
CHAPTER 2 | Trade-offs, Comparative Advantage, and the Market System

Brief Chapter Summary and Learning Objectives

2.1 Production Possibilities Frontiers and Opportunity Costs

Use a production possibilities frontier to analyze opportunity costs and trade-offs.

- The model of the production possibilities frontier is used to analyze the opportunity costs and trade-offs that individuals, firms, and countries face.

2.2 Comparative Advantage and Trade

Describe comparative advantage and explain how it serves as the basis for trade.

- Comparative advantage is the ability of an individual, firm, or country to produce a good or service at a lower opportunity cost than other producers.

2.3 The Market System

Explain the basics of how a market system works.

- Markets enable buyers and sellers of goods and services to come together to trade.

Key Terms

Absolute advantage The ability of an individual, a firm, or a country to produce more of a good or service than competitors, using the same amount of resources.

Circular-flow diagram A model that illustrates how participants in markets are linked.

Comparative advantage The ability of an individual, a firm, or a country to produce a good or service at a lower opportunity cost than competitors.

Economic growth The ability of an economy to produce increasing quantities of goods and services.

Entrepreneur Someone who operates a business, bringing together the factors of production—labor, capital, and natural resources—to produce goods or services.

Factor market A market for the factors of production, such as labor, capital, natural resources, and entrepreneurial ability.

Factors of production Labor, capital, natural resources, and other inputs used to make goods and services.

Free Market A market with few government restrictions on how a good or service can be produced or sold or on how a factor of production can be employed.

Market A group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade.

Opportunity cost The highest-valued alternative that must be given up to engage in an activity.

Product market A market for goods—such as computers—or services—such as medical treatment.

Production possibilities frontier (PPF) A curve showing the maximum attainable combinations of two goods that can be produced with available resources and current technology.

Property rights The rights individuals or businesses have to the exclusive use of their property, including the right to buy or sell it.

Scarcity A situation in which unlimited wants exceed the limited resources available to fulfill those wants.

Trade The act of buying and selling.

Chapter Outline

Elon Musk and Tesla Motors Face a Trade-Off

In 2019, Elon Musk, founder of Tesla Motors, hoped to sell his Model 3 automobile for \$35,000. In early 2021, however, the least-expensive version of that vehicle was \$37,990. The Model Y was even more expensive with a starting price of \$49,900. Musk and Tesla’s managers faced an important trade-off: Should the firm increase the resources—machinery, workers, and research and development work—devoted to the Model 3 and Model Y to bring its costs down so the firm could earn a profit at a lower price.

As Tesla dealt with the trade-offs involved in allocating resources among its models, the federal government was phasing out a tax credit of up to \$7,500 on the purchase of an electric car. The federal government faced its own trade-off: The tax revenue it gives up as a result of the tax credit isn’t available to fund other programs.

2.1

Production Possibilities Frontiers and Opportunity Costs

Learning Objective: Use a production possibilities frontier to analyze opportunity costs and trade-offs.

Scarcity is a situation in which unlimited wants exceed the limited resources available to fulfill those wants. Goods and services are scarce, as are the resources used to make goods and services.

A **production possibilities frontier (PPF)** is a curve showing the maximum attainable combinations of two goods that can be produced with available resources and current technology.

A. Graphing the Production Possibilities Frontier

All combinations of products on a production possibilities frontier are efficient because all available resources are being used. Combinations inside the frontier are inefficient because maximum output is not obtained from available resources. Points outside the frontier are unattainable given the firm’s current resources. **Opportunity cost** is the highest-valued alternative that must be given up to engage in an activity.

B. Increasing Marginal Opportunity Costs

A production possibilities frontier that is bowed outward illustrates increasing marginal opportunity costs, which occur because some workers, machines, and other resources are better suited to one use than to another. Increasing marginal opportunity costs illustrate an important concept: The more resources already devoted to any activity, the smaller the payoff to devoting additional resources to that activity.

C. Economic Growth

Economic growth is the ability of an economy to produce increasing quantities of goods and services. Economic growth can occur if more resources become available or if a technological advance makes resources more productive. Growth may lead to greater increases in production for one good than another.

2.2

Comparative Advantage and Trade

Learning Objective: Describe comparative advantage and explain how it serves as the basis for trade.

Trade is the act of buying and selling. Trade makes it possible for people to become better off by increasing both their production and their consumption.

A. Specialization and Gains from Trade

PPFs show the combinations of two goods that can be produced if no trade occurs. We can also use *PPFs* to show how someone can benefit from trade even if she is better than someone else at producing both goods.

B. Absolute Advantage versus Comparative Advantage

Absolute advantage is the ability of an individual, a firm, or a country to produce more of a good or service than competitors, using the same amount of resources. If the two individuals have different opportunity costs for producing two goods, each individual will have a comparative advantage in the production of one of the goods. **Comparative advantage** is the ability of an individual, a firm, or a country to produce a good or service at a lower opportunity cost than competitors. Comparing the possible combinations of production and consumption before and after specialization and trade occur proves that trade is mutually beneficial.

C. Comparative Advantage and the Gains from Trade

The basis for trade is comparative advantage, not absolute advantage. Individuals, firms, and countries are better off if they specialize in producing the goods and services for which they have a comparative advantage and obtain the other goods and services they need by trading.

Teaching Tips

A classic example of comparative advantage is the career of baseball legend Babe Ruth. Before he achieved his greatest fame as a home run hitter and outfielder with the New York Yankees, Ruth was a star pitcher with the Boston Red Sox. Ruth may have been the best left-handed pitcher in the American League during his years with Boston (1914–1919), but he was used more as an outfielder in his last two years with the team. In fact, he established a record for home runs in a season (29) in 1919. The Yankees acquired Ruth in 1920 and made him a full-time outfielder. The opportunity cost of this decision for the Yankees was the wins he could have earned as a pitcher. But because New York already had skilled pitchers, the opportunity cost of replacing him as a pitcher was lower than the cost of replacing Ruth as a hitter. No one else on the Yankees could have hit 54 home runs, Ruth's total in 1920; the next highest total on the Yankees was 11. It can be argued that Ruth had an absolute advantage as both a hitter and pitcher for the Yankees in 1920—but he had a comparative advantage only as a hitter.

2.3

The Market System

Learning Objective: Explain the basics of how a market system works.

In the United States and most other countries, trade is carried out in markets. A **market** is a group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade. A **product market** is a market for goods—such as computers—or services—such as medical treatment. A **factor market** is a market for the factors of production, such as labor, capital, natural resources, and entrepreneurial ability. **Factors of production** are labor, capital, natural resources, and other inputs used to make goods and services.

A. The Circular Flow of Income

A **circular-flow diagram** is a model that illustrates how participants in markets are linked. The diagram demonstrates the interaction between firms and households in both product and factor markets.

B. The Gains from Free Markets

A **free market** is a market with few government restrictions on how a good or service can be produced or sold or on how a factor of production can be employed. Adam Smith is considered the father of modern economics. His book, *An Inquiry into the Nature and Causes of the Wealth of Nations*, published in 1776, was an influential argument for the free market system.

C. The Market Mechanism

A key to understanding Adam Smith's argument is the assumption that individuals usually act in a rational, self-interested way. This assumption underlies nearly all economic analysis.

D. The Role of the Entrepreneur in the Market System

Entrepreneurs are an essential part of a market economy. An **entrepreneur** is someone who operates a business, bringing together the factors of production—labor, capital, and natural resources—to produce goods or services. Entrepreneurs often risk their own funds to start businesses and organize factors of production to produce those goods and services that consumers want.

E. The Legal Basis of a Successful Market System

The absence of government intervention is not enough for a market economy to work well. Government has to provide a legal environment that allows markets to operate efficiently. **Property rights** are the rights individuals or businesses have to the exclusive use of their property, including the right to buy or sell it. To protect intellectual property rights, the federal government grants patents to inventors. A patent grants the exclusive right to produce and sell a new product for 20 years from the date the patent is filed. Books, films, and software receive copyright protection. Under U.S. law, the creator of a book, film, or piece of music has the exclusive right to use the creation during the creator's lifetime. The creator's heirs retain this right for 70 years after the death of the creator.

Teaching Tips

To initiate class discussion regarding intellectual property rights, ask students these questions:

1. How many of you have downloaded music from the Internet?
2. Should the government have the right to grant exclusive rights to musicians and other artists to produce and sell their creative works?

3. Should the government fine or prosecute people who illegally obtain music, books, movies, and other creative works in violation of property rights laws?

Extra Solved Problem 2.3

Adam Smith's "Invisible Hand"

The late economist Alan Krueger argued that Adam Smith was concerned that the invisible hand would not function properly if merchants and manufacturers convinced the government to issue regulations to help them.

Source: Alan B. Krueger, "Rediscovering the Wealth of Nations," *New York Times*, August 16, 2001.

- a. What types of regulations might merchants and manufacturers seek from the government?
- b. How might these regulations prevent the invisible hand from working?

Solving the Problem

- Step 1:** **Review the chapter material.** This problem is about how goods and services are produced and sold and how factors of production are employed in a free market economic system as described by Adam Smith in *An Inquiry into the Nature and Causes of the Wealth of Nations*, so you may want to review the section "The Gains from Free Markets."
- Step 2:** **Answer part (a) by describing the economic system in place in Europe in 1776.** At the time, governments gave guilds—associations of producers—the authority to control production. The production controls limited the output of goods such as shoes and clothing, as well as the number of producers of these items. Limiting production and competition led to higher prices and fewer choices for consumers. Instead of catering to the wants of consumers, producers sought favors from government officials.
- Step 3:** **Answer part (b) by contrasting the behavior of merchants and manufacturers under a guild system and in a market system.** Because governments in a guild system gave producers the power to control production, producers did not have to respond to consumers' demands for better quality, greater variety, and lower prices. In a market system, producers who sell poor quality goods at high prices suffer economic losses; producers who provide better quality goods at low prices are rewarded with profits. Therefore, it is in the self-interest of producers to address consumer wants. This is how the invisible hand works in a free market economy but not in most of Europe in the eighteenth century.

Extra Analyze the Concept

An Elementary Case of Copyright

The U.S. Congress provides copyright protection to authors to give them an economic incentive to invest the time and effort required to write books. While a book is under copyright, only the author—or whoever the author sells the copyright to—can legally publish a paper or digital copy of the book. Once the copyright expires, however, the book enters the *public domain*, and anyone is free to publish

the book. Copies of classic books written in the 1800s, such as Mark Twain’s *Huckleberry Finn* and Charles Dickens’s *Oliver Twist*, are available from many publishers that do not have to pay a fee to the authors’ heirs.

Arthur Conan Doyle was a doctor in England when he published his first story featuring the detective Sherlock Holmes in 1887. Anyone who wants to publish any of the Sherlock Holmes stories that Doyle wrote from 1887 through the end of 1922 is free to do so. But the last 10 Sherlock Holmes stories that Doyle wrote from 1923 to 1927 remain under copyright protection. Doyle’s heirs argue that because the author continued to develop the personalities of Sherlock Holmes and his companion Dr. John Watson in the 10 stories that remain under copyright protection, the characters cannot be used in new books, films, or television shows without payment. Doyle’s heirs have asked anyone who wants to include Holmes in a new work to pay them a fee of \$5,000 per use.

The producers of two Sherlock Holmes films starring Robert Downey, Jr., and the producers of the television series *Sherlock*, starring Benedict Cumberbatch, and *Elementary*, starring Jonny Lee Miller, agreed to pay the fee, as have most authors of books using Holmes as a character. In 2011, when Leslie S. Klinger published *A Study in Sherlock*, a collection of new stories involving Sherlock Holmes, his publisher insisted that he pay the usual fee to Doyle’s descendants. But two years later, when Klinger decided to publish another collection, *In the Company of Sherlock Holmes*, he decided that rather than pay the fee he would sue Doyle’s descendants, hoping the federal courts would rule against their copyright claims.

Federal Appeals Judge Richard Posner—who is also an economist—eventually ruled in favor of Klinger. He argued that copyright law did not allow authors or their heirs to require fees for the use of characters from stories in the public domain. He also noted that, “the longer the copyright term is, the less public-domain material there will be and so the greater will be the cost of authorship, because authors will have to obtain licenses from copyright holders for more material.” As a result of this ruling, for the first time since 1887, anyone can use Sherlock Holmes as a character in a book, television show, or movie without having to pay a fee.

Sources: Jennifer Schuessler, “Appeals Court Affirms Sherlock Holmes Is in Public Domain,” *New York Times*, June 17, 2014; Jennifer Schuessler, “Conan Doyle Estate Told to Pay Legal Fees,” *New York Times*, August 5, 2014; Eriq Gardner, “Conan Doyle Estate Loses Appeal Over ‘Sherlock Holmes’ Rights,” *Hollywood Reporter*, June 16, 2014; and *Leslie S. Kling v. Conan Doyle Estate, Ltd.* (7th Cir. 2014), media.ca7.uscourts.gov.

Extra Analyze | Managers at Feeding America Use the Market Mechanism the Concept | to Reduce Hunger

Charitable giving doesn’t seem to have much to do with markets. When donors give money, clothing, or food to a charity, they typically don’t expect anything in exchange—beyond a possible tax deduction. In 1979, retired businessman John van Hengel started Feeding America. This charity collects donations of food from farmers, supermarkets, food processing plants, and governments and distributes the food to thousands of food pantries and food programs operated by churches, schools, and community centers around the country. These programs give the donated food away free or at a very low price to low-income families.

By 2004, Feeding America was providing 1.8 billion pounds of food per year to millions of low-income people, but the organization’s managers realized that they could serve even more people if they could operate more efficiently. In particular, the managers were concerned that food was sometimes not allocated in ways that were consistent with the needs of local food programs. For

example, potatoes might be shipped to food programs in Idaho—the country’s leading potato growing state—or milk might be shipped to food programs that lacked the refrigeration capacity to keep it fresh long enough to distribute. In 2005, Feeding America asked Canice Prendergast, Don Eisenstein, and Harry Davis, professors at the University of Chicago’s Booth School of Business, to design a more efficient way of allocating food to local food programs.

Feeding America had been allocating food by calculating how many low-income people lived in an area and then shipping a target number of pounds of food to food programs in the area. All food, whether fruit, bread, milk, or pasta, that weighed the same was treated the same in making allocations to local food programs. The food programs were not allowed to choose which foods they wanted to receive. Because Feeding America provided on average only about 20 percent of the total food donations local food programs received, it might ship food—for example, bread and breakfast cereal—the local program already had, while failing to ship food, such as fruits and vegetables, that the program needed.

The business professors advising Feeding American proposed changing the food allocation system to one that resembled a market. Each food program was given a number of “shares” that they could use in bidding against other food programs for the types of food that best met the needs of the low-income people using their program. In addition, any local program that had surplus food was allowed to sell it to other local programs in exchange for shares. Although this new system does not involve money, it operates like a market—in which consumers determine prices by competing against each other in buying goods. Goods for which consumers have a greater preference tend to have higher prices than goods for which consumers have a lesser preference; for instance, in supermarkets, organic produce often sells for a higher price than nonorganic produce. Similarly, food programs turned out to have a stronger preference for fresh fruits and vegetables than for pasta. Under the previous system, a pound of fresh fruit would have been treated the same as a pound of pasta in calculating how much food Feeding America would allocate to a local program. But when under the new system local food banks were allowed to bid for food with shares, the price of a pound of fruit or vegetables was 116 times higher than the price of a pound of pasta.

Because under the new system food is allocated in a way that more closely fits the needs of local food programs, Feeding America is able to provide food to thousands more low-income people than was possible under the old system. In addition, because less food is wasted, people and organizations have been willing to donate more food to the program. Finally, Feeding America’s managers have used the knowledge of which types of foods local food programs prefer to guide the types of food they ask companies to donate. For instance, in addition to fruits and vegetables, programs are willing to pay more shares for peanut butter and frozen chicken because these foods are easy to store. Even many critics of using a market mechanism to allocate food donations eventually embraced the system, including the director of one Michigan food program whose initial reaction was: “I am a socialist. That’s why I run a food bank. I don’t believe in markets.” The success of Feeding America’s revised procedures for allocating food donations shows how powerfully market mechanisms can increase efficiency and raise living standards.

Sources: Sendhil Mullainathan, “Sending Potatoes to Idaho? How the Free Market Can Fight Poverty,” *New York Times*, October 7, 2016; Canice Prendergast, “The Allocation of Food to Food Banks,” Working Paper, University of Chicago, Booth School of Business, October 11, 2016; Ray Fisman and Tim Sullivan, “The Invisible Helping Hand,” *slate.com*, June 7, 2016; and feedingamerica.org.

Extra Economics in Your Life & Career:***Economists Express Their Agreement on Free Trade***

During the summer of 2017, fifteen former leaders of the White House Council of Economic Advisors signed a letter to then President Trump urging him not to place tariffs on imports of steel into the United States. The letter notes that “Among us are Republicans and Democrats alike, and we have disagreements on a number of policy issues. But on some policies, there is near universal agreement. One such issue is the harm of imposing tariffs on steel imports.” Tariffs are taxes imposed by government on imports. Those who endorse tariffs and other barriers to free international trade believe that such barriers protect domestic industries and the jobs of their employees.

Questions: (a) Why do many economists, including those who have served for both Republican and Democratic administrations, support free trade policies and oppose tariffs and trade barriers even if these barriers are designed to protect domestic workers from losing their jobs? (b) What types of jobs would be most vulnerable to job losses due to competition from imports?

Answers: (a) As you learned in this chapter, countries are better off if they specialize in producing goods and services in which they have a comparative advantage and trading with other countries for other goods and services. Tariffs prevent countries from taking full advantage of the benefits from free trade. The argument that economists who have worked for both Democratic and Republican governments made is based on positive economic analysis (analysis concerned with what is) rather than normative analysis (analysis concerned with what ought to be). Ben Bernanke, former chair of the Federal Reserve Board, has cited a study that examined the effect of international trade on income in the United States since World War II: “... the increase in trade... has boosted U.S. annual incomes on the order of \$10,000 per household. The same study found that removing all remaining barriers to trade would raise incomes anywhere from \$4,000 to \$12,000 per household.”

(b) Another study cited by Bernanke found that the 21 occupations in the United States that were most vulnerable to imports from foreign firms were primarily for relatively low-wage positions. In general, the greater the skill requirements for the job you hold, the less vulnerable you will be to losing your job due to competition from imports.

Sources: Nick Timiraos, “Former White House Economists to Donald Trump: Don’t Impose Steel Tariffs,” *Wall Street Journal*, July 12, 2017; Ben Bernanke, “Embracing the Challenge of Free Trade: Competing and Prospering in a Global Economy,” The Federal Reserve Board, May 1, 2007.

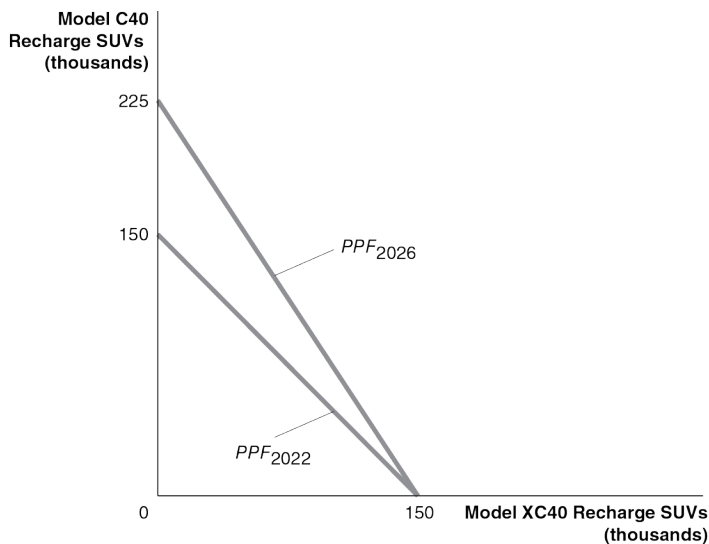
<https://www.federalreserve.gov/boarddocs/speeches/2007/20070501/default.htm>; and “Why Open Markets Matter,” <http://www.oecd.org/trade/understanding-the-global-trading-system/why-open-markets-matter/>

Solutions to End-of-Chapter Exercises

Answers to *Thinking Critically* Questions to accompany the *Inside Look* newspaper feature

1. In 2022, maximum production at Volvo is 150,000 C40 Recharge SUVs or 150,000 XC40 Recharge SUVs, so to gain 1 C40 Recharge SUV, 1 XC40 Recharge SUV must be given up. In 2026, maximum production is 225,000 C40 Recharge SUVs or 150,000 XC40 Recharge SUVs, so to gain 1 C40 Recharge SUV, two-thirds of a XC40 Recharge SUV must be given up. Therefore:

- The opportunity cost of 1 C40 Recharge in 2022 is 1 XC40 Recharge SUV
- The opportunity cost of 1 C40 Recharge SUV in 2026 is two-thirds of a XC40 Recharge SUV.



2. The production alternative of 100,000 C40 Recharge SUVs and 140,000 XC40 Recharge SUVs lies *outside* the 2026 production possibilities frontier (PPF_{2026}) and is therefore an unattainable production alternative. The PPF_{2026} represents maximum production in that year. According to the figure, the maximum number of total vehicles that can be produced in 2026 is 225,000. If Volvo filled the 100,000 C40 Recharge SUV orders, it would be able to produce only 125,000 XC40 Recharge SUVs. If Volvo filled the 140,000 XC40 Recharge SUV orders, the company would be able to produce only 85,000 C40 Recharge SUVs.

2.1

Production Possibilities Frontiers and Opportunity Costs

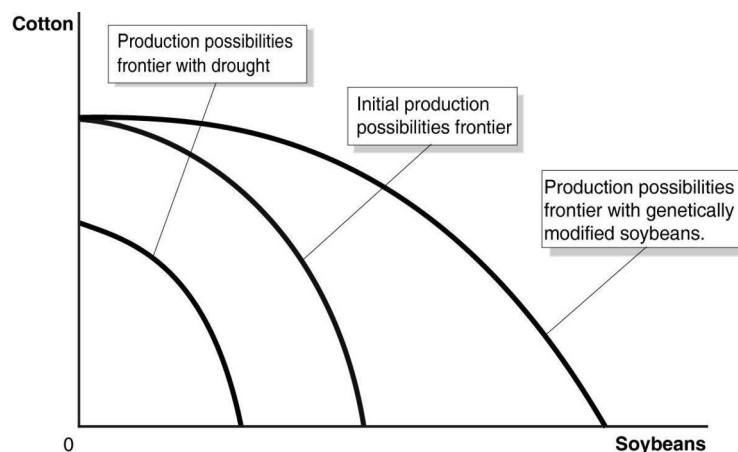
Learning Objective: Use a production possibilities frontier to analyze opportunity costs and trade-offs.

Review Questions

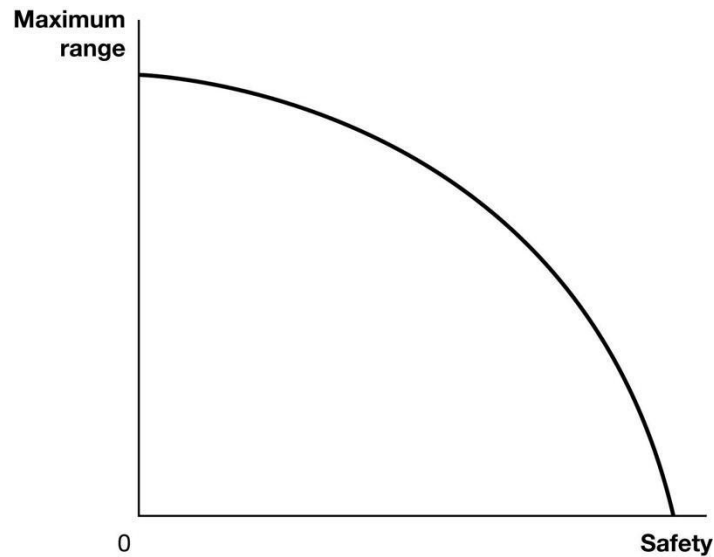
- 1.1 Scarcity is the situation in which wants exceed the limited resources available to fulfill those wants. There are some things that are available in such abundance that they exceed our wants. For example, for most people there is enough oxygen in the atmosphere that the amount they want to inhale would not exceed the available amount—so oxygen isn't scarce for them. Another example might be something undesirable, such as weeds in your garden.
- 1.2 The production possibilities frontier (*PPF*) is a curve showing all the attainable combinations of two products that can be produced with available resources and existing technology. Combinations of goods that are on the frontier are efficient because all available resources are being fully used, and the fewest possible resources are being used to produce a given amount of output. Points inside the *PPF* are inefficient because the maximum output is not being obtained from the available resources. A *PPF* will shift outward (to the right) if more resources become available for making the products or if technology improves so that firms can produce more output with the same amount of inputs.
- 1.3 Increasing marginal opportunity costs means that as more and more of a product is made, the opportunity cost of making each additional unit rises. This occurs because the first units of a good are produced with the resources that are best suited for making it, but as more and more of the good is produced, resources must be used that are better suited for producing something else. Increasing marginal opportunity costs imply that the production possibilities frontier (*PPF*) is bowed out—the slope of the *PPF* gets steeper and steeper as you move down the frontier.

Problems and Applications

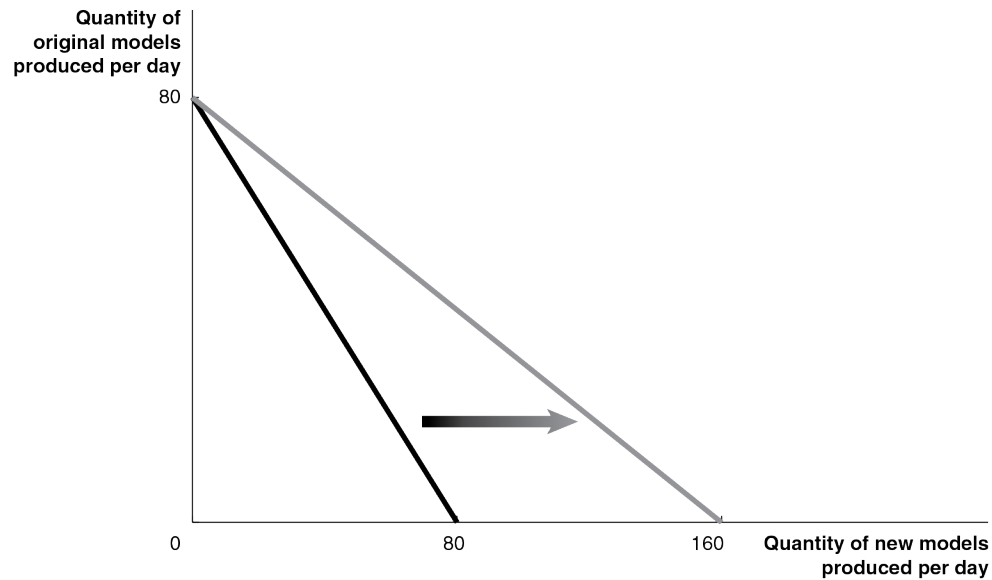
- 1.4
 - a. The production possibilities frontiers in the figure are bowed outward because of increasing marginal opportunity costs. The drought causes the production possibilities frontier to shift to the left (see the graph in part (b)).
 - b. The genetic modifications would increase the maximum soybean production, which we can show by shifting out where the *PPF* intersects the horizontal axis, but the maximum cotton production would be unchanged.



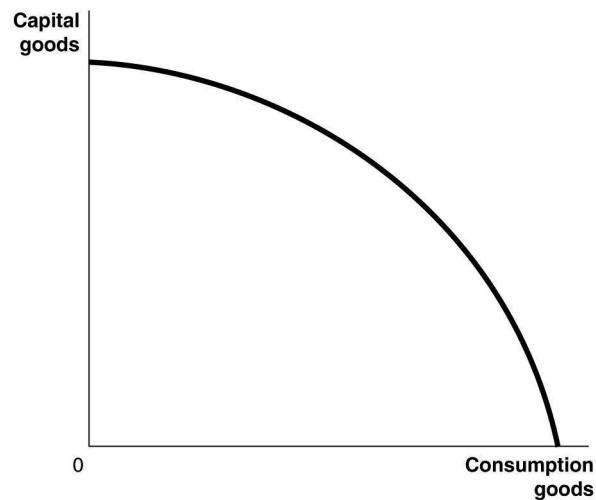
- 1.5** As shown in the following figure, increased safety will decrease the maximum range for one of Tesla's electric vehicles. Trade-offs can be between physical goods, such as cotton and soybeans in problem 1.4, or between the features of a product, like the maximum range and the safety of an electric vehicle.



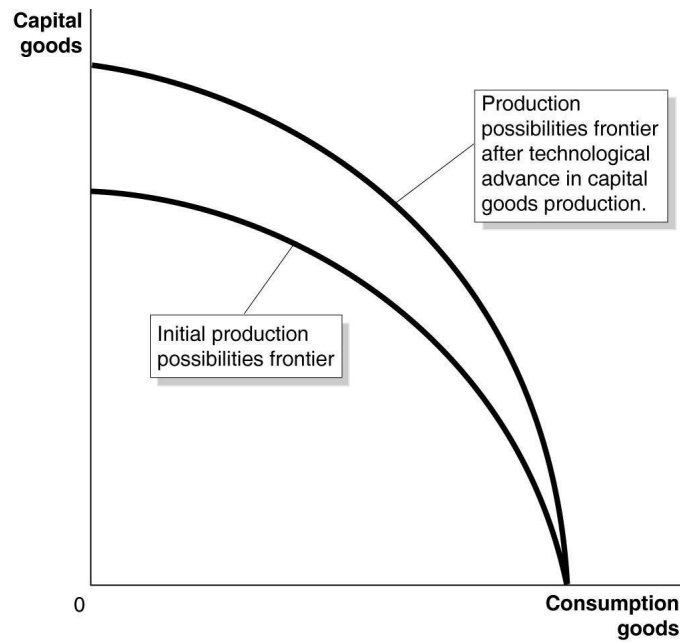
- 1.6**
- You should draw a figure like Figure 2.1 in the chapter that shows the trade-off Tesla faces between original models (Models S and X) and new models (Models 3 and Y). We can assume that the capacity in the Fremont factory is the same as the capacity assumed in Figure 2.1.
 - Because Tesla's factory in China produces only new models (Model 3 and Model Y) vehicles, its opening did not affect the quantity of original models the company produces. We can show this change on a production possibilities frontier (*PPF*) by keeping the maximum quantity of original models Tesla can produce per day fixed at 80, while pivoting the *PPF* to increase the maximum number of new model vehicles Tesla can produce per day. We don't know how many additional new models Tesla produces in its new China factory. If the China factory has the same capacity as the Fremont factory, then the maximum quantity of new models Tesla can produce per day will increase from 80 to 160.



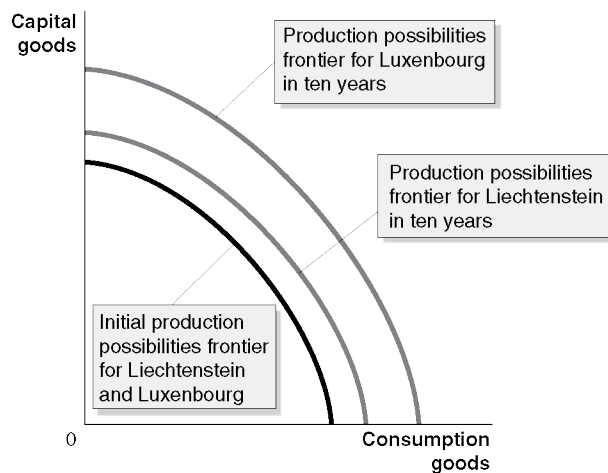
- 1.7 You could argue that the price you pay for a book is a close approximation to the opportunity cost of *buying* a book, but *consuming*—that is, reading—the book could require many hours of leisure time that you could be spending on some other activity. The time you spend reading a book always has an opportunity cost.
- 1.8 a. The production possibilities frontier will be bowed out like Figure 2.2 because some economic inputs are likely to be more productive when making capital goods, and other inputs are likely to be more productive when making consumption goods.



b.

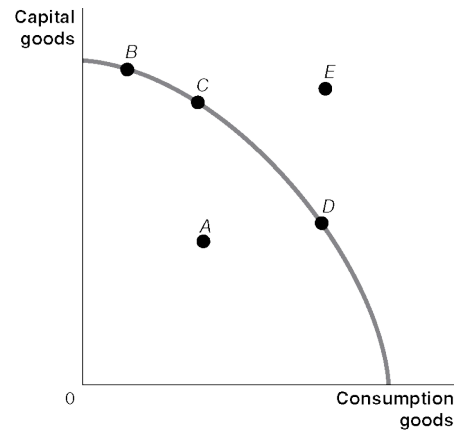


c. Luxembourg will have more capital goods, such as machinery, equipment, and robots, so it is likely to experience more rapid growth in the future than Liechtenstein.

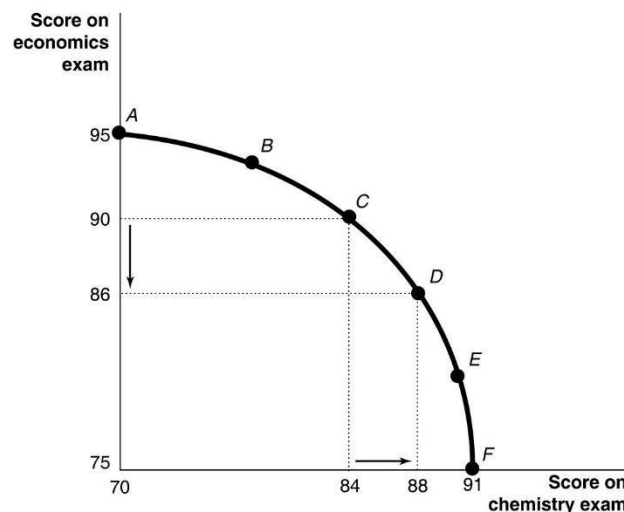


- 1.9
- a. Point *E* is outside the production possibilities frontier, so it is unattainable.
 - b. Points *B*, *C*, and *D* are on the production possibilities frontier, so they are efficient.
 - c. Point *A* is inside the production possibilities frontier, so it is inefficient.

- d. At point *B*, the country is devoting the most resources to producing capital goods, so production at this point is most likely to lead to the highest growth rate. The more capital goods the country produces, the greater the capacity of the country to produce goods and services in the future.



1.10 a.



- If you spend all 5 hours studying for your economics exam, you will score a 95 on the exam; therefore, your production possibilities frontier will intersect the vertical axis at 95. If you devote all 5 hours studying for your chemistry exam, you will score a 91 on the exam; therefore, your production possibilities frontier will intersect the horizontal axis at 91.
- b. The points for choices *C* and *D* can be plotted using information from the table given in the problem. Moving from choice *C* to choice *D* increases your chemistry score by 4 points but lowers your economics score by 4 points. Therefore, the opportunity cost of increasing your chemistry score by 4 points is the decline of 4 points in your economics score.
- c. Choice *A* might be sensible if the marginal benefits of doing well on the chemistry exam are low relative to the marginal benefits from doing well on the economics exam. For example, that choice might be sensible if: (1) you are majoring in economics and don't care much about chemistry; or (2) if you already have an A grade sewn up in chemistry, but the economics professor will replace a low exam grade with this exam grade.

- 1.11** a. By reducing firms' potential profits from selling new drugs and medical devices, price regulation may reduce the incentive firms have to devote resources to the research and development necessary to develop these products.
- b. From the point-of-view of the public, the opportunity cost of regulating the prices of pharmaceuticals and medical devices is the decline in the number of these products that firms will develop following the imposition of the price regulations. The public would be trading off lower prices today for less effective health care in the future. The presidential candidate may also want to consider whether implementing price regulations on pharmaceuticals and medical devices might lead Congress to impose price regulations on other goods and services. Doing so could interfere with the operation of the market system as described later in this chapter in Section 2.3.
- 1.12** State governments have limited budgets. Subsidies that state governments pay for prescription drugs under the Medicaid program use tax revenue that could otherwise be used to pay for other valuable goods and services, including highway and bridge repair and funding of schools. Nearly all state governments are required by their constitutions to balance their budgets. Therefore, increases in spending on one program require either a reduction in spending on other programs or an increase in taxes. Facing this trade-off, some states have subsidized expensive drugs only for patients with the most serious illnesses. How best to allocate a state government's limited resources is a normative issue and depends on how governors and state legislators evaluate the trade-offs involved.
- 1.13** Resources used to reduce pollution are not available for other uses, such as saving lives through medical research. It is therefore more ethical to take the opportunity cost of reducing pollution into account than to ignore the cost.
- 1.14** Economic systems that do not allow people to keep most of the output they produce do not provide much incentive for people to work hard. Unfortunately, experience has shown that people are more self-interested and less altruistic than would be necessary for the system used in the Land of Oz to work in the real world.

2.2**Comparative Advantage and Trade**

Learning Objective: Describe comparative advantage and explain how it serves as the basis for trade.

Review Questions

- 2.1** Absolute advantage is the ability of an individual, a firm, or a country to produce more of a good or service than competitors using the same amount of resources. Comparative advantage is the ability of an individual, a firm, or a country to produce a good or service at a lower opportunity cost than competitors. It is possible for a country to have a comparative advantage in producing a good even if another country has an absolute advantage in producing that good (and every other good). Unless the two countries have exactly the same opportunity costs of producing two goods—the same trade-off between the two goods—one country will have a comparative advantage in making one of the goods and the other country will have a comparative advantage in making the other good.
- 2.2** The basis for trade is comparative advantage. If each individual or country specializes in making the product for which it has a comparative advantage, trading makes each of them better off. Each

individual or country will be able to obtain the product made by its trading partner at a lower opportunity cost than it would be able to produce it without trade.

Problems and Applications

- 2.3** In the example illustrated in Figure 2.4, the opportunity cost of 1 pound of apples is 1 pound of cherries to you and 2 pounds of cherries to your neighbor. Any price of apples between 1 and 2 pounds of cherries will be a fair trading price. And, the price falls within this range because exchanging 10 pounds of apples for 15 pounds of cherries represents the same price as when exchanging 1 pound of apples for 1.5 pounds of cherries. We could take any other value in this range to complete the table. Let's take, for example, 1.25 pounds of cherries per pound of apples. We will keep the pounds of apples traded as before at 10. The completed table will now be:

TABLE 2.1: A Summary of the Gains from Trade

	You		Your Neighbor	
	Apples (pounds)	Cherries (pounds)	Apples (pounds)	Cherries (pounds)
Production <i>and</i> consumption <i>without</i> trade	8	12	9	42
Production <i>with</i> trade	20	0	0	60
Consumption <i>with</i> trade	10	$10 \times 1.25 = 12.5$	10	$60 - 12.5 = 47.5$
Gains from trade (increased consumption)	2	$12.5 - 12 = 0.5$	1	$47.5 - 42 = 5.5$

Note that both you and your neighbor are better off after trade than before trade. Note also that this rate of trading cherries for apples is better for your neighbor than the original rate of trading and worse for you.

- 2.4** As explained in this section of the chapter, when individuals, firms, or countries specialize in producing goods or services in which they have a comparative advantage, they are producing at the lowest cost. When McKenzie refers to goods that can be “made more cheaply abroad,” he means the goods are being produced in countries that have a comparative advantage in producing them. The goods that can be “made more cheaply at home” are the goods in which the home country has a comparative advantage. As this section of the chapter shows, when countries specialize in producing goods in which they have a comparative advantage and trade for goods in which other countries have a comparative advantage, the incomes of all countries can increase.
- 2.5**
- Canada has a comparative advantage in making boots. Canada's opportunity cost of making 1 boot is giving up 1 shirt. In the United States, the opportunity cost of making 1 boot is giving up 3 shirts. The United States has a comparative advantage in making shirts. In the United States, the opportunity cost of making one shirt is giving up 1/3 boot, but Canada's opportunity cost of making 1 shirt is 1 boot.
 - Neither country has an absolute advantage in making both goods. The United States has an absolute advantage in making shirts, but Canada has an absolute advantage in making boots. Remember that both countries have the same amount of resources. If each country puts all of its resources into making shirts, then the United States makes 12 shirts, but Canada makes only 6 shirts. If each country puts all of its resources into making boots, then Canada makes 6 boots, but the United States makes only 4 boots.
 - If each country specializes in the production of the good in which it has a comparative advantage and then trades with the other country, both will be better off. Let's use the case in which each country trades half of what it makes for half of what the other makes. The United States will specialize by making 12 shirts, and Canada will specialize by making 6 boots. Because each country gets half of the other country's production, they both end up with 6

shirts and 3 boots. They are better off than before trading because they end up with the same number of boots, but twice as many shirts. Other trades will also make them better off.

- 2.6**
- a. By writing “China is always better than Spain” at producing textiles, the columnist means that China has an absolute advantage in producing textiles.
 - b. Assuming that Spain has a comparative advantage in producing textiles (that is, it can produce textiles at a lower opportunity cost than China can), Spain can sell textiles to Chinese firms and consumers at a lower price than Chinese textile producers can charge even if China has an absolute advantage in producing textiles.
- 2.7**
- a. When the United Kingdom produces 1 more barrel of fish oil, it produces 1 less barrel of crude oil. When Norway produces 1 more barrel of fish oil, it produces 1 less barrel of crude oil. Therefore, neither country has a comparative advantage in either good. In both countries, the opportunity cost of 1 barrel of crude oil is 1 barrel of fish oil. Comparative advantage arises only if an individual, a firm, or a country has a lower opportunity cost of producing a good, but these two countries have the same opportunity cost. (Note, though, that the United Kingdom has an absolute advantage in producing both goods because it can produce more of each than can Norway using the same amounts of capital and labor.)
 - b. No, the countries can’t gain from trade. Trading across the border would result in the same trade-offs that can be made within each country.
- 2.8**
- a. When France produces 1 more bottle of wine, it produces 2 fewer pounds of cheese. When Germany produces 1 more bottle of wine, it produces 3 fewer pounds of cheese. Therefore, France’s opportunity cost of producing wine—2 pounds of cheese—is less than Germany’s—3 pounds of cheese. When Germany produces 1 more pound of cheese, it produces 0.33 fewer bottles of wine. When France produces 1 more pound of cheese, it produces 0.50 fewer bottles of wine. Therefore, Germany’s opportunity cost of producing cheese—0.33 bottles of wine—is less than that of France—0.50 bottles of wine. We can conclude that France has a comparative advantage in making wine and that Germany has a comparative advantage in making cheese.
 - b. We know that France should specialize where it has a comparative advantage and Germany should specialize where it has a comparative advantage. If both countries specialize, France will make 4 bottles of wine and 0 pounds of cheese, and Germany will make 0 bottles of wine and 15 pounds of cheese. After both countries specialize, France could then trade 3 bottles of wine to Germany in exchange for 7 pounds of cheese. France will have the same amount of wine as it initially had, but 1 more pound of cheese. Germany will have 3 bottles of wine and 8 pounds of cheese—that is, the same amount of wine, but 2 more pounds of cheese. Other mutually beneficial trades are possible.
- 2.9** No individual or a country can produce beyond its production possibilities frontier (*PPF*). The *PPF* shows the most that an individual or a country can produce for a given amount of resources and technology. Without trade, an individual or a country cannot consume beyond its *PPF*, but with specialization and trade each can consume beyond its *PPF*. We saw two examples in the chapter: In Figure 2.5, both you and your neighbor were able to consume beyond your *PPFs*. In Solved Problem 2.2, both Canada and the United States were able to consume beyond their *PPFs*.
- 2.10** Colombia could have a comparative advantage in producing coffee if Nicaragua has an even larger absolute advantage relative to Colombia at producing another product. If, for example, Nicaragua can produce four times more cashews than Colombia can using the same resources, then Colombia will have a comparative advantage in producing coffee.

- 2.11** Aaron Rogers and you are using absolute advantage, not comparative advantage, to decide what to do. Rogers has a comparative advantage at playing quarterback because even though he is five times better at selling Packers memorabilia than any other employee or player, he has an even larger absolute advantage in playing quarterback. You, as a creative and effective leader, have a comparative advantage in leading the organization. Your absolute advantage in leading is even larger than your absolute advantage in cleaning offices.
- 2.12** Falling transportation costs allowed people to trade more easily and to specialize on the basis of comparative advantage. If people were able to specialize, they would be more productive and, in turn, earn more income.
- 2.13** Importing only products that could not be produced here would result in the United States producing—rather than importing—many goods for which it does not have a comparative advantage. These products would be produced at a higher opportunity cost than if they had been imported. The policy would result in a lower standard of living in the United States.
- 2.14** Even though you are better at unloading the dishwasher, you might be even better relative to the other members of the household at other household chores. You have an absolute advantage in unloading the dishwasher, but you might have an even larger absolute advantage at other household chores. Having an absolute advantage does not mean that you have a comparative advantage in unloading the dishwasher. Household production will be accomplished in fewer hours if each member of the household performs chores in which he or she has a comparative advantage.
- 2.15** The amount of time that family members spend on household chores has changed over the years for a number of reasons, including changes in the average number of children per household and the average age that couples marry. But the most important reason the number of hours of housework has fallen since 1965 is probably due to technological change. It takes the average household less time to do laundry, wash dishes, and perform other household chores. This reduction has allowed men and women more time to spend working outside the home or engaging in leisure activities without having to put up with messier homes.

2.3**The Market System**

Learning Objective: Explain the basics of how a market system works.

Review Questions

- 3.1** The circular-flow diagram illustrates how participants in markets are linked. The diagram shows that in factor markets, households supply labor and other factors of production in exchange for wages and other payments from firms. In product markets, households use the payments they earn in factor markets to purchase the goods and services produced by firms.
- 3.2** The two main categories of market participants are households and firms. Households are consumers and are of greatest importance in determining what goods and services are produced. Firms make a profit only when they produce goods and services valued by consumers. Therefore, only the goods and services that consumers are willing and able to purchase are produced.
- 3.3** A free market is a market with few government restrictions on how goods or services can be produced or sold and few government restrictions on how factors of production can be employed. In a free market economy, buyers and sellers in the marketplace make economic decisions. In a

centrally planned economy, the government—rather than households and firms—makes almost all the economic decisions. Free market economies have a much better track record of providing people with rising standards of living.

- 3.4 An entrepreneur operates a business. Entrepreneurs play a key role in the economy by bringing together the factors of production—labor, capital, and natural resources—to produce goods and services for sale. Entrepreneurs decide what to produce and how to produce it. They put their own funds or borrowed funds at risk to start a business.
- 3.5 Firms are likely to produce more of a good or service if consumers want more of it. As consumer demand rises, price will rise, which will lead firms to produce more. If demand falls, price will fall, which will lead firms to produce less.
- 3.6 Private property rights are the rights individuals or firms have to the exclusive use of their property, including the right to buy or sell it. If individuals and firms believe that property rights are not well enforced, they will be reluctant to risk their wealth by opening new businesses. Therefore, the enforcement of property rights and contracts is vital for the functioning of the economy. Independent courts are crucial for a well-functioning economy because property rights and contracts will be enforced only if judges make impartial decisions based on the law, rather than decisions that favor powerful or politically connected individuals.

Problems and Applications

- 3.7
 - a. An auto purchase takes place in the product market. The household (Tariq) demands the good, and the firm (Tesla Motors) supplies the good.
 - b. The labor market is a factor market. Households supply labor, and the firm demands labor.
 - c. The labor market is a factor market. The household (Tariq) supplies a factor of production (labor), while the firm (McDonald's) demands it.
 - d. The land market is a factor market. The household (Tariq) supplies a factor of production (land), and the firm (McDonald's) demands it.
- 3.8 Firms typically are trying to make the most profit possible, while consumers are trying to spend their incomes in a way that gives them the greatest satisfaction. Neither firms nor consumers are directly interested in increasing economic efficiency or the standard of living of the average person. But the interaction of firms and consumers in markets produces outcomes that are economically efficient and that promote the economic growth that results in rising living standards. This idea is an important intellectual contribution for two reasons: (1) It is not obvious that an outcome can result even though the people involved don't intend for that outcome to occur and (2) this idea forms the basis for understanding the favorable economic outcomes that result from a market system.
- 3.9 It was not necessary for the managers of any of the firms that participated in the making of the pencils described in Leonard Read's story to know how the components they produced were used to make pencils. Nor was it necessary for the chief executive officer of the Eberhard Faber Company to have this knowledge. All of the companies were motivated by their own self-interest in providing the materials and services used to make pencils. This account is an illustration of Adam Smith's "invisible hand" metaphor.

- 3.10** Adam Smith realized—as economists today realize—that people’s motives can be complex. But in analyzing people in the act of buying and selling, economists have concluded that in most instances, the motivation of financial reward provides the best explanation for the actions people take. Moreover, being self-interested—looking out for your own well-being and happiness—and being selfish—caring only about yourself—are not the same thing. Many successful businesspeople are, in fact, generous: Donating to charity, volunteering for charitable activities, and otherwise acting in a generous way. These actions are not inconsistent with making business decisions that maximize profits for their companies.
- 3.11** Whether self-interest is an “ignoble human trait” is a matter of opinion. There are certainly more noble traits than self-interest, but without at least some self-interest, a person wouldn’t survive. A market system encourages self-interest in the sense that it paradoxically allows people to enrich themselves by fulfilling the needs of others; that is, by producing goods and services that fulfill the wants of consumers.
- 3.12**
- a. “Psychic rewards” refer to the psychological benefits of, in this case, buying lottery tickets, which provide the excitement of playing the lottery and the chance of winning big.
 - b. An entrepreneur might receive the psychic rewards of creating and running his or her own business along with the chance of making large profits.
 - c. Answers will vary here. Elements of being an entrepreneur do appear to be similar to buying a lottery ticket with the psychic rewards of playing the game along with the possibility of large returns. Other elements may differ, such as the probability of success. Although a purchaser of a lottery ticket may know at least roughly the probability that he or she will win the lottery, the probability that an entrepreneur will earn a high return is much more difficult for someone to calculate.
- 3.13**
- a. Property rights—including intellectual rights to new products and the processes used to produce goods and services—refer to the rights of firms and individuals to have exclusive use of their property, including the right to buy or sell it. It is the responsibility of government to ensure that such rights are protected. Property rights provide incentives for people to maintain and increase the value of the property they own.
 - b. By protecting private property rights, governments make it more likely that investments will be made in businesses that provide jobs and income for workers. This activity results in an increase in a country’s standard of living. It is difficult for a country to become rich without having secure property rights.
 - c. Without secure property rights, farmers in Africa may be reluctant to make the investments in their farms that would raise the farms’ productivity. When farmers have secure property rights, they can borrow more easily by using their land as collateral, which means that if the farmer stops making payments on the loan, the bank or other lender can seize the land and sell it to get its money back. Without collateral, people with low incomes often have trouble getting loans. Using their land as collateral, farmers can borrow the funds they need to make investments that will raise their farms’ productivity. With secure property rights, farmers can also obtain funds by selling some of their land.
- 3.14** In a market system, an increase in demand for a good leads to an increase in the price of the good. The higher price provides a signal to producers that the good has become more profitable. Given that lithium prices are rising, mining firms are likely to switch some of their labor and capital from producing iron, copper, and cobalt to producing lithium.

- 3.15** The columnist is likely using the term socialism to refer to a centrally planned economy in which the government directly controls most production. U.S. socialists like Senator Bernie Sanders and Congresswoman Alexandria Ocasio-Cortez would be unlikely to accept the columnist's definition of socialism. Their view of socialism is similar to that of the social democratic parties in Western Europe. These parties back an expanded role for government, particularly in the provision of services such as health care, but do not usually propose widespread government ownership of businesses.

Suggestions for the *Thinking Critically Exercise*

- CT2.1** It will be difficult for a group to come up with a product made entirely by only one company because few companies are completely vertically integrated—although oil companies are one example. So, this question is about specialization. The text explores this idea in the *Apply the Concept*, “A Story of the Market System in Action: How Do You Make an iPad?” in Section 2.3.