Chapter 3
Market Demand, Supply, and Elasticity

After reading chapter 3, MARKET DEMAND, SUPPLY, AND ELASTICITY, you should be able to:

- Discuss the Law of Demand and draw a Demand Curve.
- Distinguish between a Change in Demand and a Change in Quantity Demanded.
- List and explain the factors that will shift a demand curve.
- Explain the Law of Supply and draw a Supply Curve.
- Distinguish between a Change in Supply and a Change in Quantity Supplied.
- List and explain the factors that will shift a supply curve.
- Use demand and supply curves to determine the equilibrium price and quantity of a good.
- Use demand and supply curves to show the effect changes in supply and/or demand have on the price and quantity of a good.
- Define Price Elasticity of Demand and Supply and list factors that help determine the magnitude of these elasticities.

## Outline

I. Demand and the Demand Curve
   A) The Demand for a good is the amount people are prepared to buy with their income and at prevailing prices.
   B) The Law of Demand states that, ceteris paribus, there is a negative relationship between the price of a good and the quantity demanded.
      1. Ceteris paribus is a Latin phrase meaning that nothing else changes.
   C) The Law of Demand results from two effects:
      1. The Substitution Effect: people increase their quantity demanded for products with lower relative prices.
2. The **Income Effect**: as a product’s price falls, the purchasing power of consumers’ income increases, which generally motivates people to raise their purchases of goods.

D) The **Demand Curve**, illustrated above, shows the quantities of a good demanded at different prices. The negative slope of the demand curve shows that the quantity demanded falls when the price rises. Moving along a demand curve all other factors that affect demand, beside price, are held constant.

E) When there is a change in any factor that affects the demand, other than the price of the good, the entire demand curve shifts. These factors are:

1. **Prices of related goods**: If the demand for a good rises (falls) when the price of a related product rises, the two goods are **Substitutes** (**Complements**).
2. **Income**: If the demand for a good increases (falls) when consumers’ incomes rise, the good is a **Normal** (**Inferior**) good.
3. **Preferences**: Preferences are people’s tastes for different goods without regard to the prices of the goods.
4. **The number of buyers**: If the number of potential buyers increases, the demand for the good rises.
5. **Expectations**: If people think the price of the good will be higher in the future, they increase their current demand for the good to take advantage of the current relatively low price.

F) An **Increase** (or **Decrease**) in **Demand** refers to a shift in the entire demand curve. Whenever there is a change in any factor increasing the demand for a good, aside from the price of the good itself, the demand curve shifts to the right and there has been an increase in demand.

G) An **Increase** (or **Decrease**) in **Quantity Demanded** refers to a movement along a demand curve. When the price of the good decreases, there is an increase in the quantity demanded of the good.
II. Supply and the Supply Curve

A) The **Quantity Supplied** of a good is the amount producers are willing to sell at a given relative price. As the price of a good increases, quantity supplied increases.

B) The **Supply Curve**, illustrated above, shows the quantities of a good supplied at different prices. The positive slope of the supply curve indicates that higher prices result in an increase in the quantity supplied.

C) Along a particular supply curve all factors that affect the supply, other than the product’s price, are held constant. When these other influences change, the supply curve shifts. Some of these factors are:

1. **Prices of other goods**: An increase in the price of another product causes producers to reduce the supply of goods whose prices have not risen.
2. **Prices of inputs**: If the costs of producing a commodity rise, firms decrease the amount supplied at each potential price of the good.
3. **Technology**: As technological knowledge advances, firms are able to produce more at each potential price.
4. **The number of sellers**: If the number of sellers increases, the supply of the good rises.

D) An **Increase (or Decrease) in Supply** refers to a shift in the entire supply curve. Whenever there is a change in any factor that increases the supply of a good, other than a change in the good’s price, the supply curve shifts to the right, yielding an increase in supply.

E) An **Increase (or Decrease) in Quantity Supplied** refers to a movement along a supply curve. When the price of the good increases there is an increase in the quantity supplied.
III. Equilibrium: Supply and Demand Together

A) The **Equilibrium Price** is the price at which the quantity demanded by buyers just equals the quantity supplied by sellers. This is where the supply and demand curves intersect, as shown above where the equilibrium price is \( P \) and the quantity \( Q \).

B) When the prevailing price is less than the equilibrium price the quantity demanded is greater than the quantity supplied and there is a **Shortage**. When the prevailing price is greater than the equilibrium price the quantity supplied is greater than the quantity demanded and there is a **Surplus**.

C) There is a tendency for the market to move toward the equilibrium price. For instance, if there is a shortage, the price will rise. Likewise, if there is a surplus the price will fall.

D) Once at the equilibrium price, there is no tendency for the price to change.

IV. Changes in Equilibrium

A) If the demand for a good shifts to the right, the equilibrium price and quantity rise. If the demand for a good shifts to the left, the equilibrium price and quantity fall.

B) If the supply of a good shifts to the right, the equilibrium price falls and equilibrium quantity rises. If the supply of a good shifts to the left, the equilibrium price rises and equilibrium quantity falls.

C) If both demand and supply increase (decrease) the equilibrium quantity rises (falls) but the price is indeterminate. If demand and supply shift in opposite directions, the equilibrium price will either rise or fall but the equilibrium quantity is indeterminate.

V. Price Elasticity

A) The **Price Elasticity of Demand** (or **Supply**) measures how responsive quantity demand (or supply) for a good is to changes in its price.

B) The price elasticity of demand (or supply) is defined as the percentage change in quantity demanded or supplied divided by the percentage change in price. The price elasticity of demand is negative, but the negative sign is ignored by taking the absolute value.

1. If the elasticity exceeds one, it is called **Elastic**.
2. If the elasticity equals one, it is called **Unit Elastic**.
3. If the elasticity is less than one, it is called **Inelastic**.
C) Goods with few substitutes or that take up a small fraction of a consumer’s budget tend to have inelastic demands.

D) The elasticity of both demand and supply increase as people have more time to adjust to changes in the good’s price.

E) The more inelastic the supply (demand) curve, the greater the effect on price and the smaller the effect on quantity of a shift in the demand (supply) curve.

■ Review Questions

True/False

*If the statement is correct, write true in the space provided; if it is wrong, write false. Below the question give a short statement that supports your answer.*

_____ 1. The market demand curve shows the different prices sellers demand so that they will supply different amounts of the good.

_____ 2. If the demand curve shifts to the right, at the initial equilibrium price there is a shortage of the good.

_____ 3. Along a demand curve, price and quantity demanded are negatively related.

_____ 4. The larger the fraction of a consumer’s income spent on a good, the more inelastic the demand for the good.

_____ 5. The larger the price elasticity of supply, the more responsive is the percentage change in quantity supplied to percentage changes in price.

_____ 6. A shift in the supply curve changes the equilibrium price and/or equilibrium quantity of the good.

_____ 7. Demand increases when the demand curve shifts to the right.

_____ 8. If the price of a good rises, the demand for a complementary product increases.

_____ 9. Hot dogs are substitutes for hot dog buns.

_____ 10. If people think the relative price of a good will rise in the future, the current demand for the good falls.

_____ 11. Anything that shifts the demand curve for a good also tends to shift the product’s supply curve.
12. If the price elasticity of demand equals 3, demand is elastic.

13. If the price of inputs rises, there is a reduction in the supply of the good.

Multiple Choice Questions

Circle the letter corresponding to the correct answer.

1. “Demand” refers to
   (a) the amount of a good people would take if it were free.
   (b) the amount of a good people would want if they had unlimited income.
   (c) something ambiguous, because it has no precise definition.
   (d) the amount of a commodity firms will supply for people to buy.
   (e) the amount of a good people are prepared to buy, taking account of the good’s price and their limited incomes.

2. Suppose imported and domestic cars are substitutes. If the price of imported cars rises, the equilibrium price of domestic cars will _________ and the equilibrium quantity produced will _________.
   (a) fall; fall
   (b) fall; rise
   (c) rise; fall
   (d) rise; rise
   (e) rise; change in an ambiguous manner

3. Factors that explain the negative relationship in the law of demand are
   (a) income and consumer effects.
   (b) the substitution effect and the income effect.
   (c) the principle of substitution and the principle of demand.
   (d) the income effect and the effect of more buyers in the market.
   (e) none of the above.

4. A shift to the right in the demand curve for shoes could be the result of
   (a) an increase in the price of shoes.
   (b) a fad during which it became fashionable to go barefoot.
   (c) an increase in consumers’ incomes if shoes are a normal good.
   (d) the belief import quotas on shoes will be removed in the future, thereby causing a large fall in the price of shoes in the future.
   (e) None of the above.

5. An increase in the price of a good causes
   (a) an increase in the demand for the good.
   (b) a decrease in the demand for the good.
   (c) a decrease in the quantity demanded of the good.
   (d) an increase in the supply of the good.
   (e) a decrease in the quantity supplied of the good.
6. Which of the following would cause an increase in the supply of tires?
   (a) an increase in the demand for tires.
   (b) a decrease in the demand for tires.
   (c) an increase in the price of rubber used to manufacture tires.
   (d) a revolutionary new method of production that allows twice as many tires to be produced from the same amount of rubber.
   (e) government imposition of quotas that exclude producers from the market.

7. A factor that causes the demand curve for a good to shift to the right also causes
   (a) the supply curve of the good to shift to the right.
   (b) the supply curve of the good to shift to the left.
   (c) no shift in the supply curve.
   (d) the demand curve to shift to the left.
   (e) none of the above, because there is no general relationship.

8. Presume there is another baby boom, so that the number of babies born dramatically increases. This will _________ the price of diapers and _________ quantity produced.
   (a) lower; lower
   (b) lower; raise
   (c) raise; lower
   (d) raise; raise
   (e) raise; not change

9. Supply curves do not shift if there is a change in the
   (a) number of sellers of the good.
   (b) technology used to produce the good.
   (c) price of the good.
   (d) price of resources used to produce the good.
   (e) price of other goods.

10. If the government limits the amount of lamb that can be imported into the country, the price of lamb will _________, and the quantity of lamb consumed will _________.
    (a) fall; fall
    (b) fall; rise
    (c) rise; fall
    (d) fall; fall
    (e) rise; change in an ambiguous direction

11. As more industrial robots are installed in television assembly lines, firms are able to produce more televisions at lower cost. This causes the equilibrium price to _________ and quantity of televisions to _________.
    (a) fall; fall
    (b) fall; rise
    (c) rise; fall
    (d) rise; rise
    (e) change, but we cannot predict whether they will rise or fall
12. If two goods are substitutes, an increase in the price of one causes
   (a) no change in the other product’s demand curve.
   (b) an ambiguous change in the other good’s demand curve.
   (c) a shift to the left in the other good’s demand curve.
   (d) a decrease in demand for the other good.
   (e) a shift to the right in the other good’s demand curve.

13. Which of the following increases the elasticity of demand?
   (a) the absence of substitutes for the good.
   (b) when only a small portion of the consumers’ budgets are spent on the good.
   (c) allowing consumers only a short period of time to react to changes in the good’s price.
   (d) all of the above.
   (e) none of the above.

14. Historically, governments have taxed goods and services that:
   (a) have elastic demand curves
   (b) have elastic supply curves
   (c) having a high demand
   (d) have inelastic demand curves
   (e) none of the above

**Essay Questions**

*Write a short essay answering each question.*

1. (a) Draw a demand curve for corn.
   (b) Assuming corn is a normal good, in a separate diagram from part a, show what happens to the demand curve if people’s incomes increase.
   (c) In another separate diagram, show what happens to the demand curve if there is a drought in the corn growing areas.

2. (a) Draw a supply curve for corn.
   (b) Assuming corn is a normal good, in a separate diagram from part a, show what happens to the supply curve if people’s incomes increase.
   (c) In another separate diagram, show what happens to the supply curve if there is a drought in the corn growing areas.

3. Draw a standard supply and demand diagram. Indicate the equilibrium price and quantity. Show what happens to the equilibrium price and quantity if demand falls.

4. Fuel oil and solar water heaters are substitutes. Illustrate in a diagram what happens to the demand for solar water heaters when the price of fuel oil falls. How does the fall in the price of oil affect the price and quantity of solar water heaters?

5. Assume that teenagers’ preferences switch from skateboarding toward video games. Using two supply and demand diagrams (one for skateboards and another for video games) illustrate what happens to the equilibrium relative price and quantity of these items. Relate this to Adam Smith’s notion of the invisible hand.
6. Which of the following are likely to be normal goods or inferior goods?
   (a) Used cars
   (b) Hamburger to a poor person
   (c) Hamburger to a wealthy person
   (d) Large screen televisions
   (e) Personal computers

7. Write a paragraph detailing the differences between a change in demand and a change in the quantity demanded. Tell what factors can cause each change.

8. If a 4 percent increase in the price of a good increases the quantity supplied by 8 percent, what is the elasticity of supply? If a 5 percent decrease in the price of a good causes a 10 percent increase in the quantity demanded of the good, what is the elasticity of demand?

9. “The supply and demand model is not very useful. After all, it predicts that if the demand for a good drops, the price of the good falls. But how often do we ever see a price falling?” Comment on this.

10. Use your knowledge of elasticity to analyze the public-health and revenue effects of a $2-per-pack increase in the price of cigarettes.

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### Answers to Review Questions

**True/False**

1. False. The market demand curve shows the amounts of the good demanders are willing to buy at all different, possible prices.

2. True. When demand exceeds supply, the price rises as buyers offer to pay higher prices so they can get more of the good. This moves the price toward its equilibrium level.

3. True. The negative relationship reflects the law of demand.

4. False. Just the opposite is correct. The smaller the fraction of income spent on a good, the more inelastic is its demand.

5. True. This is what it means when the price elasticity of supply increases: supply has become more responsive to price.

6. True. If the demand curve has the typical downward slope, both the equilibrium price and quantity change.

7. True. When demand decreases, the demand curve shifts back, to the left.

8. False. The definition of complementary goods is that an increase in the price of one good lowers the demand for the other.

9. False. These goods are complements. An increase in the price of hot dogs lowers the demand for hot dog buns.

10. False. The current demand rises as people try to buy more of the good now in order to beat the expected price increase.
11. False. It is very important to realize that most factors shift either the supply or demand curve but do not shift both.

12. True. Whenever the price elasticity of demand exceeds one, demand is price elastic.

13. True. This means the supply curve shifts back, to the left.

**Multiple Choice Questions**

1. (e) This is the definition of demand. Notice how it is different from the meaning of wants.

2. (d) These changes result because the increase in price of imported cars increases the demand for domestic cars. This is illustrated above, where the equilibrium price rises from \( P \) to \( P' \) and the quantity from \( Q \) to \( Q' \).

3. (b) The substitution effect is closely related to the principle of substitution.

4. (c) Answer (a) is incorrect because it causes an upward movement along the demand curve. Answers (b) and (d) cause the demand curve to shift to the left.

5. (c) The distinction between an increase (or decrease) in demand and an increase (or decrease) in quantity demanded is vital. Changes in the price of the good cause changes in its quantity demanded but not changes in demand.

6. (d) An improvement in technology causes the supply curve for a commodity to shift out, that is, causes an increase in supply.

7. (c) Factors that cause shifts in the demand curve have no direct effect on supply, so the supply curve does not shift.

8. (d) The baby boom shifts the demand curve for diapers to the right, resulting in an increase in both the equilibrium price and quantity.

9. (c) Changes in the price of the good cause changes in the quantity supplied of the good; that is, movements along the supply curve.

10. (c) This action decreases the supply of lamb, thereby shifting the supply curve to the left. The demand curve for lamb does not shift. This is illustrated above, where the price rises from \( P \) to \( P' \) and the quantity falls from \( Q \) to \( Q' \).

11. (b) The supply curve for televisions increases; that is, shifts to the right.

12. (e) This occurs because people want more of the second good to take the place of the product that has risen in price.

13. (e) The reverse of all the statements in parts (a) to (c) is correct.

14. (d) With inelastic demand, consumers will not cut back on purchases.
Essay Questions

1. (a) The demand for corn (like the demand for all goods) slopes down, indicating that a higher price reduces the quantity of corn demanded.

(b) The demand for a normal good increases when income increases. Hence, as illustrated, the demand for corn shifts to the right, indicating that at every possible price more corn is demanded when income is higher.

(c) The drought has no effect on the demand curve. As we will see in problem 2, the drought shifts only the supply curve. It is crucial to understand that most factors influencing the supply and demand in a market shift either the supply curve or the demand curve but not both.
2. (a) The supply curve for corn (like virtually all supply curves) slopes up, indicating that more corn will be supplied the higher is the (relative) price of corn.

(b) The increase in income does not shift the supply curve; as we saw above in question 1, it shifts the demand curve but there is no direct effect on the supply curve.
(c) The drought shifts the supply curve to the left, indicating that the drought reduces the quantity of corn that will be supplied at every possible price. Comparing this answer with that for question 1, we again see that the factors that shift one curve do not shift the other.

3. \( Q \) is the equilibrium quantity; \( P \) is the equilibrium price. When demand falls or shifts to the left both the price and quantity fall to \( P' \) and \( Q' \).

4. When the price of a commodity falls, the demand for its substitutes also falls. Thus, a reduction in the price of fuel oil causes a decrease in the demand for solar water heaters. This is reflected in the figure from #3 by the shift to the left in the demand curve for solar water heaters, indicating that at every possible price people now demand fewer solar water heaters. Then, the price of solar water heaters falls, from \( P \) to \( P' \), and the quantity produced also falls, from \( Q \) to \( Q' \).
5. As teenagers switch their preferences, the demand for skateboards falls and the demand for video games rises. Thus, the relative price and quantity of skateboards falls while the relative price and quantity of video games rises. This is a good illustration of Adam Smith’s invisible hand in operation. The lower price for skateboard manufacturers causes them to reduce the quantity supplied of skateboards. The higher relative price for video games encourages video game manufacturers to increase the quantity of games they supply. As a result, consumers get what they desire: fewer skateboards and more video games.

6. (a) Inferior good; as people’s incomes rise, they tend to buy new cars rather than used.
(b) Normal good; as a poor person’s income rises he or she usually buys more meat and fewer meat substitutes, such as beans.
(c) Inferior good; this class of people tends to buy more steaks and less hamburger as their income rises. Items b and c point out the interesting fact that a product may be both a normal good and inferior good over different ranges of income.
(d) Normal good
(e) Normal good

7. A change in demand refers to the shifting of the entire demand curve. This can be distinguished from a change in the quantity demanded, which refers to a movement along a demand curve. A change in any factor that affects the demand for a good, other than its price, causes a change in demand. These include factors such as income, prices of related goods, preferences, the number of demanders, and the price expected to prevail in the future. Changes in the quantity demanded are caused by changes in the good’s price.

8. Since the elasticity of supply equals the percentage change in the quantity supplied divided by the percentage change in price, the elasticity of supply equals 2.0. In a similar fashion, the elasticity of demand equals the absolute value of the percentage change in the quantity demanded divided by the percentage change in price. So, the elasticity of demand equals 10 percent divided by 5 percent, or 2.0.
9. Don’t be mislead by this statement; it misses an important point about the prices used in the supply and demand model. The supply and demand model refers to relative prices; that is, the money price of one good relative to the money prices of other goods. Thus, the supply and demand model predicts that the relative price of a good falls if the demand for that product is reduced. It is very common to see decreases in the relative price of a good. After all, if the money price of a particular good rises by 5 percent while the money prices of all other products increase by 10 percent, the price of the good relative to other products has fallen.

10. The public-health effects depend on elasticity of demand. If there is a high elasticity of demand for cigarettes, smokers will cut back on smoking and public health will improve. The revenue effects will be the opposite. If there is a low elasticity of demand, smokers will continue to buy about the same number of packs as before, and government tax revenues will be large.

### Additional Questions.

1. Consider the market for pizza. The table below shows how many pizzas consumers demand and how many pizzas firms supply at different prices.

<table>
<thead>
<tr>
<th>Price</th>
<th>Quantity Demanded</th>
<th>Quantity Supplied</th>
</tr>
</thead>
<tbody>
<tr>
<td>$25</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>$20</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>$15</td>
<td>30</td>
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<tr>
<td>$10</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>$5</td>
<td>50</td>
<td>10</td>
</tr>
</tbody>
</table>

(a) Suppose the prevailing price is $20. Is there a surplus or shortage? By how much?
(b) Suppose the prevailing price is $5. Is there a surplus or shortage? By how much?
(c) What is the equilibrium price? How many pizzas are bought and sold at this price?

2. Consider the market for Toyotas and Fords sold in the United States. Using demand and supply analysis explain what will happen to the equilibrium price and quantity of both cars if the United States government imposes a tariff (tax) on Toyotas sold in the United States.

3. Suppose the price of gasoline increases by 10%. As a result the quantity of gasoline increases by 12%. What is the price elasticity of supply? Is the supply of gasoline elastic or inelastic?

4. Suppose the price of a Big Mac increases from $2.00 to $2.50. As a result the quantity of Big Macs demanded falls from 2 million to 1.8 million. Calculate the elasticity of demand for Big Macs.

5. On a demand and supply diagram, depict a situation in which the burden of a tax falls completely on consumers.
Answers

1.  (a) There is a surplus of 20 units.
    (b) There is a shortage of 40 units.
    (c) The equilibrium price is $15. At that price 30 pizzas are bought and sold.

2. The effect of the tariff is to reduce the supply of Toyotas in the United States. Therefore, the equilibrium price of a Toyota will rise and the equilibrium quantity of Toyotas will fall. Since the price of a Toyota has risen, the demand for Fords will increase since the two cars are substitutes. If the demand for Fords rises, the equilibrium price and quantity of Fords will increase.

3. The price elasticity of supply is 1.20 (12%/10%). Since it is greater than 1, supply is elastic.

4. The percent change in the quantity demanded is –10%. The percent change in the price of Big Mac’s is 25%. Therefore, the elasticity of demand is 0.40 (note that the answer is in absolute value).

5. In this case demand would be vertical—a perfectly inelastic demand. The tax will cause the supply curve to shift up by the amount of the tax. Since demand is vertical the price will increase by the full amount of the tax from $P_0$ to $P_1$. 

![Diagram showing supply and demand with and without tax](image-url)