

## Using Supply and Demand

# 5

**After reading this chapter, you should be able to:**

- Show the effect of a shift in demand and supply on equilibrium price and quantity.
- Explain real-world events using supply and demand.
- Demonstrate the effect of a price ceiling and a price floor on a market.
- Explain the effect of taxes, tariffs, and quotas on equilibrium price and quantity.
- State the limitations of demand and supply analysis.
- State six roles of government.

*It is by invisible hands that we are bent  
and tortured worst.*

Nietzsche

**I**n the last chapter we introduced you to the concepts of supply and demand. In this chapter we will (1) show you the power of supply and demand, (2) show you how the invisible hand interacts with social and political forces to change the outcome of supply and demand analysis; and (3) discuss how one must adjust supply and demand analysis with other issues kept at the back of one's mind.

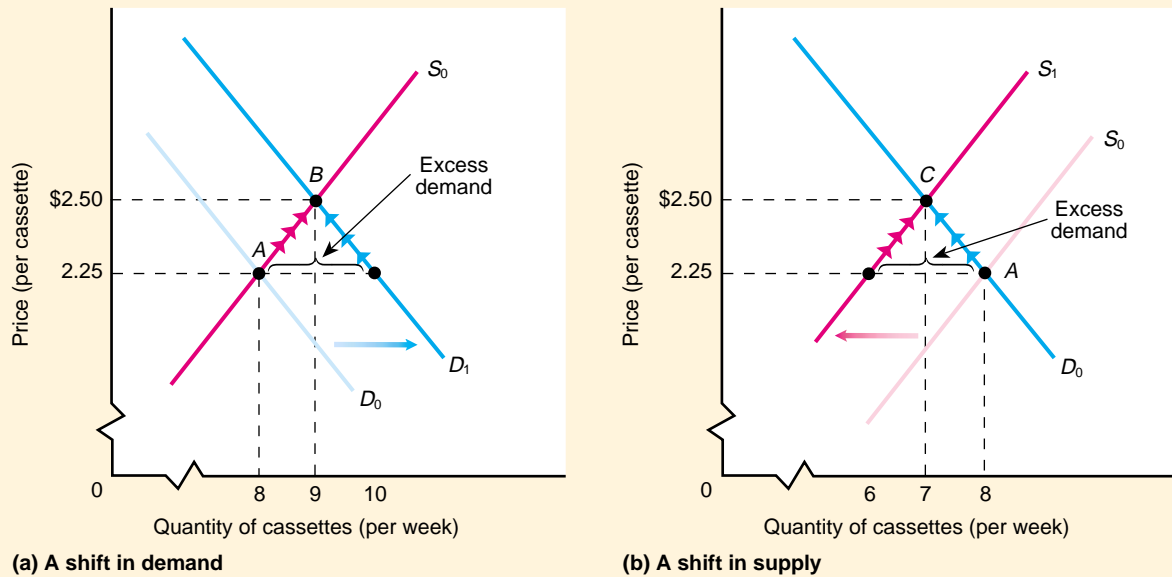
### **THE POWER OF SUPPLY AND DEMAND**

To ensure that you understand the supply and demand graphs throughout the book, and can apply them, let's go through an example. Figure 5-1(a) deals with an increase in demand. Figure 5-1(b) deals with a decrease in supply.

**Figure 5-1 (a and b) SHIFTS IN SUPPLY AND DEMAND**

When there is an increase in demand (the demand curve shifts outward), there is upward pressure on the price, as shown in (a). If demand increases from  $D_0$  to  $D_1$ , the quantity of cassette rentals that was demanded at a price of \$2.25, 8, increases to 10, but the quantity supplied remains at 8. This excess demand tends to cause prices to rise. Eventually, a new equilibrium is reached at the price of \$2.50, where the quantity supplied and the quantity demanded is 9 (point B).

If supply of cassette rentals decreases, then the entire supply curve shifts inward to the left, as shown in (b), from  $S_0$  to  $S_1$ . At the price of \$2.25, the quantity supplied has now decreased to 6 cassettes, but the quantity demanded has remained at 8 cassettes. The excess demand tends to force the price upward. Eventually, an equilibrium is reached at the price of \$2.50 and quantity 7 (point C).



Let's consider again the supply and demand for videocassette rentals from Chapter 4. In Figure 5-1(a), the supply is  $S_0$  and initial demand is  $D_0$ . They meet at an equilibrium price of \$2.25 per cassette and an equilibrium quantity of 8 cassettes per week (point A). Now say that the demand for cassette rentals increases from  $D_0$  to  $D_1$ . At a price of \$2.25, the quantity of cassette rentals supplied will be 8 and the quantity demanded will be 10; excess demand of 2 exists.

The excess demand pushes prices upward in the direction of the small arrows, decreasing the quantity demanded and increasing the quantity supplied. As it does so, movement takes place along both the supply curve and the demand curve.

The upward push on price decreases the gap between the quantity supplied and the quantity demanded. As the gap decreases, the upward pressure decreases, but as long as that gap exists at all, price will be pushed upward until the new equilibrium price (\$2.50) and new quantity (9) are reached (point B). At point B, quantity supplied equals quantity demanded. So the market is in equilibrium. Notice that the adjustment is twofold: The higher price brings about equilibrium by both increasing the quantity supplied (from 8 to 9) and decreasing the quantity demanded (from 10 to 9).

Figure 5-1(b) begins with the same situation that we started with in Figure 5-1(a); the initial equilibrium quantity and price are 8 cassettes per week and \$2.25 per cassette (point A). In this example, however, instead of demand increasing, let's assume supply decreases—say because some suppliers change what they like to do, and decide they will

**Q.1** Demonstrate graphically the effect of a heavy frost in Nova Scotia on the equilibrium quantity and price of apples.

**Q.2** Say a hormone has been discovered that increases cows' milk production by 20 percent. Demonstrate graphically what effect this discovery would have on the price and quantity of milk sold in a market.

**Q.3** Demonstrate graphically the likely effect of an increase in the price of gas on the equilibrium quantity and price of compact cars.

no longer supply cassettes. That means that the entire supply curve shifts inward to the left (from  $S_0$  to  $S_1$ ). At the initial equilibrium price of \$2.25, the quantity demanded is greater than the quantity supplied. Two more cassettes are demanded than are supplied. (Excess demand = 2.)

This excess demand exerts upward pressure on price. Price is pushed in the direction of the small arrows. As the price rises, the upward pressure on price is reduced but will still exist until the new equilibrium price, \$2.50, and new quantity, 7, are reached. At \$2.50, the quantity supplied equals the quantity demanded. The adjustment has involved a movement along the demand curve and the new supply curve. As price rises, quantity supplied is adjusted upward and quantity demanded is adjusted downward until quantity supplied equals quantity demanded where the new supply curve intersects the demand curve at point C, an equilibrium of 7 and \$2.50.

Here is an exercise for you to try. Demonstrate graphically how the price of computers could have fallen dramatically in the past 10 years, even as demand increased. (Hint: Supply has shifted even more, so even at lower prices, far more computers have been supplied than were being supplied 10 years ago.)

### Six Real-World Examples

Now that we've been through a generic example of shifts in supply and demand, let's consider some real-world examples. Below are six events. After reading each, try your hand at explaining what happened, using supply and demand curves. To help you in the process, Figure 5-2 provides some diagrams. *Before* reading our explanation, try to match the shifts to the examples. In each, be careful to explain which curve, or curves, shifted and how those shifts affected equilibrium price and quantity.

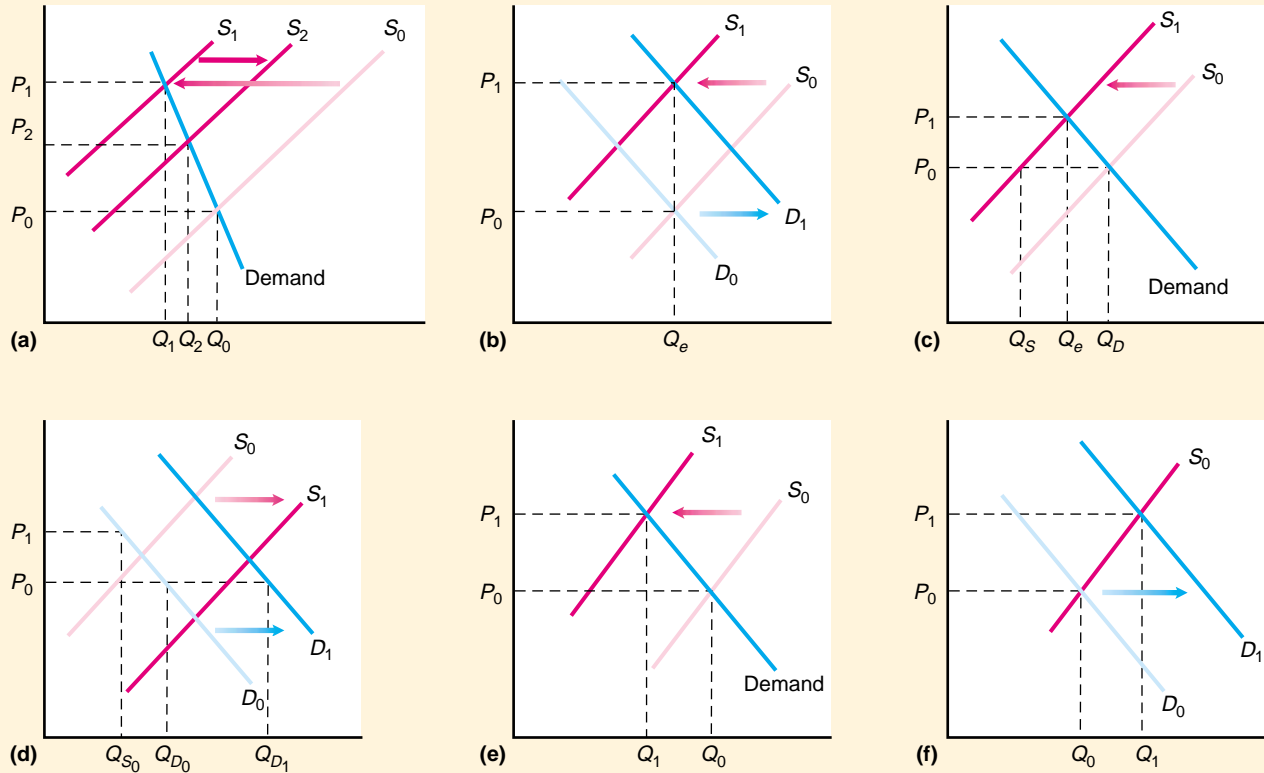
1. Brazil is the world's largest sugar producer. Inclement weather reduced production in 2000 by 15%. Market: Sugar.
2. In the mid-1990s baby boomers started to put away more and more savings for retirement. This saving was directed toward the purchase of financial assets, driving up the price of stocks. Market: Financial assets.
3. The majority of golfers in Korea prefer to use the newest American-made golf clubs. The Korean government, in an effort to protect domestic golf club producers, imposed a 20 percent luxury tax on imported American clubs. Market: American-made golf clubs in Korea.
4. Rice is crucial to Indonesia's nutritional needs and its rituals. In 1997, drought, pestilence, and a financial crash led to disruptions in the availability of rice. Its price rose so high that in 1998 more than a quarter of all Indonesians could not buy enough market-priced rice to meet their daily needs. Government programs to deliver subsidized rice were insufficient to bring the price of rice back to affordable levels. Market: Rice in Indonesia.
5. In late summer 1998, U.S. farmers were hard pressed to find enough seasonal farmhands. Why? El Niño's weather patterns compressed the harvest season. Grape, apple, and peach growers, who usually harvested at different times, were competing for the same workers. In addition, stronger efforts by authorities had reduced the flow of illegal workers to the United States. Market: Farm labourers.
6. Every Christmas a new toy becomes the craze. In 1997 it was Tickle Me Elmo and in 1998 it was Furby. Before Christmas Day, these toys were hard to find and sold for as much as 10 times their retail price on what is called the black market. Here we use the Furby as the example. Toymaker Tiger, along with retailers, worked up initial interest in Furby in late November, advertising the



If this orange orchard was damaged, supply would be reduced, thereby putting upward pressure on orange prices.

**Figure 5-2 (a-f)**

In this exhibit, six shifts of supply and demand are shown. Your task is to match them with the events listed in the chapter.



Answers: 1:c; 2:f; 3:e; 4:a; 5:b; 6:d.

limited supply. As early as 2:00 A.M., lines formed at the stores carrying Furbies. Some shoppers (including “toy scouts”) were able to buy Furbies then resell them the same afternoon for as much as \$300 apiece. Even with the shortage, retailers kept the price at its preset advertised price and producers continued to limit distribution. Newspapers carried stories about the lines and black market prices, intensifying demand for Furbies, which became even harder to come by. Days before Christmas, the supplier increased shipments of Furbies to meet the increased demand. Customers felt “lucky” when they were able to find Furbies with so few days left before Christmas, and for only \$30 instead of \$300 on the black market. Market: Furbies in 1998.

**Sugar Shock** The weather is invariably uncooperative. Nearly every year, some market is hit with a crop-damaging freeze, too little precipitation, or even too much rain. This is a shift factor of supply because it raises the cost of supplying sugar. The bad weather in 2000 shifted the supply curve for Brazilian sugar in, as shown in Figure 5-2(c). At the original price, quantity demanded exceeded quantity supplied and the invisible hand of the market pressured the price to rise until quantity demanded equalled quantity supplied.

**Financial Assets and the Baby Boomers** The postwar population swell we call the baby boom resulted in increased demand for all sorts of products as the boomers graduated, then bought houses, and now are demanding more health care and financial assets. In this case, demographic changes have led to a shift out in the demand curve for financial assets, resulting in a rise in stock market prices and an increase in the quantity of stocks and mutual funds supplied. This is depicted in Figure 5-2(f). This figure could also be used to describe the huge rise in housing prices in the 1980s as baby boomers began to purchase houses.

**Excise Taxes** In Chapter 4's discussion of shift factors, we explained that taxes levied on the supplier will reduce supply. The 20 percent luxury tax will shift the supply curve in. That some golfers use their old clubs and others look elsewhere to buy clubs is substitution at work, and a movement up along the demand curve. Figure 5-2(e) shows this scenario. After the tax, price rises to  $P_1$  and quantity of clubs sold declines to  $Q_1$ .

**Rice in Indonesia** Drought, pestilence, and the financial crash all increased the cost of supplying rice in Indonesia, shifting the supply of rice in from  $S_0$  to  $S_1$  in Figure 5-2(a). Since rice is so important to the well-being of Indonesians, quantity demanded doesn't change much with changes in price. This is shown by the steep demand curve. The price rose to levels unaffordable to many people. In response, the government purchased imported rice and distributed it to the market. This shifted the supply curve out from  $S_1$  to  $S_2$ . Since the price was still above its previous level, we know that this second shift in supply is smaller than the first.

**Farm Labourers** In this case both supply and demand shift, but this time in opposite directions. The previous year's demand is represented in Figure 5-2(b) by  $D_0$  and supply is shown by  $S_0$ .  $Q_e$  labourers were hired at a wage of  $P_0$ . The compressed harvesting season meant that more farmers were looking for labourers, shifting the demand for farm workers out from  $D_0$  to  $D_1$ . This put upward pressure on wages and increased quantity of labour supplied. Simultaneously, however, the supply of farm workers shifted in from  $S_0$  to  $S_1$  as the authorities increased border patrols. This put further upward pressure on wages and reduced the quantity of labour demanded. Wages are clearly bid up, in this case to  $P_1$ . The effect on the number of labourers hired, however, depends on the relative size of the demand and supply shifts. As we have drawn it, the quantity of labourers hired returns to the quantity of the previous year,  $Q_e$ . If the supply shift were greater than the shift in demand, the number of labourers would have declined. If it were smaller, the number of labourers would have risen.

**Christmas Toys** In this example, both supply and demand shift in the same direction. The initial market is shown by  $D_0$  and  $S_0$  in Figure 5-2(d). The price of \$30 (shown by  $P_0$ ) was below the equilibrium price and a shortage of  $Q_{D_0} - Q_{S_0}$  existed. The black market price of \$300 (shown by  $P_1$ ) is shown by the amount that consumers are willing to pay for the quantity supplied,  $Q_{S_0}$ . As the craze for the toy intensified following the free newspaper publicity of the lines and black market prices, demand shifted out to  $D_1$ . Price was kept at \$30 and the shortage became even greater,  $Q_{D_1} - Q_{S_0}$ . When Tiger made more Furbies available, supply shifted to  $S_1$ , eliminating most, but not all, of the shortage. At least one Walmart employee was injured in the mad rush to obtain a Furby.

Sorting out the effects of the shifts of supply or demand or both can be confusing. Here are some helpful hints to keep things straight:

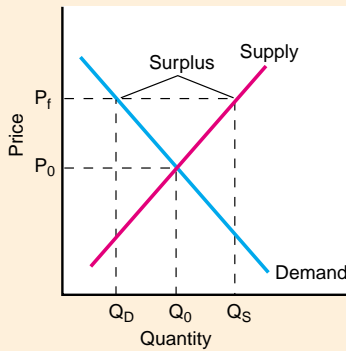
- Draw the initial demand and supply curves and label them. The equilibrium price and quantity is where these curves intersect. Label them.
- If only price has changed, no curves will shift and a shortage or surplus will result.

KNOWING THE TOOLS

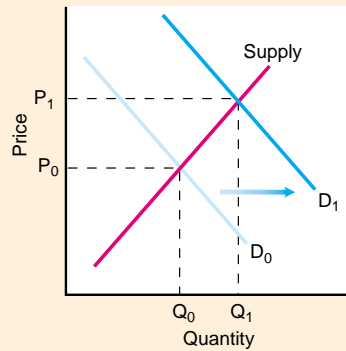
Supply and Demand in Action

- If a nonprice factor affects demand, determine the direction demand has shifted and add the new demand curve. Do the same for supply.
- Equilibrium price and quantity is where the new demand and supply curves intersect. Label them.
- Compare the initial equilibrium price and quantity to the new equilibrium price and quantity.

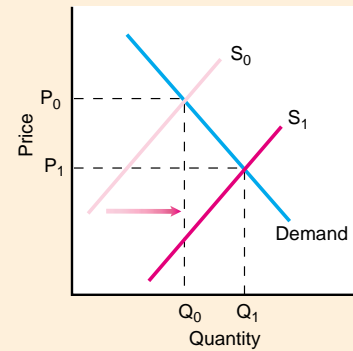
See if you can describe what happened in the three graphs below.



A change in price



A shift in demand



A shift in supply

A Review

As you can see, supply and demand analysis can get quite complicated. That is why you must separate shifts in demand and supply from movements along the supply and demand curves. Remember: Anything that affects demand and supply other than price of the good under consideration will shift the curves. Changes in the price of the good under consideration result in movements along the curves. Another thing to recognize is that when both curves are shifting you can get a change in price but little change in quantity, or a change in quantity but little change in price.

To test your understanding, we'll now give you six generic results from the interaction of supply and demand. Your job is to decide what shifts produced those results. This exercise is a variation of the first. It goes over the same issues, but this time without the graphs. On the left-hand side of the table below, we list combinations of movements of observed prices and quantities, labeling them 1–6. On the right we give six shifts in supply and demand, labeling them a–f.

Price and Quantity Changes

1.	P↑	Q↑
2.	P↑	Q↓
3.	P↑	Q?
4.	P↓	Q?
5.	P?	Q↑
6.	P↓	Q↓

Shifts in Supply and Demand

- a. Supply shifts in. No change in demand.
- b. Demand shifts out. Supply shifts in.
- c. Demand shifts in. No change in supply.
- d. Demand shifts out. Supply shifts out.
- e. Demand shifts out. No change in supply.
- f. Demand shifts in. Supply shifts out.

Anything other than price that affects demand or supply will shift the curves.

If you don't confuse your "shifts of" with your "movements along," supply and demand provide good off-the-cuff answers for many economic questions.

You are to match the shifts with the price and quantity movements that best fit each described shift, using each shift and movement only once. Our recommendation to you



If both demand and supply shift in, what happens to price and quantity?

is to draw the graphs that are described in *a–f*, decide what happens to price and quantity, and then find the match in 1–6.

Now that you've worked them, let us give you the answers we came up with. They are: 1:*e*; 2:*a*; 3:*b*; 4:*f*; 5:*d*; 6:*c*. How did we come up with the answers? We did what we suggested you do—took each of the scenarios on the right and predicted what happens to price and quantity. For case *a*, supply shifts in and there is a movement up along the demand curve. Since the demand curve is downward sloping, the price rises and quantity declines. This matches number 2 on the left. For case *b*, demand shifts out. Along the original supply curve, price and quantity would rise. But supply shifts in, leading to even higher prices, but lower quantity. What happens to quantity is unclear, so the match must be number 3. For case *c*, demand shifts in. There is movement down along the supply curve with lower price and lower quantity. This matches number 6. For case *d*, demand shifts out and supply shifts out. As demand shifts out, we move along the supply curve to the right and price and quantity rise. But supply shifts out too, and we move out along the new demand curve. Price declines, erasing some or all of the previous rise, and the quantity rises even more. This matches number 5.

We'll leave it up to you to confirm our answers to *e* and *f*. Notice that when supply and demand both shift, the change in either price or quantity is uncertain—it depends on the direction and the relative size of the shifts. As a summary, we present a diagrammatic of the combinations in Table 5-1.

**TABLE 5-1** Diagram of Effects of Shifts of Demand and Supply on Price and Quantity

This table provides a summary of the effects of shifts in supply and demand on price and quantity. Notice that when both curves shift, the effect on either price or quantity depends on the relative size of the shifts.

	No change in supply.	Supply shifts out.	Supply shifts in.
No change in demand.	No change.	$P \downarrow$ $Q \uparrow$ Price declines and quantity rises.	$P \uparrow$ $Q \downarrow$ Price rises. Quantity declines.
Demand shifts out.	$P \uparrow$ $Q \uparrow$ Price rises. Quantity rises.	$P ?$ $Q \uparrow$ Quantity rises. Price could be higher or lower depending upon relative size of shifts.	$P \uparrow$ $Q ?$ Price rises. Quantity could rise or fall depending upon relative size of shifts.
Demand shifts in.	$P \downarrow$ $Q \downarrow$ Price declines. Quantity declines.	$P \downarrow$ $Q ?$ Price declines. Quantity could rise or fall depending upon relative size of shifts.	$P ?$ $Q \downarrow$ Quantity declines. Price rises or falls depending upon relative size of shifts.

## GOVERNMENT INTERVENTIONS: PRICE CEILINGS AND PRICE FLOORS

People don't always like the market-determined price. When prices fall, sellers look to government for ways to hold prices up; when prices rise, buyers look to government for ways to hold prices down. Let's now consider the effect of such actions. Let's start with an example of the price being held down.

### Price Ceilings

When government wants to hold prices down, it imposes a **price ceiling**—a government-imposed limit on how high a price can be charged. Rent control is an example of a price ceiling. (For the price ceiling to be effective, it must be below the equilibrium price, and throughout this discussion we shall assume that it is.)

Specifically, let's consider rent control in Paris in 1948. **Rent control** is a price ceiling on rents set by government. During the First World War, to stabilize housing prices and help out those fighting for France, rents were frozen. Upon the return of veterans, the freeze was held in the interest of society. In 1926, rent control was reviewed but by that time, lifting the controls would have resulted in huge increases in rents. Rents were allowed to rise only slightly. Again, during the Second World War, rents were frozen. Right after the end of the Second World War rent was capped at \$2.50 a month. Without rent control, rent would have been \$17 a month.

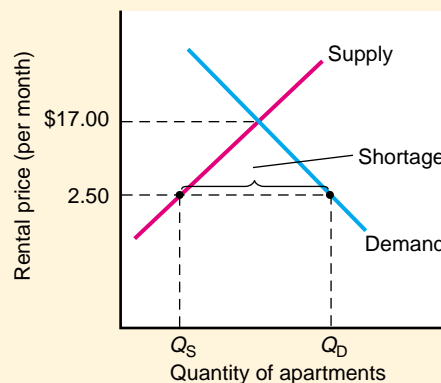
This was a good situation for those occupying apartments, but it had drawbacks. For instance, there was an enormous shortage of apartments. The situation is shown in Figure 5-3.

What were the results of the rent control besides the shortage of apartments? More than 80 percent of Parisians had no private bathrooms and 20 percent had no running water. Since rental properties weren't profitable, no new buildings were being constructed and existing buildings weren't kept in repair. From 1914 (before the First World War) to 1948, the housing stock increased by only 10 percent. Many couldn't find housing in Paris. Couples lived with their in-laws. Existing apartments had to be rationed in some way. To get into a rent-controlled apartment, individuals paid bribes of up to



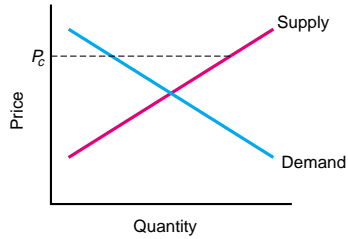
**Figure 5-3 RENT CONTROL IN PARIS**

A price ceiling imposed on housing rent in Paris during the First World War created a shortage of housing when the war ended and veterans returned home. The shortage would have been eliminated if rents had been allowed to rise to \$17 per month.





**Q.5** What is the effect of the price ceiling,  $P_c$ , shown in the graph below on price and quantity?



With price ceilings, existing goods are no longer rationed entirely by price. Other methods of rationing existing goods arise called nonprice rationing.

\$1,500 per room or watched the obituaries and then simply moved in their furniture before anyone else did. Eventually the situation got so bad that rent controls were lifted.

The system of rent controls is not only of historical interest. Below we list some phenomena that existed recently.

1. A couple pays \$350 a month for a two-bedroom downtown apartment with a solarium and two terraces, while another individual pays \$1,200 a month for a studio apartment shared with two roommates.
2. The vacancy rate for apartments in Montreal was 1.5 percent in 2000. Anything under 5 percent is considered a housing emergency.
3. Would-be tenants make payments, called key money, to current tenants or landlords to get apartments.

Your assignment is to explain how these phenomena might have come about, and to demonstrate, with supply and demand, the situation that likely caused them.

Now that you have done your assignment (you have, haven't you?), let us give you our answers so that you can check them with your answers.

The situation is identical with that presented above in Figure 5-3. Take the first item. The couple lives in a rent-controlled apartment while the individual with roommates does not. If rent control were eliminated, rent on the downtown apartment would rise and rent on the studio would most likely decline. Item 2: The housing emergency is a result of rent control. Below-market rent results in excess demand and little vacancy. Item 3: New residents must search for a long time to find apartments to rent, and many discover that illegal payments to landlords are the only way to obtain a rent-controlled apartment. Key money is a side payment for a rent-controlled apartment. Because of the limited supply of apartments, individuals are willing to pay far more than the controlled price. Landlords can use other methods of rationing the limited supply of apartments—instituting first-come, first-served policies, and, in practice, selecting tenants based on gender, race, or other personal characteristics, even though such discriminatory selection is illegal.

Before we move away from our discussion of rent controls, there's a dynamic issue we need to explicitly consider. In the long run an increase in rents should increase the quantity of apartments supplied as building owners convert commercial properties to residential use and erect new buildings, but since it takes time to construct a new apartment building or convert existing structures to apartment use, in the short run the supply of apartments is relatively fixed. This suggests we should use two supply curves to examine how rent controls differ in their impacts in the short-run and the long-run. You can see this in Figure 5-4. The short run supply curve is vertical to illustrate that the supply of apartments is fixed at a point in time, while the long run supply curve slopes upward to show that higher rents will increase the quantity of units supplied in the long run.

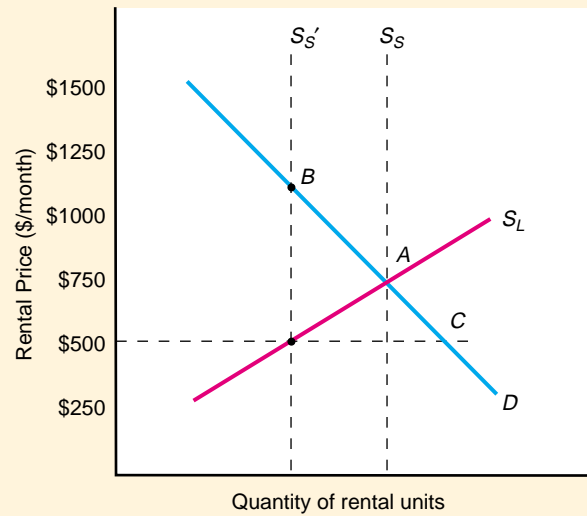
Suppose the market is in equilibrium at point A at a price of \$750 per month for a one bedroom apartment. The introduction of rent controls at the initial price creates excess demand in the short run since the quantity demanded at the controlled price of \$500 per month is higher than the fixed quantity supplied. Over time, landlords will have little incentive to maintain existing properties and may decide to convert their apartment buildings to commercial use structures that are not subject to rent controls. Over the long term, the supply of apartments will fall to  $S'_5$  in Figure 5-4, leading to a permanent excess demand for housing.

What does our model suggest will happen if rent controls are relaxed? In the short-term, rents will rise to what people are willing to pay, given the existing stock of apartments: point B in Figure 5-4. Over time, as landlords adjust to the new higher rents by building new units, the shortages will be eliminated. This is what is happening today in

**Figure 5-4 RENT CONTROLS OVER TIME**

In the short run the supply of rental units is relatively fixed and given by  $S_S$ . The long-run supply curve demonstrates that landowners will increase the quantity of apartments supplied if rents rise, over time. The initial equilibrium is at A.

Rent controls will set the price below the equilibrium, leading to excess demand in the short run. The shortages will grow over time as landlords decide to convert existing apartments to commercial use or refuse to maintain their current units. The short-run supply curve will shift left to  $S_S'$ . If rent controls are removed, in the short run rents will rise to what the market will bear at point B. Landlords respond by increasing supply over time, shifting the short-run supply curve back to its initial position.

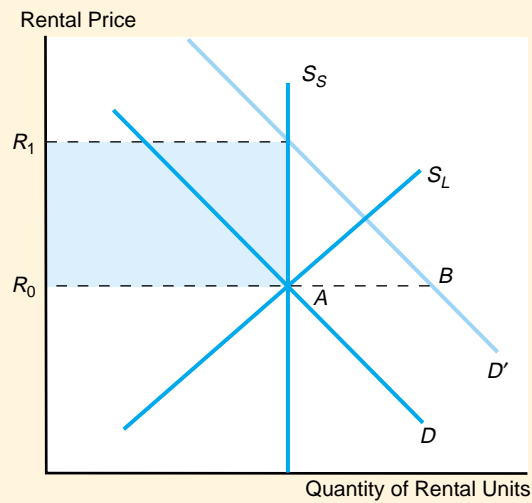


Ontario. Rent controls were introduced there in 1975. In 1998 the Ontario government passed the *Ontario Tenants Act*, which, among other things, relaxed rent controls. In the first three months rents rose by over 7 percent; in 1999 they rose by over 5 percent; and they just keep rising. The *Act* provides a guideline for rent increases for 2001 of 2.9 percent and in 2002 of 3.9 percent. Actual increases depend on how long you've been in your apartment. For new tenants, landlords can charge "what the market will bear." If you rent an apartment in Ontario, has your rent risen by the amount suggested by the guideline this year? Check out the Ontario Rental Housing Tribunal Web site for more on some Ontario evidence (<http://www.orht.gov.on.ca/home.html>).

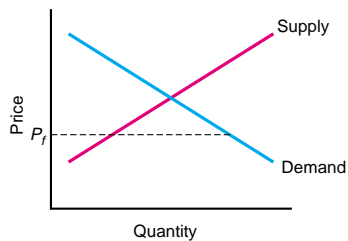
If rent controls create a wedge between quantity demanded and quantity supplied, why would a government ever introduce them? Well, consider Toronto's bid for the 2008 Olympics. The demand for housing was expected to swell in anticipation of the games, and remain high until shortly after the closing ceremony. Figure 5-5 demonstrates that there would be a temporary increase in the demand for rental units with demand shifting to  $D'$ . Given the existing supply of rental units and the fact that landlords weren't expected to construct a large number of new buildings (since after the games, demand for rental units was expected to fall back to its initial level), rents would rise from  $R_0$  to  $R_1$ , and then fall back to  $R_0$  after the games. Landlords would earn a temporary windfall of the shaded area. The authorities might have viewed this as an undesirable distribution of income and a negative consequence of holding the games in Toronto. People already living in Toronto would face the higher rents, as would those temporarily trying to find accommodations in the area. To stop this from happening, the authorities could put in place a system of rent controls. If the price ceiling were set at the initial price, landlords wouldn't gain, existing renters wouldn't lose, and the controls would create a temporary shortage of housing. Those wishing to rent units in the area might have to commute from other areas (like Buffalo) or seek alternative accommodations (such as living at campsites in their RV).

### Figure 5-5 WHEN RENT CONTROLS WORK

A temporary increase in demand transfers the shaded area from tenants to landlords. The government can stop this by placing rent controls at the initial price  $R_0$ , creating a temporary shortage of  $AB$ .



**Q.6** What is the effect of the price floor,  $P_f$ , shown in the graph below on price and quantity?



The minimum wage helps some people and hurts others.

### Price Floors

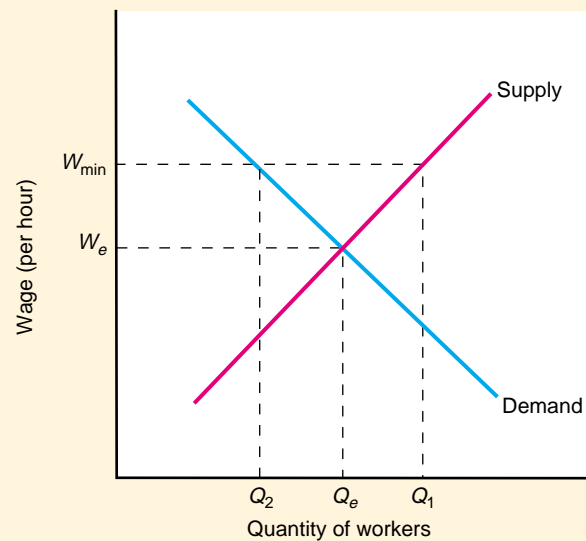
Sometimes political forces favour suppliers, sometimes consumers. So let us now go briefly through a case when the government is trying to favour suppliers by attempting to prevent the price from falling below a certain level. **Price floors**—government-imposed limits on how low a price can be charged—do just this. An example of a price floor is the minimum wage. Both individual provinces and the federal government impose **minimum wage laws**—laws specifying the lowest wage a firm can legally pay an employee. These price floors were initially set to provide a level of income that would allow a worker to cover their basic necessities. British Columbia was the first province to enact minimum wage legislation (in 1925), with the federal minimum wage set at the provincial level. In late 2001 these wages ranged from \$5.50 per hour in Newfoundland to \$8.00 per hour in British Columbia. (In 1965 the B.C. minimum wage was \$1 per hour; with inflation, that's a much smaller increase than it looks). At an average of 2000 hours worked a year, many believe these wages are too low to provide for the basic necessities of life. The minimum wage affects thousands of workers who are mostly unskilled. The market-determined equilibrium wage for skilled workers is generally above the minimum wage.

The effect of a minimum wage on the unskilled labour market is shown in Figure 5-6. The government-set minimum wage is above equilibrium, as shown by  $W_{\min}$ . At the market-determined equilibrium wage  $W_e$ , the quantity of labour supplied and demanded equals  $Q_e$ . At the higher minimum wage, the quantity of labour supplied rises to  $Q_1$  and the quantity of labour demanded declines to  $Q_2$ . There is an excess supply of workers (a shortage of jobs) represented by the difference  $Q_2 - Q_1$ . This represents people who are looking for work but cannot find it.

Who wins and who loses from a minimum wage? The minimum wage improves the wages of the  $Q_2$  workers who are able to find work. Without the minimum wage, they would have earned  $W_e$  per hour. The minimum wage hurts those, however, who cannot find work at the minimum wage but who are willing to work, and would have been hired, at the market-determined wage. These workers are represented by the distance

**Figure 5-6 A MINIMUM WAGE**

A minimum wage,  $W_{\min}$ , set above equilibrium wage,  $W_e$ , helps those who are able to find work, shown by  $Q_2$ , but hurts those who would have been employed at the equilibrium wage but can no longer find employment, shown by  $Q_e - Q_2$ . A minimum wage also hurts producers who have higher costs of production and consumers who may face higher product prices.



$Q_e - Q_2$  in Figure 5-6. The minimum wage also hurts firms who now must pay their workers more, increasing the cost of production. The minimum wage also hurts consumers to the extent that firms are able to pass that increase in production cost on in the form of higher product prices.

Late in 2001 the government of British Columbia introduced new legislation to create two different minimum wages in the province. It raised the general minimum wage to \$8.00 an hour and introduced a “first-job rate” of \$6.00 an hour for the first 500 hours. After the first 500 hours, workers would then be entitled to the general minimum wage of \$8.00 an hour. This was an attempt to encourage employers to hire and train new workers, recognizing that it may take several months to fully train a new employee. Those people already earning the minimum wage would continue to earn \$8.00 an hour; only new hires would face the \$6.00 wage floor.

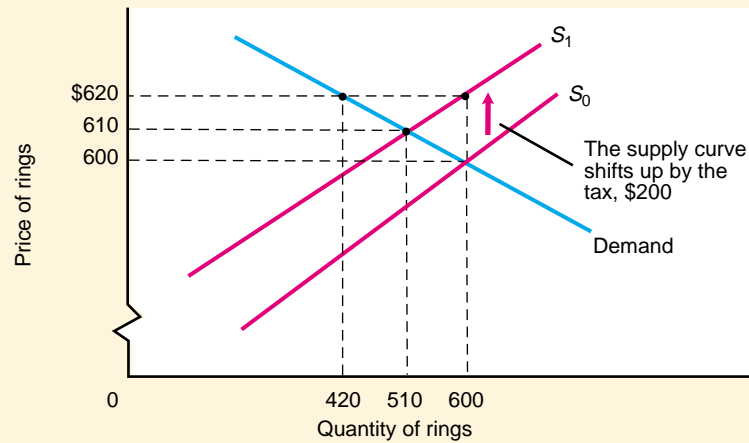
Some commentators suggested that the introduction of a \$6.00 first-job rate would stimulate employment, particularly of youth, while others argued that after 500 hours, many young workers will receive their layoff notice, only to be replaced by new entrants into the labour force. Other provinces are watching closely to see whether they should follow suit.

All economists agree that the above analysis is logical and correct. But they disagree about whether governments should have minimum wage laws. One reason is that the empirical effects of minimum wage laws are difficult to determine, since “other things” are never remaining constant. A second reason is that some real-world labour markets are not sufficiently competitive to fit the supply/demand model. The third reason is that the minimum wage affects the economy in ways that some economists see as desirable and others see as undesirable. We point this out to remind you that the supply/demand framework is a tool to be used to analyze issues. It does not provide final answers about policy. That’s where the art of economics—blending positive economic analysis with normative issues—comes into play. (In microeconomics, economists explore the policy issues of interventions in markets much more carefully.)



### Figure 5-7 THE EFFECT OF AN EXCISE TAX

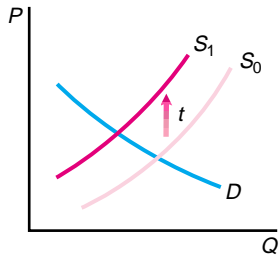
An excise tax on suppliers shifts the entire supply curve up by the amount of the tax. Since at a price equal to the original price plus the tax there is excess supply, the price of the good rises by less than the tax.



## GOVERNMENT INTERVENTIONS: TAXES, TARIFFS, AND QUOTAS

Let's now consider an example of the government entering into a market and modifying the results of supply/demand analysis in the form of a tax. An **excise tax** is a tax that is levied on a specific good. The luxury tax on expensive cars that the United States imposed in 1991 is an example. A **tariff** is an excise tax on an imported good. What effect will excise taxes and tariffs have on the price and quantity in a market?

A tax on suppliers shifts the supply curve up by the amount of the tax.



Q.7

Your study partner, Umar, has just stated that a tax on demanders of \$2 per unit will raise the equilibrium price from \$4 to \$6. How do you respond?

### Excise Taxes and Tariffs

To lend some sense of reality, let's take the example of the only luxury tax in Canada still in existence—that on jewellery manufactured in Canada. This tax was paid by the supplier. Say the price of a ring before the luxury tax was \$600, and 600 rings were sold at that price. Now the government places a tax of \$20 on such rings. What will the new price of the ring be, and how many will be sold?

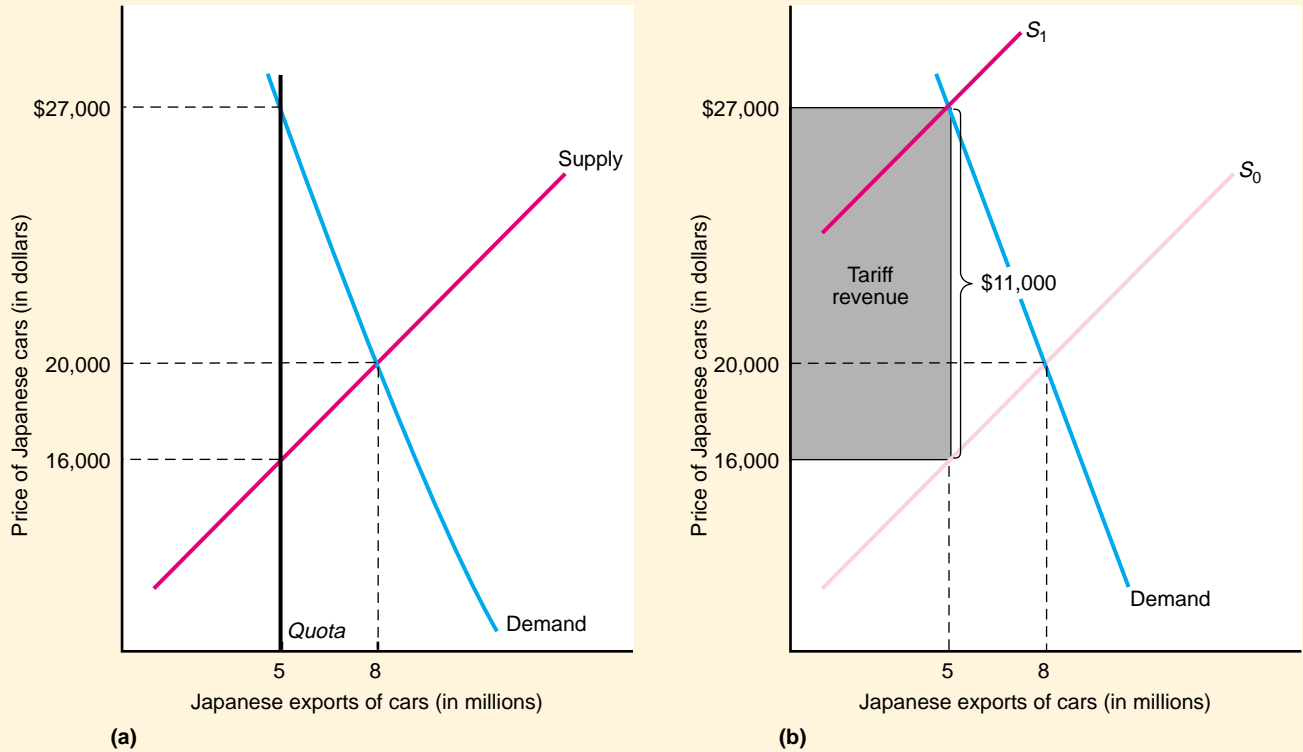
If you were about to answer “The new price will be \$620,” be careful. Ask yourself whether we would have given you that question if the answer were that easy. By looking at supply and demand curves in Figure 5-7 you can see why \$620 is the wrong answer.

To supply 600 rings, suppliers must be fully compensated for the tax. So the tax of \$20 on the supplier shifts the supply curve up from  $S_0$  to  $S_1$ . However, at \$620, consumers are not willing to purchase 600 rings. They are willing to purchase only 420 rings. Quantity supplied exceeds quantity demanded at \$620. Suppliers lower their prices until quantity supplied equals quantity demanded at \$610, the new equilibrium price. Consumers increase the quantity of rings they are willing to purchase to 510, still less than the original 600 at \$600. Why? At the higher price of \$610 some people choose not to buy rings and others purchase their rings manufactured outside Canada.

Notice that at the new equilibrium the new price is \$610, not \$620. The reason is that at the higher price, the quantity of rings people demand is less. This is a movement up along a demand curve to the left. Excise taxes reduce the quantity of goods demanded. That's why jewellers remain up in arms that the tax has not been repealed and why the revenue generated from the tax was less than expected. Instead of collecting  $\$20 \times 600$  (\$12,000), revenue collected was only  $\$10 \times 510$  (\$5100).

**Figure 5-8 (a and b) THE RELATIONSHIP BETWEEN A QUOTA AND A TARIFF**

Figure (a) shows the effect of a quota of 5 million cars on the price of Japanese cars sold. Price rises from \$20,000 to \$27,000. Figure (b) demonstrates that a tax of \$11,000 on each Japanese car sold in Canada has the same effect as the quota shown in (a). The difference between a quota and a tariff lies in who gets the revenue. With a quota, the firm selling the good gets the revenue as additional profits. With a tariff, the government gets the revenue shown by the shaded box in (b).



**Quotas**

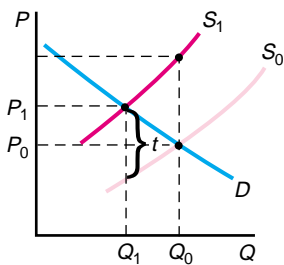
The next example we want to consider is the imposition of a quantity control—a legal restriction on the quantity that can be bought or sold. The most common type of quantity control is the international **quota**—a quantitative restriction on the amount that one country can export to another. Suppose Canada wanted to restrict imports of Japanese cars. We show the effect in Figure 5-8(a).

The market price of a Japanese car is \$20,000. At that price, Canadian consumers demand, and Japanese car makers are willing to supply, 8 million cars. But, when Canada places an import quota of, say, 5 million cars into Canada, Canadian consumers are willing to pay \$27,000 a car even though Japanese firms are willing to sell them for \$16,000 apiece. Of course, sellers will accept what consumers are willing to pay, and the price of Japanese cars rises to \$27,000. Notice what the effect of the quota is. It raises the price of Japanese cars in Canada.

**The Relationship between a Quota and a Tariff**

Above we considered the effect of both quotas and taxes, and we noted that a tariff is a type of excise tax. Both devices increase price and reduce quantity. Let's now compare

A quota of  $Q_1$  has the same effect as a tax  $t$ .



**Q.8** Why do firms prefer quotas to tariffs?

the effects of the quota above with the results of a tariff that would have achieved the same reduction in output.

We show the effects of such a tariff in Figure 5-8(b). There you can see that a tariff of \$11,000 shifts the supply curve in sufficiently to end up with the same sale of 5 million Japanese cars obtained with the quota. Consumers still pay \$27,000 for Japanese cars.

Is there a difference between the two cases? The answer is yes. In the quota case, the higher price brings in more revenue to the company. In the tariff case, the revenue goes to the government. So which of the two do you think companies favour? The quota, of course—it means more profits as long as your company is one of those to receive the rights to fill those quotas. In fact, once quotas are instituted, Japanese firms compete intensely to get them.

## THE LIMITATIONS OF SUPPLY AND DEMAND ANALYSIS

We hope the above discussion has convinced you of the power of supply and demand analysis. Now let's discuss some of its limitations. Supply and demand are tools, and, like most tools, they help us enormously when used appropriately. Used inappropriately, however, they can reduce our understanding. Throughout the book we'll introduce you to the limitations of the tools, but let us discuss an important one here.

### Other Things Don't Remain Constant

In supply and demand analysis other things are assumed equal. If other things change, then one cannot directly apply supply/demand analysis. Sometimes supply and demand are interconnected, making it impossible to hold other things constant. Let's take an example. Say we are considering the effect of a fall in the wage rate. In supply/demand analysis, you would look at the effect that fall would have on workers' decisions to supply labour, and on business's decision to hire workers. But might there be other effects? For instance, might the fall in the wage lower people's income, and thereby reduce the demand for firms' goods? And might that reduction affect firms' demand for workers? If these effects do occur, and are important enough to affect the result—those effects have to be added to the analysis in order for you to have a complete analysis.

Deciding whether such issues are important enough to affect the result requires a knowledge of the structure of the economy. All actions have a multitude of ripple or feedback effects—they create waves, like those that spread out from a stone thrown into a pool. These waves bounce back, and then hit other waves, which create new waves, which . . . . The art of applying supply/demand analysis is determining which of these multitude of ripple effects affect the analysis sufficiently that they must be added back in to the analysis.

There is no single answer to the question of which ripples must be included, and much debate among economists involves which ripple effects to include. But there are some general rules. Supply/demand analysis, used without adjustment, is most appropriate for questions where the goods are a small percentage of the entire economy. That is when the other-things-constant assumption will most likely hold. As soon as one starts analyzing goods that are a large percentage of the entire economy, the other-things-constant assumption is likely not to hold true. The reason is found in the **fallacy of composition**—the false assumption that what is true for a part will also be true for the whole.

**Q.9** When determining the effect of a shift factor on price and quantity, in which of the following markets could you likely assume that other things will remain constant?

1. Market for eggs.
2. Labour market.
3. World oil market.
4. Market for luxury boats.

## The Fallacy of Composition

Let's consider the fallacy of composition more carefully. When you are analyzing one individual's actions, small effects of an individual's actions can reasonably be assumed to be too small to change the results of supply/demand analysis. However, when you are analyzing the whole, or a significant portion of the whole, these small effects add up to a big effect. To see this, think of one supplier lowering the price of his or her good. People will substitute that good for other goods, and the quantity of the good demanded will increase. But what if all suppliers lower their prices? Since all prices have gone down, why should consumers switch? The substitution story can't be used in the aggregate. There are many such examples.

An understanding of the fallacy of composition is of central relevance to macroeconomics. In the aggregate, whenever firms produce (whenever they supply), they create income (demand for their goods). So in macro, when supply changes, demand changes. This interdependence is one of the primary reasons we have a separate macroeconomics. In macroeconomics, the other-things-constant assumption central to microeconomic supply/demand analysis cannot hold. In macroeconomics, output creates income and income is spent on output. When the output side increases, so does the income side.

It is to account for these interdependencies that we have a separate macro analysis and micro analysis. In macro we use curves whose underlying foundations are much more complicated than the supply and demand curves we use in micro.

One final comment: The fact that there may be an interdependence between supply and demand does not mean that you can't use supply and demand analysis; it simply means that you must modify its results with the interdependency that, if you've done the analysis correctly, you've kept in the back of your head. Thus using supply and demand analysis is generally a step in any good economic analysis, but you must remember that it may be only a step.

The fallacy of composition gives you some insight into why economists separate micro from macro. One of the important side effects of decisions that must be considered in macro, but not in micro, is the side effect of spending decisions. Your spending decision is someone else's income, and someone else's spending decision creates your income. The circular flow diagram presented in Chapter 3 (Figure 3-1) demonstrated that interconnection.

In our economy people can spend what they want; there is no direct mechanism in the economy that coordinates our spending decisions. Thus, the composite of all spending decisions may be either lots of spending or little spending. As that spending changes, output changes, and the economy experiences a business cycle.

The fallacy of composition is the false assumption that what is true for a part will also be true for the whole.

Macroeconomic analysis involves curves similar to, but very different from, microeconomic demand and supply curves.

**Q-10** Why is the fallacy of composition relevant for macroeconomic issues?

## THE ROLES OF GOVERNMENT

It is important to recognize both the strengths and weaknesses of supply and demand analysis because much of this book will involve a consideration of government policy issues within a supply/demand framework. To set the foundation for that discussion we will conclude this chapter by considering the general roles of a government within a market economy. This will establish the framework for consideration of public policy in later chapters.

Government's roles in a market economy include (1) providing a stable set of institutions and rules, (2) promoting effective and workable competition, (3) correcting for externalities, (4) ensuring economic stability and growth, (5) providing public goods, and (6) adjusting for undesired market results.



Most reasons for government intervention discussed in this chapter are debatable.

There is, however, one governmental role that even the strongest laissez-faire advocates generally accept. That role is for government to set up an appropriate institutional and legal structure within which markets can operate.

The reason there's little debate about this role is that all economists recognize that markets do not operate when there is anarchy. They require institutional structures that determine the rules of ownership, what types of trade are allowable, how contracts will be enforced, and what productive institutions are most desirable.

Before anyone conducts business, he or she needs to know the rules of the game and must have a reasonable expectation that those rules will not be changed. The operation of the modern economy requires that contractual arrangements be made among individuals. These con-

## BEYOND THE TOOLS

Laissez-Faire  
is Not Anarchy

tractual arrangements must be enforced if the economy is to operate effectively.

Economists differ significantly as to what the rules for such a system should be and whether any rules that already exist should be modified. Even if the rules are currently

perceived as unfair, it can be argued that they should be kept in place. Individuals have already made decisions based on those rules, and it's unfair to them to change the rules in the middle of the game.

Stability of rules is a benefit to society. When the rules are perceived as unfair and changing them is also perceived as unfair, the government must find a balance between these two degrees of unfairness. Government often finds itself in that difficult position. Thus, while there's little debate about government's role in providing some institutional framework, there's heated debate about which framework is most appropriate.

Roles of government in a market economy are:

1. providing a stable set of institutions and rules;
2. promoting effective and workable competition;
3. correcting for externalities;
4. ensuring economic stability and growth;
5. providing public goods; and
6. adjusting for undesired market results.

### Provide a Stable Set of Institutions and Rules

A basic role of government is to provide a stable institutional framework that includes the set of laws specifying what can and cannot be done as well as a mechanism to enforce those laws. Before people conduct business, they need to know the rules of the game and have a reasonable belief about what those rules will be in the future. These rules can initially develop spontaneously, but as society becomes more complex, the rules must be codified; enforcement mechanisms must be established. The modern market economy requires enforceable complex contractual arrangements among individuals. Where governments don't provide a stable institutional framework, as often happens in developing and transitional countries, economic activity is difficult; usually such economies are stagnant. Russia in the late 1990s is an example. As various groups fought for political control, the Russian economy stagnated.

### Promote Effective and Workable Competition

In a market economy the forces of monopoly and competition are always in conflict, and the government must decide what role it is to play in protecting or promoting competition. Historically, consumer sentiment runs against monopoly power. **Monopoly power** is the ability of individuals or firms currently in business to prevent other individuals or firms from entering the same kind of business. Monopoly power gives existing firms and individuals the ability to raise their prices. Similarly, individuals' or firms' ability to enter freely into business activities is generally seen as good. Government's job is to promote policies that prevent excess monopoly power from limiting competition. It needs competition policies that work.

What makes this a difficult function for government is that most individuals and firms believe that competition is far better for the other guy than it is for themselves, that their own monopolies are necessary monopolies, and that competition facing them is unfair competition. For example, most farmers support competition, but these same farmers also support government farm subsidies (payments by government to producers

based on production levels) some marketing boards (which set price floors), and import restrictions. Likewise, most firms support competition, but these same firms also support tariffs, which protect them from foreign competition. Most professionals, such as architects and engineers, support competition, but they also support professional licensing, which limits the number of competitors who can enter their field. Now, as you will see in reading the newspapers, there are always arguments for limiting entry into fields. The job of the government is to determine whether these arguments are strong enough to overcome the negative effects those limitations have on competition.

This isn't an easy task. Take the recent merger of Canadian Airlines and Air Canada. It gave Air Canada a monopoly on some domestic routes. Was this fair to the other air carriers? The government believed so, partly because the Canadian market is relatively small and geographically distinct from many others. Air Canada needed the benefits accruing to a monopolist to remain a viable business. Other air carriers responded by searching for niche markets—leisure travel, short-notice travel—to compete against Air Canada. The events of September 11, 2001 notwithstanding, Air Canada reacted by creating its own no-frills carrier, Air Canada Tango. Whether Tango will be capable of competing against Westjet and other carriers remains to be seen, but this example highlights the complexity of designing competition policies that work.

### Correct for Externalities

When two people freely enter into a trade agreement, they both believe that they will benefit from the trade. But unless they're required to do so, traders are unlikely to take into account any effect that an action may have on a third party. Economists call *the effect of a decision on a third party not taken into account by the decision maker* an **externality**. An externality can be positive (in which case society as a whole benefits from the trade between the two parties) or negative (in which case society as a whole is harmed by the trade between the two parties).

An example of a positive externality is education. When people educate themselves, all of society benefits, since better-educated people usually make better citizens and are better equipped to figure out new approaches to solving problems—approaches that benefit society as a whole. An example of a negative externality is pollution. Air conditioners emit a small amount of chlorofluorocarbons into the earth's atmosphere and contribute to the destruction of the ozone layer. Since the ozone layer protects all living things by filtering out some of the sun's harmful ultraviolet light rays, having a thinner layer of ozone can contribute to cancer and other harmful or fatal conditions. Neither the firms that produce the air conditioners nor the consumers who buy them take those effects into account. This means that the destruction of the ozone layer is an externality—the result of an effect that is not taken into account by market participants.

When there are externalities, there is a potential role for government to adjust the market result. If one's goal is to benefit society as much as possible, actions with positive externalities should be encouraged and actions with negative externalities should be restricted. Governments can step in and change the rules so that the actors must take into account the effect of their actions on society as a whole. We emphasize that the role is a potential one for two reasons. The first is that government often has difficulty dealing with externalities in such a way that society gains. For example, even if the government totally banned products that emit chlorofluorocarbons, other countries might not do the same and the ozone layer would continue to be destroyed. The second reason is that government is an institution that reflects, and is often guided by, politics and vested interests. It's not clear that, given the political realities, government intervention to correct externalities would improve the situation. In later chapters we'll have a lot more to say about government's role in correcting for externalities.

When there are externalities, there is a potential role for government.



Environmental damage is a negative externality.

## Ensure Economic Stability and Growth

In addition to providing general stability, government has the potential role of providing economic stability. If it's possible, most people would agree that government should prevent large fluctuations in the level of economic activity, maintain a relatively constant price level, and provide an economic environment conducive to economic growth. These aims are generally considered macroeconomic goals. They're justified as appropriate aims for government to pursue because they involve **macroeconomic externalities** (*externalities that affect the levels of unemployment, inflation, or growth in the economy as a whole*).

Here's how a macro externality could occur. When individuals decide how much to spend, they don't take into account the effects of their decision on others; thus, there may be too much or too little spending. Too little spending often leads to unemployment. But in making their spending decisions, people don't take into account the fact that spending less might create unemployment. So their spending decisions can involve a macro externality. Similarly, when people raise their price and don't consider the effect on inflation, they too might be creating a macro externality.

A macroeconomic externality is the effect of an individual decision that affects the levels of unemployment, inflation, or growth in an economy as a whole, but is not taken into account by the individual decision maker.

## Provide for Public Goods

A **public good** is a good that if supplied to one person must be supplied to all and whose consumption by one individual does not prevent its consumption by another individual. In contrast, a **private good** is a good that, when consumed by one individual, cannot be consumed by another individual. An example of a private good is an apple; once you eat that apple, no one else can consume it. National defense is generally considered a public good.

There are very few pure public goods, but many goods have public good aspects to them, and in general economists use the term *public good* to describe goods that are most efficiently provided collectively rather than privately. Parks, playgrounds, roads, and national defense are examples. Let's consider national defense more closely. For technological reasons national defense must protect all individuals in an area; a missile system cannot protect some houses in an area without protecting others nearby.

Everyone agrees that national defense is needed, but not everyone takes part in it. If someone else defends the country, you're defended for free; you can be a **free rider**—*a person who participates in something for free because others have paid for it*. Because self-interested people would like to enjoy the benefits of national defense while letting someone else pay for it, everyone has an incentive to be a free rider. But if everyone tries to be a free rider, there won't be any national defense. In such cases government can step in and require that everyone pay part of the cost of national defense, reducing the free rider problem.

## Adjust for Undesired Market Results

A controversial role for government is to adjust the results of the market when those market results are seen as socially undesirable. An example is income distribution. Many people believe the government should see to it that income is "fairly" distributed. Determining what's fair is a difficult philosophical question. Let's consider two of the many manifestations of the fairness problem. Should the government use a **progressive tax** (*a tax whose rates increase as a person's income increases*) to redistribute money from the rich to the poor? (A progressive income tax schedule might tax individuals at a rate of 15 percent for income up to \$20,000; at 25 percent for income between \$20,000 and \$40,000; and at 35 percent for every dollar earned over \$40,000.) Or should government impose a **regressive tax** (*a tax whose rates decrease as income rises*) to redistribute money from the poor to the rich? Or should government impose a flat or **proportional tax** (*a tax whose rates are constant at all income levels, no matter what a taxpayer's total*

*annual income is*)? Such a tax might be, say, 25 percent of every dollar of income. Canada has chosen a progressive income tax, while contributions for employment insurance and the Canada Pension Plan are a proportional tax up to a specified earned income. Economists can tell government the effects of various types of taxes and forms of taxation, but we can't tell government what's fair. That is for the people, through the government, to decide.

Another example of this role involves having government decide what's best for people, independently of their desires. The market allows individuals to decide. But what if people don't know what's best for themselves? Or what if they do know but don't act on that knowledge? For example, people might know that addictive drugs are bad for them, but because of peer pressure, or because they just don't care, they may take drugs anyway. Government action prohibiting such activities through laws or high taxes may then be warranted. *Goods or activities that government believes are bad for people even though they choose to use the goods or engage in the activities* are called **demerit goods or activities**. Illegal drugs are demerit goods and using addictive drugs is a demerit activity.

Alternatively, there are some activities that government believes are good for people, even if people may not choose to engage in them. For example, government may believe that going to the opera or contributing to charity is a good activity. But in Canada only a small percentage of people go to the opera, and not everyone in Canada contributes to charity. Similarly, government may believe that whole-wheat bread is more nutritious than white bread. But many consumers prefer white bread. Goods like whole-wheat bread and activities like contributing to charity are known as **merit goods or activities**—*goods and activities that government believes are good for you even though you may not choose to engage in the activities or consume the goods*. Government sometimes provides support for them through subsidies or tax benefits.

With merit and demerit goods, individuals are assumed not to be doing what is in their self-interest.

## Market Failures and Government Failures

The reasons for government intervention are often summed up in the phrase *market failure*. **Market failures** are *situations in which the market does not lead to a desired result*. In the real world, market failures are pervasive—the market is always failing in one way or another. But the fact that there are market failures does not mean that government intervention will improve the situation. There are also **government failures**—*situations in which the government intervenes and makes things worse*. Government failures are pervasive in the government—the government is always failing in one way or another. So real-world policy makers usually end up choosing which failure—market failure or government failure—will be least problematic.

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## CONCLUSION

We will conclude the chapter here. We will talk much more about these roles of government in later chapters. For now, we simply want you to understand the general policy framework. When you combine that general policy framework with the supply/demand framework that we presented in Chapter 4 and the first part of this chapter, you have a good foundation for understanding the economic way of thinking about policy issues.

## Chapter Summary

- When the demand curve shifts to the right (left), equilibrium price rises (declines) and equilibrium quantity rises (falls).
- When the supply curve shifts to the right (left), equilibrium price declines (rises) and equilibrium quantity rises (falls).
- By minding your  $P$ s and  $Q$ s—the shifts of and movements along curves—you can describe almost all events in terms of supply and demand.
- A price ceiling is a government-imposed limit on how high a price can be charged. Price ceilings below market price create shortages.
- A price floor is a government-imposed limit on how low a price can be charged. Price floors above market price create surpluses.
- Taxes and tariffs paid by suppliers shift the supply curve up by the amount of the tax or tariff. They raise the equilibrium price (inclusive of tax) and decrease the equilibrium quantity.
- Quotas restrict the quantity of goods that one country can export to another. They increase equilibrium price and reduce equilibrium quantity. The effect of a quota on equilibrium price and quantity is the same as a tariff. The difference between the two is who gets the additional revenue.
- In macro, small side effects that can be assumed away in micro are multiplied enormously. Thus, they can significantly change the results and cannot be ignored. To ignore them is to fall into the fallacy of composition.
- Six roles of government are (1) to provide a stable set of institutions and rules, (2) to promote effective and workable competition, (3) to correct for externalities, (4) to ensure economic stability and growth, (5) to provide public goods, and (6) to adjust for undesired market results.

## Key Terms

demerit goods or activities (123)	government failure (123)	monopoly power (120)	public good (122)
excise tax (116)	macroeconomic externality (122)	price ceiling (111)	quota (117)
externality (121)	market failure (123)	price floor (114)	regressive tax (122)
fallacy of composition (118)	merit goods or activities (123)	private good (122)	rent control (111)
free rider (122)	minimum wage laws (114)	progressive tax (122)	tariff (116)
		proportional tax (122)	

## Questions for Thought and Review

1. Say that price and quantity both fell. What would you say was the most likely cause?
2. Say that price fell and quantity remained constant. What would you say was the most likely cause?
3. Demonstrate graphically the effect of a price ceiling.
4. Demonstrate graphically why rent controls might increase the total payment that new renters pay for an apartment.
5. Demonstrate graphically the effect of a price floor.
6. Graphically show the effects of a minimum wage on the number of unemployed.
7. Oftentimes, to be considered for a job, you have to know someone in the firm. What does this observation tell you about the wage paid for that job?
8. In most developing countries, there are long lines of taxis at airports, and these taxis often wait two or three hours. What does this tell you about the price in that market? Demonstrate with supply and demand analysis.
9. Supply/demand analysis states that equilibrium occurs where quantity supplied equals quantity demanded, but in Canadian agricultural markets quantity supplied almost always exceeds quantity demanded. How can this be?
10. Demonstrate graphically the effect of a tax of \$4 per unit on equilibrium price and quantity.
11. Using a graph like the one you drew for question 10 above, show graphically a quota that leads to the same price and quantity.
12. You've set up the rules for a game and started the game, but now realize that the rules are unfair. Should you change the rules?

13. Say the government establishes rights to pollute so that without a pollution permit you aren't allowed to emit pollutants into the air, water, or soil. Firms are allowed

to buy and sell these rights. In what way will this correct for an externality?

14. What are six roles of government?

## Problems and Exercises

- The Canadian government has supported the price of sugar produced by Canadian sugar producers by placing a tariff on sugar imported into Canada. The tariff is effective because Canada consumes more sugar than it produces.
  - Using supply/demand analysis, demonstrate how the tariff increases the price of domestic sugar.
  - What other import policy could the government implement to have the same effect as the tariff?
  - If Canada were to eliminate the tariff, how would this affect the Canadian sugar market?
- “Scalping” is the name given to the buying of tickets at a low price and reselling them at a high price. The following information about a Grey Cup game appeared in your local newspaper. At the beginning of the season:
  - Tickets sell for \$27 and are sold out in preseason.
  - Halfway through the season, both front-runners have maintained unbeaten records. Resale price of tickets rises to \$200.
  - One week before the game, both conference finalists have remained unbeaten and are ranked 1 and 2. Ticket price rises to \$600.
  - Three days before the game, price falls to \$400.

Demonstrate, using supply/demand analysis and words, what might have happened to cause these fluctuations in price.
- In some localities “scalping” is against the law, although enforcement of these laws is spotty (difficult).
  - Using supply/demand analysis and words, demonstrate what a weakly enforced antiscalping law would likely do to the price of tickets.
  - Using supply/demand analysis and words, demonstrate what a strongly enforced antiscalping law would likely do to the price of tickets.
- Apartments in large Canadian cities like Toronto are often hard to find. One of the major reasons is that there are, or were, rent controls.
  - Demonstrate graphically how rent controls could make apartments hard to find.
  - Often one can get an apartment if one makes a side payment to the current tenant. Can you explain why?
    - What would be the likely effect of eliminating rent controls?
    - What is the political appeal of rent controls?
- Until recently, angora goat wool (mohair) has been designated as a strategic commodity (it used to be utilized in some military clothing). Because of that, in 1992 for every dollar's worth of mohair sold to manufacturers, ranchers received \$3.60.
  - Demonstrate graphically the effect of the elimination of this designation and subsidy.
  - Explain why the program was likely kept in existence for so long.
  - Say that a politician has suggested that the government should pass a law that requires all consumers to pay a price for angora goat wool high enough so that the sellers of that wool would receive \$3.60 more than the market price. Demonstrate the effect of the law graphically. Would consumers support it? How about suppliers?
- The technology is now developing so that road use can be priced by computer. A computer in the surface of the road picks up a signal from your car and automatically charges you for the use of the road.
  - How could this technological change contribute to ending bottlenecks and rush hour congestion?
  - What are some of the problems that might develop with such a system?
  - How would your transportation habits likely change if you had to pay to use roads?
- Suppose your province established a licensing requirement for all beauticians last year, and your neighbour continued to operate her salon out of her basement, without obtaining a license. After a particularly bad visit, one of her clients reports her to the authorities, and she is fined and forced to close her home business.
  - Why would the province have created the licensing requirement in the first place?
  - What options might you propose to change the system?
  - What will be the political difficulties of implementing those options?

## Web Questions

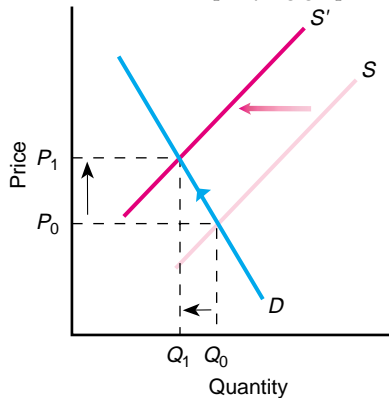


- Many provinces have recently removed rent controls on apartments. Economic reasoning suggests this should raise the quantity of apartments supplied as landlords are able to charge higher prices. The Canadian Centre for Policy Alternatives argues this is fine in theory, but it won't work "in the real world." Visit the Manitoba home page ([www.policyalternatives.ca/manitoba](http://www.policyalternatives.ca/manitoba)) and find the Fast Facts article "Lifting Rent Controls Would Not Renew Inner City." After reading the article, answer the following questions.
  - What does the traditional demand and supply model predict will happen to the price of renting an apartment if controls are removed?
  - Why does the CCPA think this won't work?
  - What do they think the government should do?
- Go to the Fraser Institute's home page ([www.fraserinstitute.ca](http://www.fraserinstitute.ca)) and search for the article "The Economics of Minimum Wage Laws" by Marc Law. Using that article, answer the following questions:
  - What happened to the proportion of young and old workers earning the minimum wage between 1988 and 1995? Within the standard supply/demand framework, how does this affect unemployment resulting from the minimum wage?
  - Who is affected by the minimum wage?
  - What effect does the article say that increasing the minimum wage will have on the distribution of income? What evidence does the author cite?

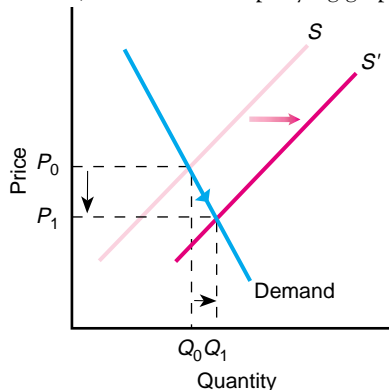
## Answers to Margin Questions



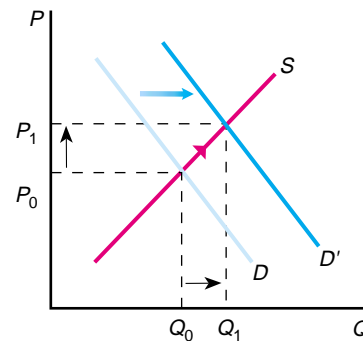
- A heavy frost in Nova Scotia will decrease the supply of apples, increasing the price and decreasing the quantity demanded, as in the accompanying graph. (105)



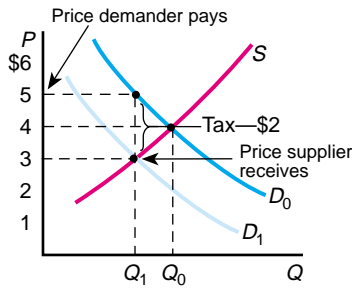
- A discovery of a hormone that will increase cows' milk production by 20 percent will increase the supply of milk, pushing the price down and increasing the quantity demanded, as in the accompanying graph. (105)



- An increase in the price of gas will likely increase the demand for compact cars, increasing their price and increasing the quantity supplied, as in the accompanying graph. (106)



- Quantity decreases but it is unclear what happens to price. (110)
- Since the price ceiling is above the equilibrium price, it will have no effect on the market-determined equilibrium price and quantity. (112)
- Since the price floor is below the equilibrium price, it will have no effect on the market-determined equilibrium price and quantity. (114)
- We state that the tax will most likely raise the price by less than \$2 since the tax will cause the quantity demanded to decrease. This will decrease quantity supplied, and hence decrease the price the suppliers receive. In the diagram below,  $Q$  falls from  $Q_0$  to  $Q_1$  and the price the supplier receives falls from \$4 to \$3, making the final price \$5, not \$6. (116)



8. Firms prefer quotas to tariffs because with quotas, they receive additional profit; with tariffs, the government receives tax revenues. (118)

- 9. Other things are most likely to remain constant in the egg and luxury boat markets because each is a small percentage of the whole economy. Factors that affect the world oil market and the labour market will have ripple effects that must be taken into account in any analysis. (118)
- 10. The fallacy of composition is relevant for macro-economic issues because it reminds us that, in the aggregate, small effects that are immaterial for micro issues can add up and be material. (119)

APPENDIX A

## Algebraic Representation of Supply, Demand, and Equilibrium

In Chapters 4 and 5, we discussed demand, supply, and the determination of equilibrium price and quantity in words and graphs. These concepts can also be presented in equations. In this appendix we do so, using straight-line supply and demand curves.

### THE LAWS OF SUPPLY AND DEMAND IN EQUATIONS

Since the law of supply states that quantity supplied is positively related to price, the slope of an equation specifying a supply curve is positive. (The quantity intercept term is generally less than zero since suppliers are generally unwilling to supply a good at a price less than zero.) An example of a supply equation is:

$$Q_S = -5 + 2P$$

where  $Q_S$  is units supplied and  $P$  is the price of each unit in dollars per unit. The law of demand states that as price rises, quantity demanded declines. Price and quantity are negatively related, so a demand curve has a negative slope. An example of a demand equation is:

$$Q_D = 10 - P$$

where  $Q_D$  is units demanded and  $P$  is the price of each unit in dollars per unit.

### Determination of Equilibrium

The equilibrium price and quantity can be determined in three steps using these two equations. To find the equilibrium price and quantity for these particular demand and supply curves, you must find the quantity and price that solve both equations simultaneously.

*Step 1:* Set the quantity demanded equal to quantity supplied:

$$Q_S = Q_D \rightarrow -5 + 2P = 10 - P$$

*Step 2:* Solve for the price by rearranging terms. Doing so gives:

$$3P = 15$$

$$P = \$5$$

Thus, equilibrium price is \$5.

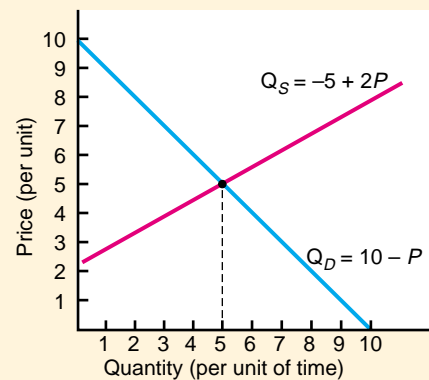
*Step 3:* To find equilibrium quantity, you can substitute \$5 for  $P$  in either the demand or supply equation. Let's do it for supply:  $Q_S = -5 + (2 \times 5) = 5$  units. we'll leave it to you to confirm that the quantity you obtain by substituting  $P = \$5$  in the demand equation is also 5 units.

The answer could also be found graphically. The supply and demand curves specified by these equations are depicted in Figure A5-1. As you can see, demand and supply intersect; quantity demanded equals quantity supplied at a quantity of 5 units and a price of \$5.



**Figure A5-1** SUPPLY AND DEMAND EQUILIBRIUM

The algebra in this appendix leads to the same results as the geometry in the chapter. Equilibrium occurs where quantity supplied equals quantity demanded.

**Movements along a Demand and Supply Curve**

The demand and supply curves above represent schedules of quantities demanded and supplied at various prices. Movements along each can be represented by selecting various prices and solving for quantity demanded and supplied. Let's create a supply and demand table using the above equations—supply:  $Q_S = -5 + 2P$ ; demand:  $Q_D = 10 - P$ .

P	$Q_S = -5 + 2P$	$Q_D = 10 - P$
\$ 0	-5	10
1	-3	9
2	-1	8
3	1	7
4	3	6
5	5	5
6	7	4
7	9	3
8	11	2
9	13	1
10	15	0

As you move down the rows, you are moving up along the supply schedule, as shown by increasing quantity supplied, and moving down along the demand schedule, as shown by decreasing quantity demanded. Just to confirm your equilibrium quantity and price calculations, notice that at a price of \$5, quantity demanded equals quantity supplied.

**Shifts of a Demand and Supply Schedule**

What would happen if suppliers' expectations changed so that they would be willing to sell more goods at every

price? This shift factor of supply would shift the entire supply curve out to the right. Let's say that at every price, quantity supplied increases by three. Mathematically the new equation would be  $Q_S = -2 + 2P$ . The quantity intercept increases by 3. What would you expect to happen to equilibrium price and quantity? Let's solve the equations mathematically first.

*Step 1:* To determine equilibrium price, set the new quantity supplied equal to quantity demanded:

$$10 - P = -2 + 2P$$

*Step 2:* Solve for the equilibrium price:

$$12 = 3P$$

$$P = \$4$$

*Step 3:* To determine equilibrium quantity, substitute  $P$  in either the demand or supply equation:

$$Q_D = 10 - (1 \times 4) = 6 \text{ units}$$

$$Q_S = -2 + (2 \times 4) = 6 \text{ units}$$

Equilibrium price declined to \$4 and equilibrium quantity rose to 6, just as you would expect with a rightward shift in a supply curve.

Now let's suppose that demand shifts out to the right. Here we would expect both equilibrium price and equilibrium quantity to rise. We begin with our original supply and demand curves—supply:  $Q_S = -5 + 2P$ ; demand:  $Q_D = 10 - P$ . Let's say at every price, the quantity demanded rises by 3. The new equation for demand would be  $Q_D = 13 - P$ . You may want to solve this equation for various prices to confirm that at every price, quantity demanded rises by 3. Let's solve the equations for equilibrium price and quantity.

*Step 1:* Set the quantities equal to one another:

$$13 - P = -5 + 2P$$

*Step 2:* Solve for equilibrium price:

$$18 = 3P$$

$$P = \$6$$

*Step 3:* Substitute  $P$  in either the demand or supply equation:

$$Q_D = 13 - (1 \times 6) = 7 \text{ units}$$

$$Q_S = -5 + (2 \times 6) = 7 \text{ units}$$

Equilibrium price rose to \$6 and equilibrium quantity rose to 7 units, just as you would expect with a rightward shift in a demand curve.

Just to make sure you've got it, we will do two more examples. First, suppose the demand and supply equations for wheat per year in Canada can be specified as follows (notice that the slope is negative for the demand curve and positive for the supply curve):

$$Q_D = 500 - 2P$$

$$Q_S = -100 + 4P$$

$P$  is the price in dollars per thousand bushels and  $Q$  is the quantity of wheat in thousands of bushels. Remember that the units must always be stated. What is the equilibrium price and quantity?

*Step 1:* Set the quantities equal to one another:

$$500 - 2P = -100 + 4P$$

*Step 2:* Solve for equilibrium price:

$$600 = 6P$$

$$P = \$100$$

*Step 3:* Substitute  $P$  in either the demand or supply equation:

$$Q_D = 500 - (2 \times 100) = 300$$

$$Q_S = -100 + (4 \times 100) = 300$$

Equilibrium quantity is 300,000 (300 thousand) bushels.

As our final example, take a look at Marie's demand curve depicted in Figure 4-4(b) in Chapter 4. Can you write an equation that represents the demand curve in that figure? It is  $Q_D = 10 - 2P$ . At a price of zero, the quantity of cassette rentals Marie demands is 10, and for every increase in price of \$1, the quantity she demands falls by 2. Now look at Ann's supply curve shown in Figure 4-7(b) in Chapter 4. Ann's supply curve mathematically is  $Q_S = 2P$ . At a zero price, the quantity Ann supplies is zero, and for every \$1 increase in price, the quantity she supplies rises by 2. What is the equilibrium price and quantity?

*Step 1:* Set the quantities equal to one another:

$$10 - 2P = 2P$$

*Step 2:* Solve for equilibrium price:

$$4P = 10$$

$$P = \$2.5$$

*Step 3:* Substitute  $P$  in either the demand or supply equation:

$$Q_D = 10 - (2 \times 2.5) = 5, \text{ or}$$

$$Q_S = 2 \times 2.5 = 5 \text{ cassettes per week}$$

Ann is willing to supply 5 cassettes per week at \$2.50 per rental and Marie demands 5 cassettes at \$2.50 per cassette rental. Remember that in Figure 4-8 in Chapter 4, we showed you graphically the equilibrium quantity and price of Marie's demand curve and Ann's supply curve. We'll leave it up to you to check that the graphic solution in Figure 4-8 is the same as the mathematical solution we came up with here.

## PRICE CEILINGS AND PRICE FLOORS

Let's now consider a price ceiling and price floor. We start with the supply and demand curves:

$$Q_S = -5 + 2P$$

$$Q_D = 10 - P$$

This gave us the solution:

$$P = 5$$

$$Q = 5$$

Now, say that a price ceiling of \$4 is imposed. Would you expect a shortage or a surplus? If you said "shortage" you're doing well. If not, review the chapter before continuing with this appendix. To find out how much the shortage is we must find out how much will be supplied and how much will be demanded at the price ceiling. Substituting \$4 for price in both lets us see that  $Q_S = 3$  units and  $Q_D = 6$  units. There will be a shortage of 3 units. Next, let's consider a price floor of \$6. To determine the surplus we follow the same exercise. Substituting \$6 into the two equations gives a quantity supplied of 7 units and a quantity demanded of 4 units, so there is a surplus of 3 units.

## TAXES AND SUBSIDIES

Next, let's consider the effect of a tax of \$1 placed on the supplier. That tax would decrease the price received by suppliers by \$1. In other words:

$$Q_S = -5 + 2(P - 1)$$

Multiplying the terms in parentheses by 2 and collecting terms results in

$$Q_S = -7 + 2P$$

This supply equation has the same slope as in the previous case, but a new intercept term—just what you'd expect. To determine the new equilibrium price and quantity, follow steps 1 to 3 discussed earlier. Setting this new equation equal to demand and solving for price gives

$$P = 5\frac{1}{3}$$

Substituting this price into the demand and supply equations tells us equilibrium quantity:

$$Q_S = Q_D = 4\frac{1}{3} \text{ units}$$

Of that price, the supplier must pay \$1 in tax, so the price the supplier receives net of tax is \$4 $\frac{1}{3}$ .

Next, let's say that the tax was put on the demander rather than on the supplier. In that case, the tax increases the price for demanders by \$1 and the demand equation becomes

$$Q_D = 10 - (P + 1), \text{ or}$$

$$Q_D = 9 - P$$

Again solving for equilibrium price and quantity requires setting the demand and supply equations equal to one another and solving for price. We leave the steps to you. The result is:

$$P = 4\frac{1}{3}$$

This is the price the supplier receives. The price demanders pay is \$5 $\frac{1}{3}$ . The equilibrium quantity will be 4 $\frac{1}{3}$  units.

These are the same results we got in the previous cases, showing that, given the assumptions, it doesn't matter who actually pays the tax: The effect on equilibrium price and quantity is identical no matter who pays it.

## QUOTAS

Finally, let's consider the effect of a quota of 4 $\frac{1}{3}$  placed on the market. Since a quota limits the quantity supplied, as long as the quota is less than the market equilibrium quantity the supply equation becomes:

$$Q_S = 4\frac{1}{3}$$

where  $Q_S$  is the actual amount supplied. The price that the market will arrive at for this quantity is determined by the demand curve. To find that price substitute the quantity 4 $\frac{1}{3}$  into the demand equation ( $Q_D = 10 - P$ ):

$$4\frac{1}{3} = 10 - P$$

and solve for P:

$$P = 5\frac{1}{3}$$

Since consumers are willing to pay 5 $\frac{1}{3}$ , this is what suppliers will receive. The price that suppliers would have been willing to accept for a quantity of 4 $\frac{1}{3}$  is 4 $\frac{1}{3}$ . This can be found by substituting the amount of the quota in the supply equation:

$$4\frac{1}{3} = -5 + 2P$$

and solving for P:

$$2P = 9\frac{1}{3}$$

$$P = 4\frac{1}{3}$$

Notice that this result is very similar to the tax. For demanders it is identical; they pay \$5 $\frac{1}{3}$  and receive 4 $\frac{1}{3}$  units. For suppliers, however, the situation is much preferable; instead of receiving a price of \$4 $\frac{1}{3}$ , the amount they received with the tax, they receive \$5 $\frac{1}{3}$ . With a quota, suppliers receive the "implicit tax revenue" that results from the higher price.

## Questions for Thought and Review

- Suppose the demand and supply for milk is described by the following equations:  $Q_D = 600 - 100P$ ;  $Q_S = -150 + 150P$ , where  $P$  is price in dollars,  $Q_D$  is quantity demanded in millions of litres per year, and  $Q_S$  is quantity supplied in millions of litres per year.
  - Create demand and supply tables corresponding to these equations.
  - Graph supply and demand and determine equilibrium price and quantity.
  - Confirm your answer to (b) by solving the equations mathematically.
- Suppose a growth hormone is introduced that allows dairy farmers to offer 125 million more litres of milk per year at each price.
  - Construct new demand and supply curves reflecting this change. Describe with words what happened to the supply curve and to the demand curve.
  - Graph the new curves and determine equilibrium price and quantity.
  - Determine equilibrium price and quantity by solving the equations mathematically.
  - Suppose the government set the price of milk at \$3 a litre. Demonstrate the effect of this regulation on the

- market for milk. What is quantity demanded? What is quantity supplied?
3. Write demand and supply equations that represent demand,  $D_0$ , and supply,  $S_0$ , in Figure 5-1(a) in the chapter.
    - a. Solve for equilibrium price and quantity mathematically.
    - b. Rewrite the demand equation to reflect the shift in demand to  $D_1$ . What happens to equilibrium price and quantity as shown in Figure 5-1(a) in the chapter? Confirm by solving the equations for equilibrium price and quantity.
  4.
    - a. How is a shift in demand reflected in a demand equation?
    - b. How is a shift in supply reflected in a supply equation?
    - c. How is a movement along a demand (supply) curve reflected in a demand (supply) equation?
  5. Suppose the demand and supply for milk is described by the following equations:  $Q_D = 600 - 100P$ ;  $Q_S = -150 + 150P$ , where  $P$  is the price in dollars;  $Q_D$  is quantity demanded in millions of litres per year; and  $Q_S$  is quantity supplied in millions of litres per year.
    - a. Solve for equilibrium price and quantity of milk.
    - b. Would a government-set price of \$4 create a surplus or a shortage of milk? How much? Is \$4 a price ceiling or a price floor?
  6. Suppose the government imposes a \$1 per litre of milk tax on dairy farmers. Using the demand and supply equations from question 1:
    - a. What is the effect of the tax on the supply equation? The demand equation?
    - b. What is the new equilibrium price and quantity?
    - c. How much do dairy farmers receive per litre of milk after the tax? How much do demanders pay?
  7. Repeat question 6(a) to 6(c) assuming the tax is placed on the buyers of milk. Does it matter who pays the tax?
  8. Repeat question 6(a) to 6(c) assuming the government pays a subsidy of \$1 per litre of milk to farmers.
  9. Suppose the demand for cassettes is represented by  $Q_D = 16 - 4P$ , and the supply of cassettes is represented by  $Q_S = 4P - 1$ . Determine if each of the following is a price floor, price ceiling, or neither. In each case, determine the shortage or surplus.
    - a.  $P = \$3$ .
    - b.  $P = \$1.50$ .
    - c.  $P = \$2.25$ .
    - d.  $P = \$2.50$ .