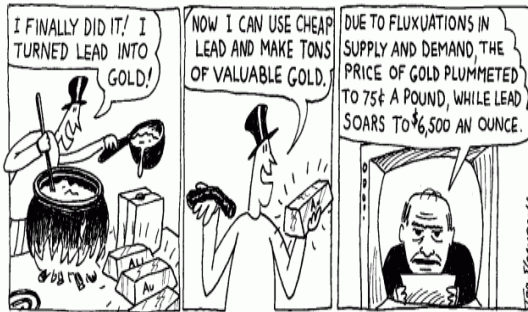
**Change:** The cost of labor to harvest blueberries rises sharply

**Change:** A clever farmer designs a new blueberry harvesting machine which can harvest berries more efficiently

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### Comment



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### Comment



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