

Chapter 4

Supply and Demand

Should your college charge you for parking, or should parking be free? Should the federal government put a ceiling of, say, \$4 a gallon on gas prices? And should drug companies be forced to make prescription drug prices affordable to senior citizens? Our price system is constantly sending buyers and sellers thousands of signals. Running an economy without that system would be like flying a jumbo jet without an instrument panel.

Our economy has a built-in guidance system that allocates resources efficiently. This guidance system, which includes the interaction of the forces of supply and demand in the marketplace, is known as the price system. How does it work? You're about to find out.

How are you at reading graphs? Economists love to draw them, so if you're going to get through this course, you'll need to be able to read them. The main graph we like to draw has just two curves: the demand curve and the supply curve. By observing where they cross, we can easily find not only the price of a good or service, but the quantity sold.

LEARNING OBJECTIVES

After reading this chapter you should be able to:

1. Define and explain demand in a product or service market.
2. Define and explain supply.
3. Determine the equilibrium point in the market for a specific good, given data on supply and demand at different price levels.
4. Explain what causes shifts in demand and supply.
5. Explain how price ceilings cause shortages.
6. Explain how price floors cause surpluses.
7. Apply supply and demand analysis to real-world problems.

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Demand

We define **demand** as the schedule of quantities of a good or service that people are willing and able to buy at different prices. And as you would suspect, the lower the price, the more people will buy.

How much would people living in Denver or in Chicago be willing and able to pay for a round-trip plane ticket for weekday travel between the two cities? Suppose we conducted a survey and were able to draw up a demand schedule like the one shown in Table 1.

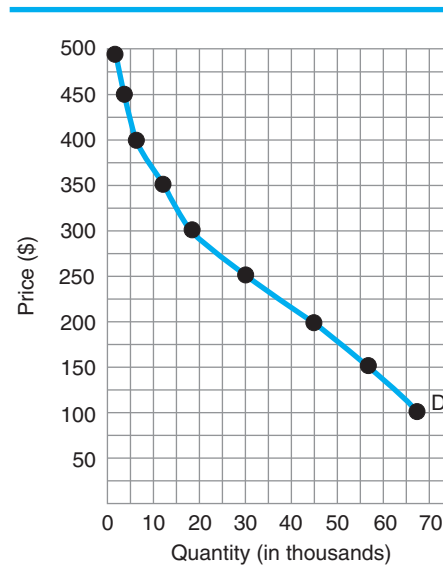
Demand is the schedule of quantities of a good or service that people are willing and able to buy at different prices.

TABLE 1 Hypothetical Daily Demand for Coach Seats on Round-Trip Weekday Flights between Denver and Chicago

Price	Quantity Demanded
\$500	1,000
450	3,000
400	7,000
350	12,000
300	19,000
250	30,000
200	45,000
150	57,000
100	67,000

Figure 1

Hypothetical Daily Demand for Coach Seats on Round-Trip Weekday Flights between Denver and Chicago



Note that, as the price declines, increasing quantities of tickets are demanded. Now look at Figure 1 to see how a graph of this demand schedule actually looks.

The demand curve slopes downward and to the right. That's because of the way we've set up our graph. Prices are on the vertical axis, with the highest price, \$500, at the top. From here on, the vertical axis of every graph in this book will be measured in terms of money. The horizontal axis of Figure 1 measures the quantity sold, beginning with zero, at the origin of the graph, and getting to progressively higher quantities as we move to the right. In all the demand and supply graphs that follow, price will be on the vertical axis, and quantity on the horizontal.

Supply

Supply is the schedule of quantities of a good or service that people are willing and able to sell at different prices.

Supply is defined as *the schedule of quantities of a good or service that people are willing and able to sell at different prices*. If you compare the definition of supply with that of demand, you'll find that only one word is changed. Can you find that word?

If you are a supplier, then you are willing and able to *sell* a schedule of quantities at different prices; if you are a buyer, then you are willing and able to *buy* a schedule of quantities at different prices. What's the difference, then, between supply and demand?

At higher prices the suppliers are willing and able to sell larger and larger quantities, while the buyers are willing to buy smaller and smaller quantities. Similarly, as prices decline, buyers are willing to buy more and sellers are willing to sell less. But we're getting a little ahead of ourselves, since you haven't yet been formally introduced to a supply schedule. So first check out Table 2, and then Figure 2, which is a graph drawn from the numbers in the table.

What happens, then, to quantity supplied as the price is lowered? It declines. It's as simple as that.

In our definitions of demand and supply, we talked about a schedule of quantities of a good or service that people are willing and able to buy or sell at different prices. But what if some buyers just don't have the money? Then those buyers are simply not counted. We say that they are not in the market. Similarly, we would exclude from the market any sellers who just don't have the goods or services to sell. I'd *love* to sell my services as a \$600-an-hour corporate lawyer, but quite frankly, I just don't have those services to sell.

That brings us to a second factor not included in our definitions of supply and demand. The supply and demand for any good or service operates within a specific market. That market may be very local, as it is for food shopping; regional, as it is for used cars; national, as it is for news magazines; or even international, as it is for petroleum.

TABLE 2 Hypothetical Daily Supply for Coach Seats on Round-Trip Weekday Flights between Denver and Chicago

Price	Quantity Supplied
\$500	62,000
450	59,000
400	54,000
350	48,000
300	40,000
250	30,000
200	16,000
150	7,000
100	2,000

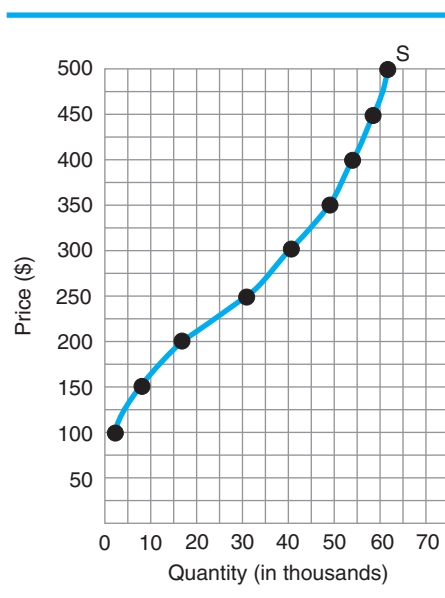


Figure 2
Hypothetical Daily Supply for
Coach Seats on Round-Trip
Weekday Flights between
Denver and Chicago

Equilibrium

You've heard a lot about supply and demand—or is it demand and supply? It doesn't matter whether you put demand or supply first. What *does* matter is placing them together on the same graph. Look at Figure 3.

Can you find the equilibrium price? Did you say \$250? Good! And how much is equilibrium quantity? Right again! It is 30,000.

Let's step back for a minute and analyze what we've just done. We've figured out the equilibrium price and quantity by looking at the demand and supply curves in Figure 3. We can find equilibrium price and quantity by seeing where the supply and demand curves cross.

What is equilibrium price? It's the price at which quantity demanded equals quantity supplied. What is equilibrium quantity? It's the quantity sold when the quantity demanded is equal to the quantity supplied.

Equilibrium price is the price at which quantity demanded equals quantity supplied.

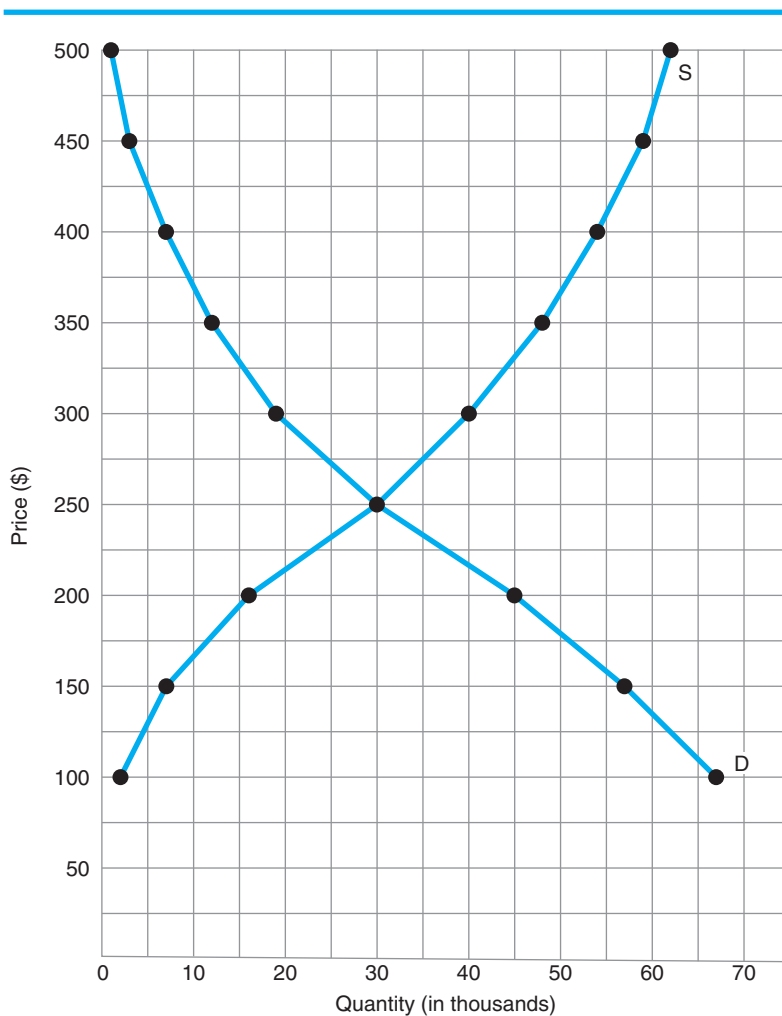
Equilibrium quantity is the quantity bought and sold at the equilibrium price.

Surpluses and Shortages

Is the actual price, or market price, always equal to the equilibrium price? The answer is no. It could be higher and it could be lower. Suppose the airlines were selling tickets for \$400. How many tickets would be demanded? Look back at Table 1 or, if you prefer, Figure 1 or Figure 3.

A total of 7,000 tickets would be demanded. And at a price of \$400, how many tickets would be supplied?

Figure 3
Hypothetical Demand and Supply Curves



The quantity supplied would be 54,000. What we've got here is a **surplus**. This occurs when the actual price, or the market price, is greater than the equilibrium price. How much is that surplus? You can measure it by finding the horizontal distance between quantity demanded and quantity supplied in Figure 3. Or, you can subtract the quantity demanded that you found in Table 1 (at a price of \$400) from the quantity supplied in Table 2 (also at a price of \$400). Either way, the surplus comes to 47,000.

The quantity that sellers are willing and able to sell (54,000) is much greater than the quantity buyers are willing and able to buy (7,000). This difference ($54,000 - 7,000$) is the surplus (47,000). The amount that sellers can sell is restricted by how much buyers will buy.

What happens when there's a surplus? The forces of demand and supply automatically work to eliminate it. In this case, some of the airlines, which would be very unhappy about all those empty seats, would cut their prices. If the market price fell to \$300, would there still be a surplus?

A glance at Figure 3 tells us that there would be. And how much would that surplus be?

It would be 21,000 seats. So *then* what would happen?

Some of the airlines would cut their prices to \$250, and the buyers would flock to them. The other airlines would have no choice but to cut their prices—or stop flying the Denver–Chicago route altogether. At \$250, we would be at the equilibrium point. There would be no tendency for the price to change.

What if the market price were below equilibrium price? Then we'd have a **shortage**. How much would that shortage be if the market price in Figure 3 were \$200?

At a price of \$200, quantity demanded would be 45,000, while quantity supplied would be just 16,000. So the shortage would be 29,000.

This time the buyers would be disappointed, because they would be quite happy to pay \$200 for a round-trip ticket, but most would be unable to get one without waiting for months. Many of the buyers would be willing to pay more. So what do you think would happen?

You guessed it! The market price would rise to \$250. At that price—the equilibrium price—quantity demanded would equal quantity supplied, and the shortage would be eliminated.

Thus we can see that the forces of demand and supply work together to establish an equilibrium price at which there are no shortages or surpluses. At the equilibrium price, all the sellers can sell as much as they want and all the buyers can buy as much as they want. So if we were to shout “Is everybody happy?” the buyers and sellers would all shout back “yes!”

A **surplus** occurs when the market price is above the equilibrium price.

A **shortage** occurs when the market price is below the equilibrium price.

Shifts in Demand and Supply

So far we've seen how the forces of demand and supply, or the price mechanism, send signals to buyers and sellers. For example, the surplus that resulted from a price of \$400 sent a clear signal to sellers to cut their prices. Similarly, a price of \$200 was accompanied by a shortage, which made many buyers unhappy. And sellers quickly realized that they could raise their price to \$250 and *still* sell all the tickets they wanted to sell.

Now we'll see how shifts in supply curves and shifts in demand curves change equilibrium price and quantity, thereby sending new sets of signals to buyers and sellers. Figure 4 has a new demand curve, D_2 . This represents an increase in demand because it lies entirely to the right of D_1 , the original demand curve. There has been an increase in demand if the quantity demanded is larger at every price that can be compared.

Why did the demand for airline tickets increase? Let's say that newer planes were introduced that cut travel time by 30 percent.

I'd like you to find the new equilibrium price and the new equilibrium quantity. When you do, please write down your answers.

The new equilibrium price is \$300, and the new equilibrium quantity is 40,000. So an increase in demand leads to an increase in both equilibrium price and quantity.

Next question: What would happen to equilibrium price and quantity if there were a decrease in demand?

EXTRA HELP

How Changes in Demand Affect Equilibrium

If demand falls and supply stays the same, what happens to equilibrium price and equilibrium quantity? To answer those questions, sketch a graph of a supply curve, S , and a demand curve, D_1 . Then draw a second demand curve, D_2 , representing a decrease in demand. I've done that in this figure.

The original equilibrium price was \$50, and the original equilibrium quantity was 10. Equilibrium price fell to \$35, and equilibrium quantity fell to 8. So a decrease in demand leads to a decrease in equilibrium price and quantity.

What would happen to equilibrium price and equilibrium quantity if demand rose and supply stayed the same? Equilibrium price and quantity would rise.

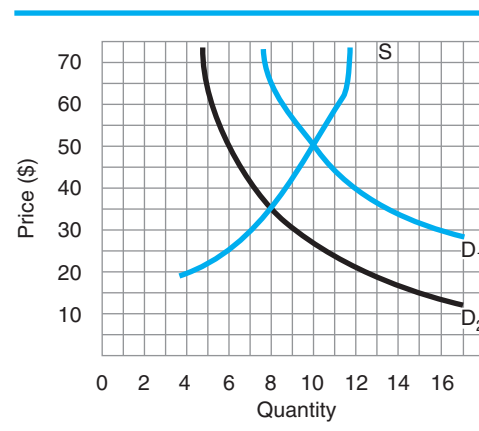
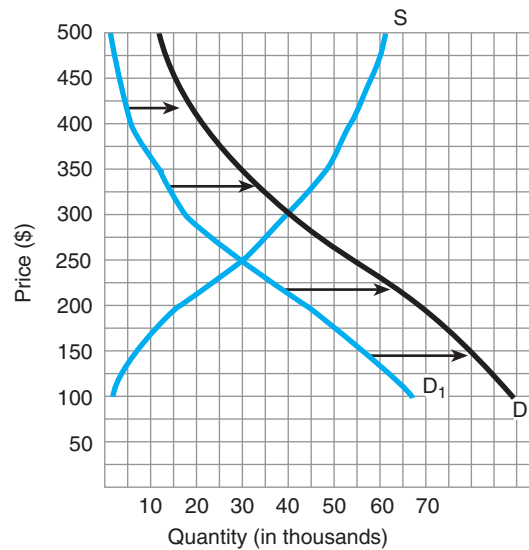


Figure 4
Increase in Demand



There would be a decrease in both equilibrium price and quantity. Need a little extra help? Then see the box “How Changes in Demand Affect Equilibrium.”

OK, one more set of shifts and we're out of here.

Figure 5 shows an increase in supply. You'll notice that the new supply curve, S_2 , is entirely to the right of S_1 . There has been an increase in supply if the quantity supplied is larger at every price that can be compared.

Why did supply increase? Let's assume that the cost of jet fuel fell by 50 percent. In response, the airlines scheduled more flights. Please find the new equilibrium price and quantity, and write down your answers.

The new equilibrium price is \$200, and the new equilibrium quantity is 45,000. So an increase in supply lowers equilibrium price and raises equilibrium quantity. One last question: If supply declines, what happens to equilibrium price and equilibrium quantity? Equilibrium price rises and equilibrium quantity falls. A decline in supply has the opposite effect as a rise in supply.

An increase in supply lowers equilibrium price and raises equilibrium quantity.

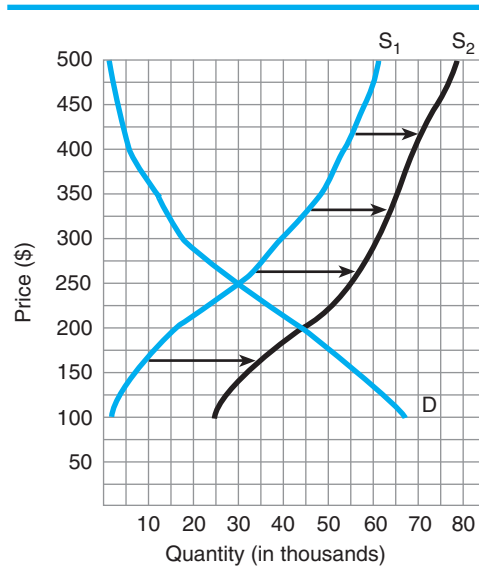


Figure 5
Increase in Supply

Now let's work out a couple of problems. First, look at Figure 6 and write down your answers to this set of questions: (a) If the supply curve is S_1 , how much are the equilibrium price and quantity? (b) If supply changes from S_1 to S_2 , does that represent an increase or decrease in supply? (c) How much are the new equilibrium price and quantity?

Here are the answers: (a) \$13; 275; (b) decrease; and (c) \$14; 225.

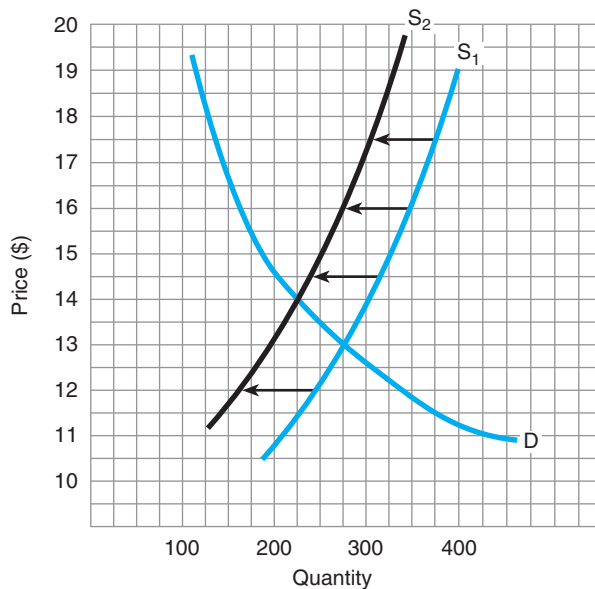


Figure 6

When supply declines, equilibrium price rises and equilibrium quantity declines. As you make your way through this text, supply and demand graphs will pop up from time to time. In every case you'll be able to find equilibrium price and quantity by locating the point of intersection of the demand and supply curves. If you need extra help, see the box "How Changes in Supply Affect Equilibrium."

Next problem: Use Figure 7 to answer these questions: (a) If the demand curve is D_1 , how much are the equilibrium price and quantity? (b) If demand changes from D_1 to D_2 , does that represent an increase or decrease in demand? (c) How much are the new equilibrium price and quantity?

EXTRA HELP

If supply rises and demand stays the same, what happens to equilibrium price and equilibrium quantity? Again, to answer those questions, sketch a graph of a demand curve, D , and a supply curve, S_1 . Then draw a second supply curve, S_2 , representing an increase in supply. I've done that in this figure.

The original equilibrium price was \$12, and the original equilibrium quantity was 20. Equilibrium price fell to \$9, and equilibrium quantity rose to 26. So an increase in supply leads to a decrease in equilibrium price and an increase in equilibrium quantity.

What happens to equilibrium price and equilibrium quantity if supply falls and demand stays the same? Equilibrium price rises and equilibrium quantity falls.

How Changes in Supply Affect Equilibrium

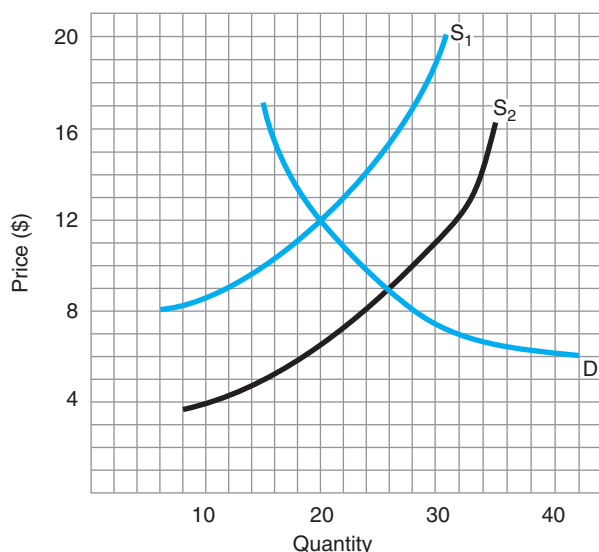
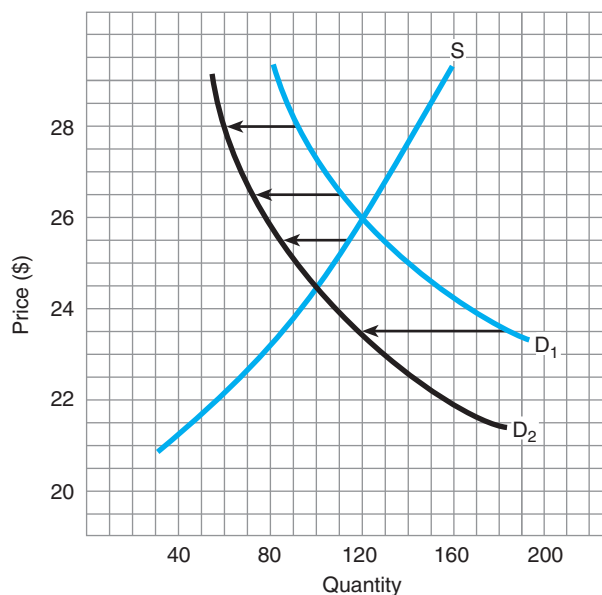


Figure 7



Here are the answers: (a) \$26; 120; (b) decrease; and (c) \$24.50; 100.

OK, you're taking an exam, and here's the first question: Demand rises and supply stays the same. What happens to equilibrium price and quantity? Just sketch a graph (like the one in Figure 4). Then you'll see that an increase in demand raises equilibrium price and quantity.

What happens to equilibrium price and quantity when there's a decrease in demand? Again, just sketch a graph, and you'll see that a decrease in demand lowers equilibrium price and quantity.

Next question: What happens to equilibrium price and quantity when there's an increase in supply? If your sketch looks like the one in Figure 5, you'll see that an increase in supply leads to a lower equilibrium price and a higher equilibrium quantity.

And finally, how does a decrease in supply affect equilibrium price and quantity? A decrease in supply leads to a higher equilibrium price and a lower equilibrium quantity.

Now let's return to that exam. When you're asked: How does an increase or decrease in demand affect equilibrium price and quantity, what do you do?

You just sketch a graph of a demand curve and a supply curve, and then another demand curve representing an increase or decrease in demand. Similarly, if you're asked how an increase or decrease in supply affects equilibrium price and quantity, just draw a sketch. It leads you to the right answers.

Price Ceilings and Price Floors

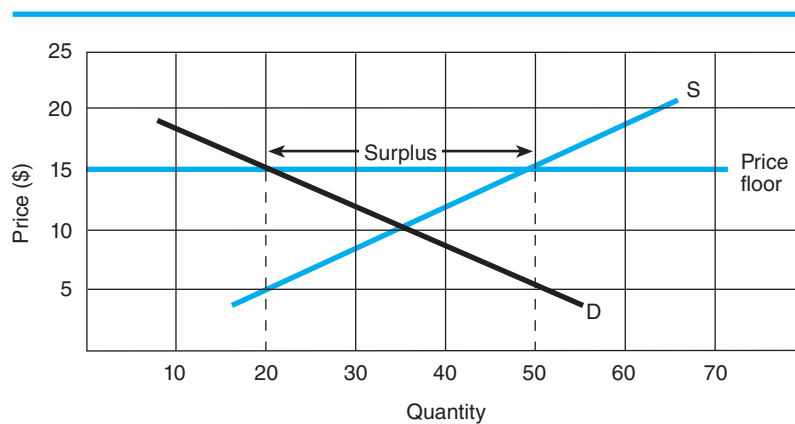
One of the most popular sayings of all time is "You can't repeal the law of supply and demand." Maybe not, but our government sure has a lot of fun trying. Price floors and price ceilings, which Washington has imposed from time to time, have played havoc with our price system. And taxes on selected goods and services have also altered supply and demand.

What's the difference between a floor and a ceiling? If you're standing in a room, where's the floor and where's the ceiling? As you might expect, economists turn this logic upside down. To find floors, we need to look up. How high? Somewhere above equilibrium price. And where are ceilings? Just where you'd expect economists to place them. We need to look down, somewhere below equilibrium price. A **price floor** is so named because that is the lowest the price is allowed to go in that market. Similarly, a **price ceiling** is the highest price that is allowed in that market.

Figure 8 illustrates a price floor. Equilibrium price would normally be \$10, but a price floor of \$15 has been established. At \$15 businesses are not able to sell everything they offer for sale. Quantity supplied is much larger than quantity demanded. Why? At the equilibrium price of \$10, sellers are willing to sell less while buyers are willing to buy more.

At a price of \$15, there is a surplus of 30 units (quantity demanded is 20 and quantity supplied is 50). The government has created this price floor and surplus to keep the price at a predetermined level. This has been the case for certain agricultural commodities, most notably wheat and corn. It was hoped that these relatively high prices would encourage family farms to stay in business. That the bulk of farm price support payments has gone to huge corporate farms has not discouraged Congress from allocating billions of dollars a year toward this end.

The way the government keeps price floors in effect is by buying up the surpluses. In the case of Figure 8, the Department of Agriculture would have to buy 30 units.



You can't repeal the law of supply and demand.

The **price floor** is the government-imposed minimum price.

The **price ceiling** is the government-imposed maximum legal price.

Floors and surpluses

Figure 8

Price Floor and Surplus

The price can go no lower than the floor. The surplus is the amount by which the quantity supplied is greater than the quantity demanded.

Another important price floor is the minimum wage. Since 2009 the vast majority of Americans have been guaranteed a minimum of \$7.25 an hour. Unless your job is not covered under the Fair Labor Standards Act, you are legally entitled to at least this wage rate.

Price ceilings are the mirror image of price floors. An example appears in Figure 9. Price ceilings are set by the government as a form of price control. “No matter what,” the government tells business firms, “don’t charge more than this amount.”

Ceilings and shortages

A ceiling prevents prices from rising. The last time we had widespread price ceilings was during World War II. Because ceilings cause shortages, a rationing system was worked out to enable everyone to obtain their “fair share” of such commodities as butter, meat, and sugar.

I remember World War II. I remember the ration books and the coupons you’d tear out when you went to the store. But chances are, even your parents don’t remember the war, with its attendant shortages and rationing.

Ceilings and gas lines

Those over 40 may remember the gas lines we had in 1979, and real old-timers even recall the ones we had back in 1973. If not, imagine waiting a couple of hours in a line of cars six blocks long just to fill up your tank. What was the problem? In 1973 it was the Arab oil embargo, while the crisis in 1979 was set off by the Iranian Revolution.

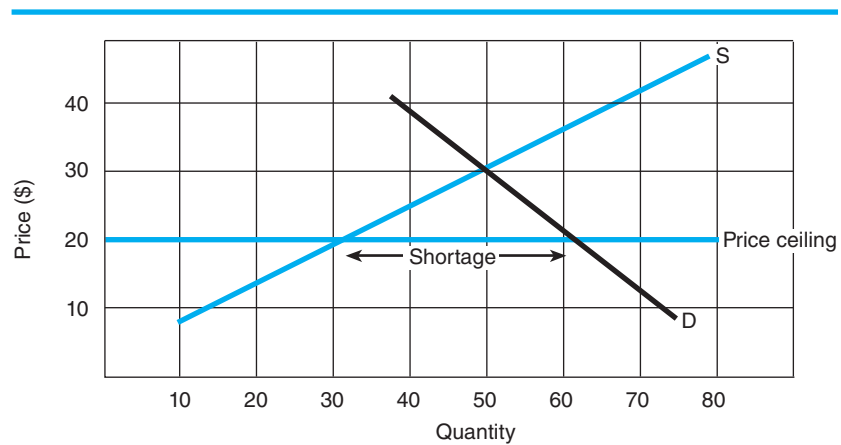
How shortages are eliminated

In both cases, there was ostensibly an oil shortage. But according to the law of supply and demand, there can’t really *be* any shortages. Why not? Because prices will rise. For example, in Figure 9, at a price of \$25, there’s a shortage. But we know the price will rise to \$30 and eliminate that shortage. Why? Who drives it up? The dissatisfied buyers (the people who would rather pay more now than wait) drive it up because they are willing to pay more than \$25. Note that as the price rises, the quantity demanded declines, while the quantity supplied rises. When we reach equilibrium price, quantity demanded equals quantity supplied, and the shortage is eliminated.

Figure 9

Price Ceiling and Shortage

The price can go no higher than the price ceiling. The shortage is the amount by which quantity demanded is greater than quantity supplied.



Now, I left you back in that gas line, and I know you don’t want to wait two hours until it’s your turn at the pump. Wouldn’t you be willing to pay a few cents more if that meant you didn’t have to wait? Let’s suppose the gas station owner posted a higher price. What would happen? Some people would get out of line. What if he posted a still higher price? Still more people would leave the line. And as gas prices rose, more stations would miraculously open, and the others would stay open longer hours. What would happen to the gas lines? They’d disappear.

Who actually caused the shortages?

So now, let’s ask the obvious question: What *really* caused the gasoline shortages? Who was the *real* villain of the piece? You guessed it! It was the federal government, which had set a ceiling on gasoline prices.

Let's return once more to Figure 9, the scene of the crime. What crime? How could you forget? Our government was caught red-handed, trying to violate the law of supply and demand.

In Figure 9, when a ceiling of \$20 is established, there is a shortage of about 30 units. Had price been allowed to stay at the equilibrium level of \$30, there would have been no shortage. However, at this lower price, business firms would be willing to sell about 18 units fewer than they'll sell at equilibrium, and consumers would demand about 12 units more than they would at equilibrium. This explains the shortage.

One way the market deals with a government-imposed shortage is to create what is known as a black market. Products subject to the price ceiling are sold illegally to those willing to pay considerably more. During World War II there was an extensive black market.

Two important price ceilings are **rent control laws** (see the box "Rent Control: The Institution People Love to Hate") and **usury laws**, which put a ceiling on interest

Rent control laws put a ceiling on rent.

Usury laws put a ceiling on interest rates.

Rent Control: The Institution People Love to Hate

I grew up in a rent-controlled apartment and still believe that rent control worked very well at the time it was instituted. Very little new housing had been built during the 1930s because of the Great Depression and during the first half of the 1940s because of World War II. If rents had been allowed to rise to their market value in the late 1940s, my family, and hundreds of thousands—if not millions—of other families would have been forced out of their apartments.

Rent control is an institution that landlords, economists, libertarians, and nearly all good conservatives just love to hate. In fact, about the only folks who still seem to support rent control are the tenants whose rents are below what the market would have set and the politicians who voted for these laws in the first place.

Today rent controls establish ceilings for how much rent may be charged for particular apartments and how much, if at all, these rents may be raised each year. The case for rent control is that it keeps down housing costs for poor and elderly people. Actually, it keeps down housing costs for a lot of middle-class and rich people as well. Because the rent ceiling is established for each apartment regardless of who is living there, many people are paying a lot less than they could afford.

One of the perverse effects of rent control is to reduce vacancy rates. First, those paying low rents don't want to move. Second, real estate developers are reluctant to build apartment houses if their rents will be subject to controls. Still another perverse effect has been the large-scale abandonment of apartment buildings, especially in the inner cities, when landlords find that it makes more sense to walk away from their buildings than to continue losing money. These landlords had been squeezed for years by rising maintenance costs and stagnant rent rolls.

Richard Arnott has noted that "Economists have been virtually unanimous in their opposition to rent control." Why? Arnott provides a full list of reasons:

There has been widespread agreement that rent controls discourage new construction, cause abandonment, retard maintenance, reduce mobility, generate mismatch between housing units and tenants, exacerbate discrimination in rental housing, create black markets, encourage the conversion of rental to owner-occupied housing, and generally short-circuit the market mechanism for housing.*

After rent control was imposed in New York City in 1943, many landlords stopped taking care of their buildings and eventually walked away from 500,000 apartments.

Today nearly 200 cities, mostly in New York, New Jersey, and California, have some form of rent control. It is clear that this price ceiling has kept rents well below their equilibrium levels and consequently has resulted in housing shortages.

From a policy standpoint, do we want to eliminate rent controls? Would skyrocketing rents drive even more families into the ranks of the homeless? Perhaps a gradual easing of rent controls and their eventual elimination in, say, 10 or 15 years would send the right message to builders. But because these are local laws, only local governments can repeal them. And because the name of the political game is getting reelected, it is unlikely that many local politicians will find it expedient to repeal these popular laws.

*Richard Arnott, "Time for Revisionism on Rent Control?" *Journal of Economic Perspectives*, Winter 1995, p. 99.

EXTRA HELP

Let's look at Figure 1. See if you can answer these three questions: (1) Is \$10 a price ceiling or a price floor? (2) Is there a shortage or a surplus? (3) How much is it?

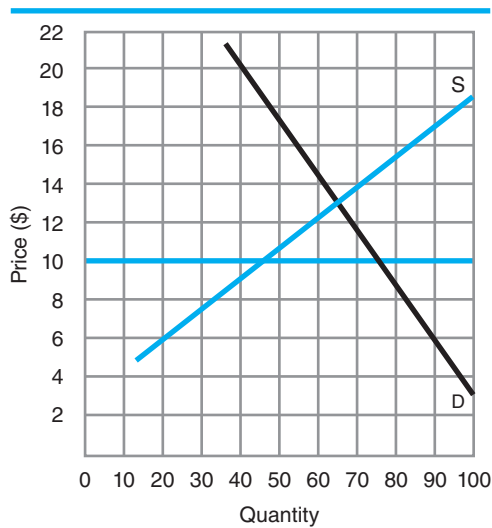


Figure 1

Solution: (1) \$10 is a price ceiling because it is below equilibrium price: The ceiling is holding the market price *below* equilibrium price. (2) There is a shortage because quantity demanded is greater than quantity supplied. (3) The shortage is 30.

Price Ceilings, Price Floors, Shortages, and Surpluses

Let's look at Figure 2. We see that the quantity demanded is 75 and the quantity supplied is 45. The shortage is equal to quantity demanded less quantity supplied ($75 - 45 = 30$).



Figure 2

rates. Usury laws go back to biblical times when the prophets debated what, if anything, was a “fair” rate of interest. This same debate was carried on more than two millennia later by Christian scholars. And to this day we ask whether it is “moral” to charge high interest rates.

*One dictionary definition of usury is “an unconscionable or exorbitant rate or amount of interest.”*¹ Many states have usury laws that prohibit banks, savings and loan associations, and certain other financial institutions from charging above specified rates of interest. What effect, if any, do these laws have?

Until the late 1970s interest rates were well below their legal ceilings. But then came double-digit inflation rates, sharply rising interest rates, and, as these interest rates reached their legal ceilings, a full-fledged credit crunch. In other words, these interest rate ceilings created a shortage of loanable funds—which is exactly what one would expect to happen when a price ceiling is set below the market’s equilibrium price. In this case we’re talking about the market for loanable funds and their price, the interest rate.

¹Webster’s Collegiate Dictionary, 10th ed., p. 1302.

Moving right along, answer these three questions with respect to Figure 3. (1) Is \$40 a price ceiling or a price floor? (2) Is there a shortage or a surplus? (3) How much is it?

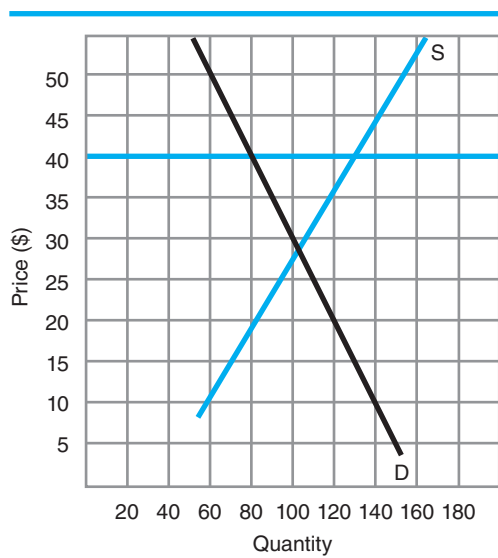


Figure 3

Let's look at Figure 4. We see the quantity supplied is 130 and quantity demanded is 80. The surplus is equal to quantity supplied less quantity demanded ($130 - 80 = 50$).



Figure 4

Solution: (1) \$40 is a price floor because it is above equilibrium price: The floor is holding market price *above* equilibrium price. (2) There is a surplus because quantity supplied is greater than quantity demanded. (3) The surplus is 50.

The confusion over the location of price floors and ceilings on the graph may be overcome by considering what the government is doing by establishing them. Normally, price would fall to the equilibrium level, but a price floor keeps price artificially high. Think of a floor holding price above equilibrium; therefore, a price floor would be located above equilibrium price.

By the same logic, a price ceiling is intended to keep price *below* equilibrium. If not for that ceiling, price would rise. Therefore, an effective price ceiling must be located below equilibrium to keep price from rising to that level.

Keep in mind, then, that the normal tendency of prices is to move toward their equilibrium levels. A price ceiling will prevent prices from rising to equilibrium, while a price floor will prevent prices from falling to equilibrium. If you need more information about ceilings, floors, shortages, and surpluses, see the box "Price Ceilings, Price Floors, Shortages, and Surpluses."

Let's summarize: When the government sets a price floor above equilibrium price, it creates a surplus. That surplus is the amount by which the quantity supplied exceeds the quantity demanded. When the government sets a price ceiling below equilibrium price, it creates a shortage. That shortage is the amount by which the quantity demanded exceeds the quantity supplied.

Applications of Supply and Demand

Throughout this book we encounter many applications of supply and demand—so many, in fact, that I’m going to give you a quiz. But it will be an extremely easy quiz. There’s just one answer to all these questions. Are you ready?

1. Interest rates are set by _____.
Did you answer “supply and demand”? Good.
2. Wage rates are set by _____.
3. Rents are determined by _____.
4. The prices of nearly all goods are determined by _____.
5. The prices of nearly all services are determined by _____.

We may conclude, then, that the prices of nearly everything are determined by demand and supply.

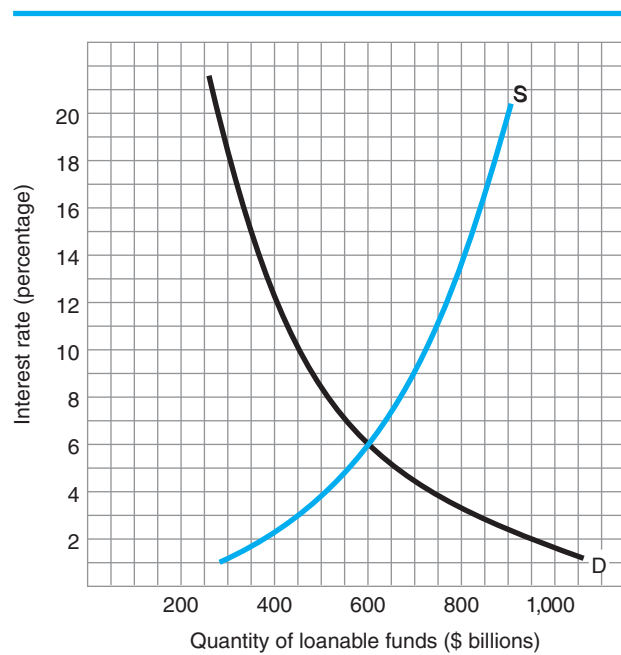
Occasionally, however, government intervention interferes with the price mechanism and imposes price floors (or minimums) or price ceilings (or maximums). This gets economists very upset because it not only prevents the most efficient allocation of resources. It also makes it much harder to read our supply and demand graphs.

Interest Rate Determination

Let’s take a closer look at the determination of the interest rate. I want to state right up front that there is no “interest rate” but rather scores of interest rates, such as mortgage rates, commercial loan rates, and short-term and long-term federal borrowing rates, as well as the interest rates paid by banks, credit unions, and other financial intermediaries. Figure 10 shows a hypothetical demand schedule for loanable funds and a corresponding hypothetical supply schedule.

We can see that \$600 billion is lent (or borrowed) at an interest rate of 6 percent. In other words, the market sets the price of borrowed money at an interest rate of 6 percent. What would happen to the interest rate and to the amount of money borrowed if the supply of loanable funds increased?

Figure 10
Hypothetical Demand for and
Supply of Loanable Funds



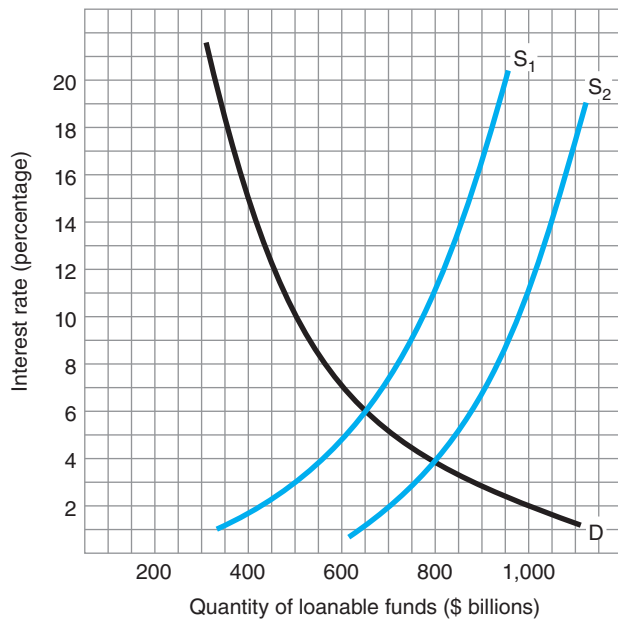


Figure 11
Hypothetical Demand for and Supply of Loanable Funds

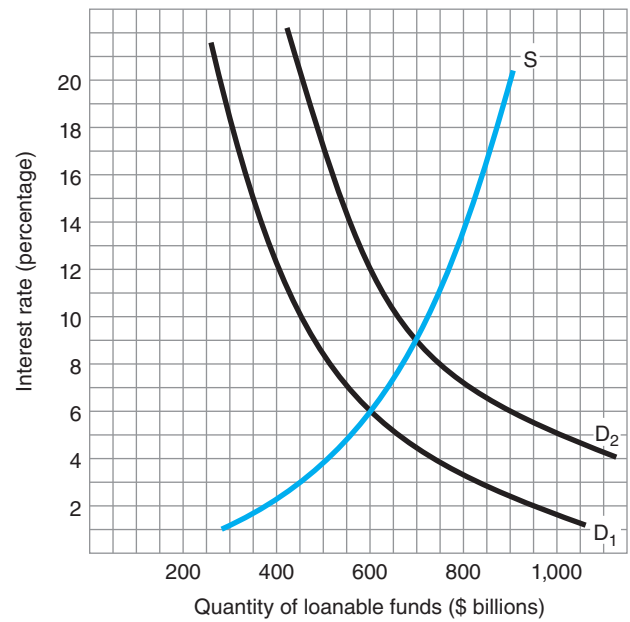


Figure 12
Hypothetical Demand for and Supply of Loanable Funds

Although you haven't been asked to draw graphs in this chapter, it's often useful to sketch a graph of a demand curve and a supply curve to help you answer questions. For example, what happens to the equilibrium price and quantity sold if there is an increase in supply while demand stays the same? Sketch a graph and *then* answer the question.

If your graph looks like the one in Figure 11, then you probably answered that equilibrium price went down and equilibrium quantity went up.

Did you figure it out? If you did, then you can confirm your answers by glancing at Figure 11. A rise in the supply of loanable funds leads to a decrease in the interest rate to 4 percent and an increase in the amount of money borrowed to \$800 billion.

One more question: What happens to the interest rate and to the amount of money borrowed if the demand for loanable funds rises?

Did you say that the interest rate would rise and the amount of money borrowed would also rise? Good. Then what you must have done was to have sketched a graph like the one shown in Figure 12. The interest rate rose to 9 percent, and the amount of money borrowed rose to \$700 billion.

College Parking

One of the big complaints on college campuses is the scarcity of parking spots for students—which means that, if you get to school after nine o'clock, you may have to walk a half mile or even more to get to class.

Is parking free at your school? Although you may well believe it should be, let's look at the consequences of free parking. The school has set the price of parking at zero. That's a price ceiling of zero. We may conclude that this price ceiling has caused a shortage of available parking spots.

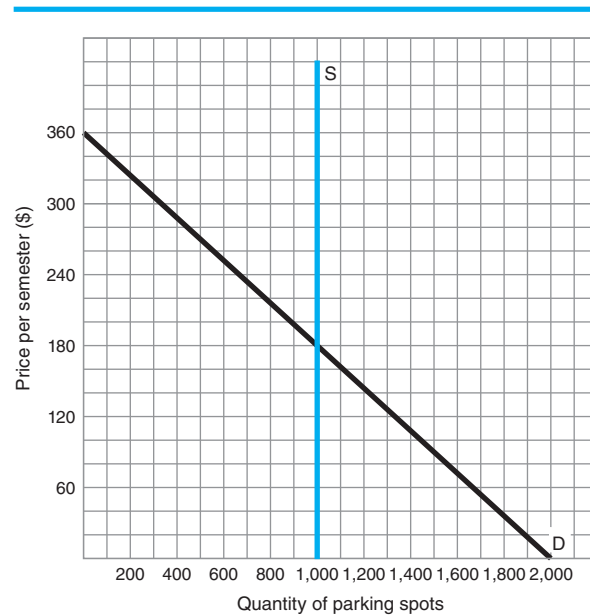
Suppose that your college has a few parking lots within easy walking distance of the classroom buildings, and that they had a total of 1,000 spots. If parking is free, figure out the shortage of spots by using the information in Figure 13.

The shortage is 1,000 spots. Two thousand drivers are competing for 1,000 spots. They would have three choices: arrive early, park in a remote lot, or find another way to get to school.

Should parking be free at your school?

Figure 13

Demand for and Supply of
College Parking Spots



The college administration can eliminate the shortage by charging to park in the close-in lots. How much should it charge for a one-semester permit?

Again, referring back to Figure 13, we can see that the fee should be \$180. That is the equilibrium price that would set quantity demanded equal to quantity supplied. Students who wanted to park close by could do so by paying \$180 per semester. And they'd get a little more sleep as well.²

The Rationing Function of the Price System

If gasoline went up to \$8 a gallon, would you cut back on your driving? Maybe you would try to do all your shopping in one trip instead of in two or three. And if gasoline went still higher, maybe you would even agree to join a car pool.

The price system is constantly sending buyers and sellers thousands of signals. The price of *this* service has gone through the roof. *That* product is on sale. *This* good is overpriced and *that* one is a bargain. When something becomes very expensive, we generally cut back. We do this not because the government ordered us to do so or because it issued ration coupons entitling everyone to only three gallons a week, but because the price system itself performed this rationing function.

Think of how most people behave at all-you-can-eat buffets. They certainly eat a lot more than they would in a regular restaurant. *Why?* The price system signals to them: This appetizer will cost them another \$4.50, or that slice of pie will cost them another \$3.75. At the buffet there's nothing to get them to ration how much they eat—except possibly a very full stomach. But in a regular restaurant the price system performs its **rationing** function so well that they end up eating less.

Rationing is a system used to determine how a scarce good or service is distributed.

At the beginning of Chapter 2, economics was defined as *the efficient allocation of the scarce means of production toward the satisfaction of human wants*. In a free-market, private-enterprise economy such as ours, we depend on the price mechanism, or the forces of supply and demand, to perform that job.

The advent of the Internet has made the workings of supply and demand even more efficient. Before the Internet, we bought nearly all of our books in bookstores. Now we buy them online from a variety of sellers. If you want to buy a bestseller, your local bookstore will charge you full price. But chances are, you could find a seller online offering that same book at a steep discount. See for yourself by going to the websites that follow.

²Students running late to class at the University of Southern California can take advantage of valet parking.

Check the price charged at your local bookstore for a couple of bestsellers and then go to these sites to see how much money you could save: www.amazon.com; www.barnesandnoble.com; www.hpb.com; and www.ebay.com.

Last Word

We talked earlier of how the government sometimes interferes with the free operation of markets by imposing price floors and price ceilings. But the government may also ensure the smooth operation of markets by protecting property rights, guaranteeing enforcement of legal contracts, and issuing a supply of money that buyers and sellers will readily accept. Economist John McMillan has emphasized the historic importance of property rights:

The prophet Mohammed was an early proponent of property rights. When a famine in Medina brought sharp price increases, people implored him to lessen the hardship by fixing prices. He refused because, having once been a merchant himself, he believed the buyers' and sellers' free choices should not be overridden. "Allah is the only one who sets the prices and gives prosperity and poverty," he said. "I would not want to be complained about before Allah by someone whose property or livelihood has been violated."³

Mohammed on supply and demand and property rights

So while governmental interference with the market system can have adverse effects, the government does have a substantial supportive role to play in a market economy. In the previous chapter we considered the role of government under economic systems ranging from capitalism to communism.

Economics in Action: High Gas Prices— Something Only an Economist Could Love

On the Labor Day weekend of 2005, gas prices reached nearly \$6 in some parts of the South. Customers grouched about "price gouging," and many even limited their purchases to "just" \$30 or \$40, rather than filling their tanks.

What drove prices so high—*besides* the greed of the sellers? As you may remember, Hurricane Katrina, in addition to devastating New Orleans and its neighboring Gulf Coast communities, also temporarily shut down offshore oil wells, which accounted for 25 percent of our domestic oil production. The storm also briefly put about 10 percent of our refineries out of commission.

What we had was a sudden drop in supply. When that happens, of course, price will go up sharply. Which is exactly what happened.

So what is there to love about high gas prices? Consider the alternative. Back in 1973 and 1979 we had similar supply problems, when shipments from the Middle East were curtailed. Although prices rose sharply, there were gas lines, sometimes six or eight blocks long. In 1979, various states imposed odd and even days to buy gas. If your license plate ended with an even number, you could buy gas on Monday, Wednesday, and Friday. If it ended with an odd number, then you were a Tuesday, Thursday, Saturday buyer.

The government's solution to the gasoline shortage in the 1970s was to restrict purchases and to hold down price increases. One unintended consequence was two- and three-hour waits in gas lines. But in 2005, the government basically took a hands-off attitude to the gasoline shortage. Prices certainly *did* go up, but there were few gas lines. Everyone was able to buy as much gas as they wanted, albeit at perhaps \$3.50 or \$3.75 a gallon. So the price system performed its rationing function very, very well. Although

³John McMillan, *Reinventing the Bazaar* (New York: W. W. Norton, 2002), p. 90.

there were widespread complaints about prices, nearly everyone was much happier to pay, say, a dollar a gallon more, and not have to wait in line for an hour or two to buy gas.

Most economists believe price ceilings do more harm than good. In the short run, at least we don't have to wait in gas lines. Furthermore, because of high prices since the summer of 2005, some people cut back on their driving. In the long run, if gas prices stay high, some of them will trade in their SUVs for more gas efficient cars. Also, higher prices encourage greater exploration for oil, as well as the development of alternative energy sources. To sum up, rather than impose price controls, we should let the market forces of supply and demand reduce the shortage of gasoline.

Key Terms and Concepts

demand 75	surplus 79	rent control laws 85
supply 76	shortage 79	usury laws 85
equilibrium price 78	price floor 83	rationing 90
equilibrium quantity 78	price ceiling 83	

Questions for Further Thought and Discussion

- If market price is above equilibrium price, explain what happens and why.
 - If market price is below equilibrium price, explain what happens and why.
- As the price of theater tickets rises, what happens to the quantity of tickets that people are willing to buy? Explain your answer.
 - As the price of theater tickets rises, explain what happens to the quantity of tickets that people are willing to sell. Explain your answer.
- Where is a price ceiling with respect to equilibrium price? What will be the relative size of quantity demanded and quantity supplied?
- How is equilibrium price affected by changes in (a) demand and (b) supply?
- What are the two ways to depict a demand schedule? Make up a demand schedule for some good or service you often buy.
- What is equilibrium? Why is it advantageous for the market price to be at equilibrium?
- If you were a landlord, why would you be against rent control? A shortage occurs when the market price is below the equilibrium price.
- Practical Application:* How would the abolition of rent control reduce the housing shortage in some cities? Explain in terms of supply and demand.
- Practical Application:* Urban highways are usually very congested during morning and evening commuting times. Using supply and demand analysis, what simple step could be taken to greatly reduce congestion?



Name _____

Date _____

Multiple-Choice Questions

Before you get started, you'll find it's much easier to answer many of these questions by first sketching a graph of a supply and demand curve. In fact, that graph will help you answer the first four questions.

Circle the letter that corresponds to the best answer.

1. When demand rises and supply stays the same, _____ (LO3)
 - a) equilibrium quantity rises
 - b) equilibrium quantity declines
 - c) equilibrium quantity stays the same
2. When supply rises and demand stays the same, _____ (LO3)
 - a) equilibrium quantity rises
 - b) equilibrium quantity falls
 - c) equilibrium quantity stays the same
3. At equilibrium price, quantity demanded is _____ (LO3)
 - a) greater than quantity supplied
 - b) equal to quantity supplied
 - c) smaller than quantity supplied
4. When quantity demanded is greater than quantity supplied, _____ (LO3)
 - a) market price will rise
 - b) market price will fall
 - c) market price will stay the same
5. What happens to quantity supplied when price is lowered? (LO3)
 - a) It rises.
 - b) It falls.
 - c) It stays the same.
 - d) It cannot be determined if it rises, falls, or stays the same.
6. What happens to quantity demanded when price is raised? (LO3)
 - a) It rises.
 - b) It falls.
 - c) It stays the same.
 - d) It cannot be determined if it rises, falls, or stays the same.
7. When market price is above equilibrium price, _____ (LO3)
 - a) market price will rise
 - b) equilibrium price will rise
 - c) market price will fall
 - d) equilibrium price will fall
8. At equilibrium, quantity demanded is _____ equal to quantity supplied. (LO3)
 - a) sometimes
 - b) always
 - c) never
9. Market price _____ equilibrium price. (LO3)
 - a) must always be equal to
 - b) must always be above
 - c) must always be below
 - d) may be equal to
10. A demand schedule is determined by the wishes and abilities of _____. (LO1)
 - a) sellers
 - b) buyers
 - c) buyers and sellers
 - d) neither sellers nor buyers
11. In Figure 1, if market price were \$110, there would be _____. (LO5, 6)
 - a) a shortage
 - b) a surplus
 - c) neither a shortage nor a surplus

12. In Figure 1, if market price were \$140, there would be _____. (LO5, 6)
- a shortage
 - a surplus
 - neither a shortage nor a surplus

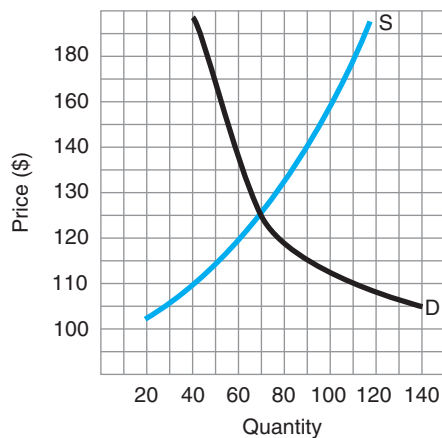


Figure 1

13. Market price may not reach equilibrium if there are _____. (LO5, 6)
- both price ceilings and price floors
 - neither price ceilings nor price floors
 - only price ceilings
 - only price floors
14. Gas lines in the 1970s were caused by _____. (LO5, 6)
- price floors
 - price ceilings
 - both price floors and price ceilings
 - neither price floors nor price ceilings

15. Statement 1: Price ceilings cause shortages. Statement 2: Interest rates are set by supply and demand, but wage rates are not. (LO5, 6)
- Statement 1 is true and statement 2 is false.
 - Statement 2 is true and statement 1 is false.
 - Both statements are true.
 - Both statements are false.
16. If the equilibrium price of corn is \$3 a bushel, and the government imposes a floor of \$4 a bushel, the price of corn will _____. (LO6)
- increase to \$4
 - remain at \$3
 - rise to about \$3.50
 - be impossible to determine
17. Usury laws tend to _____. (LO5)
- create a shortage of loanable funds
 - create a surplus of loanable funds
 - make it easier to obtain credit
 - have no effect on the amount of loanable funds available
18. If the price system is allowed to function without interference and a shortage occurs, quantity demanded will _____ and quantity supplied will _____ as the price rises to its equilibrium level. (LO5, 6)
- rise, rise
 - fall, fall
 - rise, fall
 - fall, rise
19. Which statement is true? (LO5, 6)
- A price floor is above equilibrium price and causes surpluses.
 - A price floor is above equilibrium price and causes shortages.
 - A price floor is below equilibrium price and causes surpluses.
 - A price floor is below equilibrium price and causes shortages.

20. An increase in supply while demand remains unchanged will lead to _____. (LO3)
- an increase in equilibrium price and a decrease in equilibrium quantity
 - a decrease in equilibrium price and a decrease in equilibrium quantity
 - an increase in equilibrium price and an increase in equilibrium quantity
 - a decrease in equilibrium price and an increase in equilibrium quantity
21. A decrease in demand while supply remains unchanged will lead to _____. (LO3)
- an increase in equilibrium price and equilibrium quantity
 - a decrease in equilibrium price and equilibrium quantity
 - an increase in equilibrium price and a decrease in equilibrium quantity
 - a decrease in equilibrium price and an increase in equilibrium quantity
22. As price rises, _____. (LO1, 2)
- quantity demanded and quantity supplied both rise
 - quantity demanded and quantity supplied both fall
 - quantity demanded rises and quantity supplied falls
 - quantity demanded falls and quantity supplied rises
23. When quantity demanded is greater than quantity supplied, there _____. (LO5, 6)
- is a shortage
 - is a surplus
 - may be either a shortage or a surplus
 - may be neither a shortage nor a surplus
24. When quantity supplied is greater than quantity demanded, _____. (LO3)
- price will fall to its equilibrium level
 - price will rise to its equilibrium level
 - price may rise, fall, or stay the same, depending on a variety of factors

Use Figure 2 to answer questions 25 and 26.

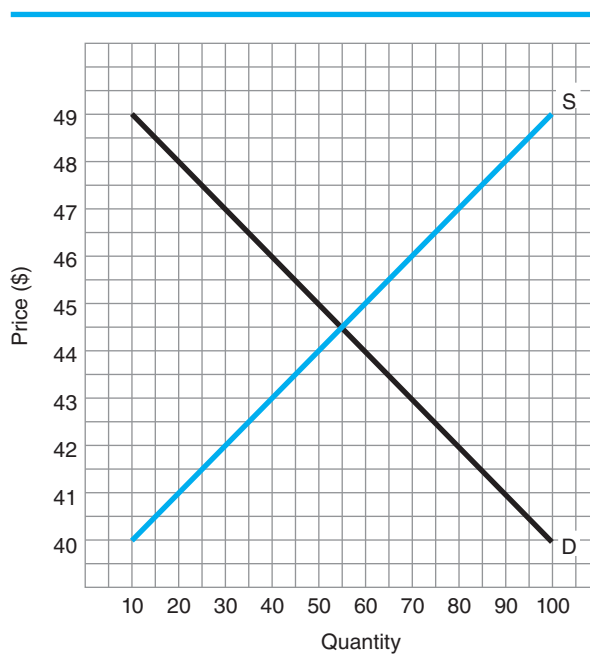


Figure 2

25. At a market price of \$47, there is _____. (LO5, 6)
- a shortage
 - a surplus
 - both a shortage and a surplus
 - neither a shortage nor a surplus
26. At a market price of \$42, there is _____. (LO5, 6)
- a shortage
 - a surplus
 - both a shortage and a surplus
 - neither a shortage nor a surplus
27. If the government set a price ceiling of 25 cents for a loaf of bread, the most likely consequence would be _____. (LO5, 6, 7)
- a surplus of bread
 - no one would go hungry
 - most Americans would put on weight
 - a shortage of bread

28. Usury laws and rent control are examples of _____ . (LO5, 6)
- price floors
 - price ceilings
 - rationing
 - the law of supply and demand
29. The best way to eliminate gas lines would be to _____ . (LO7)
- impose government price ceilings
 - impose government price floors
 - allow the forces of supply and demand to function
 - put price gougers in jail

Fill-In Questions

- If demand falls and supply stays the same, equilibrium price will _____ , and equilibrium quantity will _____ . (LO3)
- If supply rises and demand stays the same, equilibrium price will _____ , and equilibrium quantity will _____ . (LO3)
- If quantity supplied were greater than quantity demanded, market price would _____ . (LO3)
- Equilibrium price is always determined by _____ and _____ . (LO3)
- As price is lowered, quantity supplied _____ . (LO3)
- Shortages are associated with price _____ ; surpluses are associated with price _____ . (LO5, 6)
- If supply falls and demand remains the same, equilibrium price will _____ , and equilibrium quantity will _____ . (LO3)
- Price floors and price ceilings are set by _____ . (LO5, 6)
- Interest rates are set by _____ and _____ . (LO3, 7)

10. What happens to interest rates when the demand for money rises? _____ . (LO3, 7)
11. When the supply of money falls, interest rates _____ . (LO7)

Use Figure 3 to answer questions 12 through 15.

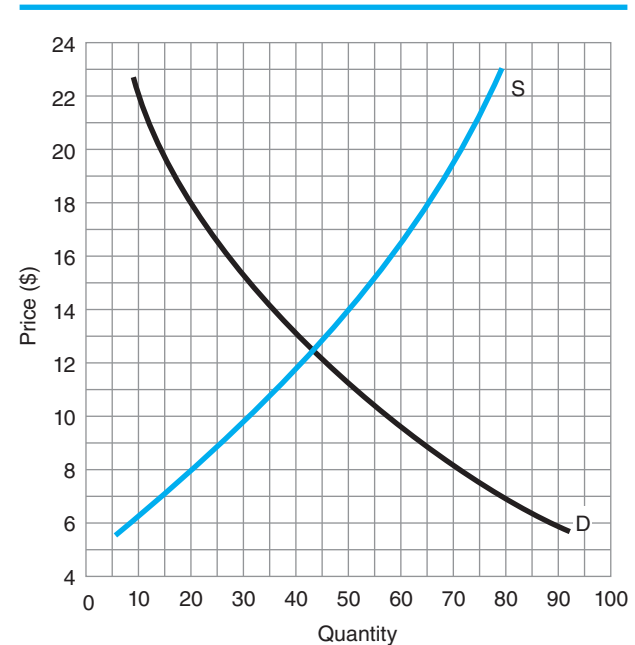


Figure 3

- Equilibrium price is about \$ _____ . (LO3)
- Equilibrium quantity is about _____ . (LO3)
- If price were \$20, there would be a (shortage or surplus) _____ of _____ units of quantity. (LO5, 6)
- If price were \$8, there would be a (shortage or surplus) _____ of _____ units of quantity. (LO5, 6)
- Price floors keep prices _____ equilibrium price; price ceilings keep prices _____ equilibrium price. (LO5, 6)

Problems

- In Figure 4, find equilibrium price and quantity (in dollars and units, respectively). (LO3)
- Draw in a new demand curve, D_1 , on Figure 4, showing an increase in demand. What happens to equilibrium price and quantity? (LO4)

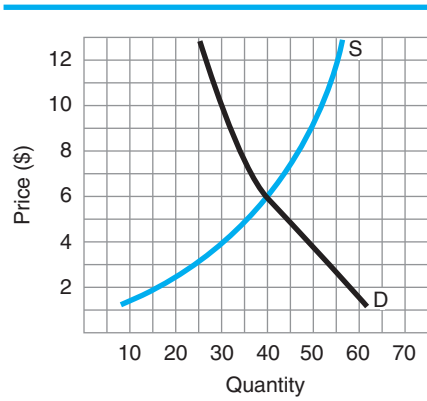


Figure 4

- In Figure 5, find equilibrium price and quantity (in dollars and units, respectively). (LO3)
- Draw in a new supply curve, S_1 , on Figure 5, showing a decrease in supply. What happens to equilibrium price and quantity? (LO4)

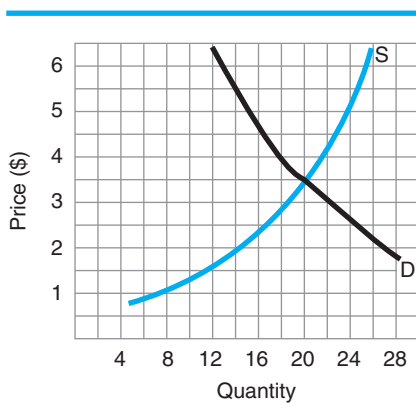


Figure 5

- In Figure 6, if the demand curve is D_1 , how much are equilibrium price and quantity?
 - If demand changes from D_1 to D_2 , does that represent an increase or decrease in demand?
 - How much are the new equilibrium price and quantity? (LO3, 4)

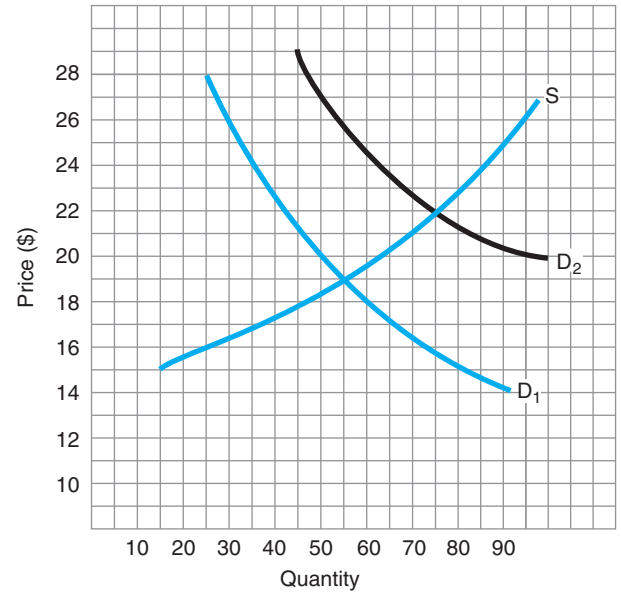


Figure 6

6. a) In Figure 7, if the supply curve is S_1 , how much are equilibrium price and quantity? b) If the supply changes from S_1 to S_2 , does that represent an increase or decrease in supply? c) How much are the new equilibrium price and quantity? (LO3, 4)

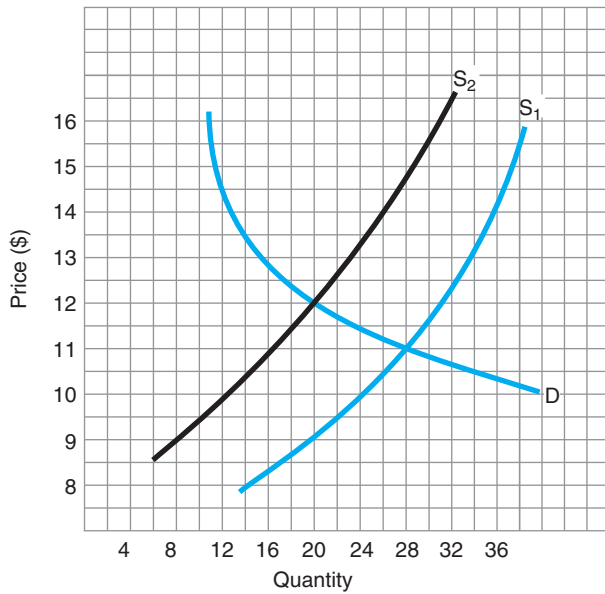


Figure 7

7. Given the information in Figure 8: a) Is \$12 a price ceiling or a price floor? b) Is there a shortage or a surplus? c) How much is it (in units of quantity)? (LO5, 6)

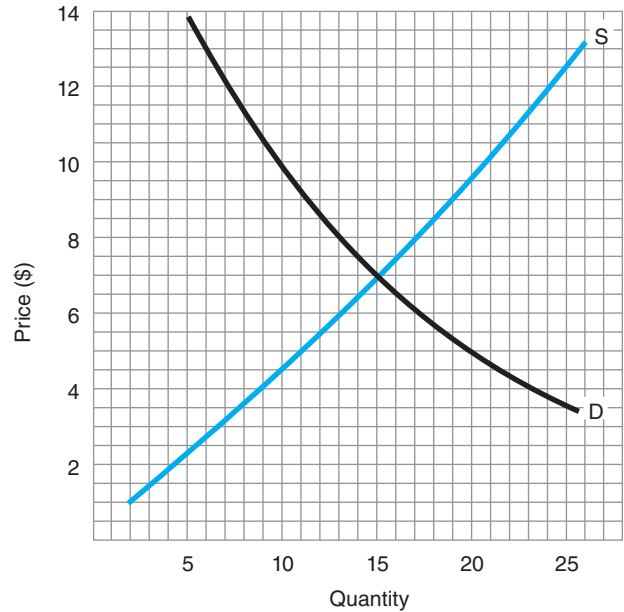


Figure 8

8. Given the information in Figure 9: a) Is \$16 a price ceiling or a price floor? b) Is there a shortage or a surplus? c) How much is it (in units of quantity)? (LO5, 6)

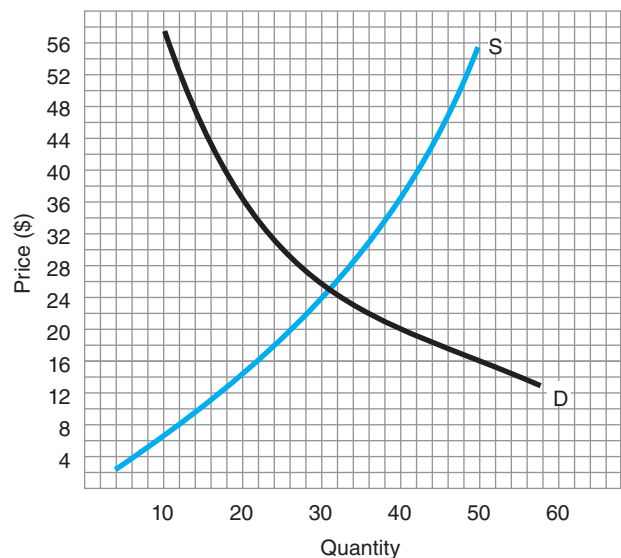


Figure 9