

MODERN PRINCIPLES  
OF ECONOMICS

3

MODERN PRINCIPLES:  
MACROECONOMICS

3

## Supply and Demand

### Facts and Tools

1. When the price of a good increases the quantity demanded \_\_\_\_\_. When the price of a good decreases the quantity demanded \_\_\_\_\_.

**Solution** 1. When the price of a good increases the quantity demanded falls. When the price of a good decreases the quantity demanded rises.

2. When will people search harder for substitutes for oil: When the price of oil is high or when the price of oil is low?

**Solution** 2. When the price of oil is high, people will search harder for substitutes.

3. Your roommate just bought a Nike+ Sportwatch for \$160. She would have been willing to pay \$250 for a device that could improve her morning runs by measuring the speed, distance, and duration of the runs, and calculating the calories she burns. How much consumer surplus does your roommate enjoy from the Nike+ Sportwatch?

**Solution** 3. Roommate enjoys \$90 of consumer surplus from the Nike+ Sportwatch (willingness to pay minus price you actually paid equals consumer surplus:  $\$250 - \$160 = \$90$ ).

4. What are three things that you'll buy less of once you graduate from college and get a good job? What kinds of goods are these called?

**Solution** 4. There are many possible answers, including ramen noodles, macaroni and cheese, clothes from discount stores, low-quality used cars, and bus tickets. These are called "inferior goods."

5. When the price of MacBooks goes down, what probably happens to the computers?

**Solution** 5. The demand for laptops featuring Microsoft Windows probably falls—remember that this means the entire demand curve shifts down/to the left. The demand for laptops featuring Microsoft Windows falls when the price of MacBooks goes down because laptops featuring Microsoft Windows and MacBooks are substitutes. Thus, when the price of MacBooks goes down, people switch to buying more MacBooks and fewer laptops featuring Microsoft Windows at any particular price.

6. a. When the price of olive oil goes up, what probably happens to the demand for corn oil?  
b. When the price of petroleum goes up, what probably happens to the demand for natural gas? To the demand for coal? To the demand for solar power?

- Solution** 6. **a.** The demand for corn oil probably goes up—remember that this means the entire demand curve shifts up/to the right, the demand for corn oil rises when the price of olive oil goes up because olive oil and corn oil are substitutes.  
**b.** When the price of petroleum goes up, the demand for these substitutes also goes up.
7. **a.** If everyone thinks that the price of tomatoes will go up next week, what is likely to happen to demand for tomatoes today?  
**b.** If everyone thinks that the price of gasoline will go up next week, what is likely to happen to the demand for gasoline today? (Note: Is this change in demand caused by consumers or by gas station owners?)

- Solution** 7. **a.** Today's demand for tomatoes will probably rise, since people see "tomatoes today" and "tomatoes next week" as substitutes.  
**b.** It's the same question as 7a: So gas demand probably rises. This rise in demand is caused by consumers, since consumers create demand, not the gas station owners.
8. Along a supply curve, if the price of oil falls, what will happen to the quantity of oil supplied? Why?

- Solution** 8. As the price of oil falls, it will drop below the cost of production of the highest cost producers, such as those developing Canada's tar sands. Thus, as the price falls the high-cost producers will stop producing thereby reducing the quantity supplied.
9. If the price of cars falls, are carmakers likely to make more or fewer cars, according to the supply curve? (Notice that the "person on the street" often thinks the opposite is true!)

- Solution** 9. If the price of cars falls but the technology for making cars stays the same, carmakers are likely to produce fewer cars. This is because at a lower price, the only factories that will stay open are the ones that are most efficient at producing cars. The person on the street often thinks that if the price falls, businesses will have to make more cars in order to earn the same amount of total revenue, but this logic is wrong in most cases. Rational business owners care about profits (total revenue minus costs) not total revenue.
10. When is a pharmaceutical business more likely to hire highly educated, cutting-edge workers and use new, experimental research methods: When the business expects the price of its new drug to be low or when it expects the price to be high?

- Solution** 10. A pharmaceutical business will invest more in research, including hiring the very best researchers, when they expect new drug prices to be higher.
11. Imagine that a technological innovation reduces the costs of producing high-quality steel. What happens to the supply curve for steel?

- Solution** 11. The supply of steel will increase. Lower costs shift the supply curve down and to the right.

12. When oil companies expect the price of oil to be higher next year, what happens to the supply of oil today?

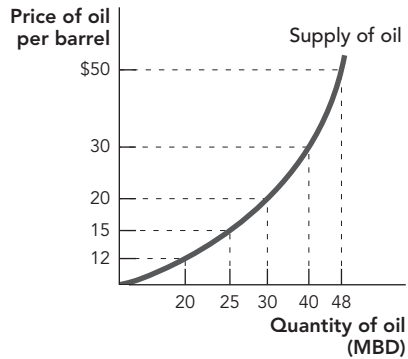
- Solution** 12. When they expect the price to rise in the future, they cut supply today. "Oil now" and "oil next year" are substitutes in production so when the price of oil is expected to be high next year firms will devote fewer resources to producing oil this year and more to producing oil next year.

13. Do taxes usually increase the supply of a good or reduce the supply?

- Solution** 13. To a firm, taxes are equivalent to higher costs which shifts the supply curve up and to the left. In other words, higher taxes cause supply to fall.

## Thinking and Problem Solving

1. Consider the following supply curve for oil. Note that MBD stands for “millions of barrels per day,” the usual way people talk about the supply of oil:



- a. Based on this supply curve, fill in the table:

Price	Quantity Supplied
\$12	
	40

- b. If the price for a barrel of oil was \$15, how much oil would oil suppliers be willing to supply?  
 c. What is the lowest price at which suppliers of oil would be willing to supply 20 MBD?

- Solution** 1. a.

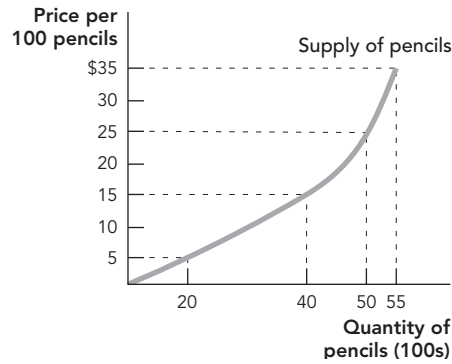
Price	Quantity Supplied
\$12	20
\$15	25
\$20	30
\$30	40
\$50	48

- b. 25 MBD  
 c. \$12 per barrel
2. From the following table of prices per 100 pencils and quantities supplied (in hundreds of pencils), draw the supply curve for pencils:

Price	Quantity Supplied
\$5	20
\$15	40
\$25	50
\$35	55

**Solution**

2.

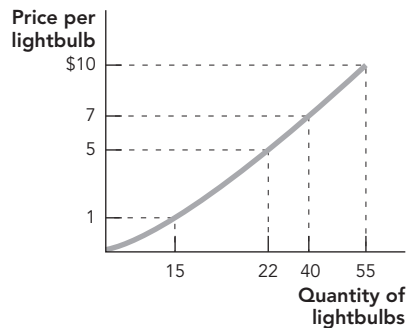


3. Suppose LightBright and Bulbs4You were the only two suppliers of 60-watt lightbulbs in Springfield. Draw the supply curve for the 60-watt lightbulb industry in Springfield from the following tables for the two companies. To create this “light bulb industry supply curve,” note that you’ll add up the *total* number of bulbs that the industry will supply at a price of \$1 (15 bulbs), and then do the same for the prices of \$5, \$7, and \$10:

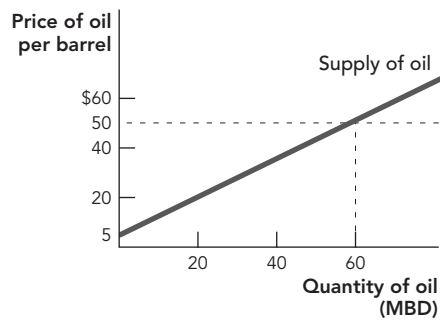
Price	Bulbs Supplied by LightBright	Bulbs Supplied by Bulbs4You
\$1	10	5
\$5	15	7
\$7	25	15
\$10	35	20

**Solution**

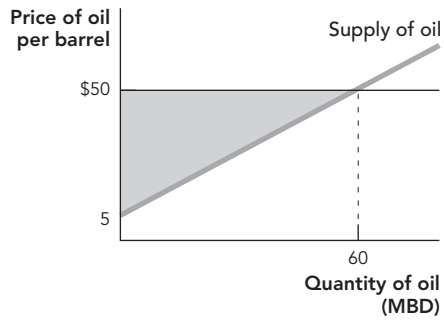
3. The key is to look at a certain price, like \$5, and add how much would be produced by each firm at that price.



4. Using the following diagram, identify and calculate total producer surplus if the price of oil is \$50 per barrel. Recall that for a triangle,  $\text{area} = (1/2) \times \text{base} \times \text{height}$ . (You never thought you’d use that equation unless you became an engineer, did you?)

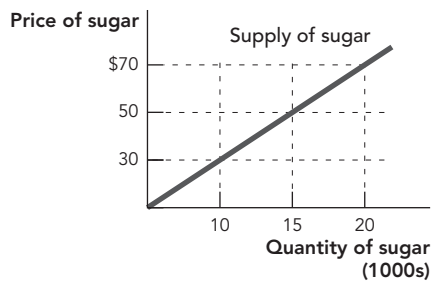


**Solution** 4. Producer surplus:  $0.5(45)(60) = \$1,350$



5. In Sucrosia, the supply curve for sugar is as follows:

Price (per 100 pound bag)	Quantity
\$30	10,000
\$50	15,000
\$70	20,000



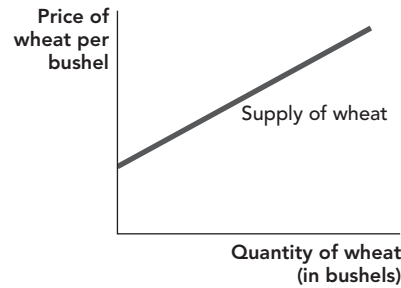
Under pressure from nutrition activists, the government decides to tax sugar producers with a \$5 tax per 100 pound bag. Using the figure above, draw the new supply curve. After the tax is enacted, what price will bring forth quantities of 10,000? 15,000? 20,000? Give your answers in the table.

Price (per 100 pound bag)	Quantity
	10,000
	15,000
	20,000

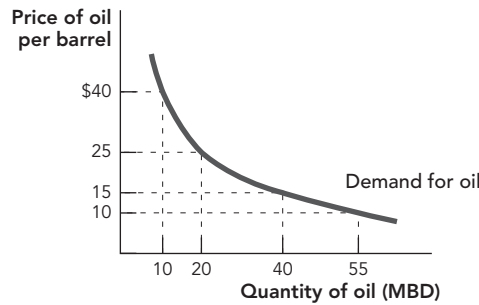
**Solution** 5. The new supply curve will be \$5 higher than the old one.

Price (per 100 pound bag)	Quantity
\$35	10,000
\$55	15,000
\$75	20,000

6. Consider the farmers talked about in the chapter who have land that is suitable for growing both wheat and soybeans. Suppose all farmers are currently farming wheat but the price of soybeans rises dramatically.
- Does the opportunity cost of producing wheat rise or fall?
  - Does this shift the supply curve for wheat (as in one of the panels of Figure 3.11), or is it a movement along a fixed supply curve? What direction is this shift or movement? Illustrate your answer on the following figure:



- Solution** 6. a. When the price of soybeans rises, the opportunity cost of growing wheat also rises. When you have a great alternative, that means you have a high opportunity cost of sticking with the same old, same old.
- b. This reduces the supply of wheat. Higher opportunity costs suggests some producers will invariably shift to producing soybeans, thereby reducing total wheat supply.
7. Consider the following demand curve for oil:



- a. Using this demand curve, fill in the following table:

Price	Quantity Demanded
	55
\$25	

- If the price was \$10, how much oil would be demanded?
- What is the maximum price (per barrel) that demanders will pay for 20 million barrels of oil?

- Solution** 7. a.

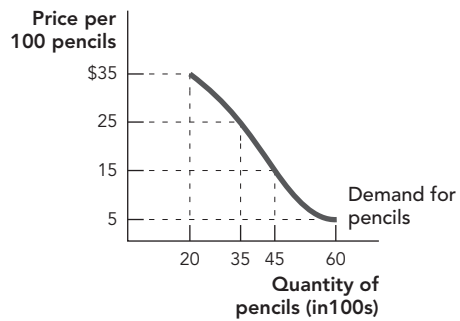
Price	Quantity Demanded
\$10	55
\$15	40
\$25	20
\$40	10

- b. 55 MBD  
 c. \$25 per barrel
8. From the following chart, draw the demand curve for pencils (in hundreds):

Price	Quantity Demanded (100s)
\$5	60
\$15	45
\$25	35
\$35	20

**Solution**

8.



9. If the price of glass dramatically increases, what are we likely to see a lot less of: glass windows or glass bottles? Why?

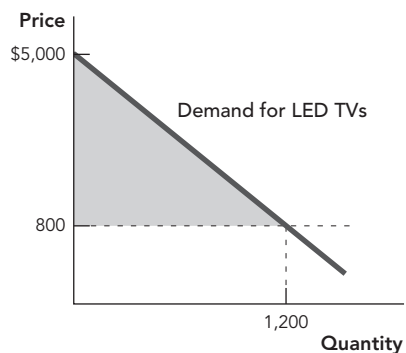
**Solution**

9.

We'll probably see a big decline in glass bottles, but only a small decline in glass windows. Plastic is a good substitute for glass in the manufacturing of bottles, but not as good a substitute for windows. Thus, we would probably see a greater percentage decline in glass bottles than in windows.

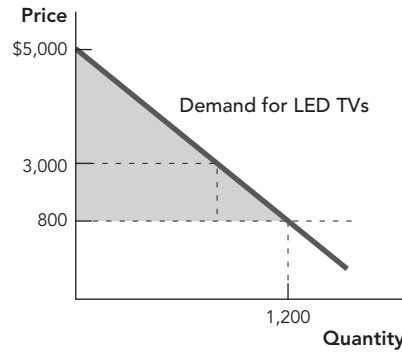
10. Let's think about the demand for LED TVs.

- a. If the price for a 60-inch LED TV is \$800, and Newhart would be willing to pay \$3,000, what is Newhart's consumer surplus?
- b. Consider the following figure for the total demand for LED TVs. At \$800 per TV, 1,200 TVs were demanded, what would be the total consumer surplus? Calculate the total, and identify it on the diagram.

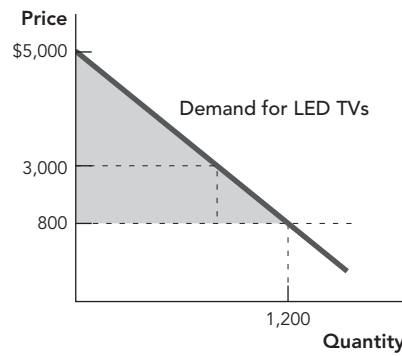


- c. Where is Newhart in the figure?

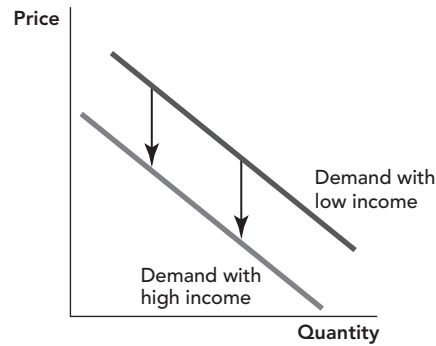
- Solution 10.** a. Individual consumer surplus: \$2200  
 b. Total consumer surplus: \$1,794,000: It's  $1/2 \times \text{base} \times \text{height}$ .



- c. The short, vertical dashed line below reflects Newhart's consumer surplus: \$2200, which is  $\$3000 - \$800$ .



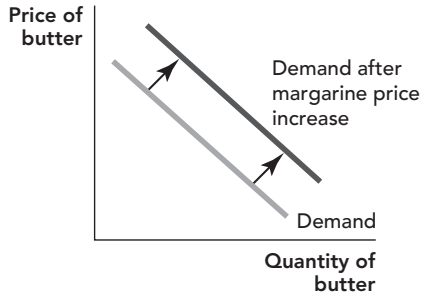
11. If income increases and the demand for good X shifts as shown in the figure, then is good X a normal or inferior good? Give an example of a good like good X.



- Solution 11.** Inferior. The shift is a fall in demand, and when a rise in income causes a fall in demand, that's the definition of an "inferior good." Ramen noodles, secondhand clothes, and Hamburger Helper are all examples of inferior goods for most people in rich countries like the United States. (Note: All of these goods might be normal goods for people living in the world's poorest countries.)
12. Assume that butter and margarine are substitutes. What will happen to the demand curve for butter if the price of margarine increases? Why?



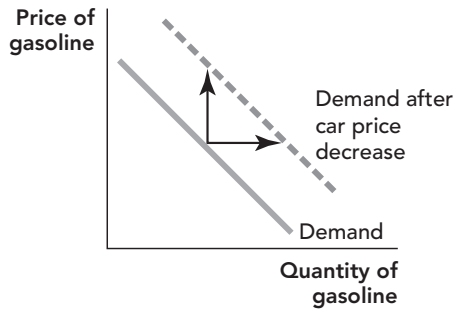
**Solution 12.** Demand increases, that is the curve shifts to right/up.



Price of margarine goes up → Less margarine consumed → Increased demand for butter

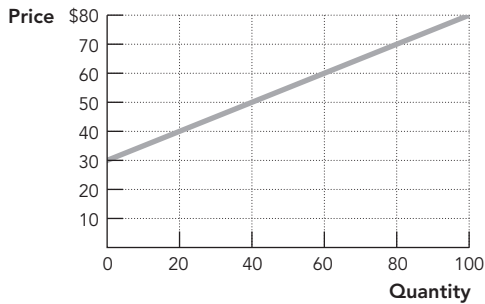
13. Cars and gasoline are complements. What will happen to the demand curve for gasoline if the price of cars decreases? Why? (Hint: What happens to the quantity demanded of cars?)

**Solution 13.**



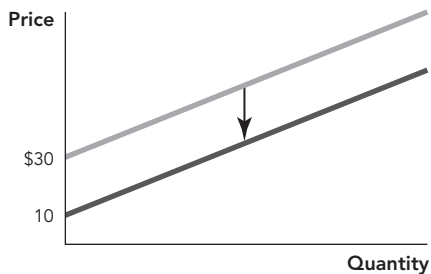
Price of cars down → More consumption of cars → More consumption of gas

14. Suppose that the supply curve for solar panels is as shown in the diagram:



The government decides that it would like to increase the quantity of solar panels in use, so it offers a \$20 subsidy per panel to producers. Draw the new supply curve. (Hint: Remember our analysis of how a tax affects supply, as shown in Figure 3.12, and bear in mind that a subsidy can be thought of as a “negative tax.”)

**Solution 14.** The \$20 subsidy shifts the supply curve down at each point along the curve by exactly \$20 so the old and new supply curves look like this:



## Challenges

1. Michael is an economist. He loves being an economist so much that he would do it for a living even if he only earned \$30,000 per year. Instead, he earns \$80,000 per year. (Note: This is the average salary of new economists with a PhD degree.) How much producer surplus does Michael enjoy?

**Solution** 1. He enjoys \$50,000 of producer surplus.

2. The economist Bryan Caplan recently found a pair of \$10 arch supports that saved him from the pain of major foot surgery. As he stated on his blog (econlog.econlib.org), he would have been willing to pay \$100,000 to fix his foot problem, but instead he paid only a few dollars.
  - a. How much consumer surplus did Bryan enjoy from this purchase?
  - b. If the sales tax was 5 percent on this product, how much revenue did the government raise when Bryan bought his arch supports?
  - c. If the government could have taxed Bryan based on his *willingness to pay* rather than on how much he *actually* paid, how much sales tax would Bryan have had to pay?

**Solution** 2. a. \$99,990  
 b. 50 cents  
 c. \$5,000

3. For most young people, working full time and going to school are substitutes: You tend to do one or the other. When it's tough to find a job, does that raise the opportunity cost of going to college or does it lower it? When it's tough to find a job, does the demand for college rise or fall?

**Solution** 3. When it's tough to find a job, the opportunity cost of going to college is lower. The demand for college typically rises as a result.

4. What should happen to the “demand for speed” (measured by the average speed on highways) once airbags are included on cars?

**Solution** 4. Airbags decrease the costs associated with driving fast by decreasing injuries caused by high-speed crashes, thus the demand for speed increases, raising the average speed. As a result, safety devices such as airbags and mandatory seatbelts tend to increase the safety of car drivers and passengers (although not as much as if there were no increase in speed), but decrease the safety of pedestrians.

5. The industrial areas in northeast Washington, DC, were relatively dangerous in the 1980s. Over the last two decades, the area has become a safer place to work (although there are still seven times more violent crimes per person in these areas compared with another DC neighborhood, Georgetown). When an area becomes a safer place to work, what probably happens to the “supply of labor” in that area?

**Solution** 5. A decrease in crime reduces the costs of supplying labor in crime prone neighborhoods thus the supply curve for labor shifts down and to the right, i.e. there is an increase in labor supply.