CHAPTER 3
DEMAND AND SUPPLY

Chapter in a Nutshell

How are prices determined? This is the basic question we explore in this chapter. Let's conclude before we start our analysis of price determination: Price depends on demand and supply. That's it. But what's demand and what's supply? Demand represents people's willingness to buy goods and services at different prices. Price is a reflection of how willing people are to buy goods and services. Supply can be interpreted similarly. Supply represents the willingness of producers to supply goods and services at different prices. However, supply depends on the time frame being considered to a greater extent than does demand. Producers can better adjust to changes in the market given more time. We'll develop three time frames in which to consider supply — the market day, the short run, and the long run.

With an understanding of demand and supply, it is possible to describe how equilibrium prices are determined in markets for goods and services. The equilibrium price equates the quantity demanded and the quantity supplied in a market. Changes in demand and changes in supply cause changes in equilibrium prices and quantities demanded and supplied in markets. Prices effectively ration goods and services in our economy. Price increases ration the available supply of a good to those who can still afford it. A price decrease makes a good available to a wider segment of the market.

After you study this chapter, you should be able to:

• Discuss how consumer demand is measured.
• Describe the inverse relationship between price and quantity demanded.
• Discuss how supply is measured.
• Distinguish between market-day supply, short-run supply, and long-run supply.
• Explain how equilibrium supply, short-run supply, and long-run supply are determined.
• Define normal goods, substitute goods, and complementary goods.
• Show how changes in demand and changes in supply cause changes in equilibrium prices.
• Give examples of price as a rationing mechanism.

Concept Check — See how you do on these multiple-choice questions.

With this question, be careful to keep separate in your mind the difference between a change in quantity demanded and a change in demand.

1. A decrease in price causes an increase in the quantity demanded because
   a. consumers cannot afford to buy as much
   b. consumers are willing to buy more at a lower price
   c. consumers’ tastes change as the price decreases
   d. consumers’ incomes increase as the price decreases
   e. the number of consumers increases as the price decreases.
What is the shape of the market-day supply curve?

2. One characteristic of the market-day supply is that
   a. the time period is too short to allow changes in the quantity supplied
   b. it applies in the short run
   c. it applies in the long run
   d. it depends on the demand
   e. it depends on the quantity demanded

Recall that a change in demand is different from a change in quantity demanded.

3. A change in demand can be caused by all of the following except a change in
   a. income
   b. the prices of other goods
   c. tastes
   d. population
   e. the price of the good being considered

Improvements in technology permit a larger quantity of a good to be produced with the same amount of resources.

4. An improvement in the technology for producing a good will cause
   a. an increase in the demand for the good
   b. a shift to the left in the short-run supply curve
   c. a shift to the left in the long-run supply curve
   d. an increase in the supply of the good
   e. an increase in the incomes of consumers

If wants are insatiable and resources are scarce, then a mechanism must exist for allocating products among the consumers who desire them.

5. To say that price serves as a rationing mechanism means that
   a. only those with the willingness to pay for goods in a market get them
   b. demand is limitless
   c. supplies keep dwindling
   d. wants are insatiable
   e. resources are scarce

Am I on the Right Track?

Your answers to the questions above should be b, a, e, d, and a. Understanding demand and supply is key to your understanding all that follows in this text. If the answers to the questions above weren’t readily apparent to you, then you may want to return to the text and re-read some or all of the chapter. Be sure that you understand the difference between changes in demand and quantity demanded, the different time frames in which to consider supply, and the role that prices play in rationing goods and services in markets. Then come back and work carefully through the exercises that follow. This is an extremely important chapter!
Key Terms Quiz — Match the terms on the left with the definitions in the column on the right.

1. change in quantity demanded  _____ a. a curve that relates price and quantity demanded
2. law of demand   _____ b. the sum of all individual demands in a market
3. demand schedule   _____ c. quantity supplied greater than quantity demanded at a price
4. demand curve   _____ d. the price that equates quantity demanded to quantity supplied
5. market demand   _____ e. supplier can change all resources used in production
6. supply schedule   _____ f. a shift in the entire demand curve
7. market-day supply   _____ g. goods that can replace each other
8. supply curve    _____ h. a shift in the entire supply curve
9. excess supply   _____ i. a change in the amount purchased due to a price change
10. excess demand   _____ j. inverse relationship between price and quantity demanded
11. equilibrium price   _____ k. quantity supplied is fixed, regardless of price
12. short run   _____ l. a schedule of quantities of goods purchased at different prices
13. long run   _____ m. a schedule of quantities of goods supplied at different prices
14. change in demand   _____ n. goods that are used together
15. normal good   _____ o. quantity demanded greater than quantity supplied at a price
16. substitute goods   _____ p. a curve that relates price and quantity supplied
17. complementary goods   _____ q. supplier can change some resources used in production
18. change in supply   _____ r. a good whose demand increases when income increases

Graphing Tutorial

Drawing and interpreting demand and supply diagrams is easy. Consider the data presented below for the market for brooms during a month-long period. The first column shows the price per broom in dollars, the second column shows the quantity demanded at each price, and the third column shows the quantity supplied at each price. The table combines information for the demand schedule and the supply schedule.

<table>
<thead>
<tr>
<th>Price ($ per broom)</th>
<th>Quantity Demanded (per month)</th>
<th>Quantity Supplied (per month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>10</td>
<td>70</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>50</td>
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<tr>
<td>3</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>1</td>
<td>60</td>
<td>20</td>
</tr>
</tbody>
</table>

Note that the information contained in the table corresponds to the market for brooms. Therefore, the demand schedule represents the sum of all the buyers’ individual demand schedules. Likewise, the supply schedule represents the total number of brooms put on the market by suppliers at different prices during a month. It is a simple matter to plot these data on a graph with quantities measured horizontally and prices measured vertically. The graph is shown below.

The demand curve is drawn as a downward-sloping line starting at the point 10 brooms per month and $6 per broom. At a price of $6, 10 brooms per month are demanded by consumers. The demand curve shows
that for each $1 decrease in the price of a broom, the quantity demanded increases by 10 brooms per month. The supply curve is an upward-sloping line starting at the point 20 brooms per month and $1 per broom. For each $1 increase in the price of a broom, the quantity of brooms supplied increases by 10 per month.

Consider the point where the demand curve and the supply curve intersect. This point is 40 brooms per month at a price of $3 per broom. At a price of $3 per broom, the quantity of brooms demanded is equal to the quantity of brooms supplied. In other words, all the brooms that are offered for sale are purchased at this price. In this example, $3 is the equilibrium price.

Suppose the price were $2 per broom. At $2 per broom, the quantity of brooms demanded is 50 while the quantity of brooms supplied is 30. There is an excess demand for brooms, represented on the graph as the horizontal distance between the points on the demand curve and the supply curve at a price of $2, which is 20 brooms. Would the price stay at $2 per broom? Of course not. The excess demand for brooms will generate competition between buyers that will push the price of brooms higher, causing the quantity demanded to decrease and the quantity supplied to increase until equilibrium is reached at a price of $3 per broom.

Consider a price above equilibrium at, say, $4 per broom. At $4 per broom, the quantity of brooms supplied is 50 while the quantity of brooms demanded is 30. At this price, an excess supply of brooms exists, represented by the horizontal distance between the points on the supply curve and the demand curve at a price of $4 per broom, which is 20 brooms. Suppliers are trying to sell 20 brooms more than consumers are willing to buy at $4 per broom. In this case, the price will begin to decrease as suppliers lower price, causing the quantity demanded to increase and the quantity supplied to decrease until the equilibrium is reached at a price of $3 per broom.

What sort of supply curve have we drawn in this example? We know that it cannot be a market-day supply curve because it isn’t drawn vertically at a specific quantity level. This supply curve could either be a short-run supply curve or a long-run supply curve, depending on how easily suppliers can adjust the quantities of resources used to produce brooms.

A variety of factors influence the position of the demand and supply curves we have drawn. These are discussed at length in the text. Make sure you understand how demand and supply curves shift due to changes in these factors. Any time there is a shift in one or the other or both curves, the equilibrium price will change, as will the quantity demanded and supplied. The exercises below will give you the opportunity to practice drawing and interpreting demand and supply diagrams.
Graphing Pitfalls

Consider the graph shown below. What is wrong with it? In a purely technical sense, nothing at all. The only difference between this graph and the one shown above is that price is measured along the horizontal axis and quantity is measured on the vertical axis in the graph below. The information conveyed by the graph is exactly the same. So, does this mean it doesn’t matter which axis we label price and which we label quantity? No! By convention, economists measure price on the vertical axis and quantity on the horizontal axis. You’ll decrease the level of confusion if you stick to this convention in drawing your graphs!

![Graph with axes switched]

The axes are switched on this graph! Measure quantity on the horizontal axis and price on the vertical axis!

True-False Questions — If a statement is false, explain why.

1. The law of demand states that as price decreases, quantity demanded decreases. (T/F)

2. A demand schedule shows people's willingness to buy specific quantities of a good at different prices. (T/F)

3. The market demand for a good is the sum of individual demands for the good. (T/F)

4. In the time period known as the market day, producers can sell more goods as their prices rise. (T/F)

5. An increase in the number of suppliers in a market will cause the supply curve to shift to the left. (T/F)

6. The short run is a period in which producers can devote larger quantities of some resources to production as prices increase. (T/F)
Short-run supply curves are vertical. (T/F)

An increase in the price of a good will cause the supply curve to shift to the right. (T/F)

An increase in supply causes an excess demand at the original price, and competition between sellers leads to a lower equilibrium price. (T/F)

An increase in demand causes an excess demand at the original price, and competition between demanders leads to a higher equilibrium price. (T/F)

The expectation that the price of a good will increase can cause the demand for that good to increase. (T/F)

If two goods are complements, then one can replace the other in consumption. (T/F)

If income increases and the demand for a good increases, then it is a normal good. (T/F)

The long run is a time period sufficient to allow suppliers to make some, but not all, of the changes necessary to adjust the quantity supplied to price changes. (T/F)

A change in demand refers to a movement along a demand curve due to a price change, but a change in quantity demanded refers to a shift in the entire demand curve. (T/F)

Multiple-Choice Questions

1. If a market is in equilibrium, then
   a. demand curves and supply curves are the same
   b. at the equilibrium price, quantity demanded is equal to quantity supplied
   c. the short-run quantities of supply and demand equal the long-run quantities of supply and demand
   d. the short-run equilibrium price equals the long-run equilibrium price
   e. all demanders receive the goods they want, and all suppliers sell the goods they want

2. If excess demand exists in a market, then
   a. excess supply will emerge to absorb the excess demand
   b. the quantity supplied is less than the quantity demanded
   c. the quantity demanded is less than the quantity supplied
   d. the equilibrium price will fall
   e. the price will fall
3. The market demand for fish represents the
   a. sum of all individual demands for fish
   b. specific quantities consumers will buy, given the market-day supply
   c. relationship between price and quantity of fish demanded by a consumer on the fish market
   d. maximum quantity consumers will buy, given the limitations of their income
   e. changing tastes of consumers

4. An increase in demand causes
   a. an increase in supply as new firms enter the market
   b. an increase in price and an increase in supply
   c. an increase in price and an increase in the quantity supplied
   d. a decrease in demand in the future
   e. a decrease in price and an increase in the quantity supplied

5. If supply increases and demand does not change, then price
   a. as well as quantities demanded and supplied will increase
   b. will decrease, and quantity demanded and supplied will increase
   c. will decrease, and quantity demanded and supplied will decrease
   d. and quantity demanded remain unchanged
   e. remains unchanged, but both quantities demanded and supplied will decrease

6. If, at a specific price, quantity demanded is greater than the quantity supplied, then price will
   a. increase until the excess supply is eliminated
   b. decrease until the excess supply is eliminated
   c. increase until the excess demand is eliminated
   d. remain unchanged, and quantity demanded will decrease
   e. decrease, and quantity supplied will increase

7. Suppose that a dramatic technological breakthrough related to nuclear fusion occurs so that the cost of energy is significantly reduced. We would expect that the immediate effect of this technological advance is
   a. a shift to the right in most demand curves
   b. a decrease in the demand for automobiles
   c. a shift to the right in most supply curves
   d. to cause long-run supply curves to become steeper
   e. to increase the price of fossil fuels
8. In the graph below, an increase in the price from 3 to 5 causes
   a. a market-day supply curve to shift to the right
   b. a short-run supply curve to shift
   c. suppliers to increase their use of all resources to produce 10 units
   d. the quantity supplied to increase from 5 to 10
   e. the supply to increase from 5 to 10

9. The long run refers to a time period long enough for producers to
   a. make partial adjustments in the resources used in production to price changes
   b. add more labor but not more capital to production
   c. add more capital but not more labor to production
   d. make complete adjustments in the resources used in production to price changes
   e. produce less in response to an increase in price

10. When economists refer to price as a rationing mechanism, they mean that
    a. the government can establish a rationing program by setting prices
    b. price weeds from the market those who want the good, but can't afford it
    c. most markets have chronic problems with excess demand so rationing is necessary
    d. suppliers ration goods by setting a price demanders can afford
    e. demanders ration their incomes by choosing only low-priced goods

11. Suppose that the price of computer chips increases by 20 percent during the early stages of an economic
    recovery. Intel, a chip manufacturer, increases its payroll by 1,000 workers. Intel’s hiring of new
    workers is best described as a
    a. long-run adjustment to the price change
    b. complete adjustment to the price change
    c. market-day adjustment to the price change
    d. short-run adjustment to the price change
    e. shift to the left in Intel’s supply curve for computer chips
12. If the price of a good starts out above the equilibrium price, then
   a. consumers will compete to bid the price up
   b. suppliers will compete to bid the price up
   c. suppliers will compete to bid the price down
   d. consumers will compete to bid the price down
   e. producers will hire more labor to produce more of the good

13. The market-day supply is drawn as a vertical line at a particular level of production because
   a. output can easily be adjusted
   b. chronic excess supply is permanent
   c. output can completely adjust to price changes
   d. output can partially adjust to price changes
   e. output cannot be changed during the market day

14. The demand and supply curves shown in the diagram below represent which of the following changes?
   a. an increase in demand and an increase in the equilibrium price
   b. a decrease in demand and a decrease in the equilibrium price
   c. a decrease in demand and a decrease in the quantity supplied
   d. an increase in the quantity demanded and an increase in supply
   e. an increase in the supply and an increase in the equilibrium price

15. If consumers are presented with strong scientific evidence that a diet including moderate red wine consumption leads to lower rates of heart disease, which of the following changes is likely to occur?
   a. an increase in red wine prices
   b. an increase in white wine prices
   c. a decrease in brie cheese prices
   d. a decrease in grape prices
   e. an increase in beer prices

16. The difference between a change in quantity demanded and a change in demand is that
   a. a change in demand is in response to a price change
   b. a change in quantity demanded occurs when income changes
   c. the demand curve shifts when there is a change in quantity demanded but not when demand changes
   d. a change in quantity demanded results from a price change but other factors cause a change in demand
   e. a change in demand occurs after a change in supply
17. The main effect of Hurricane Katrina in September 2005 on the United States market for gasoline was to
   a. cause an increase in demand and price as people topped off the gas tanks and fled New Orleans
   b. increase supply as the price rose and production shifted to newly discovered oil fields
   c. decrease the supply and demand simultaneously leaving price unchanged
   d. increase the demand and price as people purchased gasoline in advance of anticipated price increases
   e. decrease supply and cause the price to rise from $2 per gallon to over $3 per gallon

18. Suppose the demand and supply for strawberries decrease, but the decrease in demand is major while the
decrease in supply is minor. Under these conditions
   a. price increases, and quantities demanded and supplied decrease
   b. price decreases, and quantities demanded and supplied increase
   c. price decreases, and quantities demanded and supplied decrease
   d. price increases, and quantities demanded and supplied increase
   e. price remains unchanged, but quantities demanded and supplied increase

19. Stan the news man on Channel 6 reports that the automobile prices were unchanged over the last year, yet
   automobile sales increased by 5 percent. In the same year, incomes rose by 2.5 percent. Based on this
   information, you could reasonably conclude that automobiles are
   a. substitute goods
   b. complementary goods
   c. normal goods
   d. priced below their equilibrium level
   e. priced above their equilibrium level

20. A change in quantity demanded of a good always results from a change in
   a. tastes
   b. the price of that good
   c. income
   d. the price of substitutes
   e. the price of complements

The following questions relate to the theoretical and applied perspectives in the text.

21. If the length of time from the market-day supply to the long-run supply is ordered from the shortest to the
    longest time span for the number of new Subway sandwich franchises, board-feet of walnut lumber,
teenage workers at amusement parks in the summer, and pounds of tomatoes at a summertime farmers’
market we would have
   a. pounds of tomatoes, teenage workers, Subway franchises, walnut lumber
   b. teenage workers, Subway franchises, walnut lumber, pounds of tomatoes
   c. Subway franchises, walnut lumber pounds of tomatoes
   d. teenage workers, pounds of tomatoes, Subway franchises, walnut lumber
   e. pounds of tomatoes, teenage workers, Subway franchises, walnut lumber

22. The best explanation for the surge in demand for bottled water is a change in
   a. income
   b. tastes
   c. expectations about future prices
   d. the prices of related goods
   e. population
THE BASICS

Fill in the Blanks

1. From the shortest to the longest, the time periods in which we consider supply are ____________________, ________________, and ________________________.

2. Pairs of goods for which a price increase in one causes an increase in the demand for the other are called ____________________________.

3. When the ___________________ is equal to the __________________, the price is an ________________ price.

4. Price serves as a ___________________ mechanism by removing from the market those who are ____________________________ to purchase the good.

5. The market demand for a good is calculated by ___________________ all of the ___________________ demand curves of consumers in the market.

Discussion Questions

1. Richard III was willing to exchange his kingdom for a horse. What was the opportunity cost of his having a horse?

2. What is the difference between a change in quantity demanded and a change in demand?

3. Contrast market-day supply, short-run supply, and long-run supply. Why does the nature of supply depend so much on the length of the time period being considered?
4. Would the following events cause a change in demand or a change in quantity demanded in the market for automobiles? Explain.
   
a. A limit is placed on the number of cars that can be imported from Japan.
   
b. Malaysia becomes a major new exporter of cars to the United States.
   
c. Congress passes a big income tax increase in an attempt to deal with the deficit.
   
d. A report is issued suggesting that air travel has become much less safe in recent years.
   
e. The legal driving age is lowered to 15.

Problems

1. The following table shows the demand and supply schedules for an initial release of the first compact disc by the new female pop group from England, the Nice Girls.

<table>
<thead>
<tr>
<th>Price ($/CD)</th>
<th>Quantity Demanded (1,000s)</th>
<th>Quantity Supplied (1,000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>22</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>20</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>18</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>16</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>14</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>12</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>10</td>
<td>140</td>
<td>100</td>
</tr>
</tbody>
</table>
THE BASICS

a. Sketch a demand and supply diagram to represent the data from the table in the space below.

b. What time frame is represented by the supply curve you have drawn? How do you know?

c. What is the equilibrium price, quantity demanded, and quantity supplied?

d. At each price listed in the table, note whether an excess demand or supply exists and its magnitude.

e. Suppose that record executives had initially issued 120,000 compact discs for the Nice Girls’s first album? How would your answers to parts c and d change?

2. Draw the market-day, the short-run, and the long-run supply curves. Why do the slopes of these supply curves differ?
3. The graph below shows the market for British beef after the announcement that consumption of beef posed the risk of Mad Cow Disease. The demand curve shifts to the left, from D to D'. Explain in detail how the market adjusts from a price of $6 per pound to $4 per pound as a result of the shift in demand.

![Demand and Supply Diagram]

**Everyday Applications**

A fairly painless way to become better acquainted with the business world is to watch Nightly Business Report a few nights a week on your local PBS station. It's usually on in the early evening. Check your local listings. As you watch the show, keep in mind that a separate market exists for every stock and bond discussed. We’ll present more detail on stocks and bonds in Chapter 7. For now, it’s enough to know that the prices that you hear quoted on the show are set by the interaction of demand and supply, just as has been discussed in this chapter. Listen to the discussion of the “most active” stocks — those whose prices have changed most dramatically. Typically, something has happened in these markets to make the stock more or less attractive. Think about how various factors shift the demand and supply curves for stocks and bonds to change their prices.
The Christmas shopping season begins the day after Thanksgiving (“Black Friday” to some) and ends with the closing of shops and malls on Christmas Eve. This period produces huge revenues for suppliers and retailers. You can explore the numbers at [http://www.census.gov/Press-Release/www/releases/archives/cb08ff-21.pdf](http://www.census.gov/Press-Release/www/releases/archives/cb08ff-21.pdf) which details the effects of the holiday season on consumption of various goods. What do you suppose happens to demand between Thanksgiving and Christmas? What happens to supply? What impact do these changes have on price in your experience?

### Answers to Questions

#### Key Terms Quiz

| a. 4 | f. 14 | k. 7 | p. 8 |
| b. 5 | g. 16 | l. 3 | q. 12 |
| c. 9 | h. 18 | m. 6 | r. 15 |
| d. 11 | i. 1 | n. 17 |
| e. 13 | j. 2 | o. 10 |

#### True-False Questions

1. False. The law of demand states that as price decreases, quantity demanded increases.
2. True
3. True
4. False. In the market-day period, quantity supplied is fixed no matter what happens to the price.
5. False. An increase in the number of suppliers in a market will cause the supply curve to shift to the right.
6. True
7. False. Market-day supply curves are vertical.
8. False. An increase in the price of a good will cause the quantity supplied to increase in the short run or long run.
9. False. An increase in supply will cause an excess supply at the original price, then competition between sellers leads to a lower equilibrium price.
10. True
11. True
12. False. If two goods are substitutes, then one can replace the other in consumption.
13. True
14. False. The long run is a time period long enough to allow producers to make any changes necessary to adjust the quantity supplied to price changes.
15. False. A change in demand is a shift in the entire demand curve due to a change in income, tastes, prices of other goods, expectations of price changes, and/or a change in the number of consumers. A change in quantity demanded is a movement along a demand curve due to a change in price.

#### Multiple-Choice Questions

1. b
2. b
3. a
4. c
5. b
6. c
7. c
8. d
9. d
10. b
11. d
12. c
13. e
14. a
15. a
16. d
17. e
18. c
19. c
20. B
21. d
22. b
Fill in the Blanks

1. the market day; the short run; the long run
2. substitutes
3. quantity demanded; quantity supplied; equilibrium
4. rationing; less willing
5. summing; individual

Discussion Questions

1. If Richard III was willing to give up his kingdom for a horse, then the opportunity cost of his having a horse was his kingdom. Remember that opportunity cost represents what we are willing to sacrifice in order to have something or do something. Prices and opportunity costs are linked in this way. The price that Richard III was willing to pay for a horse was his kingdom.

2. A change in quantity demanded is always the result of a change in the price of the good. When the price changes, there is a movement along a specific demand curve between the two prices. On the other hand, when demand changes, it is due to a change in income, tastes, prices of other goods, expectations about future prices, and/or the number of consumers in the market. A change in demand results in a shift in the demand curve.

3. The market-day supply corresponds to the shortest time period a supplier faces. In fact, it is so short that production cannot be adjusted at all in response to price changes. The short-run supply allows the supplier to change the quantities of some (but not all) resources used in production. The long-run supply is a time period long enough to allow for changes in the quantities of all resources used in production. The market-day supply curve is drawn as a vertical line at the quantity that is put on the market and can’t be changed. The short-run and the long-run supply curves are drawn as upward sloping so that as price increases, the quantity supplied increases. However, the long-run supply curve is flatter than the short-run supply curve because in the long run a producer can make greater adjustments to the resources used in production; hence, for any price change, the change in output will be greater in the long run than in the short run.

4. a. A limit on the number of cars imported from Japan will cause the supply curve for automobiles to shift to the left; therefore, the quantity demanded of cars will decrease.

b. If Malaysia becomes a major new exporter of cars to the United States, then the supply of cars will increase, and the quantity demanded of cars will increase as the price falls.

c. A big tax increase will decrease consumers’ after-tax incomes; therefore, the demand for cars will decrease.

d. If air travel is reported to have become much less safe, then tastes for automobiles will change and the demand for cars will increase.

e. If the legal driving age is lowered to 15, then the number of consumers of cars will increase and the demand for cars will increase.

Problems

1. a. See the diagram on the following page. Note that the units on the quantity axis are 1,000s of CDs.
b. The supply curve shown above is a market-day supply because it is drawn vertically at the level of output equal to 100,000 compact discs. This output cannot be changed on the market day no matter what happens to price.

c. At a price equal to $14 per CD, the quantity demanded equals the quantity supplied at 100,000 compact discs.

d. When the price is $24 per disc, the excess supply is 100,000.
   When the price is $22 per disc, the excess supply is 80,000.
   When the price is $20 per disc, the excess supply is 60,000.
   When the price is $18 per disc, the excess supply is 40,000.
   When the price is $16 per disc, the excess supply is 20,000.
   When the price is $12 per disc, the excess demand is 20,000.
   When the price is $10 per disc, the excess demand is 40,000.

e. If 120,000 compact discs had been issued initially, the market-day supply would shift to the right by 20,000. The new equilibrium price would be equal to $12 per disc. Excess supply at each price would increase by 20,000 until a price of $10 per disc was reached where the excess demand would be 20,000 discs.

2. The market-day supply curve is drawn as a vertical line at the output level that is given. The short-run supply curve has a positive slope, as does the long-run supply curve, but the short-run supply curve is steeper. The slopes of these curves differ because they reflect the different abilities of producers to alter resources devoted to production in response to price changes in different time periods. In the market day, the amount of resources devoted to production cannot be changed, no matter what the price change is. In the short run, some resources devoted to production can be changed, but not all of them. In the long run, the producer can change the level of all the resources devoted to production in response to price changes.

3. The announcement that consumption of British beef might lead to a risk of contracting Mad Cow Disease caused a decrease in demand for British beef due to a change in tastes. The demand curve shifted to the left, and, at the original price of $6 per pound, an excess supply of beef existed. Beef producers competed with one another to lower the price in order to eliminate the excess supply. As price fell, quantity demanded increased along D’ and quantity supplied decreased along the supply curve until the new equilibrium price of $4 was reached. At $4 per pound, the quantity of beef demanded along D’ equals the quantity of beef supplied.
APPENDIX

APPLICATIONS OF SUPPLY AND DEMAND

Appendix in a Nutshell

These applications of supply and demand analysis move from an examination of one child’s desire for a puppy whose price is beyond the child’s means — a sad situation for the child, but hardly a tragedy — to consideration of some unique markets where the pure market outcome would be ethically intolerable to many people. For example, consider the market for Seeing Eye dogs. Although the market price for Seeing Eye dogs is $25,000, a price too high for all but a handful of the blind people who need them, donations to suppliers of Seeing Eye dogs permit them to supply 1,000s of dogs at the more affordable $100 per dog price.

Supply and demand analysis can be used to examine the market for organ transplants as well. Although the market price for, say, a human kidney is extremely high, perhaps $140,000, the National Transplant Organ Act of 1984 prohibited the private sale of organs. All transplant organs must come from voluntary donors so that, in effect, hospitals become the suppliers of organs and they charge what it costs to harvest the organ from a donor. The problem that has arisen with this system is a chronic excess demand for transplant organs. Price cannot play its rationing function in this market, so other rationing mechanisms take its place such as age, urgency, or geography.

Scalper’s market is the only key term presented in this appendix. In a scalper’s market, a good is resold at a price higher than the original or official published price. Scalper’s markets are common sights at many prominent sporting events and at sold-out concerts. These markets operate according to the same principles of supply and demand as any other markets. On the supply side of the market are those who are willing to sell their tickets to a scalper rather than attend the event and on the demand side are individuals who are willing to pay for the tickets in the scalper’s market. But beware! Though scalper’s markets seem like ordinary free markets, they are illegal in most cities. Cincinnati is one of the few cities in the United States that permits tickets for various events to be resold for a profit.

Discussion Questions

1. How does normative economic analysis enter into our examination of the market for Seeing Eye dogs and transplant organs? In your answer, be careful to distinguish between positive analysis in these markets that focuses on questions about what is and normative analysis that focuses on what ought to be.

2. Should people be allowed to offer their organs for sale in a free market? Refer to panel c in Exhibit A3 as you think about how to answer this question.
Problems

1. a. Tina Turner recently played to a sold-out audience at the Wright State University Nutter Center Arena on what is being billed as her farewell tour. Would it be in Tina’s interest to call the tour a farewell tour even though she might change her mind in a few years and tour again? What impact would the news have on prices in the scalper’s market? How would sellers in the scalper’s market respond?

b. Suppose the official price for tickets is $60. The table below depicts the scalper’s market for tickets to the Tina Turner show. The willingness to sell their $60 tickets is shown in the quantity supplied column in the table. The willingness of fans to buy those tickets is shown in the quantity demanded column. How much will scalpers be paid for their $60 tickets? How many tickets are “scalped” (sold) at this price?

<table>
<thead>
<tr>
<th>Price</th>
<th>Quantity Supplied</th>
<th>Quantity Demanded</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100</td>
<td>300</td>
<td>900</td>
</tr>
<tr>
<td>$120</td>
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<td>700</td>
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<td>$140</td>
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<tr>
<td>$180</td>
<td>700</td>
<td>100</td>
</tr>
</tbody>
</table>

c. Suppose that two days before the show, there is a report that Tina Turner has a bad cold and sore throat. She’s performing, but not at her peak. As a result, more people are willing to part with their
$60 tickets so that at each price level, 200 more tickets are offered. Fill in this quantity supplied below. On the demand side of the market, 100 fewer tickets are being purchased at each price level on the news of Tina’s cold. Fill in the new figures for quantity demanded in the table. What price are scalpers getting for their tickets now and how many are sold?

<table>
<thead>
<tr>
<th>Price</th>
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<th>Quantity Demanded</th>
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<tbody>
<tr>
<td>$100</td>
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<tr>
<td>$180</td>
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Answers to Questions for the Appendix

Discussion Questions

1. In the case of the Seeing Eye dog, positive economic analysis shows us that the price of a dog is extremely high — $25,000. The $25,000 price is a reflection of the high opportunity cost associated with producing these extraordinary dogs. Enormous amounts of training and care go into producing the dogs. Normative economic analysis applied to this problem suggests that the $25,000 price, which would put the dogs beyond the financial reach of many blind people who need them, is ethically inappropriate. The market outcome needn’t be the end of the story. Suppliers of seeing eye dogs and others with an interest in the well-being of blind persons solicit donations and supply the dogs for the nominal $100 price.

The case of transplant organs is quite different. Although positive analysis shows that the market for human kidneys might generate a price as high as $140,000 for a potential donor, the government has made the normative decision that the private sale of organs should be prohibited. Therefore, hospitals become suppliers of transplant organs on a not-for-profit basis. The cost of transplant organs then becomes the cost of harvesting them from donors. The price of the transplant organs is thus reduced, however, chronic excess demand at the lower price may be a problem.

2. Exhibit A3, panel c in the text depicts organ-for-a-price supply curves. If the supply curve for kidneys sold in the market looks like line abc, then the organ-for-a-price plan might seem like a good idea. A small increase in the price leads to a relatively large increase in the quantity supplied. However, if the supply curve appears like the steeper line abd, then fewer kidneys will be donated at a much higher price of $60,000. The worst case scenario in this example is line aa’e. In this situation, non-paid donors reduce the number of kidneys that they supply by 5,000 and the price goes up to $70,000. The total quantity of kidneys supplied at this price drops to 24,000. The organ-for-a-price program looks less appealing in the cases of the steep supply curves.

Problems

1. a. The demand for tickets will increase because this is the farewell tour. Should she decide to make a comeback, the fans will forgive her for tricking them the time before. The price of tickets in the scalper’s market will increase due to the increase in the demand for tickets to a sold-out show. As a result of the increase in demand and increase in price, the quantity of tickets supplied in the scalper’s
market will increase.

b. The price of the tickets is $140 and 500 tickets are traded at this price.

c. The completed table is shown below.

<table>
<thead>
<tr>
<th>Price</th>
<th>Quantity Supplied</th>
<th>Quantity Demanded</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100</td>
<td>500</td>
<td>800</td>
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<tr>
<td>$120</td>
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<tr>
<td>$160</td>
<td>800</td>
<td>200</td>
</tr>
<tr>
<td>$180</td>
<td>900</td>
<td>0</td>
</tr>
</tbody>
</table>

The equilibrium price decreases to $120 and the number of tickets traded in 600.
Homework Questions

True-False Questions — If a statement is false, explain why.

1. If the quantity demanded for a good is equal to the quantity supplied, then price is the equilibrium price. (T/F)

2. During the market day, it is possible to adjust some but not all resources in response to price changes. (T/F)

3. The demand for inferior goods increases as price decreases. (T/F)

4. If both demand and supply decrease but supply decreases by proportionately more than demand, then the equilibrium price will decrease. (T/F)

5. Innovation causes supply curves to shift to the right. (T/F)

Multiple-Choice Questions

1. Suppose you and your roommate are driving to Columbus for an overnight visit. On the way you suggest stopping for gas but your roommate says there is enough to make the one-way trip and suggests filling up the next day. The price of gasoline has been falling all week. Your roommate likely believes that
   a. her income will rise
   b. her taste for gasoline will be stronger the next day
   c. she expects the price of gas to keep falling
   d. consumers will drop out of the market so the price will fall
   e. more gasoline stations are slated to open overnight

2. If both the demand and supply for steel decrease we can be sure that the equilibrium
   a. price will increase
   b. price will decrease
   c. price will stay the same
   d. quantity will decrease
   e. quantity will increase

3. Which of the following best explains why the price of many goods are decreasing in the current economic slump, yet sales are decreasing too?
   a. demand curves have a positive slope during recessions
   b. innovations have caused price and sales to decline
   c. incomes have fallen
   d. population has grown
   e. people expect prices to begin rising soon

4. The short run is a time period long enough for
   a. all resources used in production to be adjusted in response to price changes
   b. some, but not all, resources used in production to be adjusted in response to price changes
   c. any adjustment in the use of resources to be made in response to price changes
   d. innovation to occur in response to price changes
   e. demand to either increase or decrease in response to price changes
5. If the price of chicken increases, then the demand for hamburger will likely _______________, whereas if the price of chicken increases, then the demand for noodles will likely _______________
   a. increase; decrease
   b. increase; increase
   c. decrease; increase
   d. decrease; decrease
   e. remain unchanged; remain unchanged

**Discussion Questions/Problems**

1. Use graphs and words to explain the market day supply, short-run supply, and long-run supply.

2. a. Think of your favorite good. What was the price of this good the last time you purchased it? Sketch a graph to show the supply and demand for this good with the price the last time you purchased it shown as the equilibrium price.

b. On your graph, show what happens when the demand for the good increases. How will the price change? How will the quantity produced change? What might cause an increase in demand for your favorite good?