Chapter 2: Supply and Demand in Macroeconomic Relevant Markets

Our goal in this course is to explain what is happening to output, employment and prices in the entire economy. This is a big undertaking, so we are going to start small and learn how we can analyze how the prices and quantities of a single product are determined. If you have taken microeconomics before, this will seem like a little bit of a review, but do not stop reading! The goods that will be used to learn about the foundations of microeconomics are going to be goods that are relevant to the macroeconomy. Specifically, we will look at the market for gasoline and housing, as those two markets can help us better understand overall economic activity.

In order to analyze how individual markets work, we utilize a very popular economic model that many of you may have heard of before: supply and demand. As you move forward in microeconomics, you will learn more about the types of individual markets that exist in the economy. Technically, the supply and demand model that you will learn about should only be used when examining a perfectly competitive market.

Goods that are bought and sold in a perfectly competitive market have a few notable features. First, all the products bought and sold are identical. Second, only the market can change prices. This means that if one single individual does not believe the product they want to buy is worth it, the price will not drop. However, if there are many potential buyers looking at a product and they all believe that it is too expensive, the price will fall. The same argument would apply to firms increasing or decreasing prices; no single individual firm can influence the price. Third, there is perfect information in the market. This

means that buyers know the prices that all firms are charging for a good. If one firm is charging less than the others, the buyers will go to the low-priced firm. Lastly, there is easy entry and exit into a perfectly competitive market. This means that firms can enter a market if they have enough money and if they want to leave, there is not a significant penalty (such as a fine).

Very few goods are perfectly competitive. Locally, you may come across similarly priced produce at a Farmer's Market, but even then, there is likely a difference in quality. Auctions of raw commodities may be close to a perfectly competitive market, as long as there are not high barriers to entering the market.

Perfectly Competitive Goods

Perfectly Competitive Goods have four defining characteristics. (1) The good being sold is identical across firms. (2) No single firm or individual can influence the price of the good. (3) There is perfect information about the good, meaning that all buyers and sellers know the prices being charged by all firms. (4) It is not overly costly to enter or exit the market.

Are there any goods that you can think that you would consider a perfectly competitive good?

Are the goods we will cover in this chapter perfectly competitive? Not quite. In the gasoline market, there are lots of buyers and sellers, the product being sold is the same among across all firms, and constructing a gas station just takes a lot of cash, but it is not like trying to enter the airline industry where there are many regulations. There may be perfect information about prices with internet available on phones, but actually going to a different gas station that is far from your current location is costly and prices across stations could differ.

The housing market is even further from a competitive market than the gasoline market. However, we will see that the fluctuations in prices and quantities in these markets can be reasonably explained using the supply and demand model. There is a benefit to making the markets we examine more detailed and comprehensive, but that should be saved for advanced microeconomics courses. For us, we want to get a foundation for supply and demand so that we can use it to explain important trends in the

macroeconomy and then later look at the entire supply and demand of all goods and services in the economy.

The Gasoline Market

Expensive Gasoline? Cheap Gasoline?
What is the most expensive gallon of gasoline you have seen at a station? When and where was the gasoline being sold? What about the cheapest gallon?

The responses above will depend on where you were raised, your age, how often you drive and how much you have traveled in your life. The cheapest gallon of gasoline I ever purchased was $0.69 in the winter of 1998 in a southeastern suburb of Denver, Colorado. The gas did seem cheap, but I was also driving a car that got about 7 miles per gallon (1977 Jeep CJ-5) and I needed the price to be low! The most expensive gallon I purchased was in Santa Barbara, California. In the summer of 2008, the best deal I could find was $4.75 per gallon.

Gas prices have decreased considerably since 2008. According to the American Automobile Association (AAA), the average cost of a gallon of gas is around $2.25 as of July 2017. (Check out http://gasprices.aaa.com/ for the latest averages in the US.)

Something you will notice at the AAA website link above is that there are certain areas of the USA that have higher than average gas prices (the West) and other areas with below average gas prices (the South). If you dig deeper into the variation in gas prices around the country you will find that the most expensive gallon of gas is often above $7.00 (on Catalina Island about 90 miles off the coast of Los Angeles). Not long ago (January, 2016), a gas station in northern Michigan dropped the price of a gallon to $0.47! (There are many reasons for this price reduction that we will not cover below. However, if you become an economics major and learn about game theory, the price war in Michigan can be explained.)

Gas prices differ noticeably across the country (and the world), but prices also differ over time. The figure below highlights how much gas prices have changed in the last few decades. The plot shows the average price of a gallon of gas in the US each month between 1991 and 2017, according to the US Energy Information Administration (EIA).

The first thing to notice about the historical price of gas is that prices change frequently. Every month, the price of gas changes and in some cases, that change is large. (How often do the prices at your favorite restaurant change?)

Also notice that the price of gas spiked in the summer of 2008, with a gallon averaging more than $4.00 per gallon in the US. This spike was followed by a free fall in the price to nearly $1.50! There were lots of reasons for the large price reduction, but one reason was ***speculation***, which is the practice of buying a product solely for the purpose of reselling the product at a later time (there is no intention of using a speculative product). We will learn more about speculation later in this chapter when we talk about the housing market.

Chapter 2.1: Demand for Macroeconomic Relevant Goods

Buying gasoline for a car

Imagine that you are running low on gas in your car (around 1/4 of a tank). What would cause you to fill up your tank today?

There are a lot of reasons that someone would decide to fill up their gas tank today. When I have asked this question in the past, students often say something about how much they plan on driving in the near future because of

work, school or family. Another common response has to do with the amount of money a driver has. It is difficult to fill up your car with gas if you do not have any money available to spend. One of my favorite answers to this question was, "I'm too lazy to cook." The answer is humorous, but it also does illustrate that if someone prefers to eat out at restaurants a lot in the upcoming week, filling up the car with gas is a priority.

The most common answer as to why people fill up on gas has to do with the price of gas. If you were driving around town and saw that the price of gas decreased to $0.50 per gallon, you would likely get in line and fill up your car for less than $10! However, if the price of gas increased to $20.00 per gallon, not only would you forego filling up your car (as long as you could get home), but you would start to explore different, cheaper modes of transportation. Let's try to characterize this behavior formally.

Deriving the Demand Curve for Gasoline

2.1: Responding to Prices

Assuming that nothing else in the market for gasoline changes, when the price of gasoline decreases, consumers tend to

A

purchase more gallons of gasoline.

B

purchase less gallons of gasoline.

C

not respond to the price change.

D

look into purchasing an electric cars.

The question above may seem straightforward. Hopefully you chose the first answer: when the price of gasoline decreases, consumers purchase more

gasoline. There is nothing novel about the concept: when goods and services are cheaper, consumers tend to buy more of that good.

Economists define the amount of a good or service that consumers purchase at a particular price as the **quantity demanded**. Instead of saying that consumers buy more when the price of a good decreases, we will say, "the quantity demanded increases when the price of a good or service decreases." Alternatively, if the price of a good or service increases, the quantity demanded decreases.

Again, all of this may seem very intuitive to you, as you can envision yourself as a consumer. When something so intuitive and uncontroversial arises in economics, it becomes a law! The **law of demand** says that the price and the quantity demanded of a good or service move in the opposite direction. As price rises, quantity demand falls. As price falls, quantity demanded rises. The law of demand is a simple concept, but it is the simplicity that makes it powerful, as we will see in the analysis ahead.

Although the relationship between prices and quantity demanded are understood, we can learn more about consumer behavior with a little more information. By looking at numerous combinations of prices and quantity demanded for the average consumer, we can construct a demand schedule. A demand schedule is a table that shows the quantity demanded (Q_D)of a good or service at various prices (P):

Notice that the demand schedule is telling us what was discussed above: as the price of gasoline increases, the amount of gasoline that the average consumer will purchase (the quantity demanded) decreases. It is following the law of demand! The demand schedule is particularly helpful if we want to know the exact quantity demanded at a specific price level. For example, at a price of $2.50, the average consumer will purchase 12 gallons of gas per week.

Not only does the demand schedule present detailed information, but it can be used to create a graph and visually represent how consumers respond to price changes. (If you are feeling uncomfortable with graphing, revisit Chapter 1.A.) In order to create a graph, the first thing we need to do is determine which variable goes on which axis on our graph. In many scenarios, it is easy to determine which variable is the independent variable and belongs on the X-axis (horizontal axis) and which variable is the dependent variable and belongs on the Y-axis (vertical axis).

When looking at prices and quantities of goods and services, figuring out the independent variable is not as clear-cut. An argument could be made that changing the price of a good causes the quantity that is sold to change. At the same time, it is possible that market-level changes in the quantity of a good that is bought and sold will cause a change in the price.

This issue will be solved by always putting quantity on the X-axis and prices on the Y-axis. Since the early 1900s, economists have depicted the relationship between price and quantity this way and now is not the time or place to alter over 100 years of tradition!

More importantly, in many economic scenarios, prices are the outcome of interest (dependent variable) and they are correctly placed on the Y-axis. (We will see this when we talk about the price of money in a few chapters.) It reduces confusion if we are consistent across the discipline and always put the price of a good on the Y-axis.

Now that we know that the quantity of a good will be on the X-axis and the price will be on the Y-axis, we can plot out the points on our demand schedule. Start by drawing the axes on your graph:

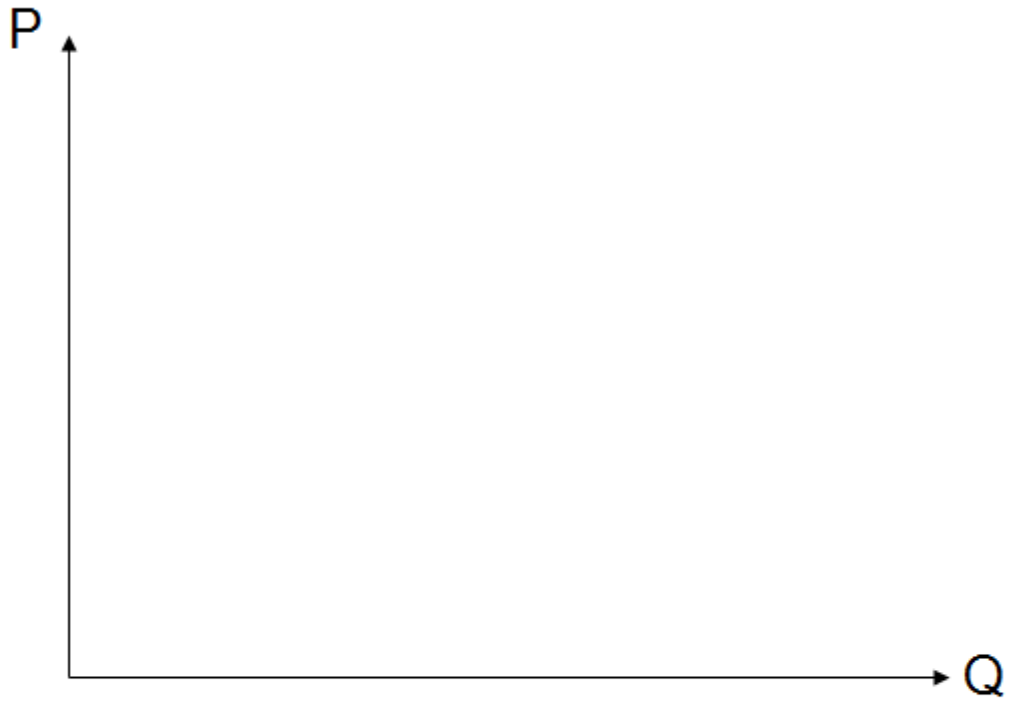


Figure 2.1.01

Prices are represented by the letter *P* and quantity is represented by the letter *Q*. If we want to plot a few points, refer to the demand schedule above. At a price of $3.50, the average consumer has a quantity demanded of 8 gallons per week. Let's plot this point and label it point A.

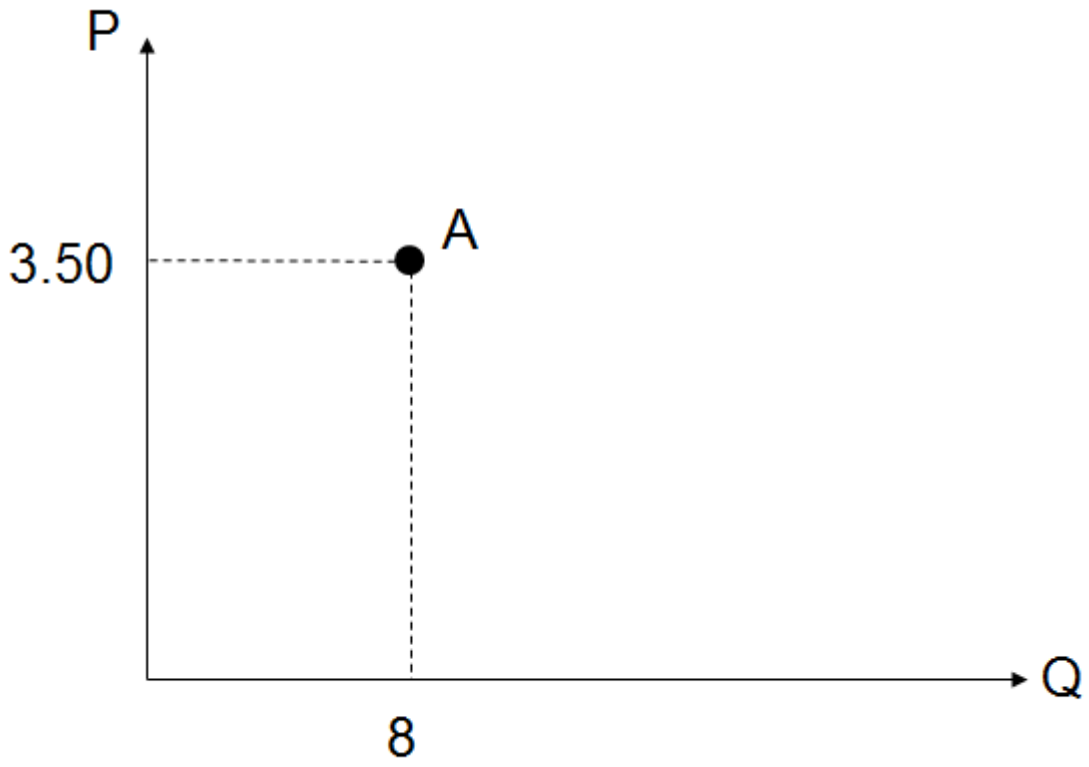


Figure 2.1.02

Now plot a second point where the price is $2.50 and the quantity demanded of gasoline is 12 gallons per week. Label this combination, point B.

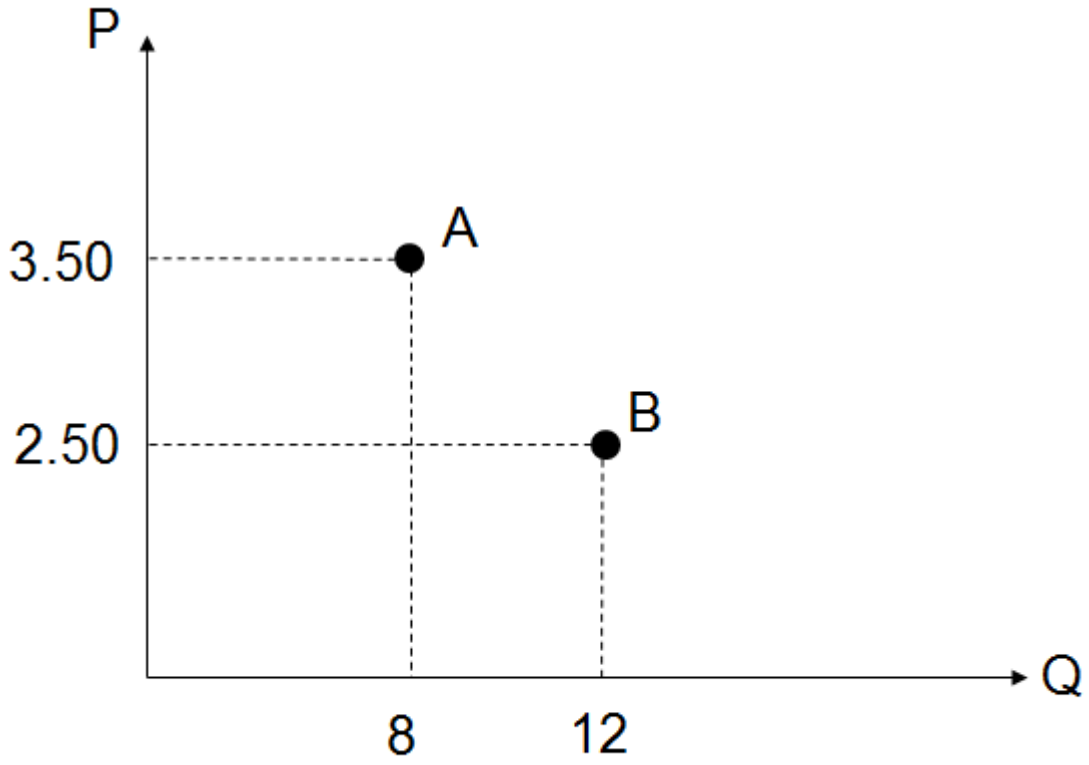


Figure 2.1.03

When the quantity demanded of gasoline increased from 8 to 12 gallons, the price of gasoline decreased from $3.50 to $2.50. According to the demand schedule, every 4 gallon increase in the quantity demanded of gasoline is associated with a $1.00 reduction in the price. This consistent change in quantity and price means that quantity and price are linearly related and can be depicted by a straight line. Connecting point A to point B generates the **demand curve**, which we label *D*.

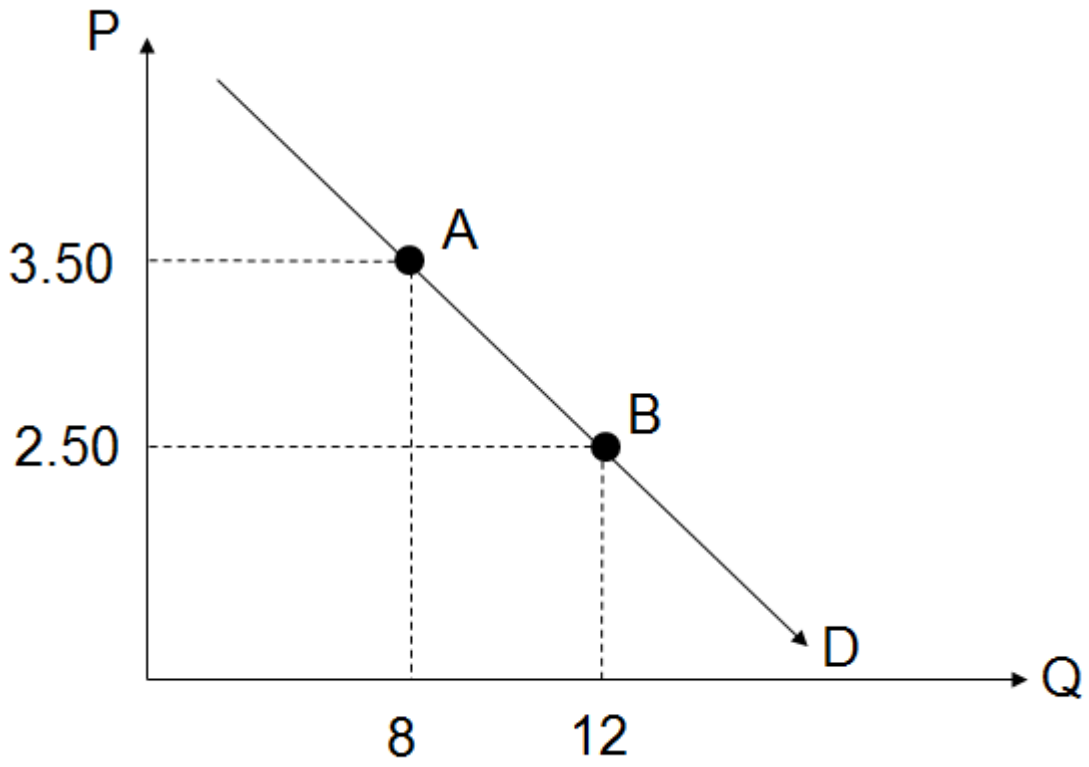


Figure 2.1.04

The demand curve is the graphical representation of *ALL* prices and quantities demanded of a good or service. It was derived by looking at combinations of prices and quantities on the demand schedule. We could have picked two other points and created the exact same demand curve.

An important thing to note here is that when we refer to the demand for a product, we are referring to the entire demand curve. This means that the "demand for gasoline" shows us how the quantity demanded changes in response to all price changes. Changing the price or quantity of gasoline does not "change" demand. Instead, a price or quantity change moves us along the demand curve, just as it did when we moved from point A to point B.

Another important thing to note is that when moving from point A to point B, we are assuming that nothing else in the gasoline market is changing. In other words, holding all things constant, increasing the quantity demanded from 8 to 12 gallons per week is associated with a reduction in price from $3.50 to

$2.50. Consumers have the same income, future vacation plans and desire to eat at restaurants at point A as they do at point B. All elements of the market are held constant.

Sometimes in economics you will hear the term *ceteris paribus*, which is Latin for "all else unchanged", used while describing the demand curve. For example, "Quantity demanded increases when prices decrease, ceteris paribus." This term may sound fancy, but if you use it too often at social gatherings or the workplace, it will draw funny looks. Feel free to stick with saying "all else equal" or similar sayings when describing the demand curve to a colleague.

An odd assumption that we have made thus far in our analysis is that the demand curve is depicting the quantity demanded of the average consumer. When analyzing a market, we are interested in all consumers in the market. Instead of there being a single consumer purchasing 8 gallons of gas at $3.50, there may be 1 million consumers purchasing 8 gallons at that price.

In order to convert our market with a single consumer to multiple consumers, we can add up the quantity demanded at every price level. If all 1 million consumers are identical, then the quantity demanded will be 8 million gallons when the price is $3.50. At a price of $2.50, the 1 million consumers will have a quantity demanded of 12 gallons each and the total quantity demanded will be 12 million gallons. The graph below shows the subtle change that adding 1 million consumers to the market does to the demand curve.

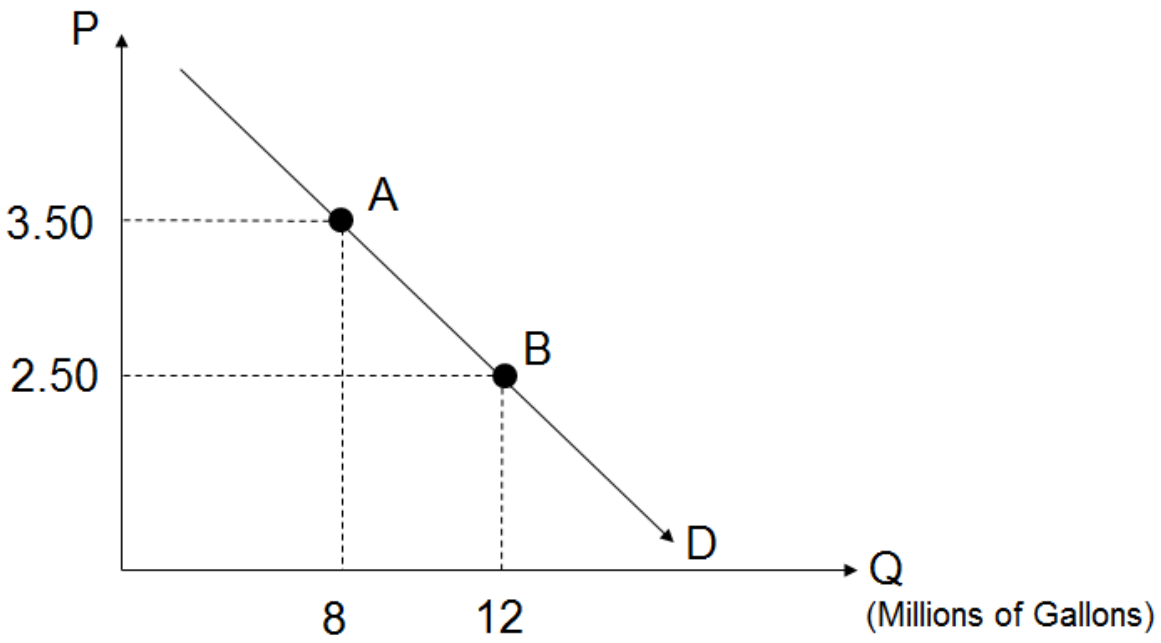


Figure 2.1.05

The X-axis shows quantity again, but now it is measured in millions of gallons. Again, a lot of assumptions about the similarity of consumers make this change relatively simple. As you move forward in microeconomics, you will learn more about the nuances of adding up demand curves for unique individuals. For now though, we will keep it straightforward.

We have went over a lot of information. Let's see how well you understand the demand for a product.

2.2: The Demand Schedule

The following demand schedule shows combination of the price and quantity demand of gasoline for the average consumer. What is the quantity demanded when the price is $2.00

Price of a Gallon of Gas	Q_D: Quantity Demanded (Gallons)
$1.75	15
$2.00	13
$2.25	11
$2.50	10
$2.75	9
$3.00	8

A

10

B

11

C

13

D

15

2.3: The Demand Schedule

Imagine that the price of a gallon of gasoline increases from $2.00 to $2.50. The average consumer will respond by

Price of a Gallon of Gas	Q_D: Quantity Demanded (Gallons)
$1.75	15
$2.00	13
$2.25	11
$2.50	10
$2.75	9
$3.00	8

A

Purchasing 3 more gallons of gasoline per week

B

Purchasing 1 more gallon of gasoline per week

C

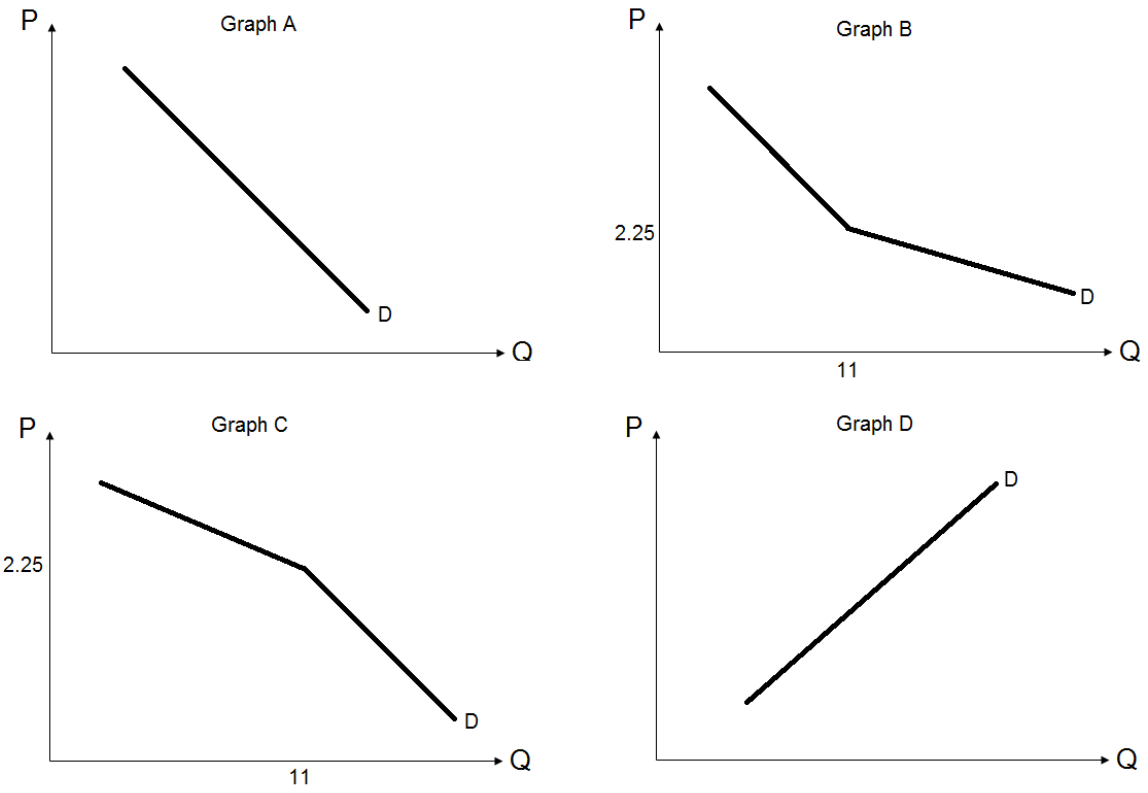
Purchasing 1 fewer gallon of gasoline per week

D

Purchasing 3 fewer gallons of gasoline per week

2.4: The Demand Curve

Considering the demand schedule in the previous two questions, which graph most accurately reflects the demand curve? (Hint: It will be helpful to accurately graph out the demand curve.)



A

Graph A

B

Graph B

C

Graph C

D

Graph D

The first two questions were straightforward. Match the quantities and prices on the demand schedule and you will get the correct answer. The last question was a bit more difficult. Notice that when the price of gas is high (for example, at $3.00), decreasing the price of gas by $0.25 only increases the quantity demanded of gasoline by 1 gallon. When the price falls from $2.25 to $2.00, the quantity of gasoline demanded increases by 2 gallons. Taking these

two parts together, the demand curve is relatively steep when the price is high (above $2.25) and relatively flat when the price is low (below $2.25).

The point of the last question illustrates that the demand curve does not need to be linear. In fact, the demand curve for most goods and services is non-linear. However, it will be easier for us to think about demand curves mathematically if we impose a functional form on the curve and assume it is linear. This is done without losing a lot of important information.

2.5: Moving along the Demand Curve

Which of the following events will move us along the demand curve for gasoline?

A

A change in the number of cars on the road.

B

A change in the quantity demanded of gasoline.

C

A change in the price of gasoline.

D

A change in the cost of making cars.

This question does not need a graph to be answered. The demand curve for gasoline tells us all the combinations of prices and quantity demanded. The only way we can move along the curve is if either the price or quantity of gasoline changes, which means both answers B and C are correct. The other events may be relevant to the gasoline market, but they are what we are holding constant when we derive the demand curve.

Changes in the Demand for Gasoline

Deriving the demand for gasoline is important since it allows us to show how much gas will be bought by consumers at an infinite number of price levels. Remember that changing the price of gasoline will not change the entire

demand curve! Instead, it will change the quantity demanded and move us along the demand curve.

So if price does not change the demand for gasoline (or any other product), then what does?

Changing the Demand Curve

What would make you buy more gasoline this week, no matter what the price of gas is?

There are a lot of potential answers here. Maybe it is a holiday weekend and you are going on a road trip, no matter what! A family emergency could also cause you to drive home. A new job offer with a big bonus or a brand new restaurant 50 miles away can also lead to buying more gas. Maybe the government decides to give away 1 million electric vehicles and now there are fewer cars on the road that need any gas at all.

The common theme among these scenarios is that none of them involve a change in the price of gas. There is either more or less gas bought by consumers at any and every price level. When this happens, the entire demand curve shifts. In other words, there is a change in demand. It is possible to talk about all the different scenarios that shift the demand for a product, but it is helpful to put the shifts into a few general categories.

Changes in Income

One of the more popular answers to the most recent question is something along the lines of "money" or income. The amount of income an individual has will have a significant impact on their purchasing decisions. Keep thinking about the gasoline market-when someone loses their job and has no income coming in, they will be very reluctant to purchase gasoline. When there is an emergency, critical commitment or an opportunity to get a new job, the individual will get gas. Gasoline for a road trip or vacation is probably not going to happen when income is low.

We define a reduction in the quantity demanded at all prices a "decrease in demand". It is shown by drawing a brand new demand curve to the left of the original demand curve. This is because at all prices, the quantity demanded has decreased. In the graph below, the original demand curve from the previous section is depicted as D1 and points A and B are changed to A1 and B1.

A decrease in demand is shown in the figure as the demand curve moves left from D1 to D2. The demand curve D1 represents the original income and D2 represents the demand for gasoline when income decreases. At a price of $3.50, the quantity demanded decreases from 8 million gallons (A1) to 4 million gallons (A2). At a price of $2.50, the quantity demanded decreases from 12 million gallons (B1) to 8 million gallons (B2). Because the demand curve is moving horizontally, it is helpful to think of a decrease in demand as a "shift left". Using the terminology of "left" and "right" to describe shifts will also keep shifts in order when we talk about supply.

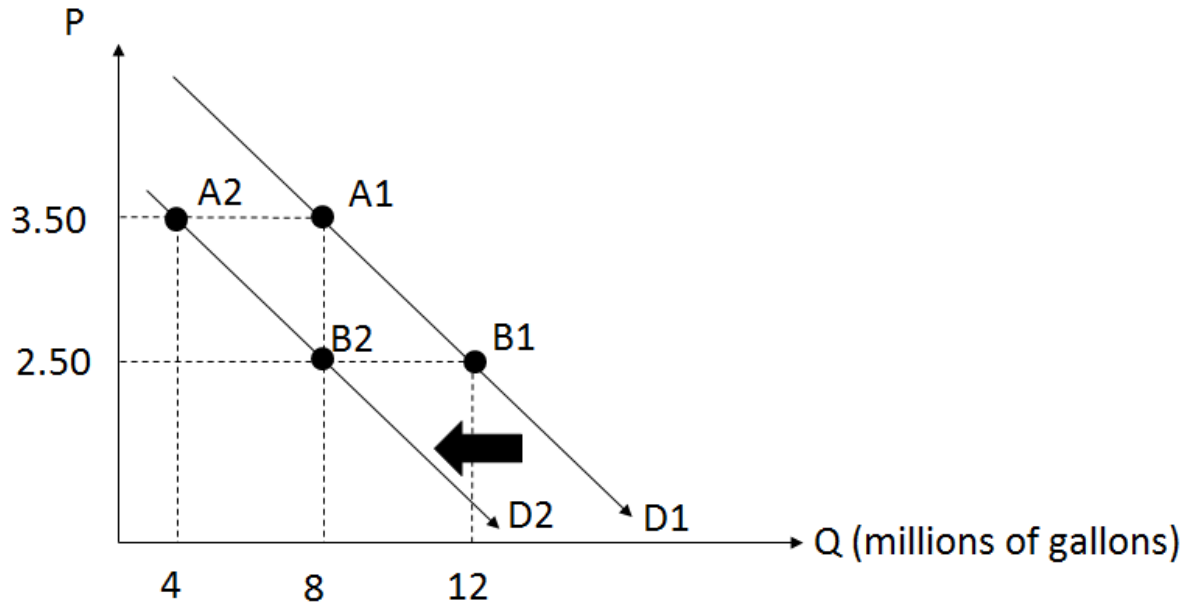


Figure 2.1.06

Let's look at the case where an individual gets a promotion and an increase in income. In this situation, the individual may decide to drive to the beach and have a celebratory BBQ, no matter what the price of gasoline is. When examining a good like gasoline, increasing income causes an increase in the quantity of gas purchased at all price levels. The figure below shows the situation where the quantity demanded of a good increases at all price levels.

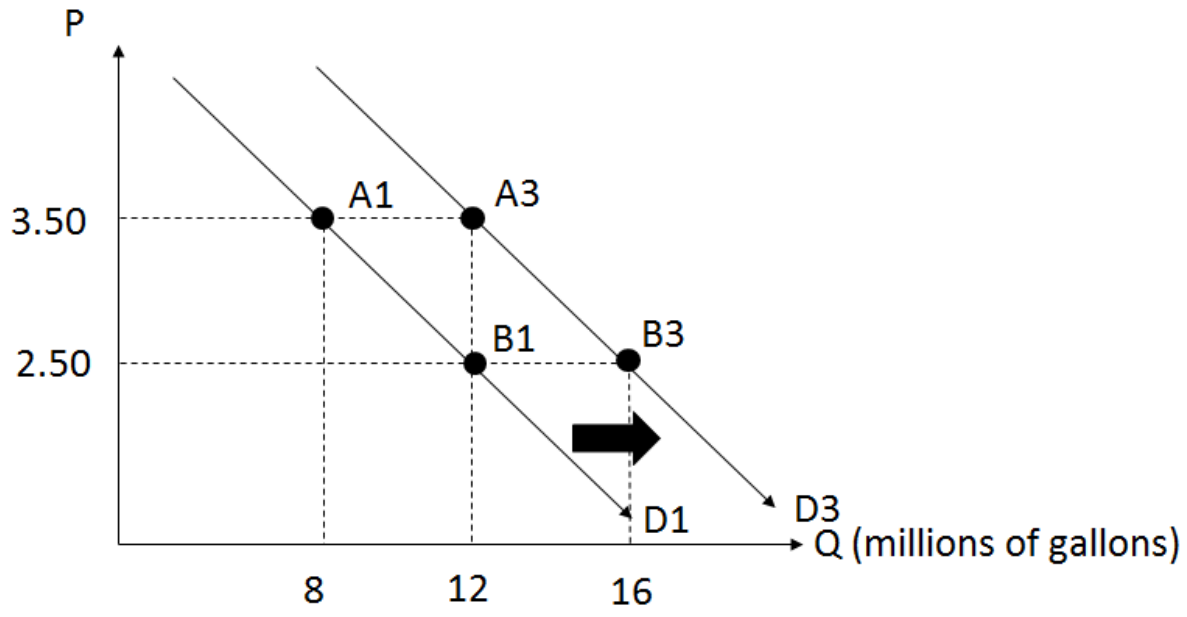


Figure 2.1.07

Similar to the previous graph, the first demand curve, D1, represents the original demand curve with the original level of income. The demand curve shifts to the right to D3 when income increases. At a price of $3.50, the quantity demand of gasoline increases from 8 million (A1) to 12 million (A3). Likewise, the quantity demanded increases from 12 million (B1) to 16 million (B3) at a price of $2.50. At every price level, the quantity demanded has increased and the demand curve shifts to the right. Remember, "increase in demand" is synonymous with "shift right" and "decrease in demand" is synonymous with "shift left".

Normal vs. Inferior Goods

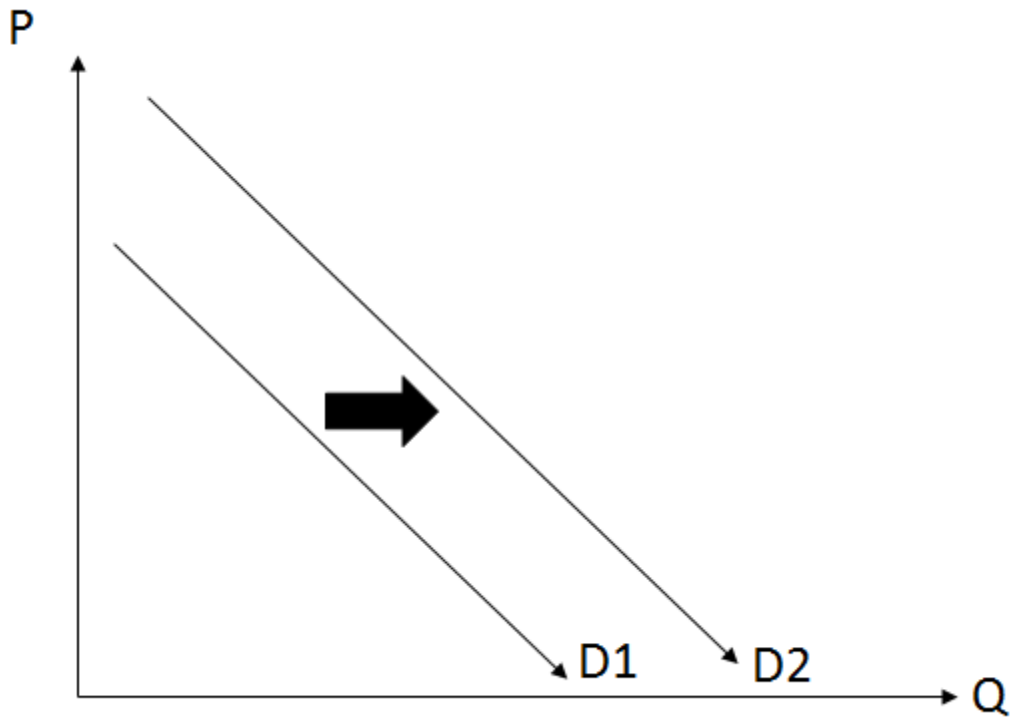
Imagine you suddenly have more income and you decide to purchase more gas. What do you purchase less of?

In our example, when income increases, demand increases. When income decreases, demand decreases. This is the case with a lot of goods: cars, clothing, computers, TVs and wine. Whenever the demand for a good and income move together, the good is called a normal good.

In the discussion above, there are many goods that consumers purchase less of when their incomes rise. Some funny, but correct, examples that I have come across in the past are: Ramen Noodles, Kraft Macaroni and Cheese, 1-Ply Toilet Paper, Economy-Sized Rental Cars and "anything from Walmart". In each of these situations, more income typically means that you will purchase higher quality items at all price levels and the demand for the lower quality goods will decrease. When there is a decrease in the demand for a good as income increases, the good is called an inferior good. A comparable way to think about an inferior good is to imagine what you would purchase more of if your income decreased. Your answer should be similar to what you listed in the discussion question above.

2.6: Normal or Inferior Good?

Consider the demand for an unknown good in year 1 as D1. In year 2, the incomes of consumers decrease and the demand for the unknown good shifts to D2. Assuming there are no other changes in the market for the unknown good, the good can be defined as



A

A normal good

B

An inferior good

C

Both normal and inferior

D

Not enough information

The exact good in question 2.6 is meant to be vague. The only information you are given is that income decreased and the demand curve shifted. In the question, the demand curve shifted to the right, which means that the quantity demanded increased at every price level. This is the same thing as saying demand increased. Because the demand for the good increased when income decreased, the good is defined as an inferior good.

The Price of Related Goods

Question 2.7: Free SUVs!

Imagine that automobile makers decide that they no longer want to produce SUVs and will give their remaining inventory of SUVs away for free! These SUVs do not get good gas mileage (less than 15 miles per gallon). What will happen to the demand for gasoline after the SUVs are given away for free?

A

The demand for gasoline will increase

B

The demand for gasoline will decrease

C

The demand for gasoline will not change

D

There is not enough information

We just learned that income can influence our demand for a product, but that is not the only event that alters demand. In the question above, you were essentially given a free SUV that consumes a lot of gasoline. Most people that get a free SUV will either have an automobile for the first time or have an automobile that consumes more gasoline than their previous car. With more people driving a gas-guzzling SUV, more gasoline will be bought, no matter what the price of gasoline is. This means that the demand for gas will increase when the SUVs become free.

The thought experiment in question 2.7 is extreme, but it gets an important point across. There are many examples of multiple goods being used together and the price of one good can influence the demand for another good. In this example, the price of a gas guzzling SUV decreases to zero. This leads to an increase in demand for goods that are needed in order to use the SUV, such as gasoline.

When the price of one good decreases and it causes an increase in demand for another product, the two related goods are called complement goods.

Conversely, if the price of one good increases, the demand for the complement good will decrease.

The question above could have been altered to say, "the price of gasoline increased by 500%, what will happen to the demand for SUVs?" An increase in the price of gasoline would make it more expensive to own a gas guzzling SUV, which would cause the demand for SUVs to decrease. The same idea holds, gasoline and SUVs are complement goods because the goods are used together and the price of one good and the demand for the other good move in opposite directions.

Complement Goods

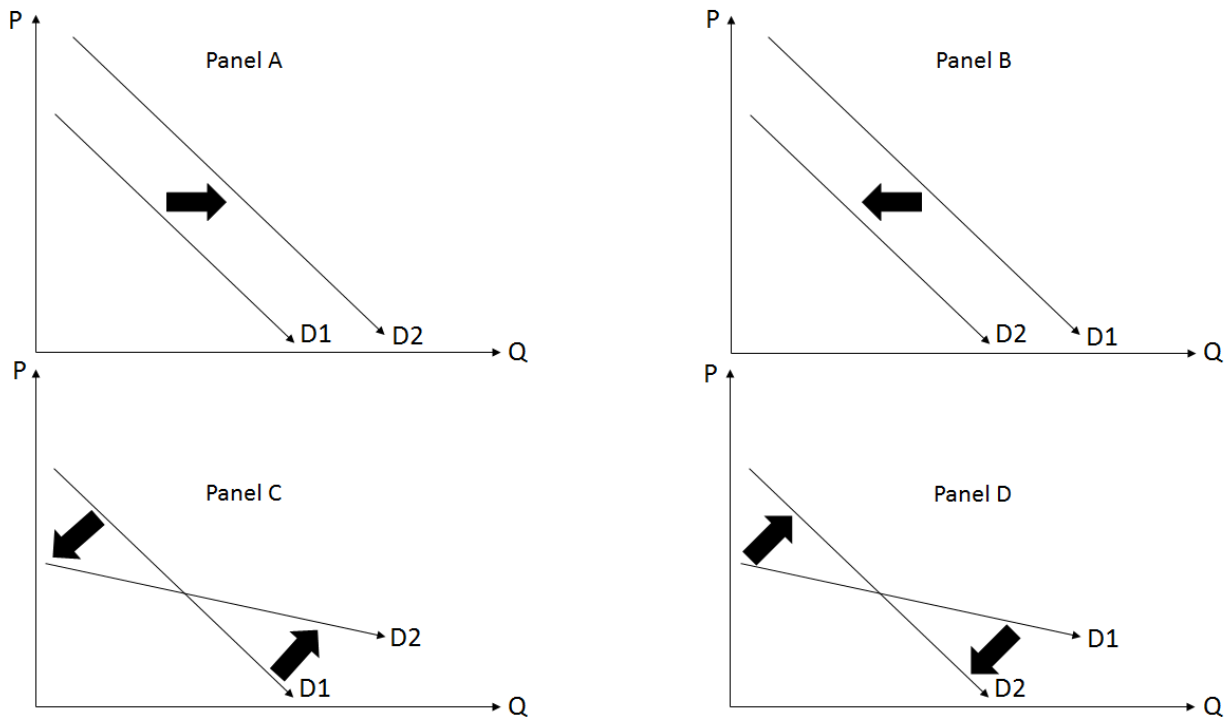
Can you come up with an example of complement goods?

There are many examples of complement goods. In the grocery store, you will often see a food item on sale in the hopes that you will also buy the complement good at full price. If you are thinking of firing up the grill, you may see a brand of lighter fluid on sale, which could encourage you to buy charcoal from the same company.

Another good example are smart phones and smart phone covers. If the price of the Samsung Galaxy decreases, more people will need to protect their phone with a cover, increasing the demand for covers. Before fancy and expensive smart phones, consumers had no use for a cell phone cover! (It is possible that you do not have a phone or are like me and still have a flip phone. In that case, you are never concerned about breaking your phone and do not have a need for a cover.)

2.8: Related Goods

When Blu-Ray DVDs were first released in 2006, the average cost of a Blu-Ray DVD was $30. Today, Blu-Ray DVDs have been sold for as little as $2! Assume that D1 is the demand for Blu-Ray Players in 2006 and D2 is the demand today. What panel best represents the change in demand for Blu-Ray Players?



A

Panel A

B

Panel B

C

Panel C

D

Panel D

In question 2.8, the price of Blu-Ray DVDs decreased from $30 to as little as $2 (not all Blu-Ray DVDs are $2, but the average Blu-Ray DVD has decreased significantly since 2006). It should not be surprising that Blu-Ray DVDs and Blu-Ray Players are complement goods. This means that cheaper Blu-Ray DVDs will cause an increase in demand for Blu-Ray Players, which is consistent with Panel A.

To make sure you understand the question fully, it is helpful to think of the opposite situation and ask yourself what would happen to the demand for Blu-Ray DVDs if the price of Blu-Ray Players increased? In this case, the demand of Blu-Ray DVDs would likely decrease since fewer consumers would be purchasing the Blu-Ray player.

2.9: Half-Priced Hot Chocolate?

It is cold outside and you are in need of a hot drink. You go to the local coffee shop where they specialize in Mocha Lattes (coffee + chocolate) and Hot Chocolate (chocolate without coffee). Today, Hot Chocolate is 50% off! What happens to the demand for Mocha Lattes?

A

The demand for Mocha Lattes increase

B

The demand for Mocha Lattes decrease

C

There is no change in the demand for Mocha Lattes

D

There is not enough information

Unlike the previous examples that looked at complement goods, question 2.9 examines two substitute goods. The question implies that consumers usually purchase a mocha or a hot chocolate, as they are both equally good from the shop. In other words, mocha lattes are substitute for hot chocolate and vice versa. In the question, the price of hot chocolate decreases and many consumers will opt for hot chocolate instead of a mocha, no matter what the price of a mocha is. In other words, the demand for mocha lattes will decrease.

Two goods are considered **substitute goods** when the price of one good decreases and the demand for the other good also decreases. Conversely, an increase in the price of one good will cause an increase in the demand for the substitute good.

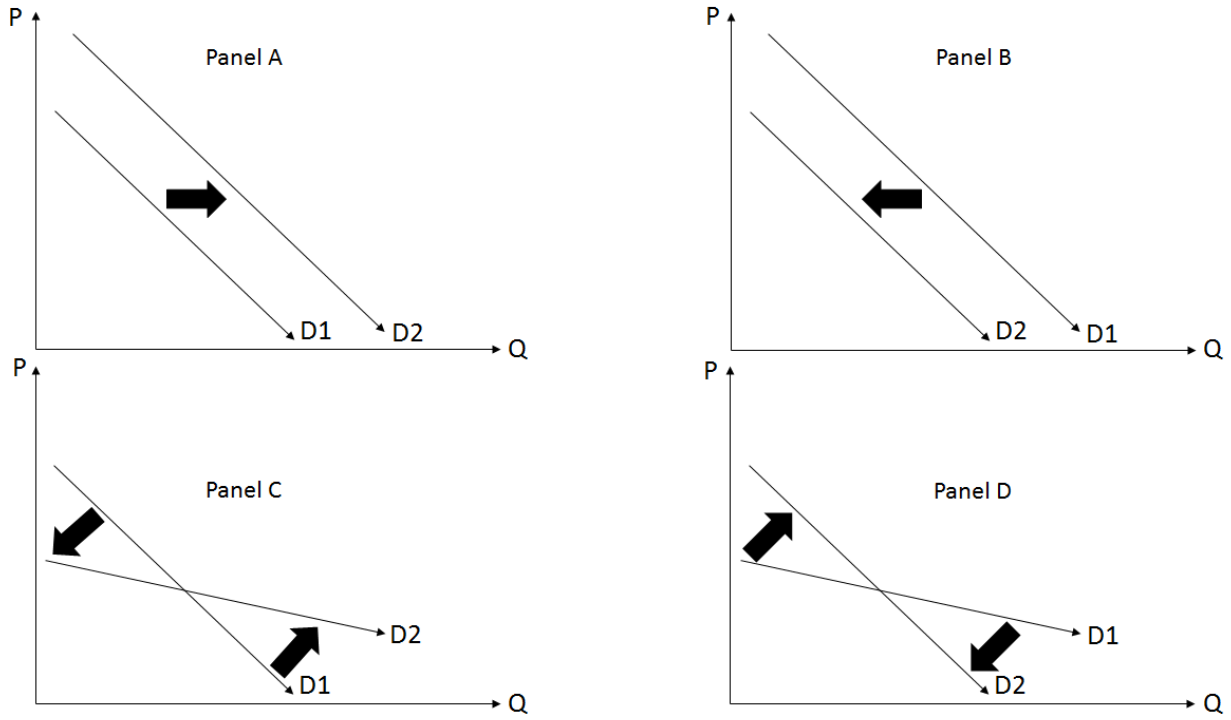
Substitute Goods

Can you come up with an example of substitute goods?

Similar to complement goods, there are lots of substitute goods. Some classic examples of substitute goods are: beef and chicken, Coke and Pepsi and Honda and Toyota. Other examples could include Verizon and T-Mobile, cable and Netflix (or other streaming service) and clothing from Amazon and Macy's. In all of these pairs, the price of one good and the demand of the other good move in the same direction. When the price of a Honda increases, the demand for a Toyota increases. If the price of Netflix decreases, the demand for cable also decreases.

Question 2.10: Electric Cars and Gasoline

Assume that there is a big push for the average household to drive electric cars that do not need gasoline. To promote electric cars, 100,000 electric cars are given away to random households! What panel best represents what happens to the demand for gasoline? (D1 is the demand for gasoline before the giveaway, D2 is the demand for gasoline after the giveaway.)



A

Panel A

B

Panel B

C

Panel C

D

Panel D

The implicit assumption in question 2.10 is that electric cars and gasoline are substitutes. In the question, the price of electric cars fall to zero for some families and now these families will no longer need gasoline. This will cause the demand for gasoline to decrease, shifting the demand curve to the left.

An alternate way to get at the same concept is to ask what happens to the demand for electric cars if the price of gasoline increases to $10 per gallon? As we briefly mentioned earlier in this chapter, an extremely high gas price could lead consumers to start thinking about fuel-efficient modes of transportation, such as an electric car. A rise in the price of gas would then lead to an increase in the demand for electric cars, since the electric cars and gasoline are substitute goods.

The Number of Consumers

In the last example looking at gasoline and electric cars, consumers who have electric cars are no longer in the market for gasoline, which causes the demand for gasoline to decrease. There are many reasons the number of consumers could enter or leave a market and these changes have a direct influence on the demand for a product.

If you are interested in the gasoline market in the city that your university is in, think about what happens to the demand for gasoline during the summer when students are on summer break? How is that different than the fall when students return to town? When the number of consumers that want a product increase, the demand for the product shifts to the right.

Expected Future Prices

Future Prices

Imagine that it is the start of November and your TV breaks. You are deciding whether or not to purchase a new TV over the weekend or wait?

Some people "need" their TV and will go out and buy a new one as soon as their old one breaks. Others will recognize that one of the biggest shopping periods of the year happens just after the Thanksgiving holiday in the US. "Black Friday", named after all the companies that go from being in the red (negative profits) to black (positive profits) the Friday after Thanksgiving, offers consumers the opportunity to purchase many goods at low prices, including TVs. Consumers at the start of November know this and will often wait until the sales later in the month. Expecting prices to decrease in the future causes a decrease in the demand for the product today, shifting the demand curve left.

Returning to our gasoline example, you can envision a situation where you are driving past a station and wondering whether or not to fill up your car. One of the factors you consider is what you think the price will be tomorrow. Maybe you happen to be listening to NPR and hear that there is political turmoil among the OPEC countries, which you believe could increase future gas prices. Consequently, you increase the quantity demanded of the gas at all price levels today, shifting the demand curve for gasoline today to the right.

Tastes and Preferences

We could go on for a long time about all the things that potentially change the demand for a product. So far we have specifically addressed changes in income, prices of related goods, the number of consumers and expected future prices. Without discrediting any other possible categories, we will place the rest of the potential changes in demand into a general category of tastes and preferences.

This general category captures unique events such as the release of a study about the harmful environmental effects of pumping gas (shift the demand for gas left) or the upgrade of gas stations food courts (shift the demand for gas right). A snow storm that keeps people from traveling or a surprisingly warm weekend in the middle of the winter that increases last-minute trips can influence the demand for gasoline as well.

Shifts in Demand vs. Movements along the Demand Curve

This subsection has covered a lot about the demand curve. Make sure you take some time to really understand what the demand curve is telling you. The demand curve specifically examines the relationship between the price of a good and the amount of a good consumers are willing and able to purchase (quantity demanded), holding all else constant. A change in the price, or quantity demanded, of the good moves you along the demand curve. The whole point of creating the demand curve is to show how quantity demanded changes when prices change (and how prices change when quantity demanded changes). Changing the price of a good WILL NOT shift the demand curve!

Shifting the demand curve comes about when things are not held constant. Things other than price or quantity demanded of a product are always changing and these changes are what causes shifts in demand. We categorized the types of shifts that can occur, but moving forward, understanding how an event influences demand will come from common sense. Many of the questions at the start of the categories showed that you already know how events can change whether you want more or less of a product. The key will be to keep the potential shifts in order, as things will get more complicated after we add the producers of a good to our analysis.

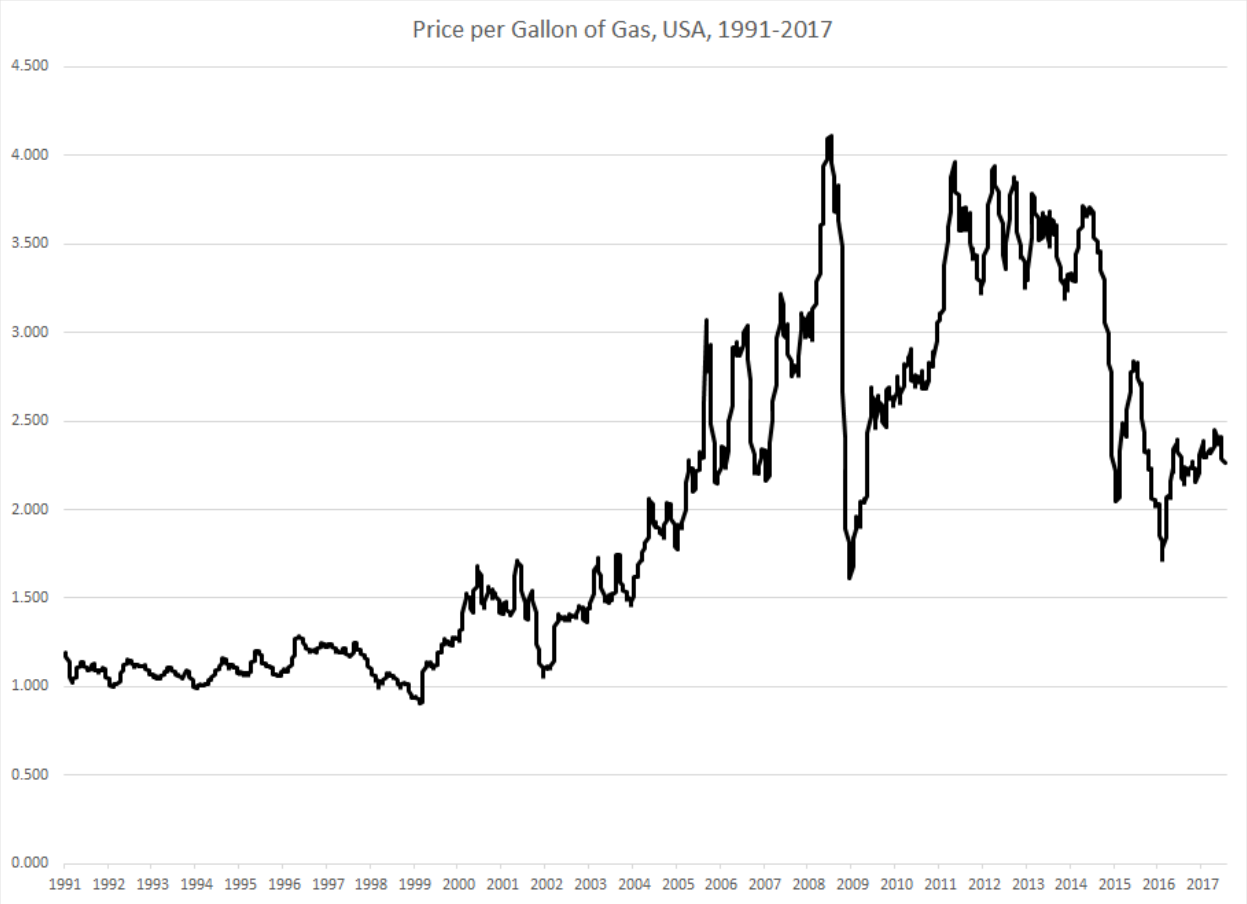


Figure 2.0.01

Why talk so much about the variation in gas prices across the country and over time? For one, the price of gasoline is important to consumers. Gas is needed to get to work and go on vacation. The price of gas is wrapped into shipping prices and the cost of airline tickets and higher gas prices will result in higher prices of things such as airline tickets.

A second reason to talk about the fluctuation in gas prices is because the variation in prices can be explained by a basic model in economics called ***supply and demand***. Although the supply and demand model is generated from straightforward intuition, researchers at the EIA have found that: *"Retail gasoline prices are mainly affected by crude oil prices and the level of gasoline supply relative to demand."* Let's find out how this model works!

Chapter 2.2: Supply of Goods in Macroeconomic Relevant Markets

Our goal this chapter is to create a model that can help us explain the variation in prices of gasoline (and other goods). Examining the behavior of consumers and understanding the demand curve is a natural place to start our discussion of a market. Most of us can put ourselves in the mindset of a consumer because we are consumers! In order to understand the entire market though, we must incorporate the behavior and decisions of producers and firms. In this section, we will envision ourselves as owners of firms and derive the supply of gasoline.

Deriving the Supply of Gasoline

Why sell more gas?

Imagine you are producing and selling gasoline. What could cause you to increase the amount of gasoline you sell?

Let's make producing gasoline simple. A firm owns a plot of land and can drill for gasoline underneath the land (again, a simplification). Dig 1 foot into the ground and 1 gallon of gasoline will be produced. Digging 2 feet into the ground produces 2 gallons of gas. This pattern continues so that digging 1000 feet into the ground results in 1000 gallons of gas.

Digging that first foot into the ground is not that difficult as the dirt and soil can easily be moved. (As a kid, you may have upset your parents by digging a foot deep hole in the ground with your hands!) The second foot is harder to get to and maybe requires a shovel. (The second foot would still be possible to reach for an ambitious child!) Each additional foot of digging is harder than

the previous foot. Long before the 1000th foot, a powerful drill is needed to get through the ground.

What will make a firm dig deeper and produce more gasoline? There are many possible answers to the discussion question above. The difficulty of digging in the ground plays an important role, as does the availability of drills, the number and quality of the workers and overall technology all influence how much gasoline will be produced.

Similar to our discussion about demand, the price of gasoline is the biggest determinant of the amount produced by firms. When the price of gasoline increases, a firm says to itself, "it is worth digging deeper into the ground and producing more gasoline. It will be expensive, but the higher price of gasoline will compensate for the increase in production costs." When the price of gasoline decreases, the firm will find digging deep into the ground unprofitable because the cost of digging is not overcome by the relatively low price.

Changes in the price will incentivize firms to produce more or less. In a similar vein, changes in the quantity of production will change the price a firm charges. When a firm decides to increase their production of gasoline, they will charge a higher price for the gasoline to compensate them for the higher costs of drilling deeper. Decreasing production will cause the firm to reduce the price they charge for a gallon since less money is spent on production.

We define the amount of a good that a firm is willing and able to produce at a given price the quantity supplied. When the price of a good increases, the quantity supplied increases. As the price decreases, the quantity supplied decreases. The relationship between quantity supplied and price is not very controversial. In fact, the relationship is so common, it has also become a law, specifically, the law of supply.

Following our line-of-thinking earlier, we can visually draw the relationship between quantity supplied and price from a supply schedule. The supply schedule below shows the combinations of quantity supplied (Q_S) and prices (P) for a single representative gasoline firm.

The first thing to notice about the supply schedule is that when the price of gasoline is $0.50, the firm will not produce any gasoline. The price is too low for the firm to even start drilling. Presumably, drilling for oil at this low price would not cover the cost of production. When the price increases to $1.00, the firm produces 3 gallons. Consistent with the law of supply, the quantity supplied increases when the price increases. In the example above, the relationship above is linear, meaning that for every $0.50 increase in the price, the quantity supplied increases by 3 gallons. This does not need to be the case, but does make graphically depicting the supply schedule easier.

Plotting the combinations of quantity supplied and price can be done in a similar fashion as above. Start by creating a graph with quantity on the horizontal axis and price on the vertical axis. Take any combination of prices and quantity supplied from the supply schedule and plot it on your graph. Point F shows that at a price of $1.50, the quantity supplied is 6 gallons per week. At point G, the price is $2.50 and the quantity supplied has increased to 12 gallons per week.

Because the relationship between quantity supplied and price is linear, a straight line is drawn between points F and G. This line is denoted as *S* and defined as the **supply curve**.

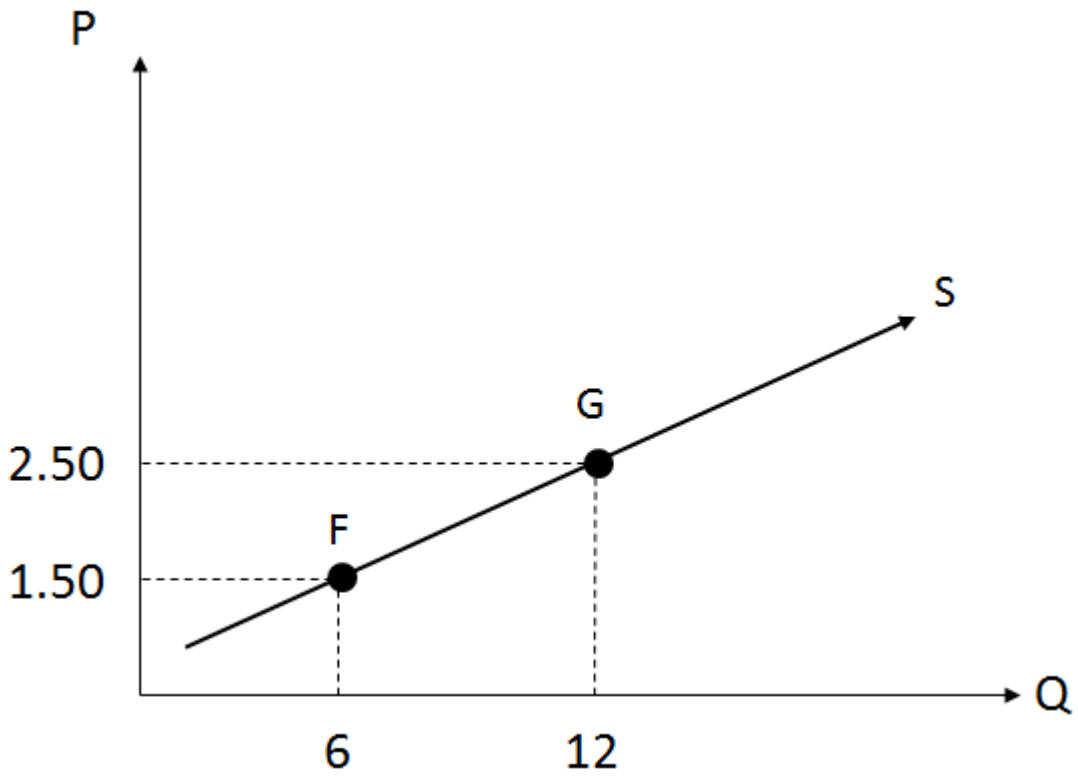


Figure 2.2.01

The supply curve is the graphical representation of *ALL* prices and quantities supplied of a good or service. The creation of the supply curve should feel very similar to the creation of the demand curve. With supply we are examining the market from the point-of-view of the producer instead of the consumer, but the techniques used to construct the supply curve are the same as the demand curve.

In the supply curve above, we were analyzing a single firm. In reality, there are many firms in a market. For simplicity, assume that there are 1 million identical firms, which means that at a price of $1.50, the quantity supplied is 6 million gallons per week, instead of 6 gallons per week. The supply curve below is updated to reflect the increase in quantity supplied at all price levels.

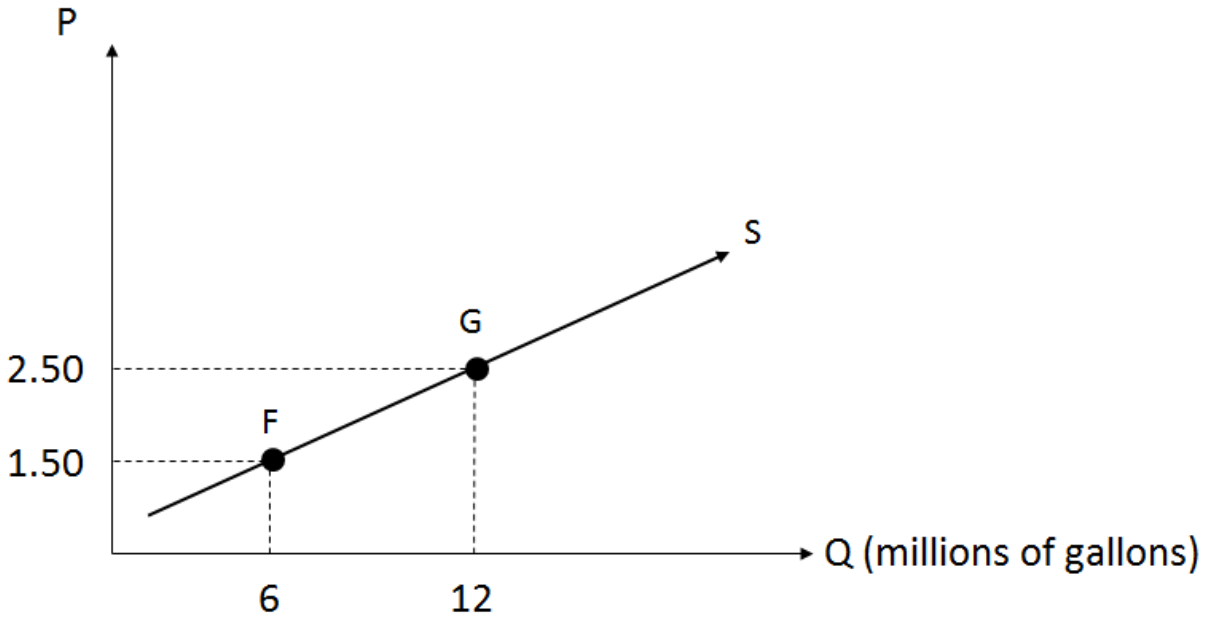


Figure 2.2.02

Similar to demand, when referring to the supply of a product, we mean the entire supply curve. The "supply of gasoline" shows us the relationship between quantity supplied and prices. Changing the price of gas does not change the entire supply curve. Instead, a change in the price will move us along the supply curve, just as it did moving from point F to G.

Another similarity to the demand curve is that the supply curve assumes all else is held constant (ceteris paribus). The shocks from our discussion above that change how much gasoline a firm is willing to produce are not happening as we move along the supply curve. When those shocks do occur, that is when the supply curve shifts. Before getting to shifts, let's make sure we understand the supply of a product.

Question 2.11: Moving along the Supply Curve

Which of the following events will move us along the supply curve for gasoline?

A

A change in the cost of a drill.

B

A change in technology.

C

A change in the cost of paying workers.

D

A change in the price of gasoline.

A graph is not necessary to answer this question. Remember that the supply curve shows us how prices and quantity supplied are related. Changing the price of gasoline will lead to a change in quantity supplied. The exact nature of the change is captured by the supply curve. So the only way to move along the supply curve is to change either the price of the good or the quantity supplied of the good.

2.12: The Supply Schedule

The following supply schedule shows combinations of the price and quantity supplied of gasoline for the average firm. What is the quantity supplied at $2.00?

P: Price of a Gallon	Q_S: Quantity Supplied (Gallons)
1.00	0
1.50	0
2.00	4
2.50	10
3.00	16
3.50	22

A

0

B

4

C

10

D

16

2.13: The Supply Schedule

Imagine that the price of gasoline increases from $2.00 to $3.00. The average firm will respond by

P: Price of a Gallon	Q_S: Quantity Supplied (Gallons)
1.00	0
1.50	0
2.00	4
2.50	10
3.00	16
3.50	22

A

Producing 12 gallons more

B

Producing 6 gallons more

C

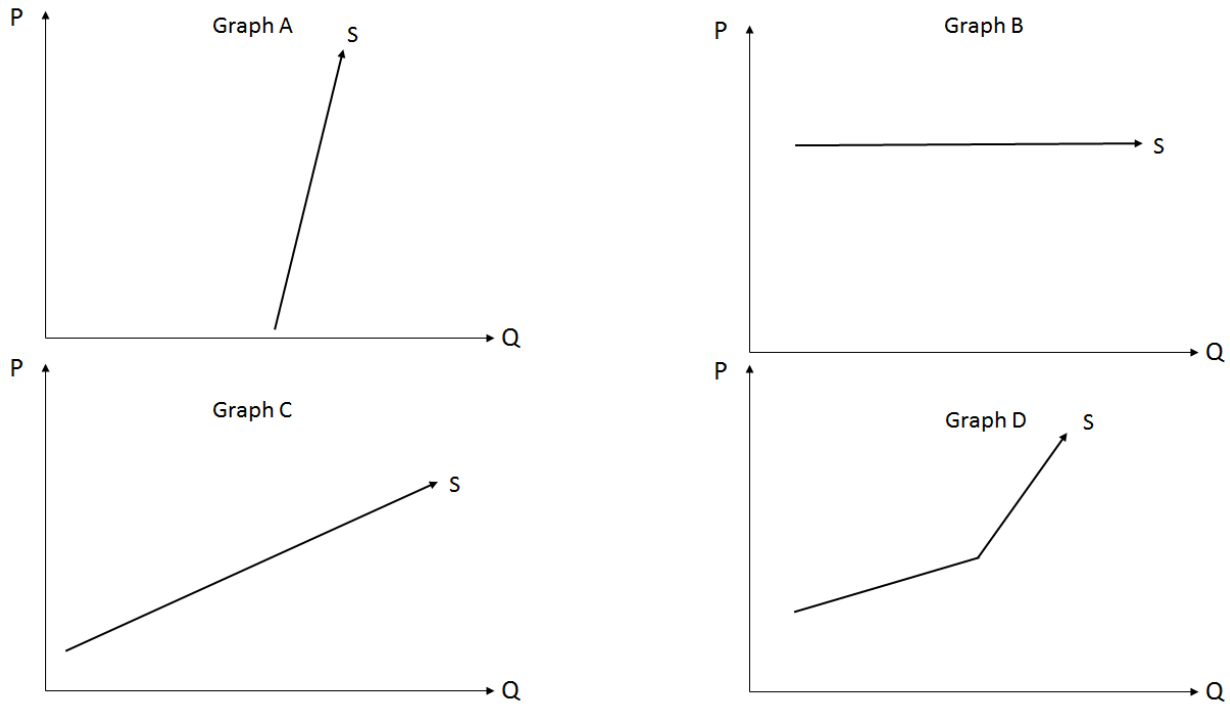
Producing 4 gallons more

D

Producing 4 gallons less

Question 2.14: The Supply Curve

Considering the supply schedule in the previous two questions, which graph most accurately reflects the supply curve? (Hint: It will be helpful to accurately graph out the supply curve.)



A

Graph A

B

Graph B

C

Graph C

D

Graph D

Questions 2.12 and 2.13 reiterated what it means to move along the supply curve. As the price of a good increases, the amount that a firm produces will also increase, according to the law of supply. In question 2.14, panel A shows a situation where firms will be willing to produce even when the price of the good is near zero. This is not the case in the supply schedule since quantity supplied is zero at a price of $1.00. In panel B, a firm is willing to produce as much of a product as necessary, as long as the price is at the correct level. If the price falls below this amount, the quantity supplied goes to zero. This is not the firm that is depicted in the supply schedule.

Changes in the Supply of Gasoline

We cannot say it enough, "prices do not change supply"! If someone says that prices change supply (or demand), a new supply curve would be needed whenever the price changes. This is not the case though, as the supply curve is showing us what the relationship between price and quantity supplied is. A change in price leads to a change in quantity supplied.

So if price does not change the supply for gasoline (or any other product), then what does? Return to our discussion question above that asked what makes firms produce more gasoline. There were likely answers that had something to do with the cost of machines or drills, something about workers and technology. Changes to these things are what will cause the supply to shift.

Generally, anything that changes the amount of a good a firm produces that is not the price will shift our supply curve. We could go on for a long time about

all the specific scenarios that shift supply. But let's group the events into categories that we can always fall back on.

Changes in the Cost of Inputs

A common answer to what changes the quantity supplied of a good is the cost of production. In the production of a good, a firm spends money on inputs in order to produce output. Inputs are generally thought of as land, labor and capital. When the cost of labor (wages of workers) increase, firms will respond by either reducing their quantity supplied or increasing the price of the good. The same idea applies if the cost of capital (machines) increases. In both situations, the quantity supplied at all prices will decrease and there is a "decrease in supply".

How can we show a decrease in supply graphically? Return to our original supply example. At point G1, the price of gasoline is $2.50 and the quantity supplied is 12 million gallons. When the cost of production increases, the firm has two options. First, they can reduce production to 6 million, but still charge $2.50. This moves the firm from point G1 to G2. Producing less will lower their costs since they do not have to drill down as far and compensate for the higher cost of inputs.

Alternatively, the firm could produce the same amount as before, but after the increase in the cost of inputs, the price the firm is willing to sell at will have to increase from $2.50 to $3.50. This moves the firm from G1 to G3. Both options end up with the same outcome, the quantity supplied decreases at all price levels, which means the supply curve decreases.

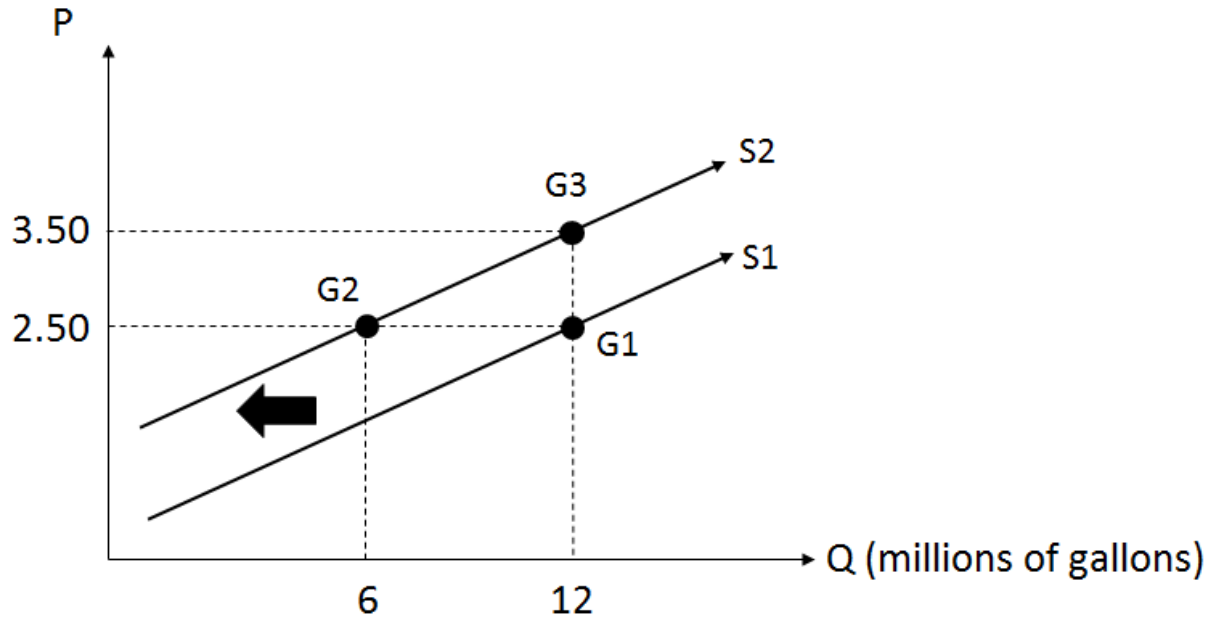


Figure 2.2.03

Even though S2 is "above" S1, it is because supply decreases. In order to avoid confusion, think of a decrease in supply as a shift left. This is the same terminology we used when said that a decrease in demand is a shift left.

An increase in the supply curve works in the opposite direction. Imagine that the price of drills decrease. Now firms spend less on drills and are willing and able to produce more gasoline at all price levels. In the figure below, this means that if we begin at a price of $2.50 and 12 million gallons supplied (point F1) and there is a decrease in the cost of drills, firms will produce more gallons. This moves the firm from F1 to F2 and the firm produces 18 million gallons at $2.50.

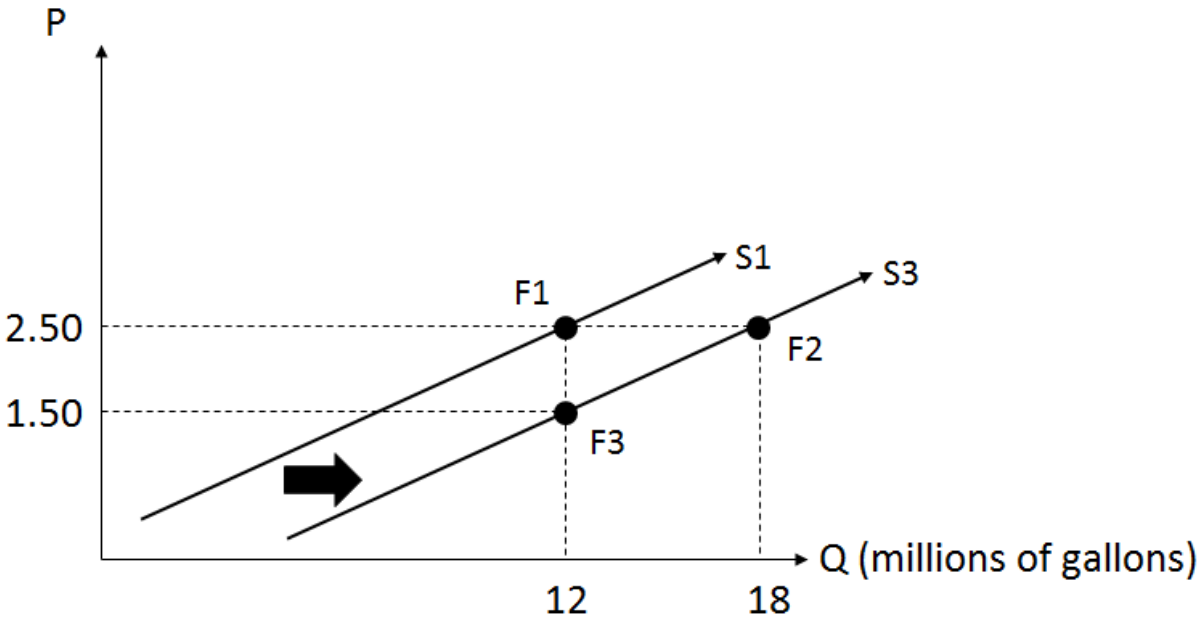


Figure 2.2.04

A comparable response is for the firm to produce the same amount before and after the reduction in the cost of production. Initially, the firm is willing and able to produce 12 million gallons when the price was $2.50 (point F1). After the reduction in the price of capital, the firm is willing and able to produce the same amount for $1.50 (point F3).

Both responses from the firm cause the supply curve to increase from S1 to S3. Notice again that the supply curve, S3, is technically "below" S1. In order to avoid confusion, we will refer to increases in supply as a shift right. Again, this follows the same nomenclature as our increase in demand.

- an increase in supply or demand means the curve shifts right
- a decrease in supply or demand shifts the curve left

Question 2.15: Wages and the Supply Curve
You own a firm that uses capital and labor to produce a general good. A new regulation requires every company in your industry to provide more vacation days for your workers. What happens to the supply curve?

A

The demand for your product increases

B

The demand for your product decreases

C

The supply of your product increases

D

The supply of your product decreases

This question has the potential to be tricky, but remember what we just learned about the cost of labor and shifts in supply. In question 2.15, firms now have to give workers more vacation, which means the workers get paid the same amount, but work fewer days. This increases the cost of labor. Because labor costs increase, the supply curve will shift to the left, which is synonymous with a decrease in supply.

Alternative Use of Resources

Continue with the simple idea that digging deeper into the ground produces more gasoline. Imagine that many areas of land have gasoline underground become candidates for a National Park. Some of the owners can make more money if their land is used as a National Park instead of producing gasoline. These owners will likely stop producing gasoline, reducing the supply of gasoline (shifting the supply curve left).

It is also possible for the supply to increase and shift right because of the alternative uses of resources. When a golf course owner learns that drilling for gasoline would be more profitable than operating a golf course, they will shut down their golf course and start producing gasoline. This behavior will increase the supply of gasoline, as the quantity supplied of gasoline will increase at all price levels.

The main idea behind this example is that firms have resources that allow for the production of a variety of goods. A company that makes wooden tables could use the wood for slats used in housing construction. Companies that

produce a good using steel can potentially make a lot of different products with steel and will likely produce the most profitable good.

Question 2.16: Alternative Resource Uses

Farmers have plots of land that can produce grapes for wine or olives for olive oil. A recent scientific study concludes that consuming olive oil prevents heart disease. What are the most likely scenarios to occur?

A

The supply of grapes will increase

B

The supply of grapes will decrease

C

The supply of olives will increase

D

The supply of olives will decrease

There are two correct answers to question 2.16. The farmers will respond to the news that olive oil is healthy by dedicating more of their land to olive production. At the same time, their land does not expand and in order to have more olive production, wine production must decrease. The supply of olives will shift right, while the supply of grapes shift left.

The Number of Producers

When firms decide to change what they produce, the number of producers of a good also change. There are many reasons the number of firms enter and exit markets and these changes have a direct impact on the supply of a product.

Technology

One of the biggest reasons that the supply of a product increases is because technology improves over time. The drills used to dig for gasoline are very different today than they were 20 years ago. Improving technology increases

the quantity supplied of a product at all price levels, shifting the supply curve right. Unlike other shifters of supply, it is reasonable to assume that improving technology only increases supply.

Expected Future Prices

Question 2.17: Future Prices

Next year, gasoline firms believe that the price of gas will increase. Assuming that they can produce gasoline relatively quickly, what will happen to the supply of gasoline today?

A

Supply of gasoline will decrease

B

Supply of gasoline will increase

C

Supply of gasoline will not change

D

There is not enough information

This question has the potential to be tricky. A producer that believes that prices next year will increase, knows that selling the good next year will be more profitable than this year. Consequently, the firm will reduce their production today in anticipation of increasing production next year. This causes today's supply curve to shift left.

Expecting the price of a good to decrease in the future will have the opposite outcome. Firms that believe the price of their product will decrease will respond to this expectation by producing more today. This will cause today's supply curve to shift right since the quantity supplied will increase at all price levels.

External Events and Preferences

Like demand shifts, the list of specific shifters of supply is quite long. Bad weather will have a direct impact on agricultural goods and can also impact markets that transport their product long distances. A run of good weather will produce a higher yield of crops, shifting the supply curve to the right, and making delivery of goods less costly.

Just like consumers, producers also have changing preferences. Taking a risk on a new production method could have a noticeable impact on the supply of a good. Government laws can also influence the supply of a product, as can health and safety regulations. Any event other than a price change that alters the quantity supplied of a good will shift the supply curve. We have categorized the most common shifts, but think about all the potential changes in the production process. All of these changes can shift the supply curve.

Shifts in Supply vs. Movements along the Supply Curve

You may have noticed that our discussion about the shifts in supply somewhat mirror shifts in demand. The specific reasons for shifts in supply and demand differ, but in both cases, a change in price or quantity will move us along the curve. The supply curve shows us specifically how prices will change when quantity supplied changes, and how quantity supplied changes when prices change, holding all else constant. Changing the price of a good WILL NOT shift the supply curve!

The supply curve shifts when we relax the assumption that all is held constant. Elements of production other than price are always changing. These changes will increase or decrease the quantity supplied at all price levels, causing a shift right or left in the supply curve.

Now that we are comfortable with both demand and supply curves, it is time to put the two together so that we can start to explain why prices of goods, such as gasoline, fluctuate so much.

Chapter 2.4: Changes in Market Equilibrium

In finding equilibrium in a market, we are seeing a snapshot of the equilibrium price and quantity. Everything is held constant when we initially depict our market equilibrium. But as discussed earlier, aspects of markets are always changing: incomes are rising, technology is improving, weather is getting better (or worse). All of these events have an impact on supply or demand and integrating the events into our model can help us understand the historical price and quantity fluctuations in markets.

Single Shifts

In the summer of 2016, average gasoline prices were lower than they had been in years. Check out this CNBC video talking about how happy it made everyone!

2.23: Prices Changing Demand ?

In the CNBC video (link above), the narrator notes that in the summer of 2016, "consumer demand (for gasoline) is spiking," because prices are so low. During the summer of 2016, gas prices were lower than in the recent past and the amount of gasoline bought per week was higher than ever. What is the most likely scenario that could have caused this outcome?

A

Demand for Gasoline Increased

B

Demand for Gasoline Decreased

C

Demand for Gasoline Did Not Change

D

Not enough information

This is a difficult question. You may have watched the video and started to draw supply and demand curves (on paper or in your head), but linking the narrator's comments to market equilibrium does not quite add up.

How can we explain what went on in the gasoline market in the summer of 2016? Start by setting the market for gasoline in equilibrium *before* the summer of 2016. Draw some general supply (S1) and demand (D1) curves and place equilibrium (E1) at the intersection of the two curves. Below, the market is drawn such that the equilibrium price and quantity is defined as P1 and Q1 and specific values are not imposed on P or Q.

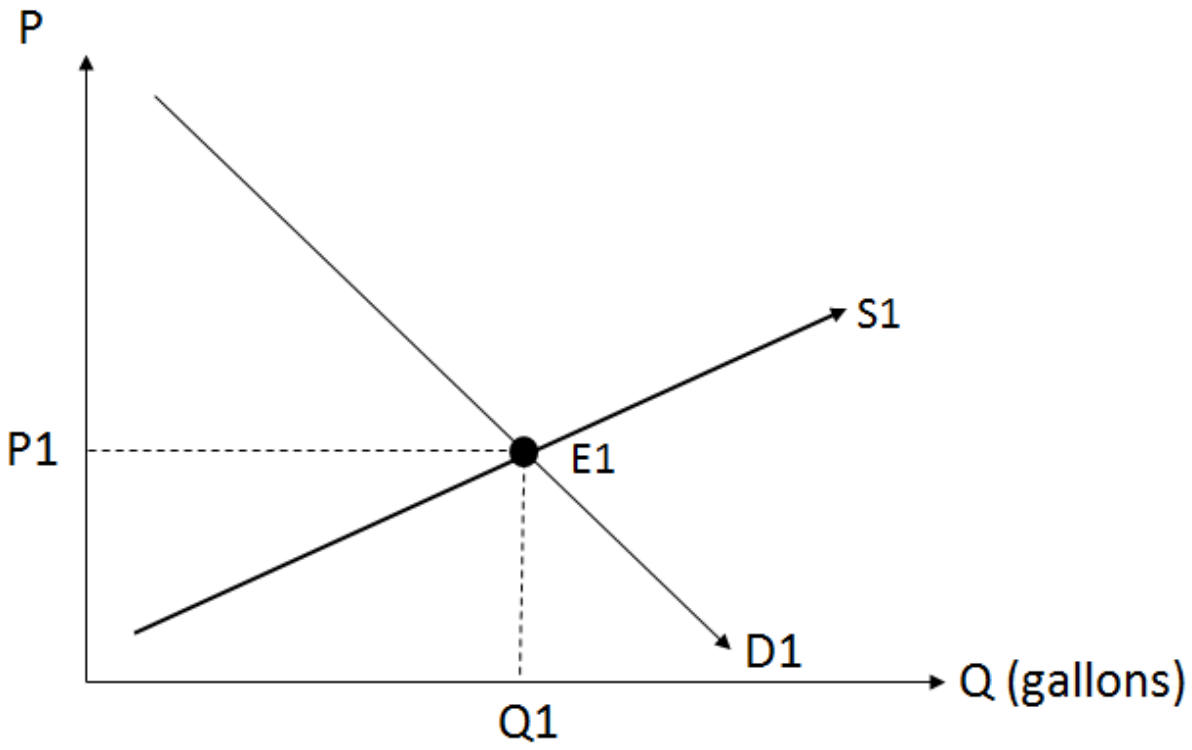


Figure 2.4.01

The CNBC video reported that*during* the summer of 2016, prices were falling, there were record sales at the gasoline station and "demand was spiking". But ask yourself, what happens when demand increases? This is a question we addressed above, but the graph below shows what happens when demand increases from D1 to D_W. ($D_W$stands for "wrong demand" here.)

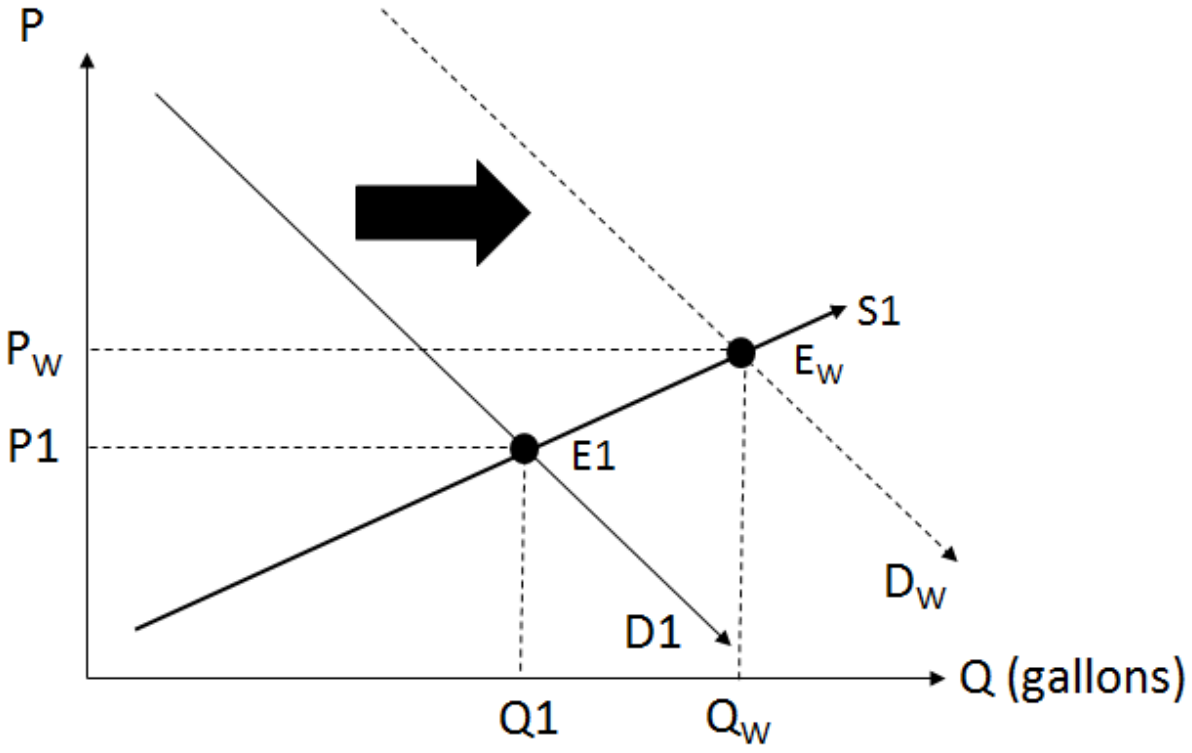


Figure 2.4.02

If a demand increase was driving the gasoline market in the summer of 2016, the equilibrium quantity and price would have both increased. The equilibrium $E_W$is at a higher price (P_W> P1) and higher quantity (Q_W> Q1) than the original equilibrium, E1. The flaw in the reporting from the video was not that there were record sales at the pump, but rather that demand was spiking.

2.24: Record Gasoline Sales?

In the summer of 2016, gasoline sales were at all-time highs, but the price was falling. What must have occurred in order for this outcome to happen?

A

Demand for Gasoline Increased

B

Demand for Gasoline Decreased

C

Supply of Gasoline Increased

D

Supply of Gasoline Decreased

The facts we are given about gasoline in 2016 is that prices were decreasing, but the equilibrium quantity (sales) were at all-time highs. The only way that equilibrium quantity can increase when equilibrium price decreases is when the supply of gasoline increases.

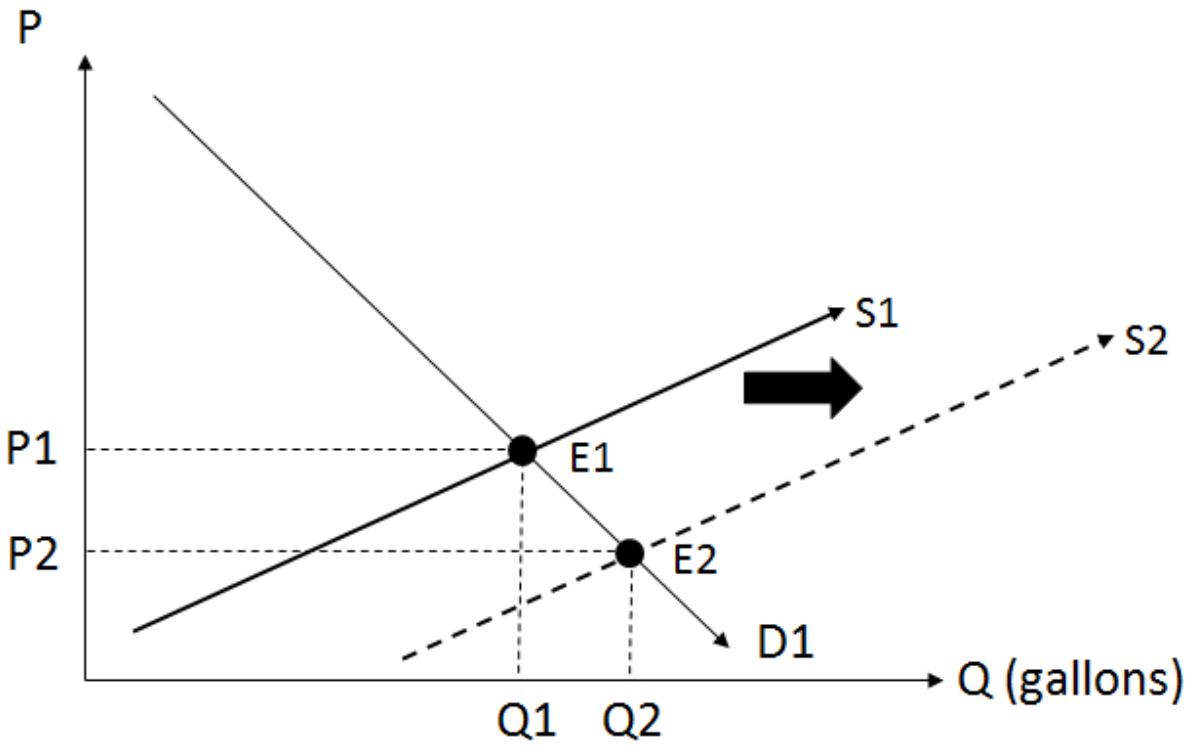


Figure 2.4.03

The figure above shows what we already knew from the previous section. When the supply of gasoline increases, the supply curve shifts right from S1 to

S2. If the price were to stay at P1 after the shift, there would be excess supply (surplus of gasoline). The excess supply puts downward pressure on prices. As the price decreases, the quantity demanded increases, moving us along D1. The price decrease also decreases quantity supplied, moving us along S2. The new equilibrium is reached at E2, where the equilibrium price is lower and equilibrium quantity is higher.

Using the fluctuations in the gasoline market in one summer, we can come up with some basic rules about how markets will behave when there are shifts in supply and demand. In our analysis above, we saw that an increase in demand will increase the equilibrium price and quantity. An increase in supply will increase the equilibrium quantity, but decrease the equilibrium price.

The opposite effects occur when there is a decrease in demand or supply. A decrease in demand will shift demand left, causing the equilibrium price and quantity to decrease. Decreases in supply will increase the equilibrium price and decrease the equilibrium quantity.

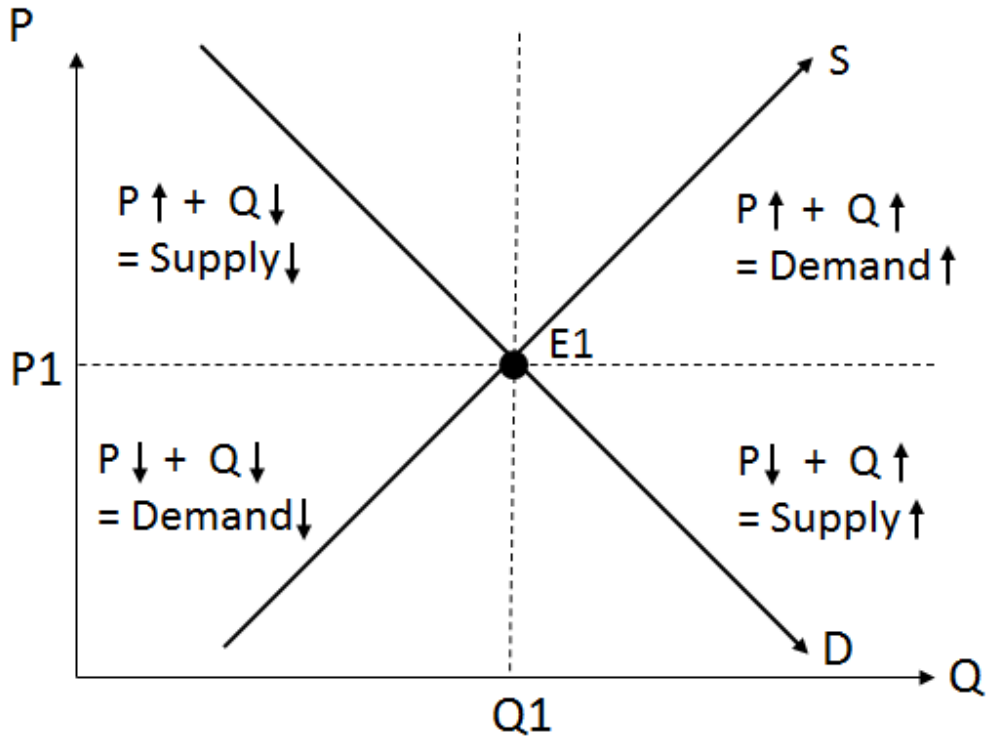


Figure 2.4.04

The consequences of shifts in supply and demand can be seen in the graph above. Start again at equilibrium (E1). When the equilibrium price decreases and the equilibrium quantity increases (equilibrium is below and right of the original E1), the dominating shift is an increase in supply. Although it is possible that demand increased or decreased, but then in order to see the change in equilibrium we did in the gasoline market, supply must have increased more than any change in demand.

If you observe the equilibrium price and quantity of a good decreasing, this means that the equilibrium is below and left of the original E1. In this case, the dominating shift is a decrease in demand. It is possible that an increase or decrease in supply could be happening at the same time that demand is decreasing, but if prices and quantity decrease overall, we can conclude that any supply shift is small relative to the demand decrease.

If the equilibrium price increases and there is a reduction in the equilibrium quantity, the new equilibrium is above and to the left of the original E1. This means that the dominating shift is a decrease in supply. An increase in the equilibrium price and quantity will occur when the dominating shift is an increase in demand. The new equilibrium will be above and to the right of E1. Use the figure to answer the following questions.

2.25: Shifts in Supply and Demand

You are interested in the market for flat screen TVs. Over time, you have observed that flat screen TVs have become cheaper and more households have bought flat screen TVs. This is because:

A

Demand Increased

B

Demand Decreased

C

Supply Increased

D

Supply Decreased

This question mirrors our gasoline market above. However, think about what is causing the supply shift in the flat screen TV market over time and you will start to see how shocks to markets can directly impact us as consumers.

2.26: Market for Diet Soda

A study is released that says diet soda, despite having zero calories, leads to weight gain and health problems. What is the most likely outcome associated with the soda market as a result of the study?

A

Prices and quantity of diet soda increase

B

Prices and quantity of diet soda decrease

C

Price of diet soda increases and quantity of diet soda decreases

D

Prices of diet soda decreases and quantity of diet soda increases

The study has no impact on how diet soda is produced, so the supply curve is unchanged. However, consumers will likely react to this news by reducing their desire to consume diet soda. This will cause a decrease in demand and the new equilibrium will be at a lower price and quantity than before.

Multiple Shifts

The section above does not directly address the situation where both supply and demand shift at the same time. Often, markets experience shifts in supply and demand simultaneously. It is important to understand how to disentangle these shifts and ultimately, connect the outcomes back to our original goal of explaining changes in the gasoline market.

Let's start by analyzing the gasoline market in 2000. Below are the generic supply and demand curves and they are labeled with subscripts of 2000.

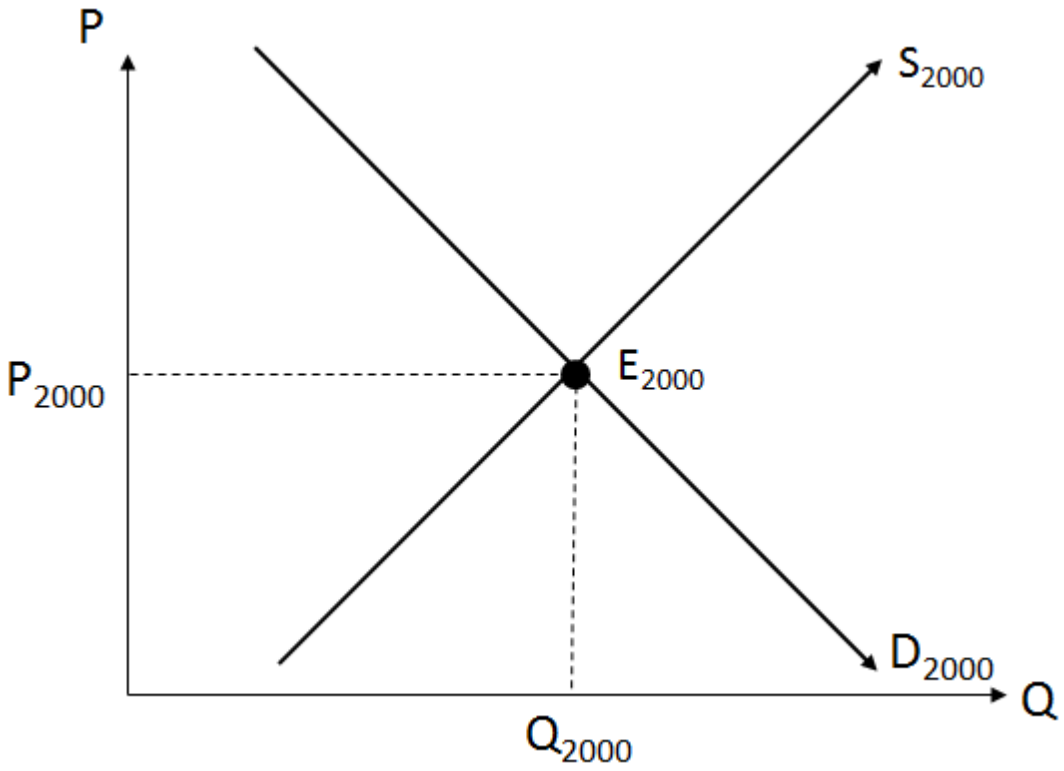


Figure 2.4.05

What events could have possibly impacted the supply or demand for gasoline between 2000 and 2008? In 2000, there was a stock market crash (dot-com crash) that caused many individuals to lose wealth. The terrorist attacks on 9/11 also had a negative impact on certain industries in the US economy. However, there was a lot of income growth between 2001 and 2008, as seen in the graph below that uses data from the Bureau of Economic Analysis (BEA).

Figure 2.4.06

Assuming that using a car is a normal good, an increase in income will increase the demand for gasoline. Over this same time period, the sales of heavy weight trucks were increasing and light weight truck sales were stable. Let's move forward with the assumption that the rise in income represents what happened to demand for gasoline between 2000 and 2008. In other words, demand for gasoline increased between 2000 and 2008.

What happened to supply over this time period? A large fraction of the oil used for the production of gasoline comes from OPEC countries in the Middle East. Increasing the supply of oil production reduces the cost of producing gasoline and increases supply. Decreases in the supply of oil work in the opposite direction.

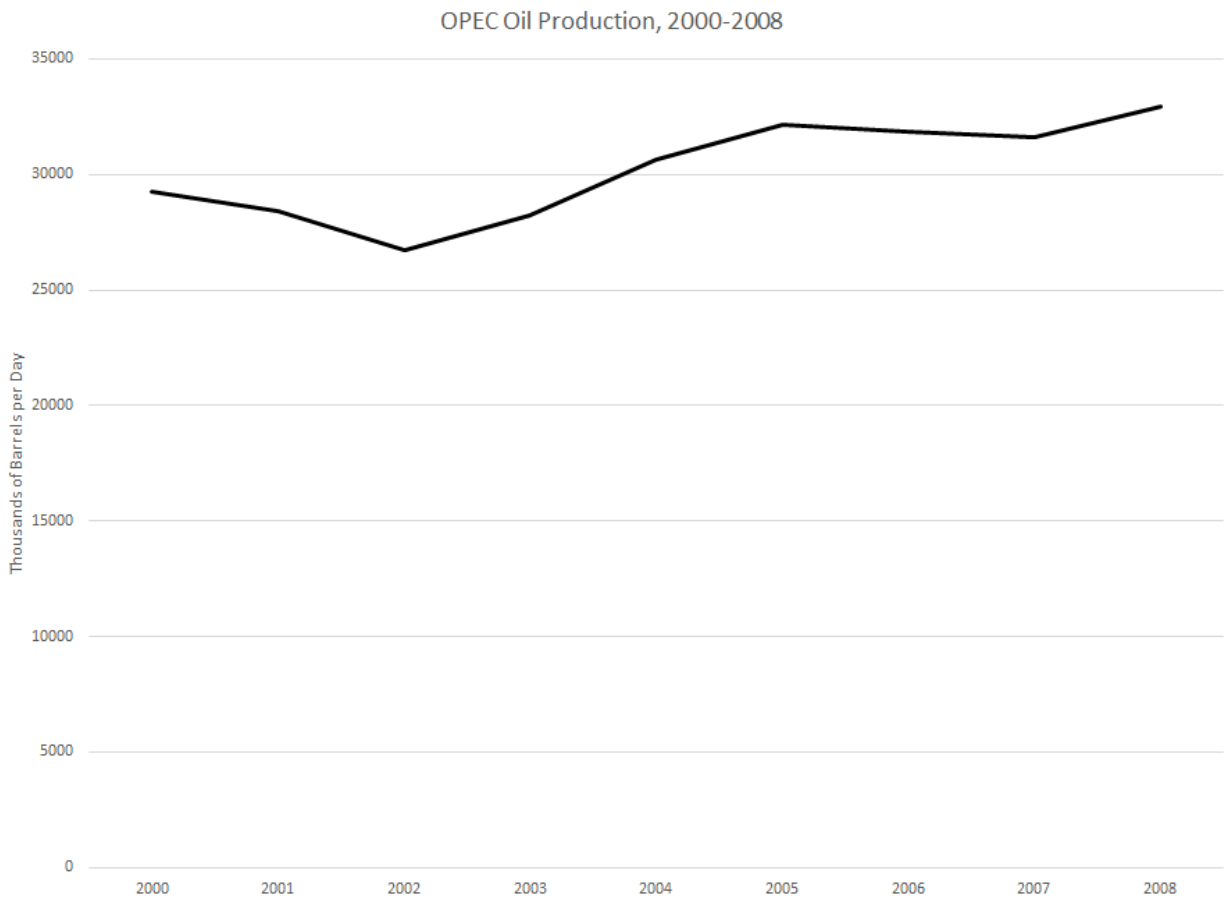


Figure 2.4.07

The graph above shows OPEC oil production from 2000 to 2008, using data from the US EIA. OPEC oil production increased slightly between 2000 and 2008, but the increase was small relative to the income growth seen in the previous graph. Assume that the small increase in oil supply represents all the supply shifts in the gasoline market over the same time. We would then conclude that supply increased a small amount between 2000 and 2008. The graph below combines the relatively large increase in demand and the smaller increase in supply.

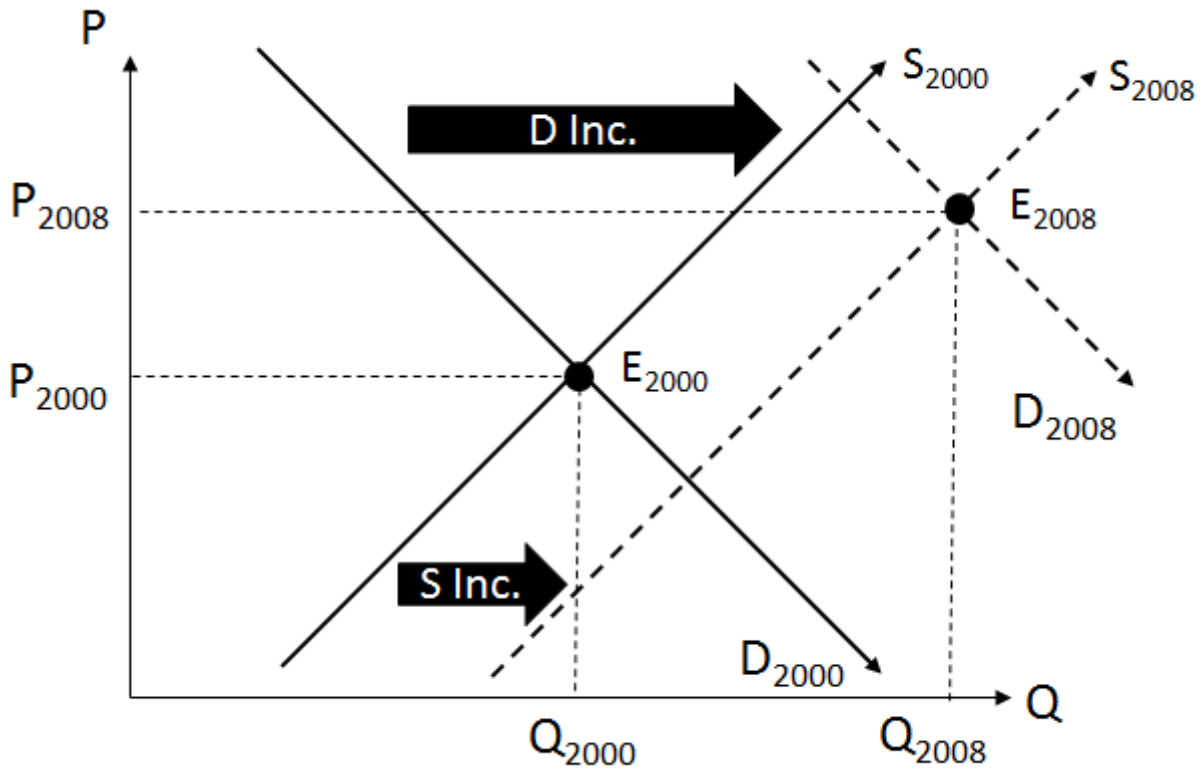


Figure 2.4.08

Notice that because the demand increase was large relative to the supply shift, the new equilibrium is at a higher price (P_{2008}) than the original price (P_{2000}). Equilibrium quantity increases because of both the increase in supply and demand.

2.27: Relative Shocks

Had the gasoline prices decreased between 2000 and 2008, but both income and oil production increased over that time, which of the following statement would most likely be true about the supply and demand of gasoline between 2000 and 2008?

A

The supply increase was larger than the demand increase

B

The demand increase was larger than the supply increase

C

Demand decreased and supply increased

D

Supply decreased and demand increased

Had gasoline prices decreased between 2000 and 2008, but both supply and demand increased over that time period, the supply shift must have been larger than the demand shift. The way to envision this is to redraw the previous graph, but have a large shift right in supply relative to the shift right in demand. You will then see that the equilibrium price will decrease, but the equilibrium quantity will rise.

Between 2000 and 2008, we would conclude that if the demand and supply curves shifted in the way we depicted in the graph above, prices and quantity would rise between 2000 and 2008. What happened between 2008 and 2009? A lot, as we will see throughout this entire course. But for our purposes, let's focus on personal income and oil production.

The figure below extends personal income to include 2009. Income levels between 2008 and 2009 fell noticeably. We will learn more about the Great Recession later in this chapter (and the rest of the book), but one of the consequences of the Great Recession was a reduction in personal income between 2008 and 2009.

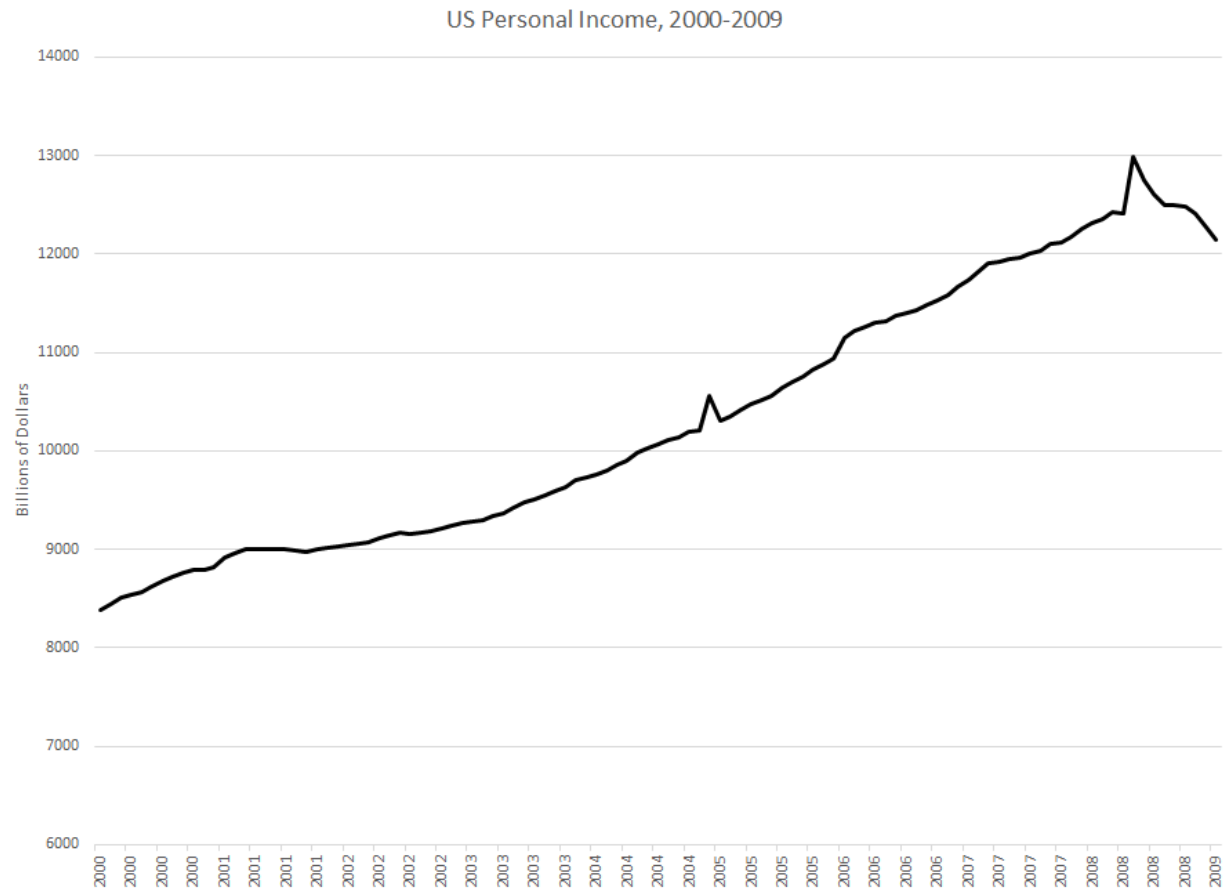


Figure 2.4.09

In actual dollars, personal income fell by almost 1 trillion dollars between 2008 and 2009. Households brought home a little more than 12 trillion dollars in 2009, whereas in 2008, they brought home 13 trillion. This is a significant reduction in income in a short amount of time. Because of the large drop in income, it is reasonable to believe that there was a reduction in the demand for gasoline.

There was little change to the supply of gasoline over such a small time horizon. This is confirmed in the graph below. While there is a small drop in oil production between 2008 an 2009, the change is small relative to the decrease in personal income.

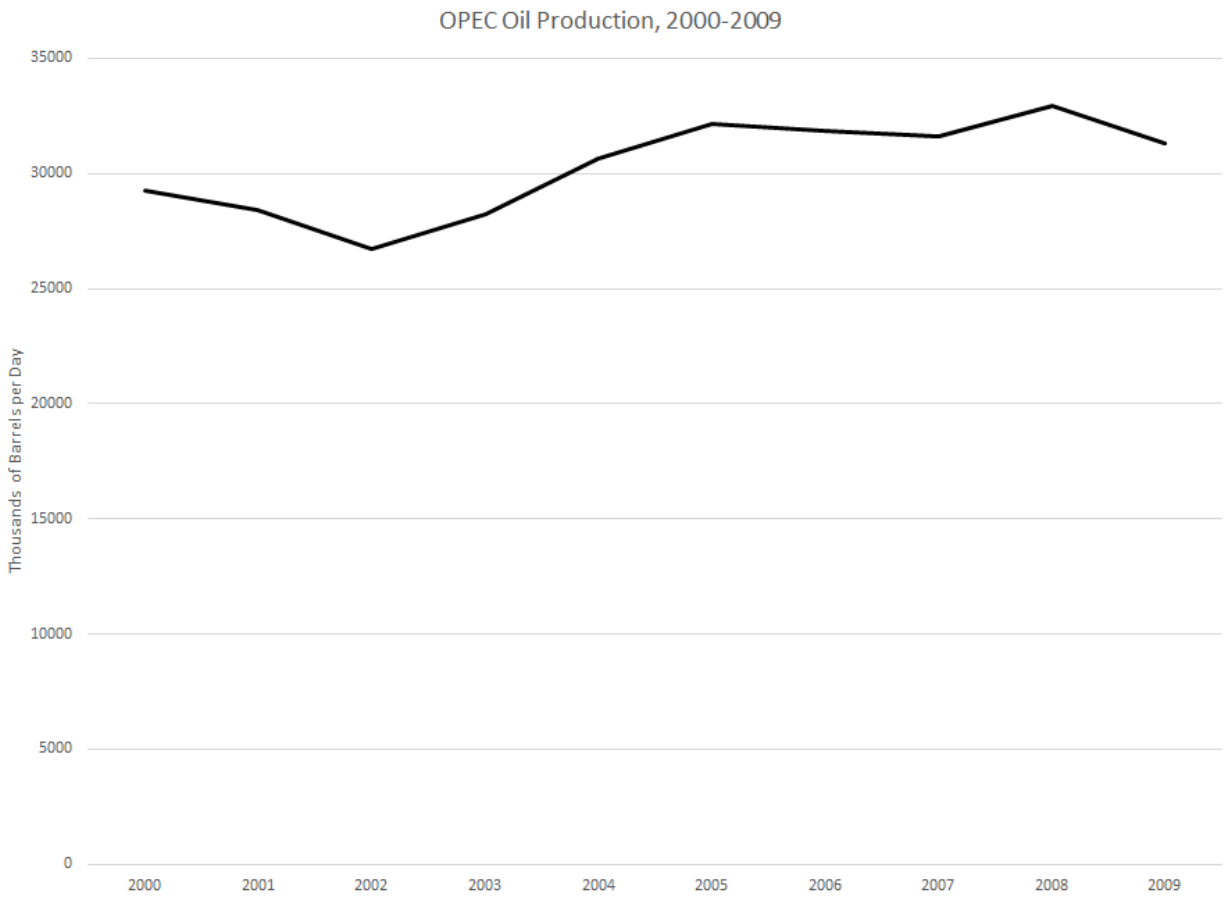


Figure 2.4.10

For simplicity, let's assume that between 2008 and 2009, there was a decrease in the demand for gasoline and the supply of gasoline stayed constant. How will this influence the price and quantity? The graph below shows us how.

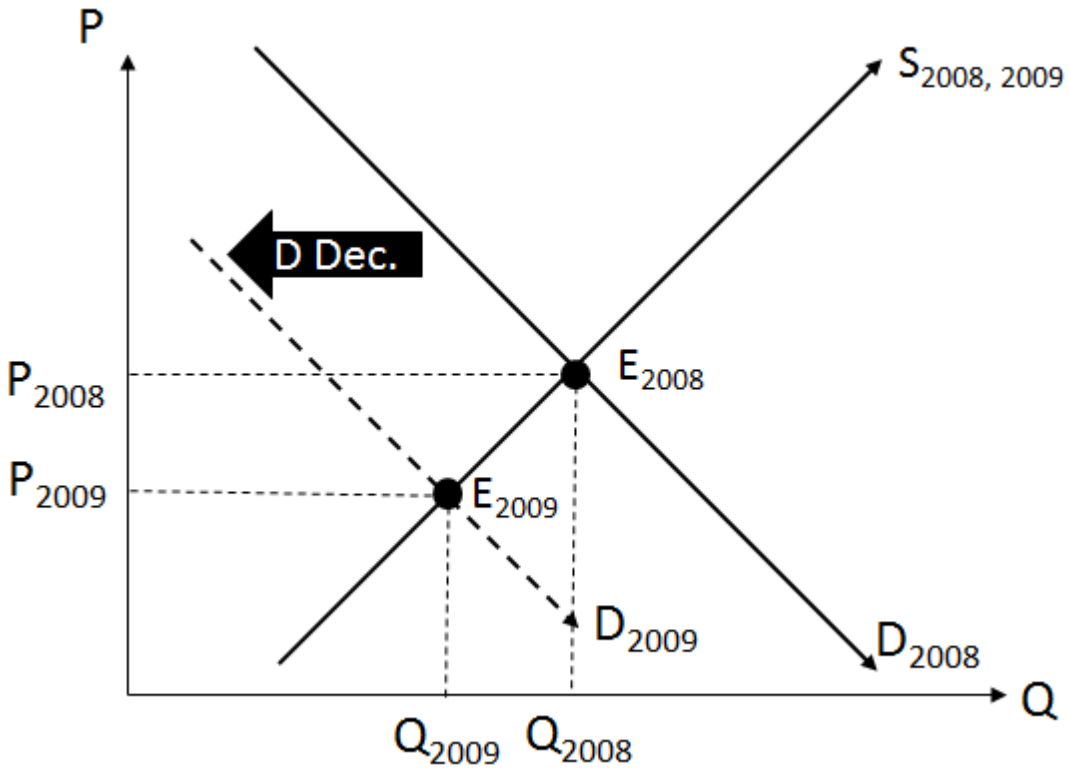


Figure 2.4.11

Compared to the shifts from 2000 to 2008, the change from 2008 to 2009 should feel a bit easier. The demand curve decreased from D_{2008} to D_{2009}. The supply curve is the same between both years and labeled as $S_{2008, 2009}$. For viewing ease, the equilibrium in 2008 has been re-centered to the middle of the graph and it is seen that equilibrium price and quantity decreased between 2008 and 2009.

Summarizing what our model tells us so far: between 2000 and 2008, the price and quantity of gasoline is predicted to increase. Between 2008 and 2009, the price and quantity is predicted to decrease.

What happened between 2009 and 2016? Again, a lot of things, but let's isolate the potential shocks to demand and supply of gasoline. After the Great Recession, US incomes recovered and grew nearly every month between 2009 and the end of 2016.

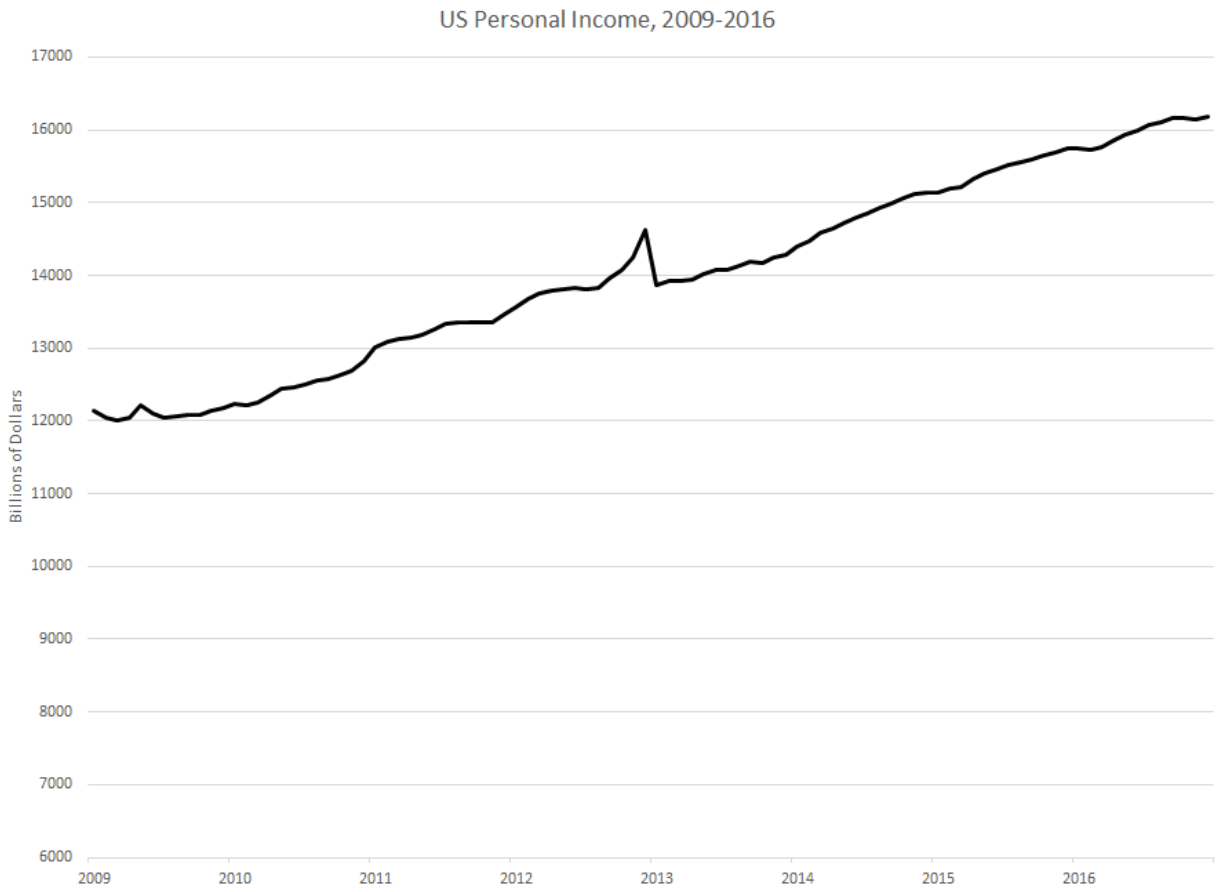


Figure 2.4.12

Before going to OPEC oil production, you may remember that there was a big increase in car technology throughout the mid-2000s and into the 2010s. Specifically, hybrid and electric car sales increased significantly between 2004 and 2007 and then again between 2011 and 2013.

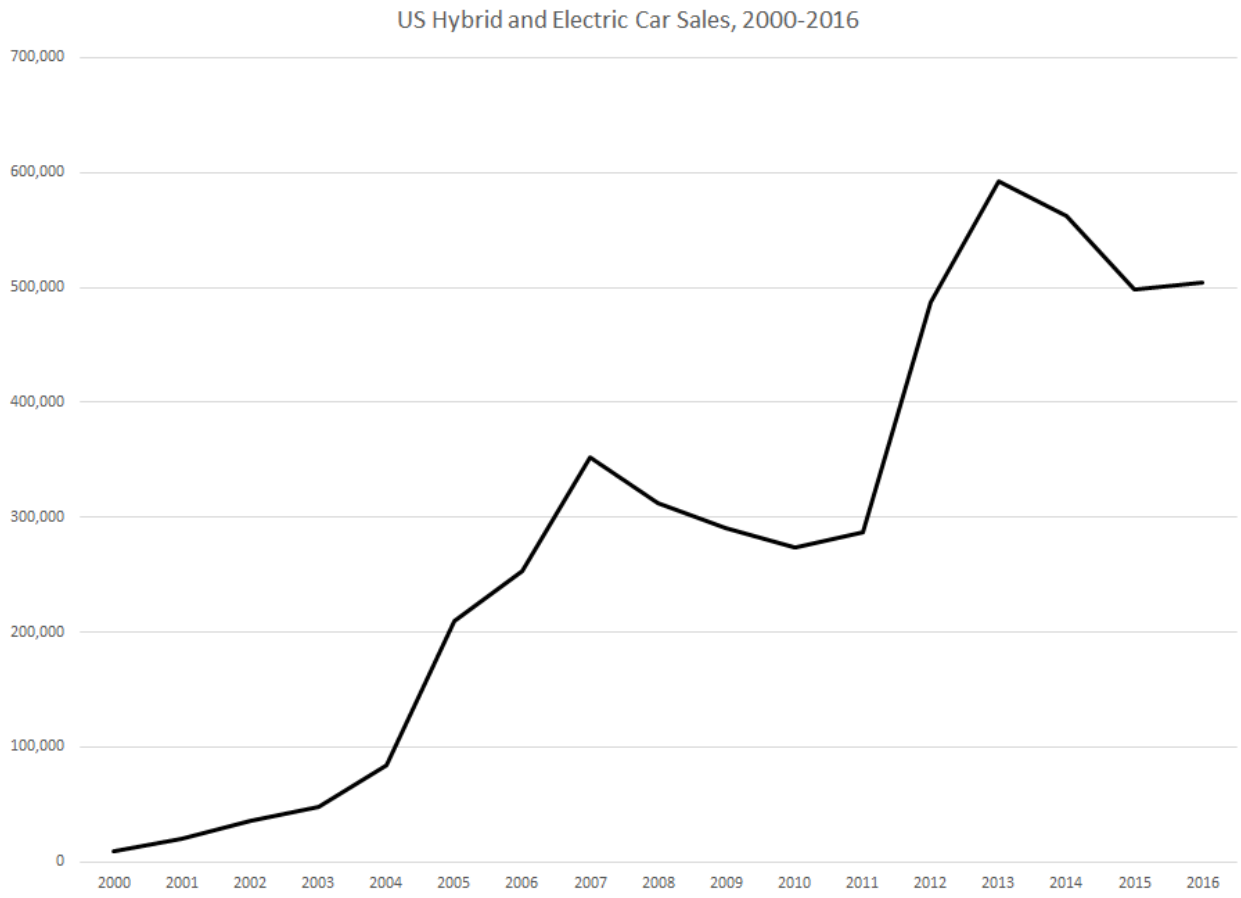


Figure 2.4.13

We have two offsetting shocks to the demand for gasoline between 2009 and 2016. Rising incomes are expected to increase the demand for gasoline, but if the cars being purchased are more fuel-efficient, the demand for gasoline will decrease. It would be possible to dig deeper into these potential shocks, but for simplicity, let's assume that the demand for gasoline was about the same between 2009 and 2016.

The supply of gasoline changed noticeably between 2009 and 2016. With the exception of 2012, OPEC oil production steadily increased between 2009 and 2016, rising from just over 31 million barrels per day in 2009 to 35 million barrels per day in 2016.

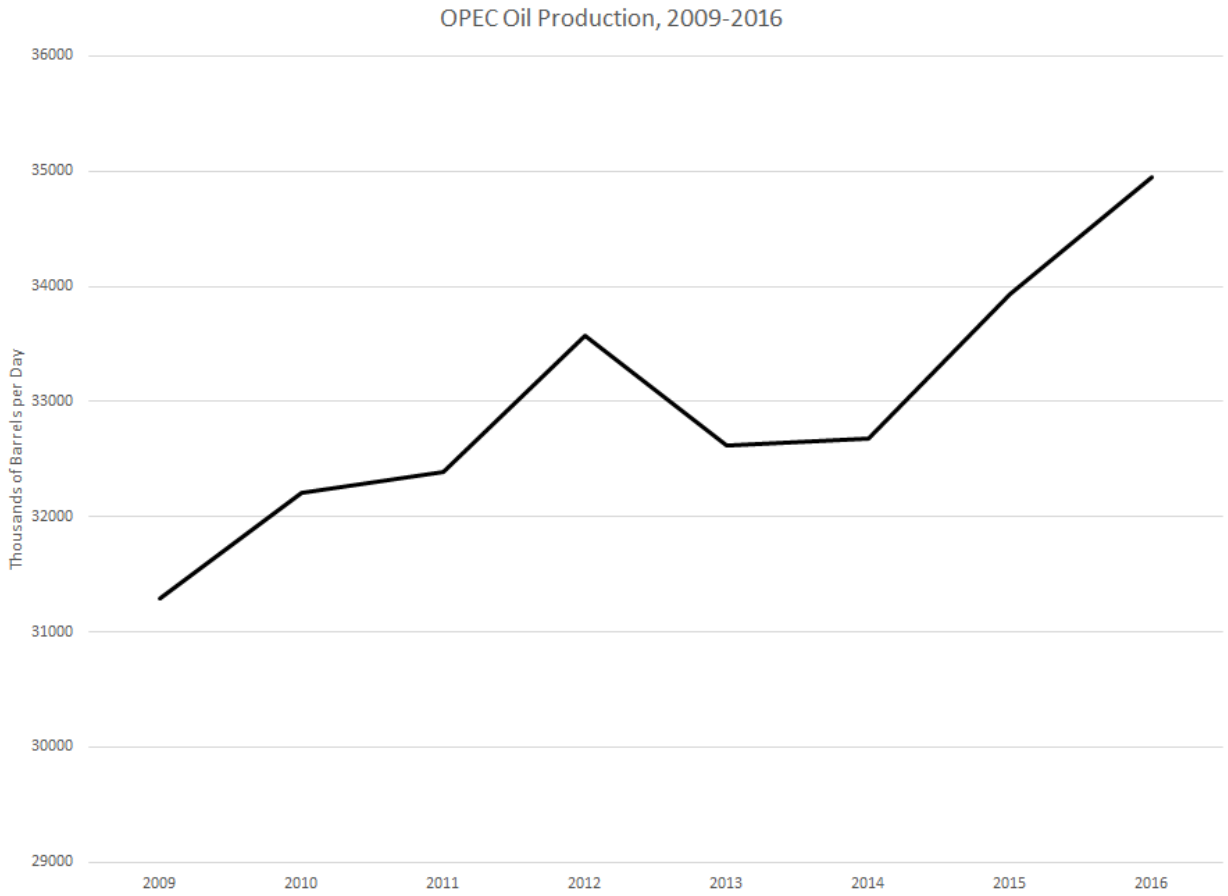


Figure 2.4.14

Although OPEC oil production increased after 2009, the most meaningful change to the supply of gasoline arguably came from the increase in oil production in the US. For many years prior to 2009, the US produced approximately 5 million barrels of oil per day. By 2015, the US was producing nearly 10 million barrels of oil per day. This is roughly one-third of all OPEC oil production. The significant increase in US oil production increased the supply of gasoline.

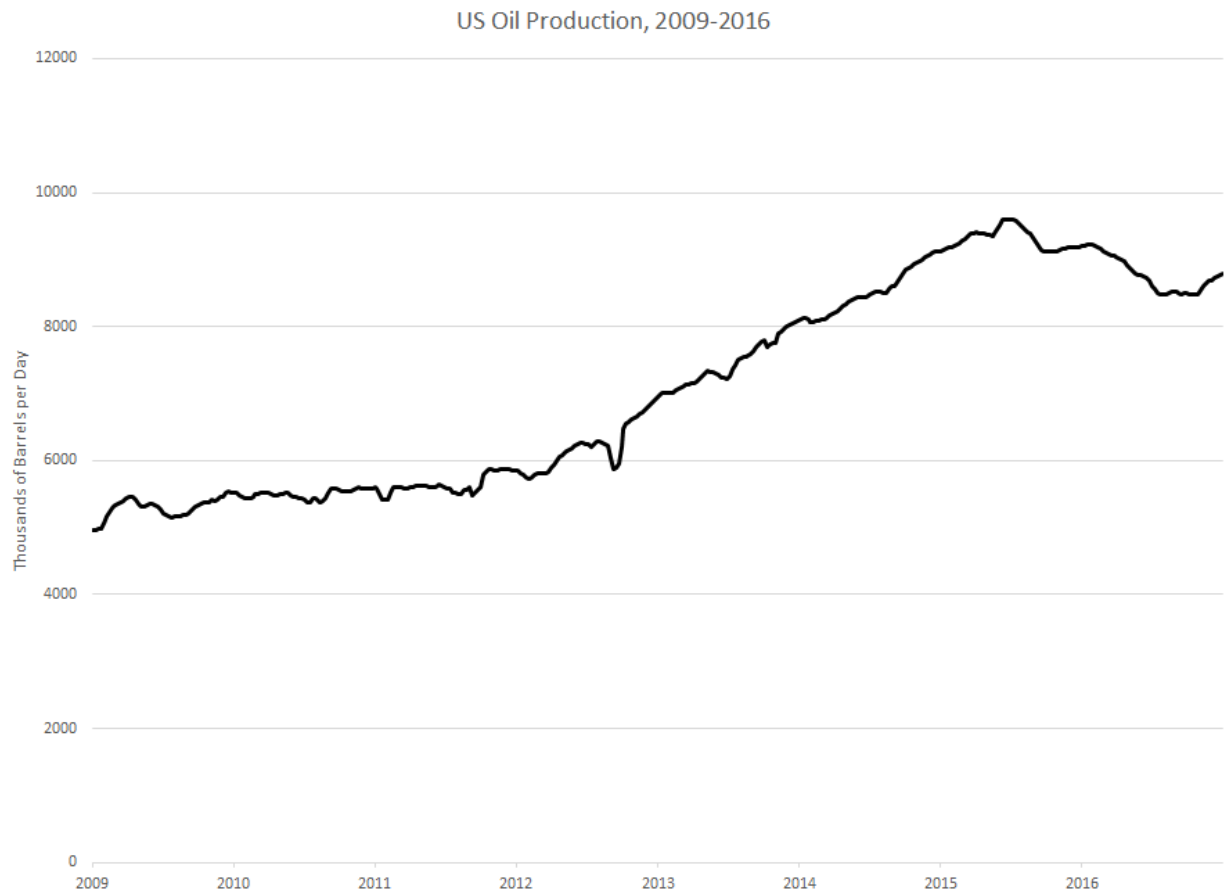


Figure 2.4.15

Between 2009 and 2016, it is safe to assume that the supply of gasoline increased. This is combined with offsetting shocks to the demand for gasoline. The graph below is re-centered so that the middle of the graph is the 2009 equilibrium (E_{2009}). There is a large increase in supply, from $S_{2009}$to S_{2016}, causing the equilibrium price to decrease and the equilibrium quantity to increase. The decrease in price moves us along the demand curve ($D_{2009, 2016}$) as quantity demanded rises. This is what we saw earlier in the section after watching the CNBC video.

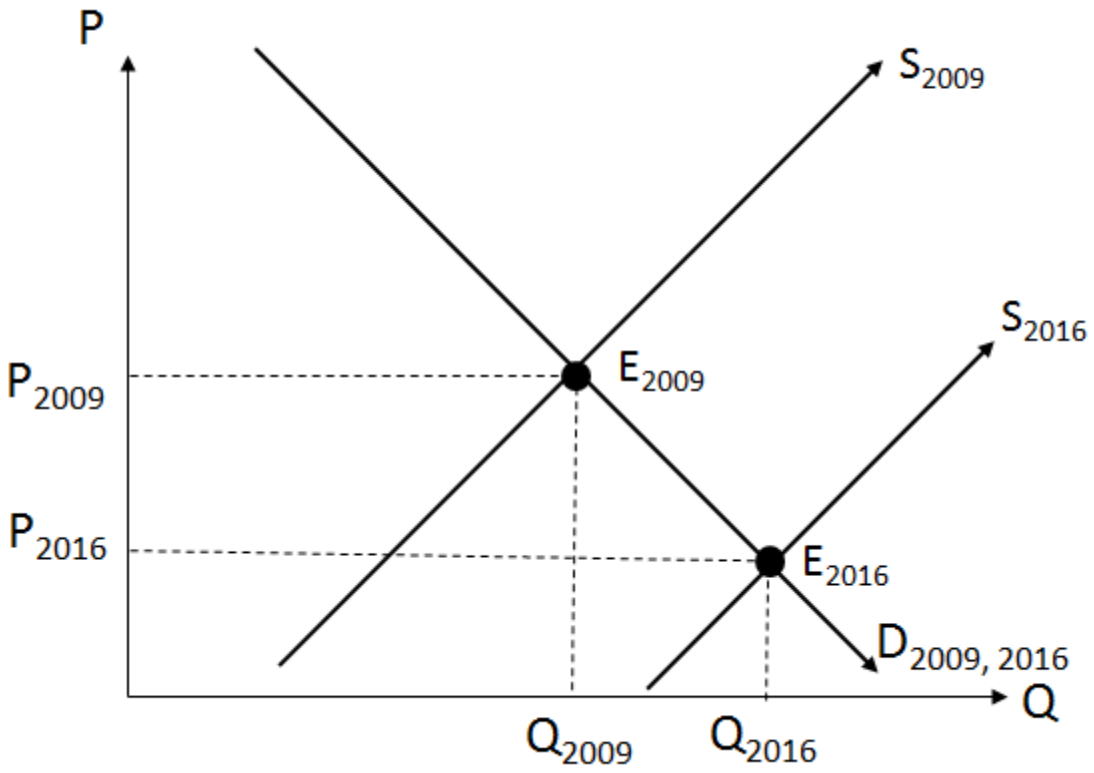


Figure 2.4.16

Between 2009 and 2016, our graph shows us that we should expect the price of gasoline to decrease and quantity demanded to increase.

We have taken snapshots in time to examine the gasoline market, but it is important that we consolidate all of our findings so that they are easy for non-economists to read and interpret. The following table breaks down our predictions.

Without being too specific, we expect gas prices to rise between 2000 and 2008, then fall between 2008 and 2016. The quantity of gasoline bought and sold is predicted to increase between 2000 and 2008, decrease between 2008 and 2009, then rise until 2016. These predictions can be depicted graphically.

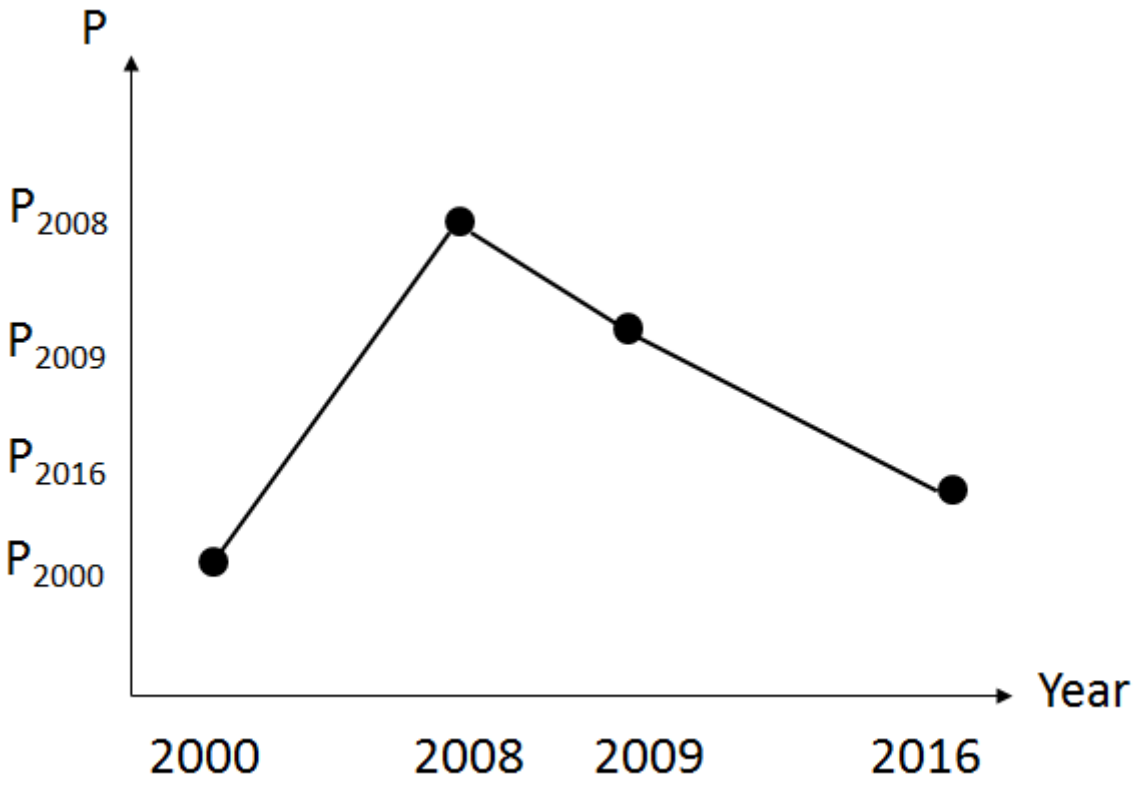


Figure 2.4.17

Figure 2.4.18

The two simple graphs show how we would expect the equilibrium price and quantity to change between 2000 and 2016. All of our analysis simplifies to a few graphs that most people can quickly follow. That is the power of the supply and demand model-complicated markets are turned into easy-to-understand visuals.

However, it would be easy to stop there and say, here are the predictions of our model. But the model is not that powerful if it does not actually map to the real world. Do changes in gasoline price and quantity look the way it was drawn above?

Return to the first graph early in this chapter, showing gasoline prices between 1991 and today.

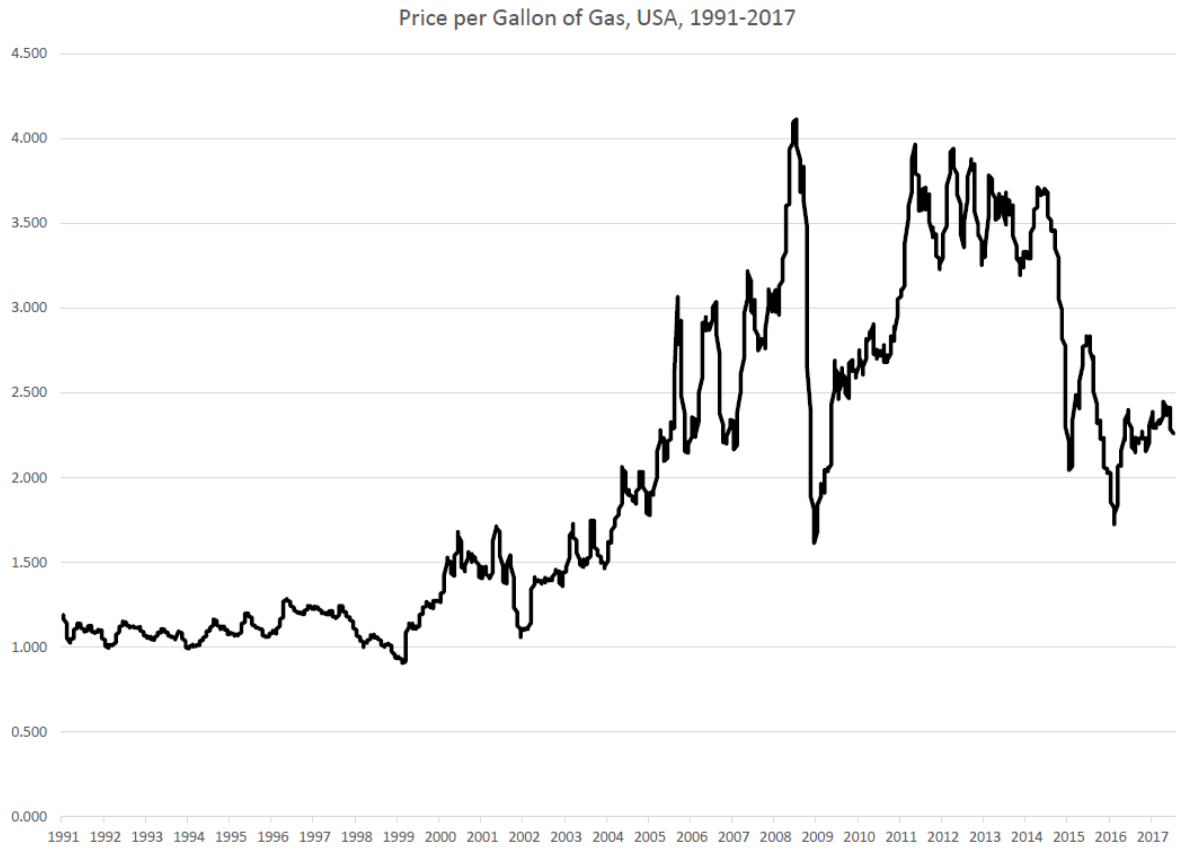


Figure 2.4.19

Between 2000 and 2008, there was the spike in gas prices we predicted. Between 2008 and 2016, there was a lot of volatility that we did not capture in our model, but there was a downward trend in prices, with the price of a gallon falling from $4.00 in 2008 to $2.25 in 2016. The volatility we see in the graph illustrates that there are a lot of potential shocks to both demand and supply in the gasoline market. We primarily only considered income, hybrid cars and oil production. Despite overlooking many shocks, our basic supply and demand model does a reasonable good job predicting the trends in gasoline prices.

Changes in the sales of gasoline are also a prediction that comes from our analysis.

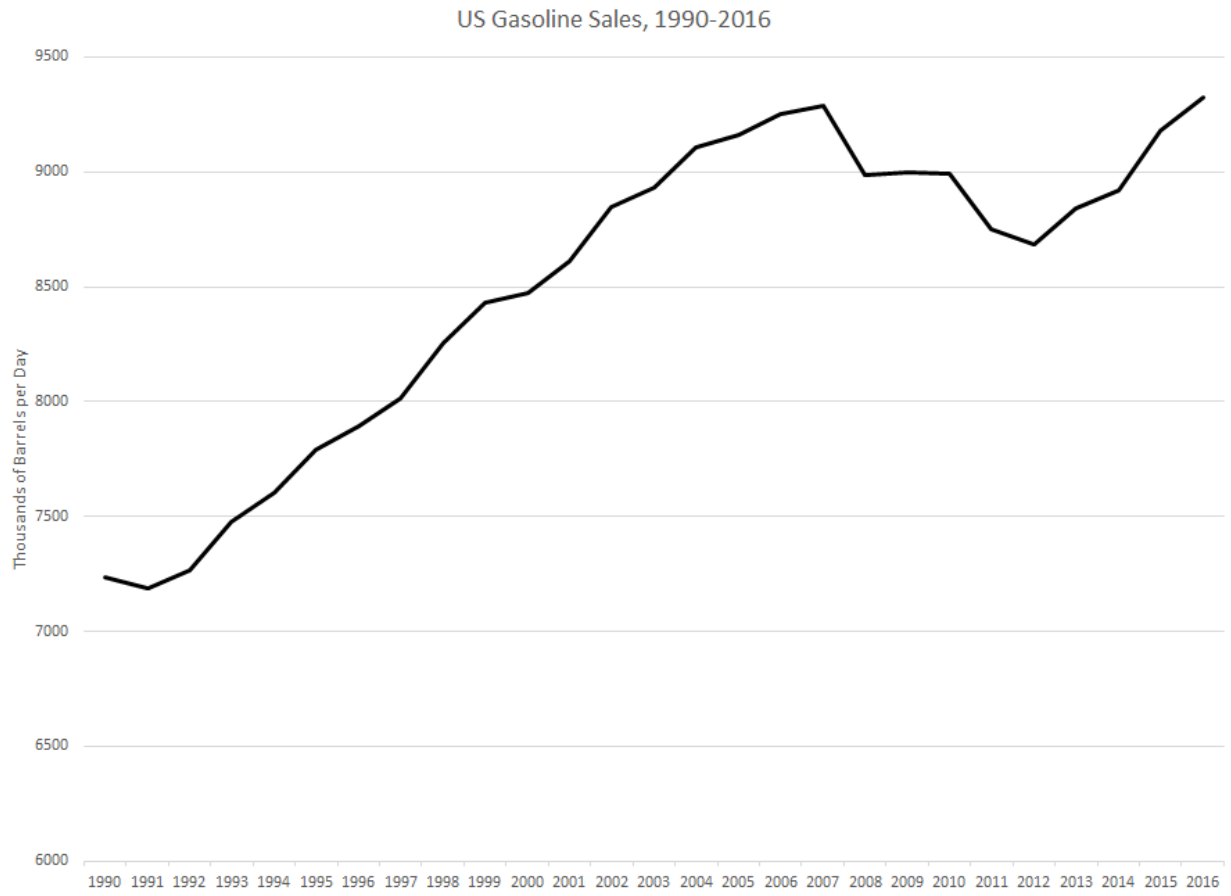


Figure 2.4.20

The equilibrium quantity of gasoline increased almost every year between 1990 and 2007. Between 2007 and 2012, there was a drop in gasoline sales, but that was followed by an increase. This pattern of quantity increasing, then decreasing, then increasing again, is exactly what our supply and demand model predicted. We left out many potential shocks, but quantity predictions and the real-world outcomes map closely to one another.

It is possible that you read through this analysis of the gasoline market and said, "supply and demand, you're OK by me. The basic setup and shocks we applied to the market do a nice job explaining real world fluctuations." But many of you may be more skeptical. There are a lot of fluctuations in those graphs that are not picked up by our model. Specifically, there was a drop in prices in 2008 from $4.00 to below $2.00 and then prices went right back up to

almost $3.00. We did not explain that change at all and it is healthy to be critical of how much we can explain with supply and demand.

What are we missing?

In our analysis of the gasoline market, we only considered a few shocks to demand or supply of gasoline. Do you know of any other shocks?

One of the biggest reasons for the volatility in gasoline prices has to do with speculation. Instead of going over speculation in the gasoline market, we will turn our attention to the housing market. This will help see how some markets can have a large impact on the entire macroeconomy.

Chapter 2.5: The Housing Market and the Great Recession

Buying your first home is arguably the biggest purchase in your life...until you purchase another home! You probably heard something like this before and if you watch the news consistently at all, a discussion of home sales is often brought up. We do not want to take everything we hear at face value, but the housing market played an important role in the Great Recession. You will probably not be surprised to read that we will use our supply and demand model to explain the general patterns seen in the housing market over the last few decades.

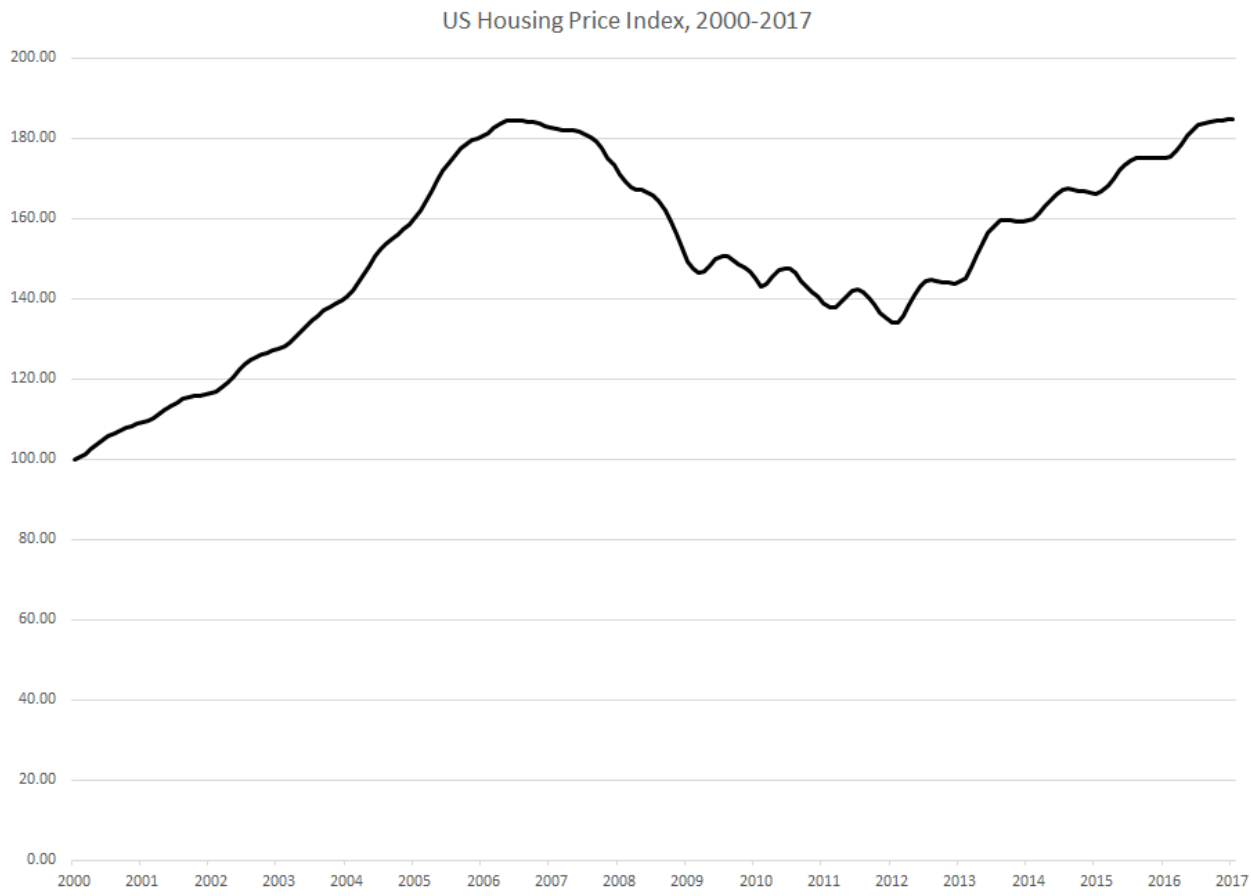


Figure 2.5.01

The graph above shows the average housing price index in the United States between 2000 and 2017. We will learn more about indexes when we talk about the CPI, but for now, you can look at the graph and say, the average home sold in 2000 was $100,000. That same home was being sold for over $180,000 by 2007. In 2012, the price went back down to about $135,000. The volatility in housing prices during this time was unprecedented in the United States and ultimately caused significant problems for both homeowners and non-homeowners. Even though housing is complicated, let's see if the supply and demand model can help explain some of the pricing fluctuations we see above.

Owning vs. Renting

There are lots of nuances to the housing market, so let's see if we can get comfortable with the market using an example.

Imagine that you graduate from your university with a bachelor's degree in economics. After landing a nice job, you determine that you will be able to spend $1,000 per month on housing. You can either rent a house (or apartment) or buy a home (or condo). Which one should you do?

First, lay out what it takes to purchase a home. If your first home is $262,000, you will need a 20% down payment, which is $52,400. This shows the bank that you are willing to put some "skin in the game" as you are paying for 20% of the home instead of borrowing the entire amount of the purchase price.

To make up the rest of the price, you will need to borrow 80%, or $209,600. This is considered the **principal** on your mortgage. A bank loans you this money at an interest rate of 4% and you have to pay back the principal and interest over the course of 30 years (360 months).

Using these specific numbers, you will pay $1,000 per month to the bank for 360 months, for a total of $360,000. This means that you will end up paying $150,400 in interest and have put out a total of $412,400 (down payment plus monthly payments) for the $262,000 home! We have yet to even consider taxes, homeowners insurance or a homeowners association fee (HOA).

Something that should come out of this example is that the interest rate can play a big role since you will end up paying a lot in interest. If the interest rate on your mortgage was 3% instead of 4%, your monthly payment would decrease to $883.68. Over the course of 30 years, you would save over $40,000.

But assume that the interest rate is 4% and you decide to buy the $262,000 home and take out a $209,600 mortgage. Your $1,000 monthly payments will go towards paying down the $209,600 principal and paying interest. A unique feature of a mortgage is that every month, the fraction of the payment that goes towards interest is decreasing. More than half of your first $1,000 payment goes towards paying interest.

Fast-forward five years. You have made 60, $1,000 payments. Of the $60,000, $39,609 has went towards interest and only $20,391 has went towards the principal. But work is good, you have a family and it is time to upgrade your home. You are able to sell your home for $300,000. How much money did you "make" from selling your home?

After you sell your home, you get a check for $300,000, but you immediately pay off the remaining principal ($189,209) on your original loan. This leaves you with a check for $110,791. Over the past five years, you paid out $112,400 between your down payment and monthly payments. This means that your net spending (amount spent minus the amount returned) on housing was $1,609!

Most likely you will use that $110,791 check as a down payment on your new home. Notice how the home sounds like a great deal. Not only did you get to live in the house for five years, you nearly got all of the money you put into the house back. In this sense, a home is not only a place to live, it is an investment.

Compare this to the cost of renting a $1,000 apartment for five years. If you decide to rent, you do not have to use the $52,400 in savings for your down payment. However, the $1,000 payments you make towards rent do not go towards a principal. It all goes to a landlord.

After five years of renting, you decide you want to use the $52,400 in savings as a down payment for a home. You will have paid $60,000 in rent, but will not

get any of it back. After five years of owning, you received a check for $110,791. This means that the opportunity cost of renting is $110,791 - $52,400 = $58,391! Renting over five years cost almost $60,000 more than owning after accounting for the down payment on a home.

In this world, everyone will try to buy a home. But you may come across people who adamantly say, "I do not want to own a home." Are they missing something? In constructing our home ownership example, we left out a few important costs.

Taxes for a $262,000 home average around $3,275 per year, homeowners insurance is approximately $2,000, upkeep on the home can be substantial, so imagine we estimate $150 per month on upkeep. There are realtor fees and closing costs when selling your home that can add up to $7,000. Now imagine that your house does not sell for as much as you hoped and the final price is $285,000 (still a nice return for five years). Now we have $57,375 less over the course of five years and the total savings from buying the home is $1,016. We are one broken air conditioner away from buying a home being a bad deal!

Here is what we want to take from all this. Buying a home is an investment and depending on a number of factors, has the potential to be a great investment. Renting takes the responsibility of upkeep, taxes, accounting and fees off of your hands. People you come across that are champions of buying a home have valid reasons. Those that never want to own a home are reasonable as well.

But if anything about our example changed, it would have an influence on whether we want to buy or sell. Imagine that all potential buyers believe that home values will double in five years. Not only will homeowners benefit from owning a more valuable asset, but they will not have to worry about buying a home when the prices are high, since they will double in five years. If you buy a home that was recently updated and will not need a lot of upkeep, that will also factor into your decision.

Is there anything that policy makers can do to influence the housing market? They could change property taxes, but that takes a lot of time. The easiest policy change that can be implemented is a change in the interest rate on your mortgage. If you are on the fence about buying a home when the interest rate is 4%, you will definitely want to buy the home when the interest rate is 3%. In fact, you may even be willing to pay more than $262,000 if the interest rate is only 3%. The idea that the interest rate has a significant impact on our decision to buy a home is something we will carry throughout the term.

The Demand for Housing

What does the demand for housing look like? It looks exactly the same as every other demand curve we have drawn this chapter. However, there is a story that goes along with the demand curve for housing that coincides with our example above.

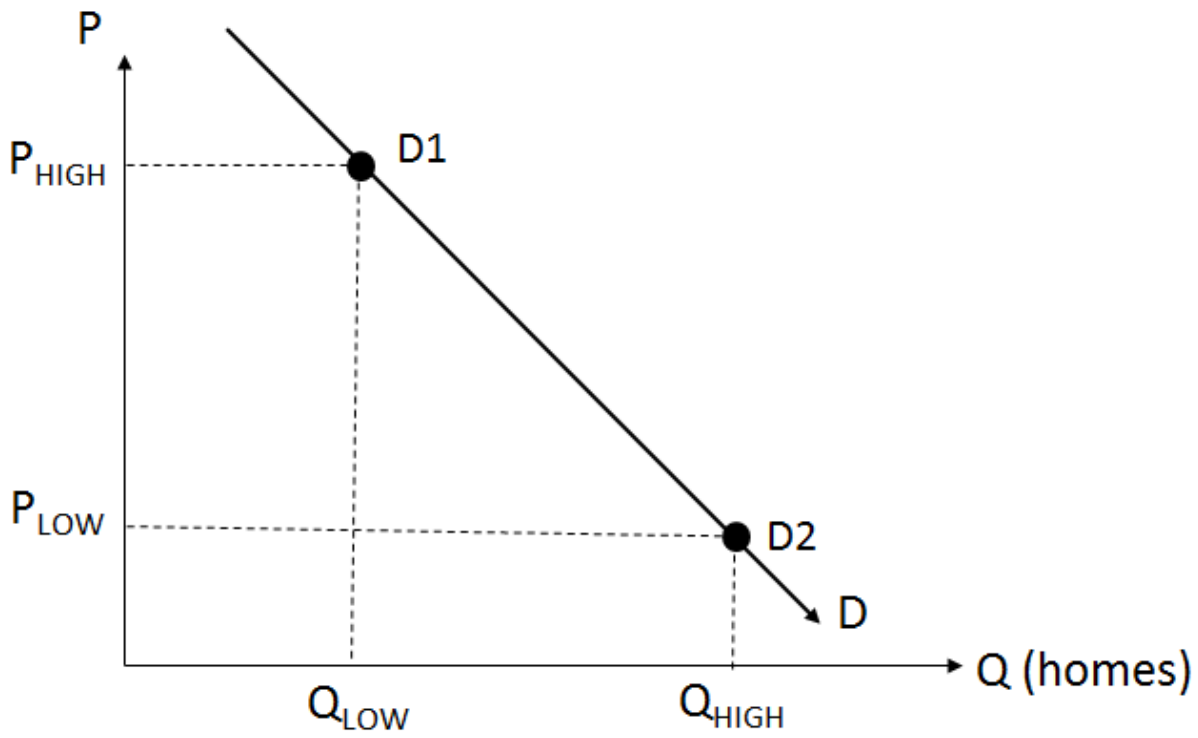


Figure 2.5.02

In the figure above, D1 represents the point on the demand curve where the price of the average home is high and the quantity of homes demanded is relatively low. Think about why this is. The price of owning a home is too high, so that means that people will find renting more desirable.

As the price of homes fall, individuals who are renting may see buying a home as a better option. They will move out of the rental market and look to buy a home. At D2, the price of the average home is low and the quantity of homes demanded is relatively high.

2.28: Shifts in Housing Demand

The interest rate on 30-year mortgages increase from 4% to 5%. What happens to the demand for housing?

A

Demand for housing increases

B

Demand for housing decreases

C

There is no change in the demand for housing

D

There is not enough information

When there is a shift in the demand for housing, that means that something other than a change in the price caused there to be a change in the quantity demanded. Another way to think about it is that the demand for housing shifts when there is a shock that changes the quantity demanded of housing at all price levels.

In the question above, the interest rate increased. Remember our example above, this has a big impact on the cost of owning a home. Now that $262,000 home is more expensive than it used to be. Consequently, fewer people will be able to purchase homes at all price levels, causing a decrease in demand (shift left).

We can apply what we know about shifts in supply in general to the housing market. If there is a change in the quantity supplied of housing at all price levels, the supply curve will shift. Another way of saying this is that if the quantity supplied of housing changes because of something other than the price of homes, the supply of housing will shift.

Changes in the Supply of Housing
What changes the supply of housing?

There are numerous scenarios that will cause a shift in the supply of housing. The cost of production, whether it is wages or building materials, will impact the supply curve. Environmental regulations will also cause changes to the housing supply. Future prices will play a big role as well. If builders think prices will fall in the future, they may respond by increasing supply today before prices fall.

Like our discussion about demand earlier, a lot of the events that shift the demand for housing should be examined on a case-by-case basis. The main point to remember is that if the quantity demanded changed for reasons other than price, the demand curve will shift.

The Supply of Housing

One of the aspects of housing that is interesting is that the home buyer in the example above became a seller after five years. Housing supply is one of the few goods that are sold by both corporations and private individuals.

When we think about the supply of housing, we are referring to the existing houses that are up for sale. The sellers come from two primary groups: 1) existing homeowners selling used homes and 2) developers building new homes. The look of the supply curve for housing is no different than any other supply curve we have drawn, but there is a story to tell as we move along the supply curve.

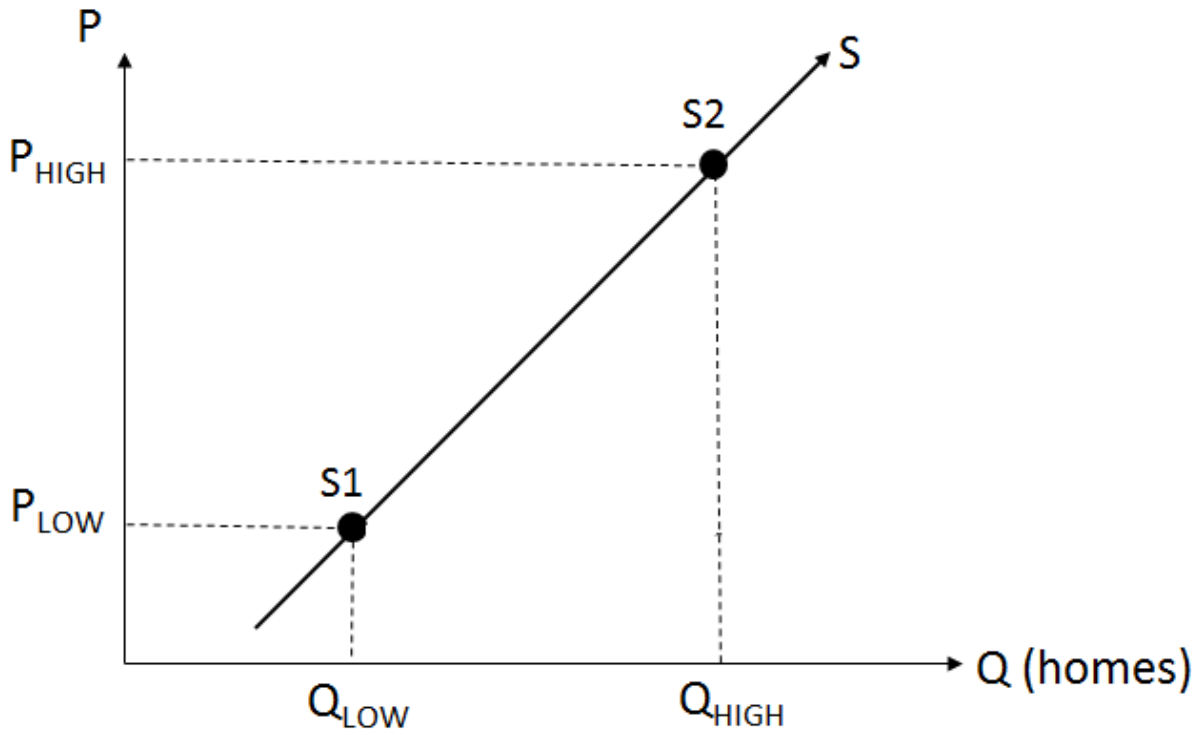


Figure 2.5.03

When the price of homes are low, existing homeowners are not excited to sell their house and the quantity of homes on the market will be relatively low (S1). If the price of the average home was to rise, homeowners may see this as a temporary profit opportunity and put their home on the market, even if they had not intended on selling their home (S2).

Developers would react in a similar fashion. At a low price, the benefit from building a new home is relatively low and only the developers who could produce houses for a low cost would build. As the price increases, more and more developers will find building new homes worthwhile, moving us along the supply curve from S1 to S2.

2.29: Shifts in Housing Supply

Developers of new homes learn that they will be charged a higher interest rate on their private loans (not the same as the interest rate on a mortgage rate). What will happen to the supply of housing?

A

The supply of housing will increase

B

The supply of housing will decrease

C

The supply of housing will not change

D

There is not enough information

Now imagine that we are at the original supply curve for housing. Developers often take out loans to fund their building projects. When they learn that the interest rate on those loans increase, fewer developers will decide to build, regardless of the price of homes. This decreases the supply curve, shifting it to the left. Had the interest rates on private loans decreased, we would expect the opposite effect and the supply would shift to the right.

We can apply what we know about shifts in supply in general to the housing market. If there is a change in the quantity supplied of housing at all price levels, the supply curve will shift. Another way of saying this is that if the quantity supplied of housing changes because of something other than the price of homes, the supply of housing will shift.

Changes in the Supply of Housing
What changes the supply of housing?

There are numerous scenarios that will cause a shift in the supply of housing. The cost of production, whether it is wages or building materials, will impact the supply curve. Environmental regulations will also cause changes to the housing supply. Future prices will play a big role as well. If builders think prices will fall in the future, they may respond by increasing supply today before prices fall.

Housing Market Equilibrium

With housing demand and supplied defined, we can put them together and find equilibrium.

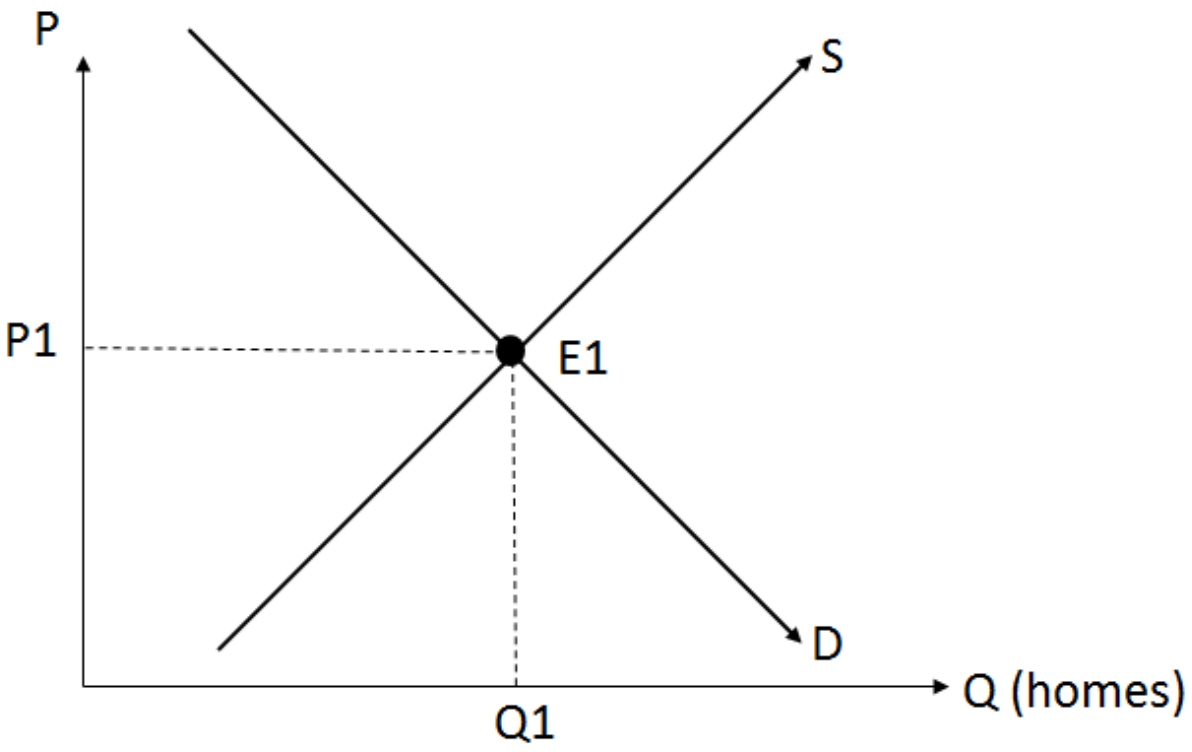


Figure 2.5.04

The first thing you may notice about the housing market is that it does not look any different than our previous analyses using supply and demand. When the prices of homes are too high, consumers will look to the rental market instead of buying and developers and potential private sellers will put a lot of homes up for sale. The excess supply of homes will cause the price of homes to decrease, leading to fewer homes on the market and more consumers wanting to rent instead of buy.

If the price is too low, the opposite events occur. Too many individuals want to buy instead of rent, but developers do not want to build at low prices and potential sellers do not want to put their house up for sale. The excess demand for homes drives housing prices up, reducing the number of potential home buyers and increasing the number of homes for sale. At the equilibrium, E1, the price of P1 causes Q1 houses to be up for sale and Q1 buyers to be on the market.

Importance of the Housing Market to the Economy

Before trying to explain why the housing market was so volatile between 2000 and 2017, it is worth understanding how the housing market permeates many facets of the economy and can significantly impact those that do not own homes.

As mentioned earlier, purchasing a home is beneficial as it provides a place to live, but also is an investment for the homeowner. However, there are many players in the housing market that benefit from a purchase of a home. A direct beneficiary is the bank that lends money. We saw how much a homeowner pays in interest over 30 years on a $209,600 mortgage (over $150,000) and many banks lend billions of dollars in mortgages.

When the bank lends money to a homeowner, they are taking on the risk that the homeowner may not end up paying back the loan. This could happen because of unforeseen circumstances, such as job loss or a health care episode. The homeowner technically has the option of not making monthly mortgage payments. Not making payments will cause the bank to take full ownership of the home (default). The evicted homeowner will lose the down payment originally put down and face credit issues in the future.

It is costly for the bank if a homeowner defaults, but the bank has the opportunity to sell the home and still profit on the transaction. Because the historical default rate has been around 2%, the bank can factor this into the mortgage rates they offer and be fairly confident about how much revenue a portfolio of mortgages will generate.

During the early 2000s as banks saw a stream of monthly mortgage payments coming in at historically low interest rates, they turned their attention to the financial innovation known as mortgage backed securities (MBS). What is a MBS?

Assume that a bank has three mortgages in their portfolio. Mortgage 1 is a $100,000 loan, mortgage 2 is a $200,000 loan and mortgage 3 is a $300,000 loan. Together, the bank has $600,000 worth of mortgages that they are owed.

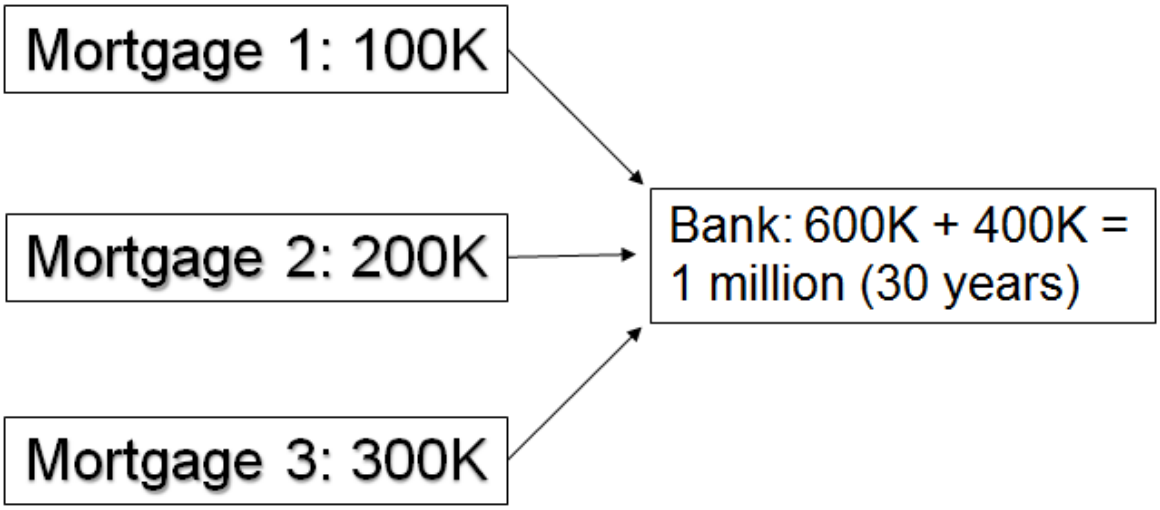


Figure 2.5.05

Over the next 30 years, the bank expects to receive $600,000 in principal plus $400,000 in interest for a total of $1,000,000. (They have accounted for the possibility of defaulting in their calculations, so there may be some variability, but if there are enough mortgages in their portfolio, the bank can reasonably predict how much they will make from the mortgages.)

Now the bank is sitting on an asset that is expected to generate 1 million dollars over 30 years. Investors see this as an opportunity to make money themselves. An investor could pay the bank $750,000 today in exchange for the stream of mortgage payments over the next 30 years. The investor is purchasing a mortgage backed security (MBS) worth $1,000,000, where the MBS is a collection of mortgages packaged into a single asset.

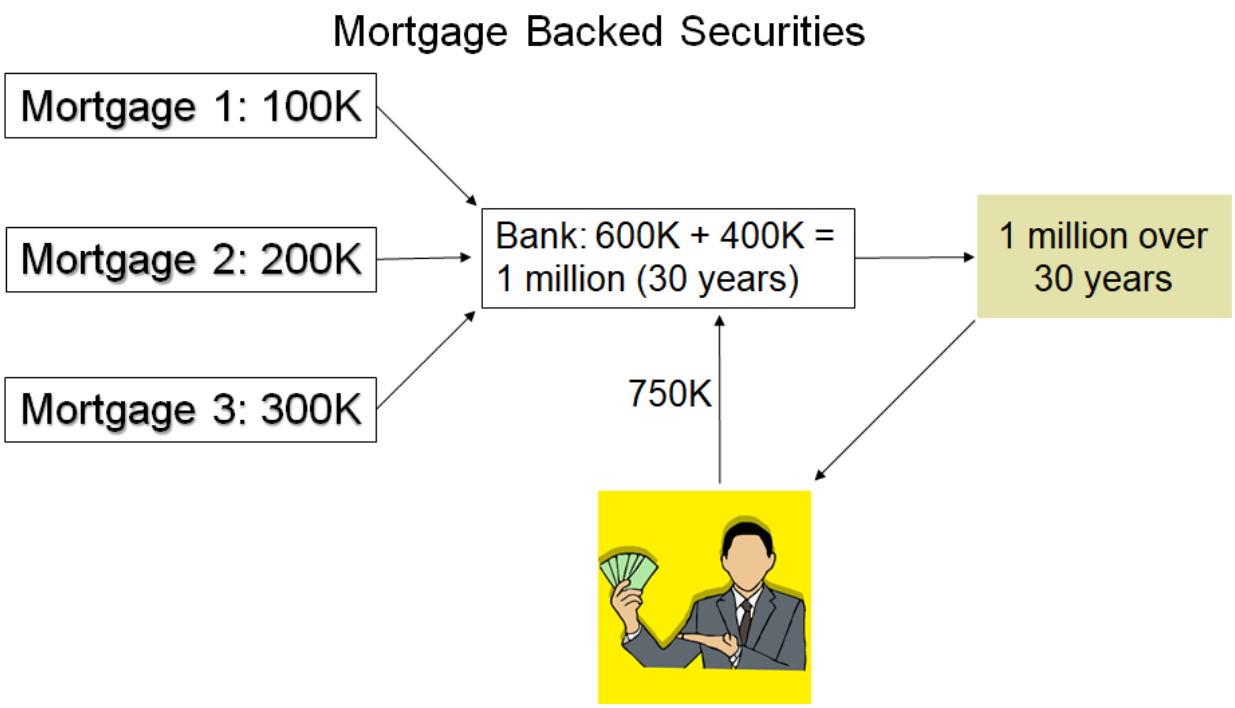


Figure 2.5.06

The investor likes this deal because they are getting a 33% return on their $750,000 investment over 30 years, which may be their best potential investment. Furthermore, they are likely happy to get in on the housing market, which has a predictable default rate of 2% that is already factored into the interest rate.

The bank likes this deal because they essentially just brokered the purchase of the home, but no longer have to worry about monthly payments. The $600,000 became a guaranteed $750,000. Now if they go out and lend to more homeowners, they can continue to receive guaranteed profits on mortgages and pass the risk off to someone else.

Where does the investor get money to make these purchases? Very few of the investors are using their own money. Instead, it comes from retirement funds and savings accounts. The investor charges a fee for growing these funds, so finding an investment with a return above the fee being charged is necessary to become a successful investor.

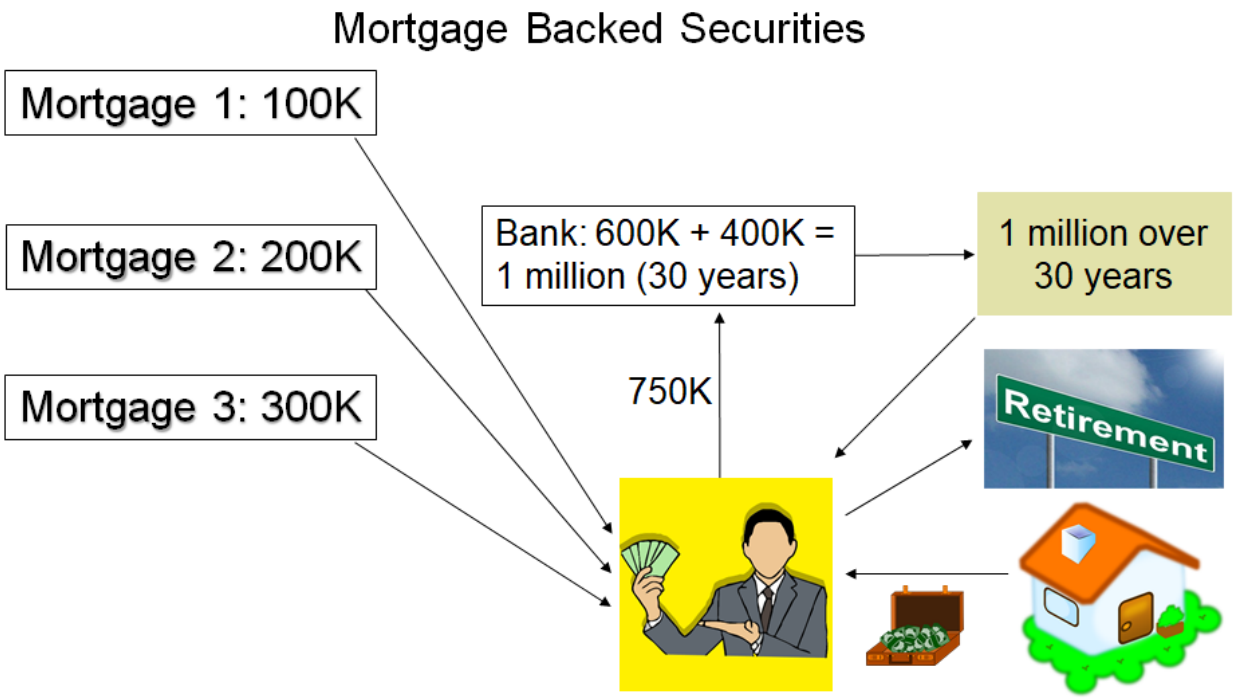


Figure 2.5.07

From this example, it should be clear that there are a lot of players in the housing market and they all stand to gain from a healthy housing market.

Changes to the Housing Market

Now that we are getting more comfortable with the role that housing plays in the economy, let's use the supply and demand model to try and explain why housing prices fluctuated so much between 2000 and 2017. Just like the gasoline market, we will make a few assumptions and try to isolate the factors that had the biggest influence on the housing market.

First, remember the personal income graph from earlier-the one that showed personal incomes rising between 2000 and 2008? If not, here it is again.

Figure 2.5.08

As incomes increased over this time period, more people entered the housing market. This can be represented by an increase in the demand for housing. But an increase in income had an impact on many markets and not all of them behaved like the housing market.

From the homeowner example above, we learned that the mortgage rate is a big factor in the decision as to whether or not one will be able to afford a home. In response to a recession in 2000, the Federal Reserve decreased mortgage rates from 8.25% in 2000 to 5.25% in 2003 (later in the book we will learn all about monetary policy).

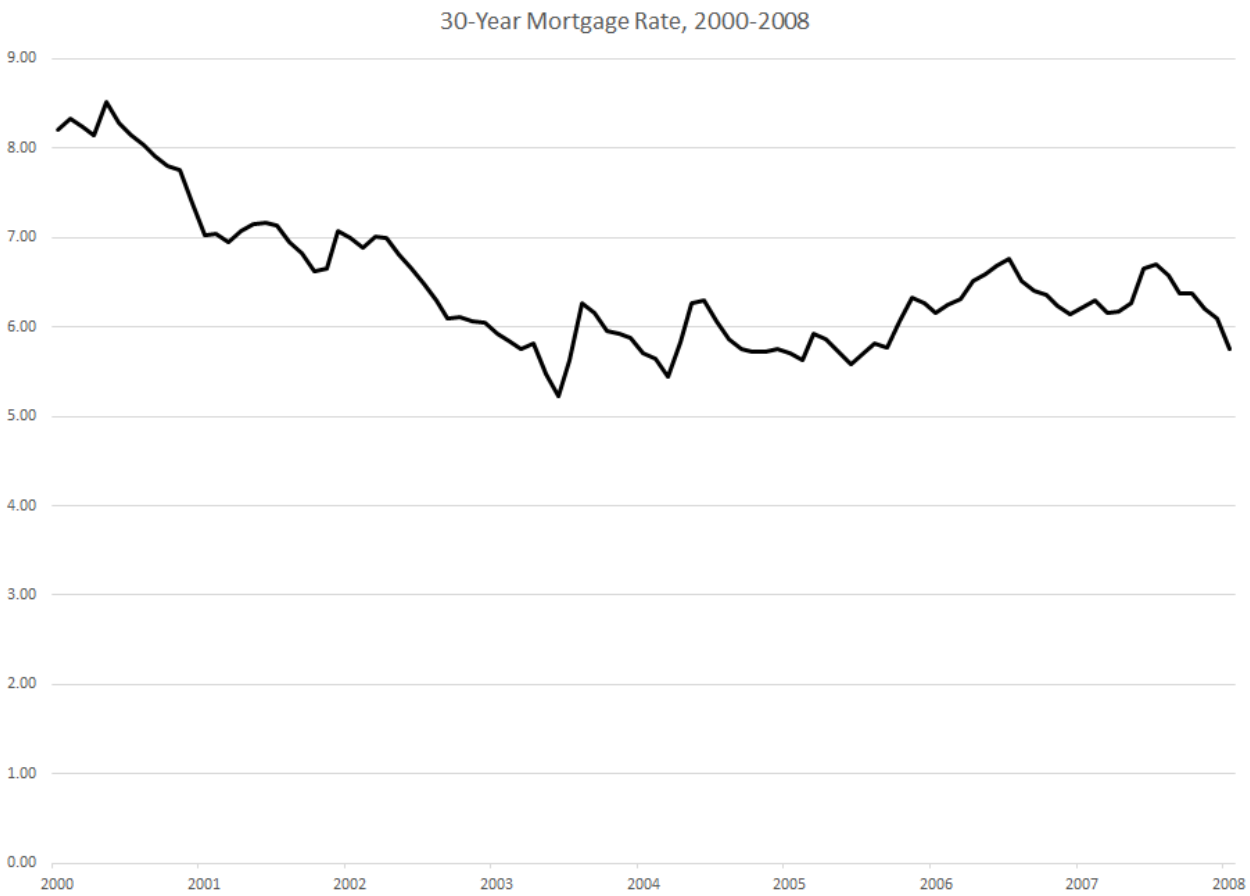


Figure 2.5.09

With interest rates at all-time lows, homes appeared cheaper than before and significantly increased the demand for buying a home.

2.30: Housing Demand

When the mortgage rate decreased between 2000 and 2003, what is the most likely outcome in the housing market?

A

The price of housing decreased

B

The price of housing increased

C

More defaults occurred

D

Few defaults occurred

Hopefully you are to the point where drawing the supply and demand curves down on paper or in your head. The increase in demand will shift the demand curve to the right, creating excess demand and driving the equilibrium price up. This is exactly what happened between 2000 and 2003 and is seen in the graph below. The increase in price does not look big, but in Las Vegas, for example, the average home price increased by 40% between the start of 2000 and the end of 2003!

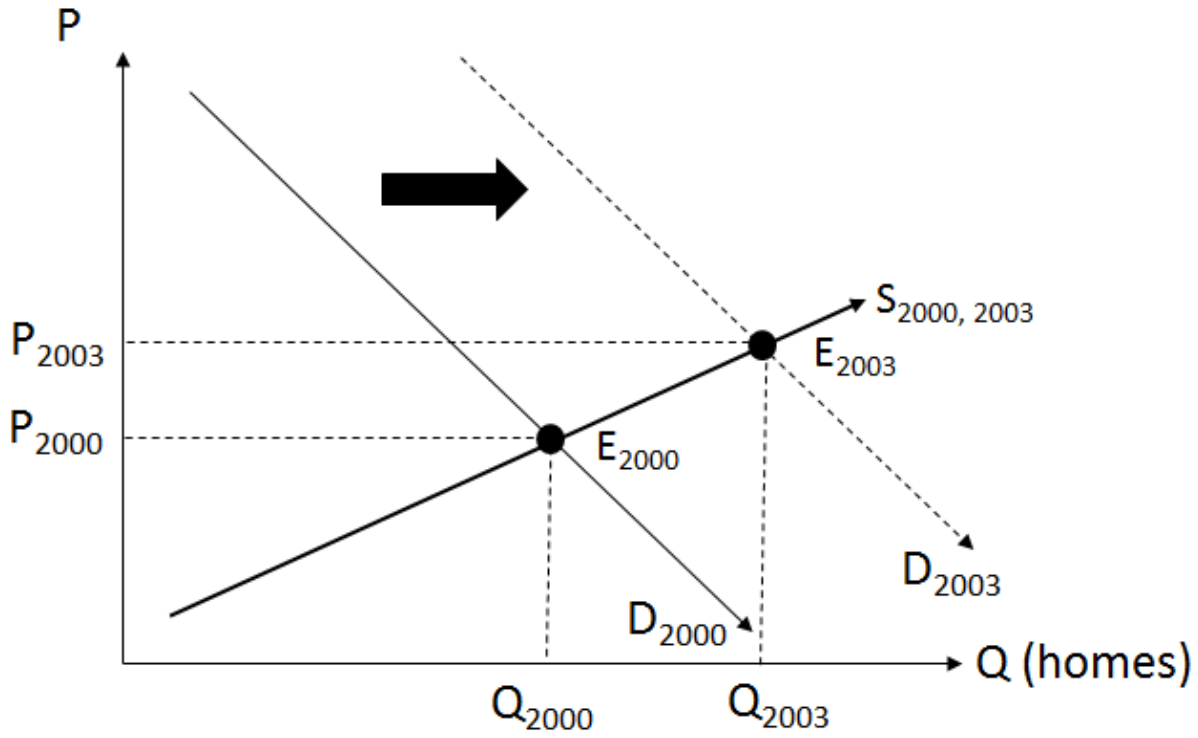


Figure 2.5.10

Between 2000 and 2003, the supply curve is assumed to be constant. This assumption is a bit strong, as lower interest rates also applied to developers. However, any increase in supply was small compared to the shock that potential home buyers felt from the reduction in mortgage rates.

From 2003 to 2007, things got out of control in the housing market. Home buyers saw prices rising faster than ever. Why not purchase a home knowing

that the value will increase and then sell it for a profit without ever actually living in it? Why not ***speculate*** in the housing market? The only cost that speculators have is the opportunity cost of a down payment and the low interest rate.

Even better for the speculators at this time was that investors were enjoying the MBS that banks were selling them. MBS felt like risk-free returns and they also benefited from the increasing home prices. The increase in demand for MBS caused banks to reduce lending standards. This meant that the 20% down payment was no longer the standard. Some people could buy homes with no money down and just use the house as collateral (since the bank would take the home if they defaulted). If the home increased in value, the bank could just sell it for a profit.

Furthermore, adjustable rate mortgages (ARMs) became more popular during this time. In an ARM, the borrower pays a low interest rate for a few years and then the interest rate adjusts to the market rate. If the rate happened to increase, speculators and short-term owners could just sell the home before any interest rate increase kicked in.

The relaxed lending standard did not just apply to speculators and typical homeowners. Individuals that banks would never have loaned to in the past became candidates for mortgages. These individuals had no down payment, an unreliable stream or income and existing debt. They were subprime borrowers and banks were giving them subprime loans. Sure they paid a higher mortgage rate, but the higher rate did not necessarily compensate the bank for the increase in risk. It did not matter much to the banks at the time, since they planned to just package subprime mortgages into a MBS and sell it to an investor.

Developers wanted to get in on the action as well. They saw future prices rising and wanted to make sure homeowners were purchasing new homes in addition to existing homes. Any increase in supply was unable to keep up with

demand, but that did not mean that developers did not start planning big projects for the future.

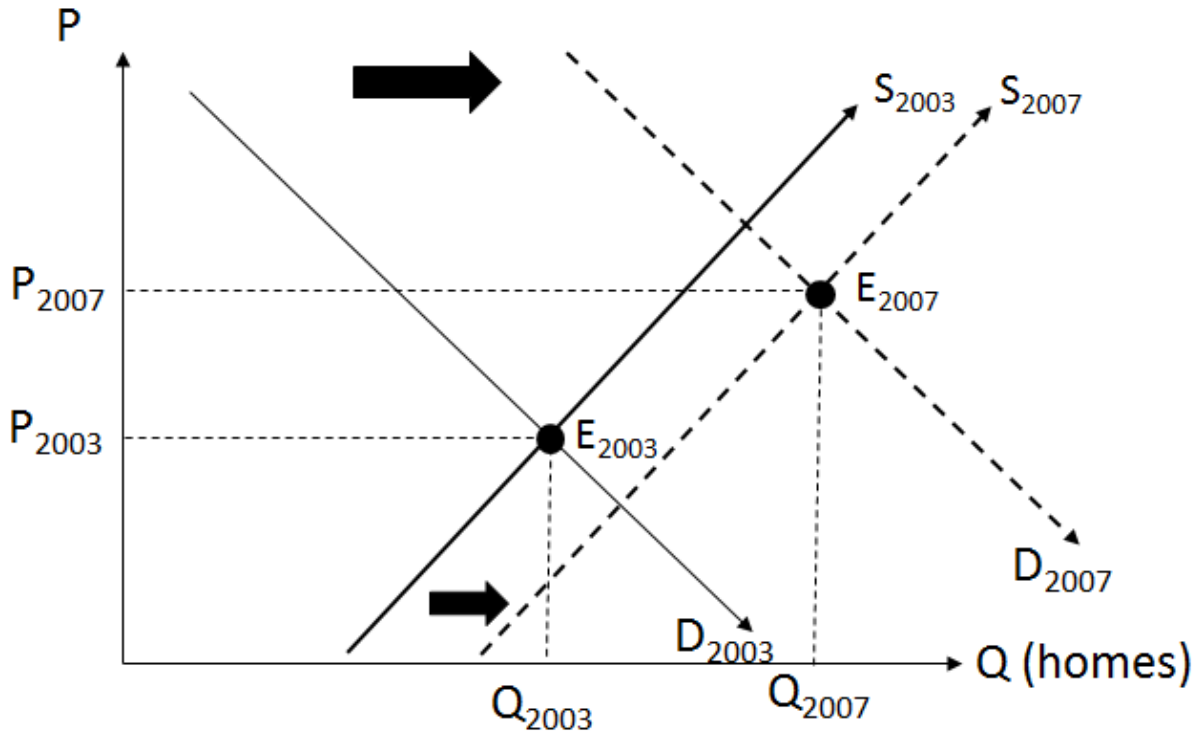


Figure 2.5.11

The graph above shows the large increase in the demand for housing between 2003 and 2007. Supply increased as much as can be expected considering housing cannot be constructed in a day, but the demand increase was substantial.

The price increase between 2003 and 2007 in a city such as Las Vegas was historically large. The average home price in 2003 was around $140,000. This shot up to $240,000 by 2007. This meant that a home bought in 2000 for $100,000 increased in value to $240,000 by 2007 (240%)! Between 1987 and 2000, the average home price in Las Vegas increased by 51%. In seven years, home prices increased nearly five times more than they had in the previous 13 years.

But there was a problem. People were not buying homes at high prices because the homes were valuable to them personally. The high prices reflected the belief that someone would come around later and buy it at an even higher price. Historically, home values were determined by some combination of the available jobs nearby, the school system and an array of other amenities that home owners care about.

In 2007, a large fraction of the recent home price increase did not reflect any change in the historical determinants of housing prices. When the price of an asset such as a house is significantly greater than the actual value of the asset or home, we say that the market for the asset is in a **bubble**. Once people realize that the price of an asset is far greater than the value, the asset becomes nearly impossible to sell. In the housing market, this was realized around 2007 and investors stopped buying homes. Speculators started leaving the market and the demand for housing decreased significantly.

Developers would have liked to stop projects, as they realized that prices in the future would make new developments unprofitable. Some of the developers did stop and left unfinished projects scattered throughout the city. Others did minimal work on half-completed projects. It is unclear exactly how the supply curve changed immediately following the housing bubble, but the graph below shows the big shock to demand as a result of the housing bubble bursting while housing supply is assumed to increase a small amount.

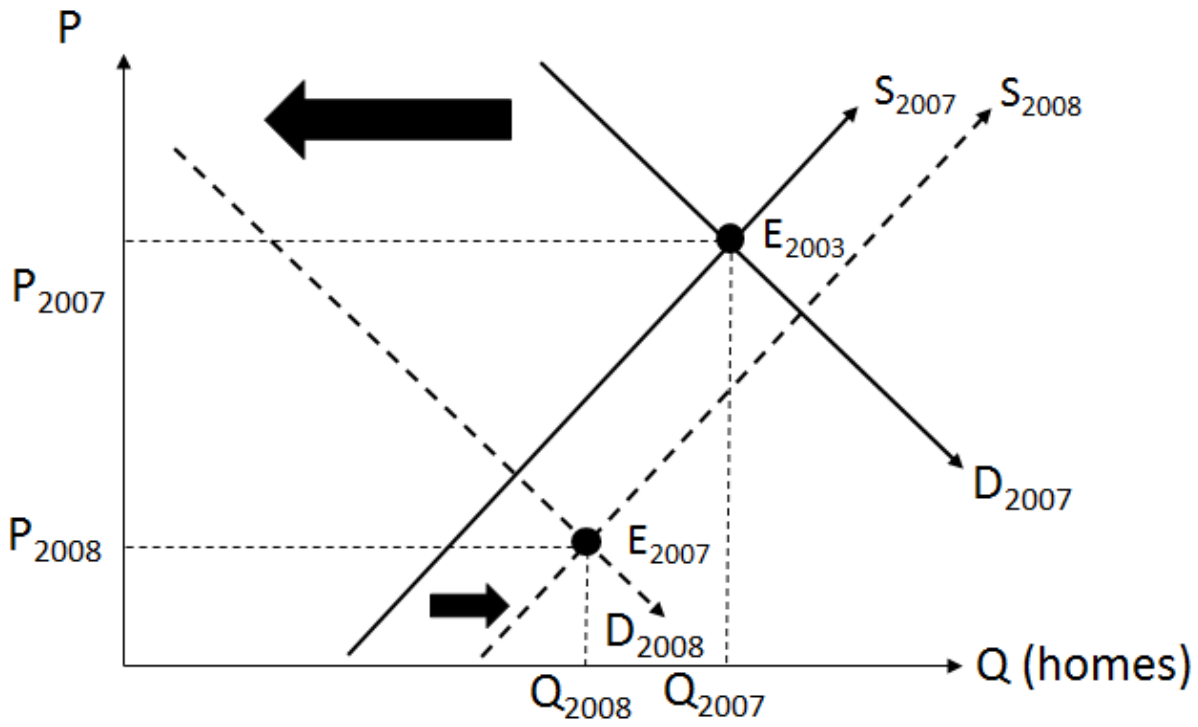


Figure 2.5.12

The drop from P_{2007} to P_{2008} looks large on the graph and it was large in reality. In Las Vegas, that $240,000 home in 2007 fell to $125,000 by the end of 2008! This would suggest that home prices in 2007 were almost double what the true value of the homes were.

During this time, other activities exacerbated the costs of the reduction in housing prices such as credit default swaps, which insured MBS. With an unstable financial system, unemployment concerns grew for all industries. Individuals who lost their jobs were more likely to be subprime borrowers and owned a bigger fraction of homes than in the past. Having not needed a down payment and now facing higher interest rates if adjustable rate mortgages were used, many homeowners defaulted on loans. This meant that the investor who had been receiving a stream of revenue from MBS was now losing money on the deal.

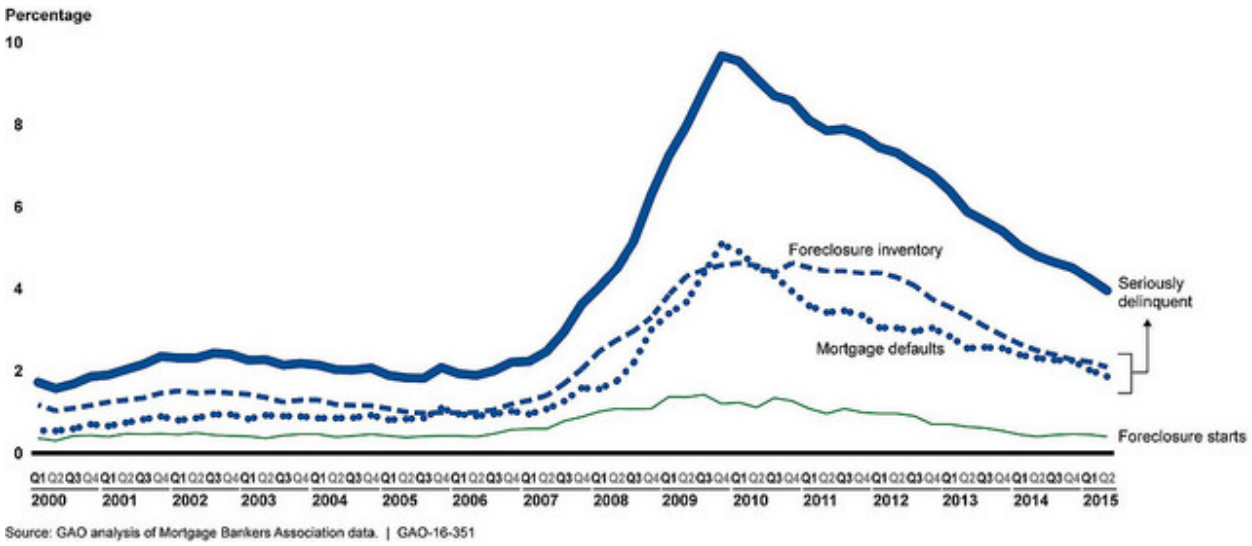


Figure 2.5.13

Foreclosure filings had been around 500,000 per year throughout the US prior to 2006. By 2009, foreclosures increased to around 3.5 million and peaked in 2011 at just under 4 million. The mortgages that banks had been giving to home buyers consider the probability of a foreclosure, but their estimates of a foreclosure were nowhere close to the approximately 400% increase seen between 2005 and 2011.

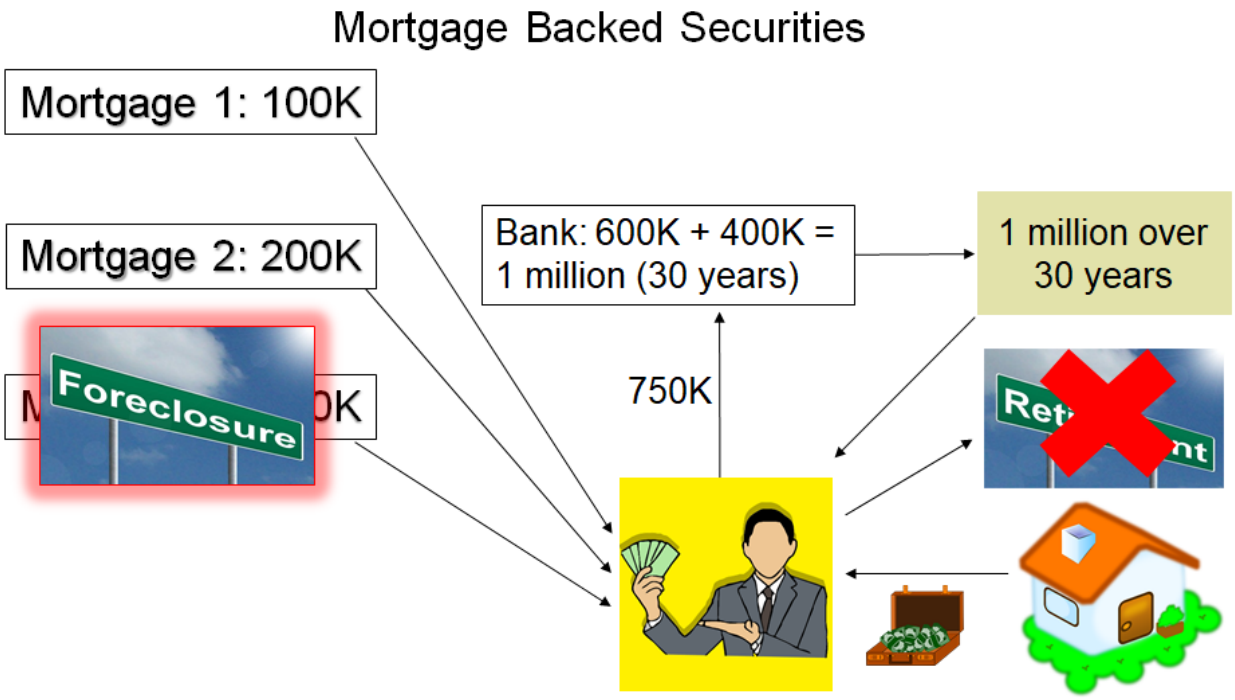


Figure 2.5.14

The foreclosures affected not only the investor, but the family that trusted the investor with their retirement. Now, individuals who planned on retiring in 2008 or 2009 had to work more years than they ever planned. Firms, with a larger than expected workforce had trouble hiring new, younger workers. Lots of people had made lots of money from the growth in housing prices from 2000 to 2007, but by 2008, the housing market crash had precipitated the Great Recession, which we will learn more about in chapter 4.

Supply and Demand: Predicting the Real-World Accurately

Before we finish this chapter, let's quickly revisit whether using the supply and demand model to depict the housing market maps to the real-world between 2000 and 2017. It would be helpful to know that after 2009, we began recovering from the Great Recession. As we saw above, this was associated with an increase in income. At the same time, developers who had lost a lot of money on unfinished projects where hesitant to overbuild after 2009.

Another important housing market determinant that changed between 2009 and 2017 was that ever important interest rate. It reach historical lows in 2003, but as a result of the housing crash in 2008, the Federal Reserve ended up dropping interest rates even lower.

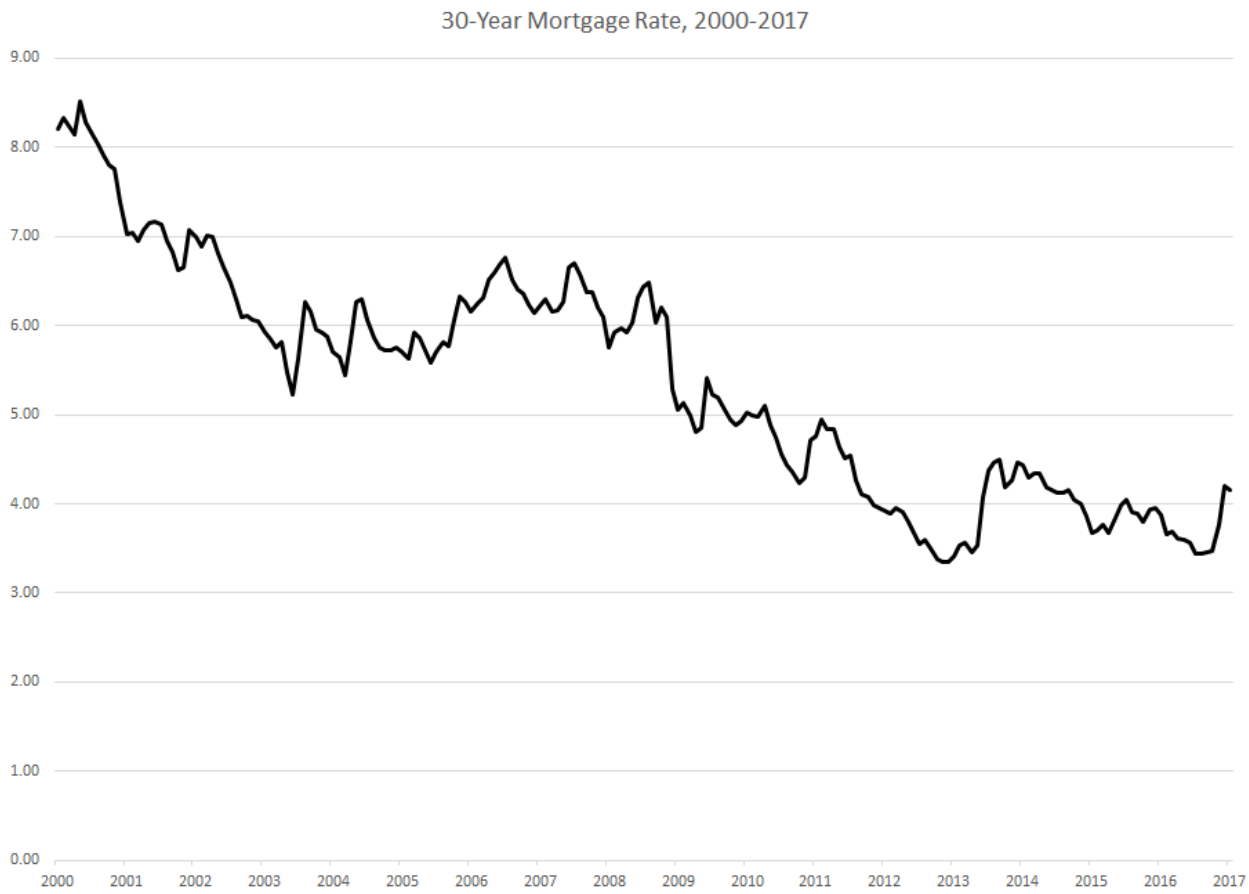


Figure 2.5.15

By 2012, the average 30-year mortgage rate was just over 3%, which is 2% less than the mortgage rate in 2003. The rate has remained below 4.5% since 2012. There are less concerns about a bubble these days, despite the low mortgage rates, since there are now stricter regulations regarding mortgages (no more zero down payments). The graph below assumes that there were relatively small changes in housing supply between 2009 and 2017. There was an increase in demand driven by rising incomes and a reduction in the interest rate over the same time period.

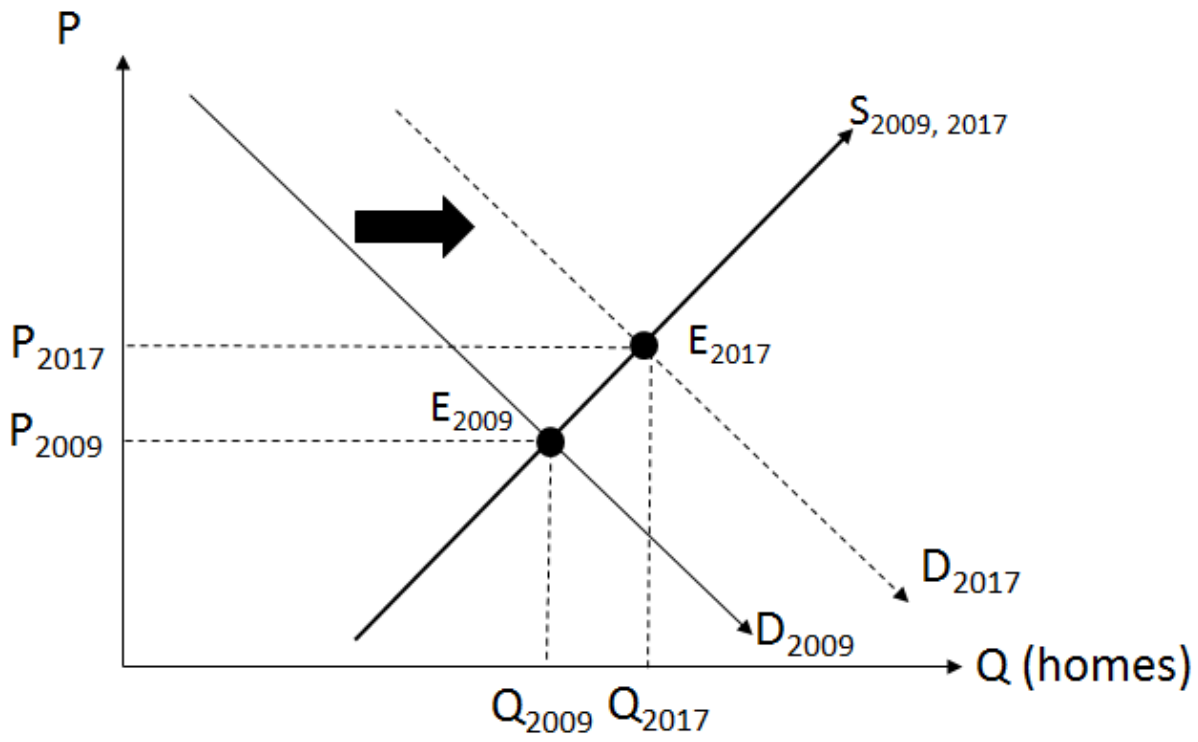


Figure 2.5.16

Recall all the shocks to the housing market we have depicted in this section. The following table summarizes the changes in the equilibrium price and quantity by time period.

The housing market shocks are largely driven by changes in demand. Again, supply shocks did occur during this time, but given how difficult it is start and stop a big development project, it is reasonable to assume that the housing market shocks were dominated by demand shocks.

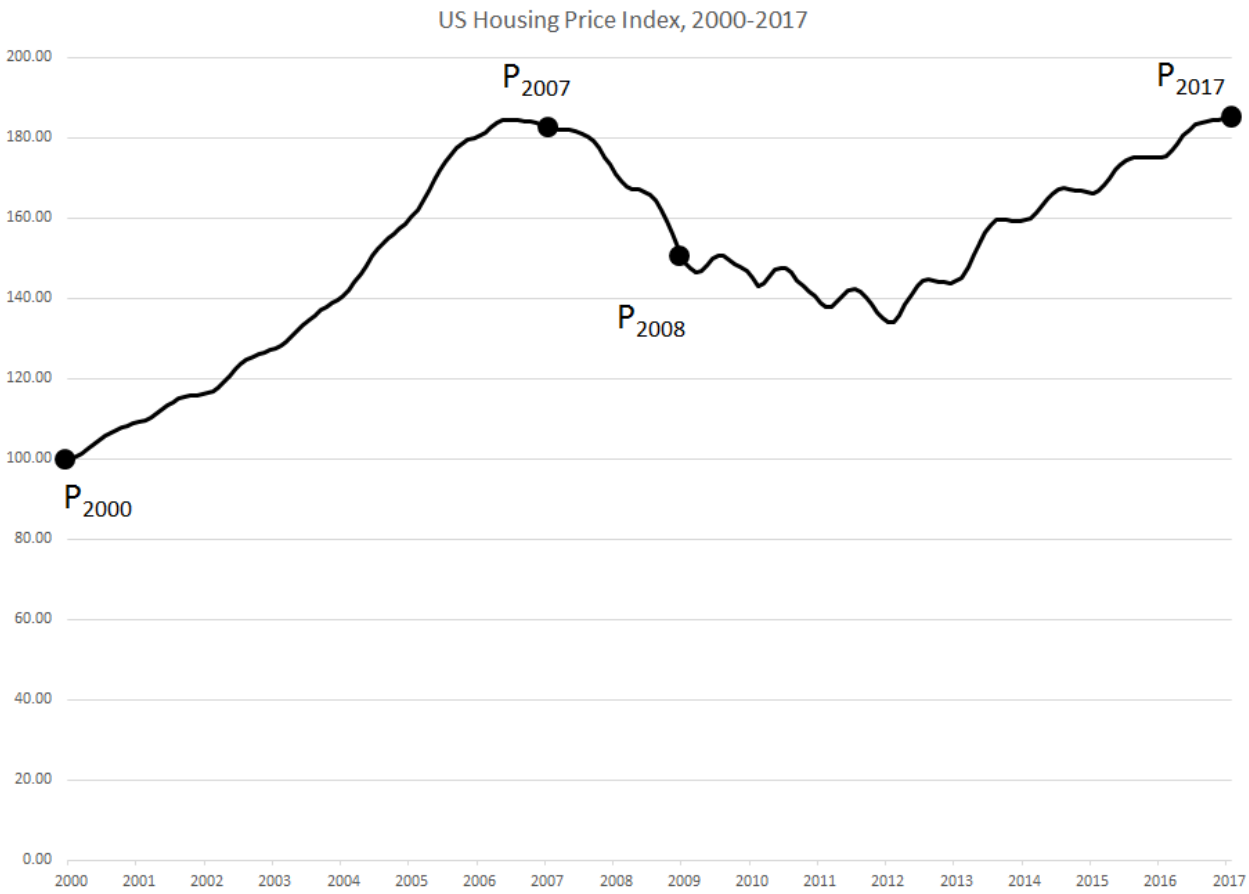


Figure 2.5.17

Here we are looking at the average housing price in the US over time. The peaks and troughs of prices do not quite match up with the years we examine, but the general price pattern is what we predicted from our supply and demand analysis.

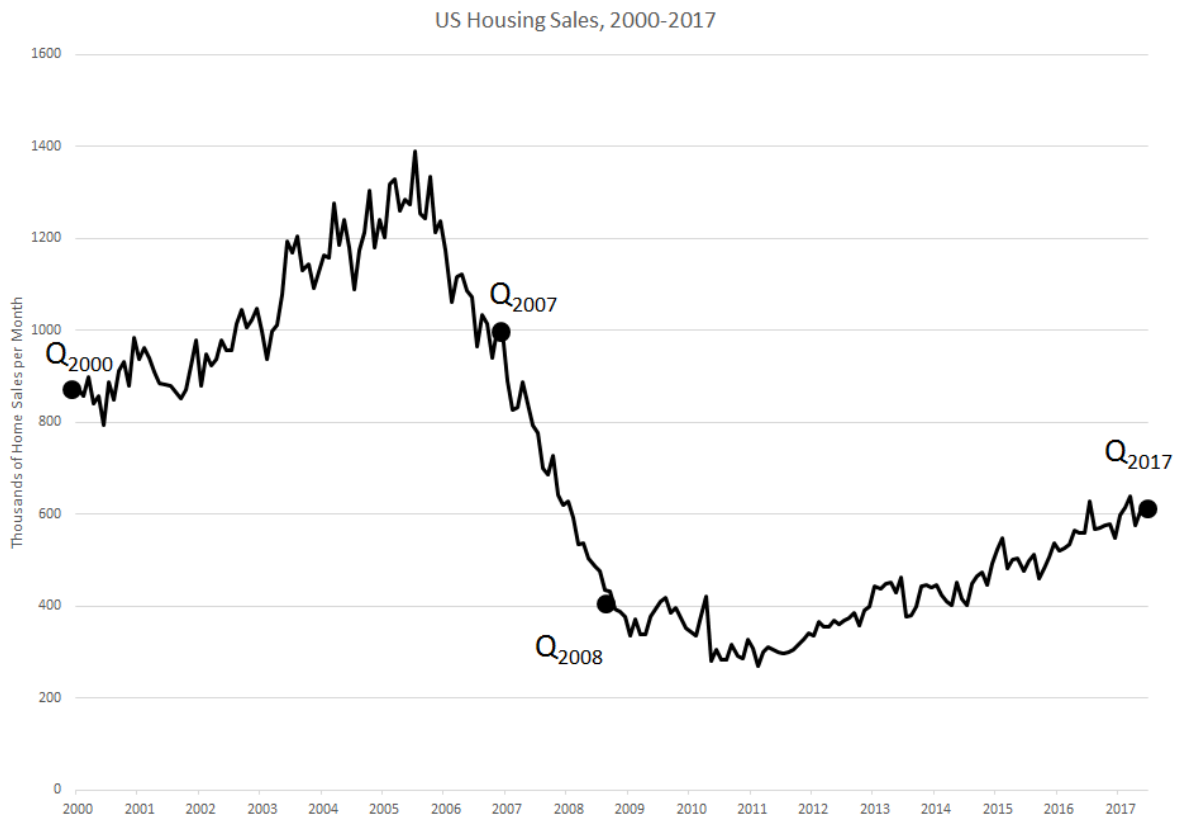


Figure 2.5.18

The number of houses sold monthly between 2000 and 2017 follow the predictions from our supply and demand model as well. The big difference is that the sales of homes spiked around 2006. Slowly home sales led to a reduction in prices, not the other way around. Between 2007 and 2008, there was a large reduction in home sales that has slowly recovered.

Although the housing market is far from perfectly competitive, the supply and demand model does a good job of predicting how shocks to the housing market will impact equilibrium prices and quantity.

Notice what we have done in this section: not only did we see another example of how to use supply and demand, but we also showed how changes to the housing market can have significant effects on the entire economy. Gasoline prices earlier in this chapter also played an important role in the downturn of certain industries during the Great Recession (such as US automobile manufacturers), but the housing market had an even larger

impact. The analysis of the housing market sets the stage for us to move onto analyzing the macroeconomic policy and allows us to center ourselves around the Great Recession of 2008-2009.