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

Brief Chapter Summary and Learning Objectives

2.1 Production Possibilities Frontiers and Opportunity Costs (pages 42–47)

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, or countries face.

2.2 Comparative Advantage and Trade (pages 48–54)

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 (pages 54–62)

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, p. 50. 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, p. 55. A model that illustrates how participants in markets are linked.

Comparative advantage, p. 51. 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, p. 47. The ability of the economy to increase the production of goods and services.

Entrepreneur, p. 59. Someone who operates a business, bringing together the factors of production—labor, capital, and natural resources—to produce goods and services.

Factor market, p. 54. A market for the factors of production, such as labor, capital, natural resources, and entrepreneurial ability.

Factors of production, p. 54. Labor, capital, natural resources, and other inputs used to make goods and services.

Free market, p. 56. 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, p. 54. A group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade.

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Opportunity cost, p. 43. The highest-valued alternative that must be given up to engage in an activity.

Product market, p. 54. A market for goods—such as computers—or services—such as medical treatment.

Production possibilities frontier (*PPF*), p. 42. A curve showing the maximum attainable combinations of two products that can be produced with available resources and current technology.

Property rights, p. 60. The rights individuals or firms have to the exclusive use of their property, including the right to buy or sell it.

Scarcity, p. 42. A situation in which unlimited wants exceed the limited resources available to fulfill those wants.

Trade, p. 48. The act of buying and selling.

Chapter Outline

Managers at Tesla Motors Face Trade-Offs

All-electric cars have struggled in the marketplace because the batteries that power them are costly and they have to be recharged about every 300 miles. Although sales of all-electric cars made by Tesla Motors represented only 0.1 percent of the U.S. car market in 2015, the company planned to introduce a new, lower-priced model that would appeal to people who had bought gasoline-powered cars. Tesla initially sold its Model S sedan for a base price of $75,000. It began selling a second automobile—the Model X—in late 2015. The Model X was designed to compete with gasoline-powered SUVs but also sold for a very high base price. To gain significant market share Tesla must allocate resources to produce an all-electric car for about $35,000. Tesla's managers must also decide how to sell and service the cars the company sells. Tesla only sells cars online and relies on company-owned service centers for maintenance and repairs. Tesla will likely face increased competition in future years from Apple and other companies that are exploring the electric vehicle market.

2.1 Production Possibilities Frontiers and Opportunity Costs (pages 42–47)

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

A key fact of economic life is that scarcity requires trade-offs. **Scarcity** is a situation in which unlimited wants exceed the limited resources available to fulfill those wants. Goods and services and the resources, or factors of production, that are used to make goods and services, are scarce.

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

A. Graphing the Production Possibilities Frontier

All combinations of products located on the production possibilities frontier are efficient because all available resources are being used. Combinations inside the frontier are inefficient because maximum output is not being 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.

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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 the economy to increase the production 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.

Extra Making the Connection

Facing Trade-offs in Health Care Spending

Households have limited incomes. If the price of health care rises, households have to choose whether to buy less health care or spend less on other goods and services. The same is true of the federal government's spending on health care. The government provides health insurance to about 30 percent of the population through programs such as Medicare for people over age 65 and Medicaid for low-income people. If the price of health care rises, the government has to either cut back on the services provided through Medicare and Medicaid or cut spending in another part of the government's budget. (Of course, both households and the government can borrow to pay for some of their spending, but ultimately the funds they can borrow are also limited.)

About 54 percent of the population has private health insurance, often provided by an employer. When the fees doctors charge, the cost of prescription drugs, and the cost of hospital stays rise, the cost to employers of providing health insurance increases. As a result, employers will typically increase the amount they withhold from employees' paychecks to pay for the insurance. Some employers—particularly small firms—will even stop offering health insurance to their employees. In either case, the price employees pay for health care will rise. How do people respond to rising health care costs? Isn't health care a necessity that people continue to consume the same amount of, no matter how much its price increases? In fact, studies have shown that rising health care costs cause people to cut back their spending on medical services, just as people cut back their spending on other goods and services when their prices rise. One academic study indicates that for every 1 percent increase in the amount employers charge employees for insurance, 164,000 people become uninsured. Of course, people without health insurance can still visit the doctor and obtain prescriptions, but they have to pay higher prices than do people with insurance. Although the consequences of being uninsured can be severe, particularly if someone develops a serious illness, economists are not surprised that higher prices for health insurance lead to less health insurance being purchased: Faced with limited incomes, people have to make choices among the goods and services they buy.

The Congressional Budget Office estimates that as the U.S. population ages and medical costs continue to rise, federal government spending on Medicare will more than double over the next 10 years. Many policymakers are concerned that this rapid increase in Medicare spending will force a reduction in spending on other government programs. Daniel Callahan, a researcher at the Hastings Center for Bioethics, has argued that policymakers should consider taking some dramatic steps, such as having Medicare stop paying for open-heart surgery and other expensive treatments for people over 80 years of age. Callahan argues that the costs of open-heart surgery and similar treatments for the very old exceed the benefits, and the funds would be better spent on treatments for younger patients, where the benefits

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would exceed the costs. Spending less on prolonging the lives of the very old in order to save resources that can be used for other purposes is a very painful trade-off to consider. But in a world of scarcity, trade-offs of some kind are inevitable.

Sources: Daniel Callahan, "The Economic Woes of Medicare," *The New York Times*, November 13, 2008; Ezekiel J. Emanuel, "The Cost–Coverage Trade-off," *Journal of the American Medical Association*, Vol. 299, No. 8, February 27, 2008, pp. 947–949; and Congressional Budget Office, *A Preliminary Analysis of the President's Budget and an Update of CBO's Budget and Economic Outlook,* March 2009.

Questions & Solutions

1. Suppose the U.S. president is attempting to decide whether the federal government should spend more on research to find a cure for heart disease. He asks you, one of his economic advisors, to prepare a report discussing the relevant factors he should consider. Use the concepts of opportunity cost and trade-offs to discuss some of the main issues you would deal with in your report.

Solution:

If the federal government has a fixed budget for medical research, then the opportunity cost of funding more research on heart disease is the reduction in funding for research on other diseases. The decision should be made at the margin: to maximize the benefits from government spending on medical research, the last dollar devoted to research on heart disease should result in the same marginal benefit—less disease and fewer deaths—as the last dollar spent on research for other diseases. If the additional funding for research on heart disease comes at the expense of other non-medical research expenditures, then the opportunity cost will be different, but a similar analysis should be conducted.

2. Uwe Reinhardt, an economist at Princeton University, wrote the following in a column in the *New York Times*:

> [Cost-effectiveness analysis] seeks to establish which of several alternative strategies capable of achieving a given therapeutic goal is the least-cost strategy. It seems a sensible form of inquiry in a nation that is dismayed over the rising cost of health care. . . . Opponents of cost-effectiveness analysis include individuals who sincerely believe that health and life are "priceless."

Are health and life priceless? Are there any decisions you make during your everyday life that indicate whether you consider health and life to be priceless?

Source: Uwe E. Reinhardt, "'Cost-Effectiveness Analysis' and U.S. Health Care," *The New York Times*, March 13, 2009.

Solution:

Nothing is priceless. Every day we makes decisions, such as driving a car or flying in a plane, that increase by at least a small amount the chances that we will be hurt or killed. If health and life were literally priceless, every decision we make would have the sole objective of minimizing the chances of our being injured or killed. In a broader sense, we do not devote all of our resources to improving health care because resources devoted to, say, saving lives through medical research are not available for other needs, such as improving education. We always have to consider the opportunity cost of using resources in one way rather than in another.

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2.2 Comparative Advantage and Trade (pages 48–54)

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

*PPF*s depict the combinations of two goods that can be produced if no trade occurs. We can use *PPF*s 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

Even good students have difficulty understanding comparative advantage. A good 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 was 11. It can be argued that Ruth had an absolute advantage as both a hitter and pitcher for the Yankees in 1920, but a comparative advantage only as a hitter.

2.3 The Market System (pages 54–59)

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 the labor, capital, natural resources, and other inputs used to make goods and services.

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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 and 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 firms 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 a patent that gives an inventor – often a firm—the exclusive right to produce and sell a new product for 20 years from the date the patent was 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.

Business activity often involves someone agreeing to carry out some action in the future. These agreements often take the form of legal contracts. For the market system to work, businesses and individuals have to rely on these contracts being carried out. Enforcing contracts or property rights requires an independent court system and judges who are able to make impartial decisions on the basis of the law. If property rights are not well enforced fewer goods and services will be produced, leaving the economy inside its production possibilities frontier.

Teaching Tips

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

1. How many of you have downloaded music via 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 individuals who illegally obtain music, books, movies, and other creative works in violation of property rights laws?

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Extra Solved Problem 2.3

Adam Smith's "Invisible Hand"

Alan Krueger, an economist at Princeton University who served as chair of the Council of Economic Advisers in the Obama administration, has argued that Adam Smith ". . . worried that if merchants and manufacturers pursued their self-interest by seeking government regulation and privilege, the invisible hand would not work its magic . . . ."

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

a. What types of regulation and privilege might merchants and manufacturers seek from the government?
b. How might these regulations and privileges keep 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*. You may want to review the section "The Gains from Free Markets," on page 56.

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 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. Under 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 Economics in Your Life:
International Trade and Household Income

Many people believe that outsourcing—firms producing goods and services outside of their home country—harms their nations' economies by increasing domestic unemployment and decreasing incomes. But most economists believe that free trade policies, including allowing goods and services to be produced in other countries, benefit domestic economies. In a letter dated March 5th 2015, 14 economists (including R. Glenn Hubbard) who served at chairs of the Council of Economic Advisers under seven Republican and Democratic presidents, wrote an open letter to congressional leaders expressing their

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support for the renewal of the Trade Promotion Authority in order to reach agreements with U.S. trading partners through the Trans-Pacific Partnership (TPP) and the Trans-Atlantic Trade and Investment Partnership (TTIP). The letter read, in part: "International trade is fundamentally good for the U.S. economy, beneficial to American families over time, and consonant with our domestic priorities."

Ben Bernanke, former chairman of the Federal Reserve Board, 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."

Source: N. Gregory Mankiw, "Economists Actually Agree on This: The Wisdom of Free Trade," *New York Times*, April 24, 2015; and Ben Bernanke, "Embracing the Challenge of Free Trade: Competing and Prospering in a Global Economy," The Federal Reserve Board, May 1, 2007. http://www.federalreserve.gov/boarddocs/speeches/2007/20070501/default.htm.

Questions: (a) Should the United States accept the advice of economists and support free trade policies even if this increases the risk of some workers losing their jobs to outsourcing? (b) What type of job would make you more or less vulnerable to outsourcing?

Answers: (a) Given the opposition from firms and workers in industries that would be harmed by free trade, it is unlikely that the United States would eliminate all trade barriers. But studies such as the one cited by Ben Bernanke show that increased trade can significantly boost the incomes of U.S. households. (b) Another study Bernanke cited found twenty-one occupations that were most vulnerable to outsourcing were primarily for relatively lower-wage positions.

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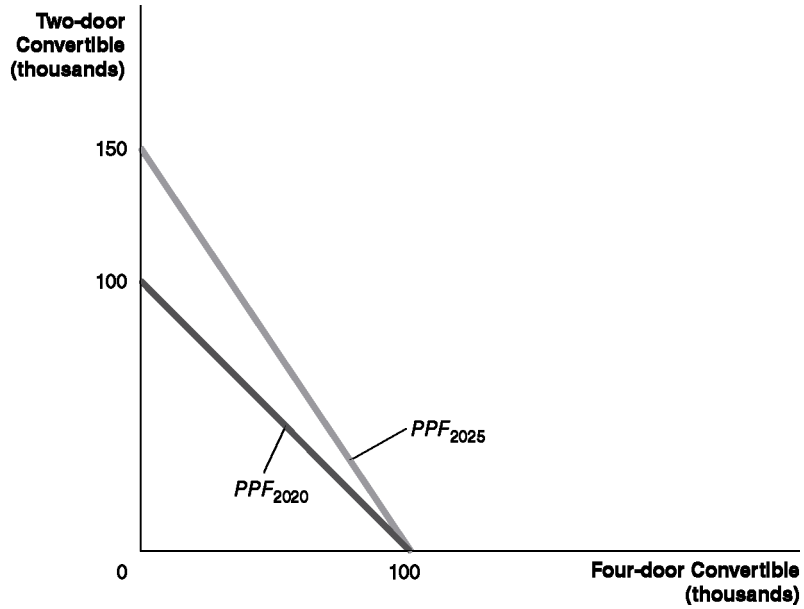
Solutions to End-of-Chapter Exercises

Answers to *Thinking Critically* Questions

1. In 2020, maximum production is 100,000 two-door convertibles or 100,000 four-door sedans, so to gain one four-door sedan, Apple must give up producing one two-door convertible. In 2025, maximum production is 150,000 two-door convertibles or 100,000 four-door sedans, so to gain one four-door sedan, Apple must give up producing 1.5 two-door convertibles. Therefore:

- The opportunity cost of one four-door sedan in 2020 is one two-door convertible.
- The opportunity cost of one four-door sedan in 2025 is 1.5 two-door convertibles.



2. The production point representing 110,000 four-door sedans and 65,000 two-door convertibles lies outside the 2025 *PPF*, and is therefore an unattainable production point. The *PPF* represents maximum production, and according to the figure, the maximum number of total vehicles that can be produced in 2025 is 150,000. If Apple filled the 110,000 four-door sedan orders, it would only be able to produce 40,000 two-door convertibles. If Apple filled the 65,000 two-door convertible orders, it would only be able to produce 85,000 four-door sedans.

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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 equals or exceeds the amount available—so oxygen isn't scarce for them. Another example might be something undesirable, such as weeds in your garden—unlike tomato plants, the number of weeds available exceeds the number you desire.

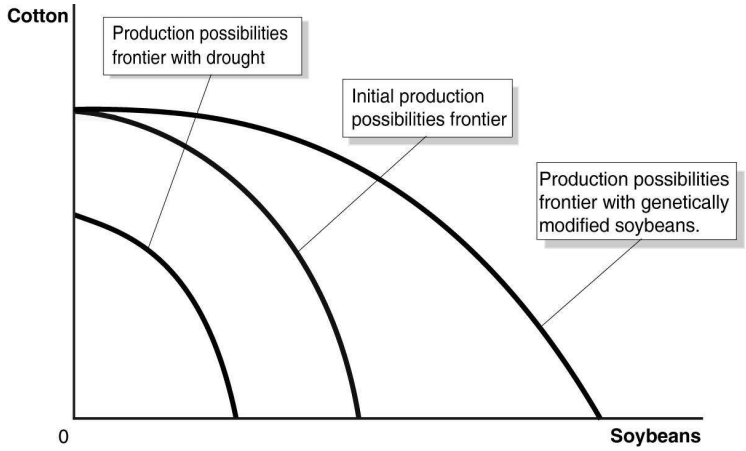
1.2 The production possibilities frontier (*PPF*) is a curve showing all the attainable combinations of two products that may be produced with available resources and existing technology. Combinations of goods that are on the frontier are efficient because all available resources are being fully used, and the fewest possible resources are being used to produce a given amount of output. Points inside the production possibilities frontier are inefficient because the maximum output is not being obtained from the available resources. A production possibilities frontier 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. It 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—that the slope of the *PPF* gets steeper and steeper as you move down it.

Problems and Applications

1.4 **a.** The production possibilities frontiers in the figure are bowed to the right from the origin because of increasing marginal opportunity costs. The drought causes the production possibilities frontier to shift to the left (see graph below in part (b)).

b. The genetic modifications would shift to the right the maximum soybean production (doubling it), but not the maximum cotton production.



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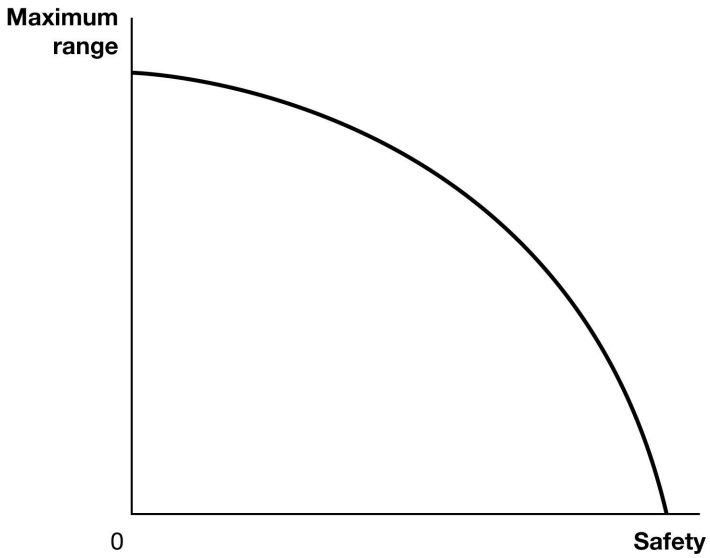
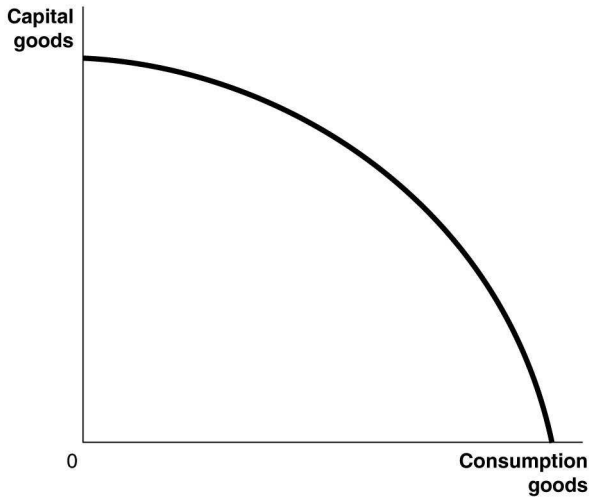
1.5 Increased safety will decrease maximum range, as shown in the figure below. Trade-offs can be between physical goods, such as cotton and soybeans in problem 1.4, or between the features of a product, like the maximum range and the safety of an electric car.



1.6 The opportunity cost of Tesla's investment in a new battery factory in Nevada is what the company considered to be the best alternative for using the funds that were used to build the factory. This best alternative may have been investing the funds in developing new electric cars, distributing the funds to the corporation's shareholders, or some other option.

1.7 One could argue that the price paid 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 could be spent on some other activity. The time spent 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 others are likely to be more productive when making consumption goods.



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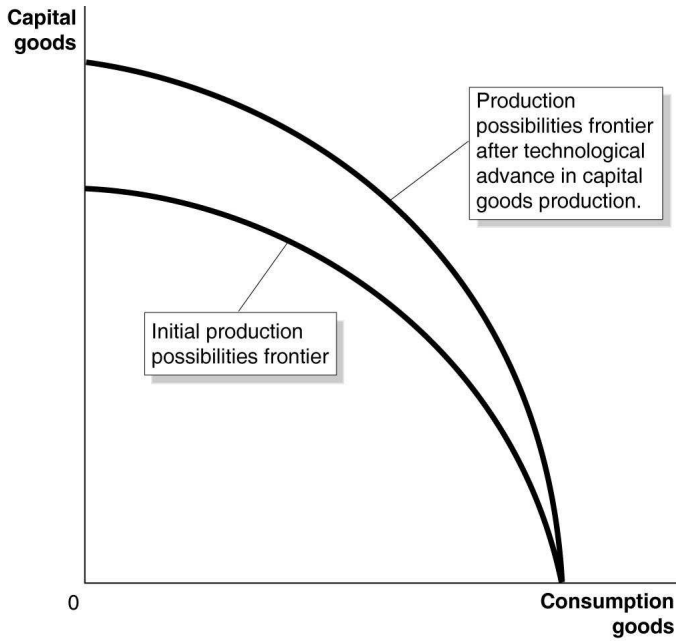
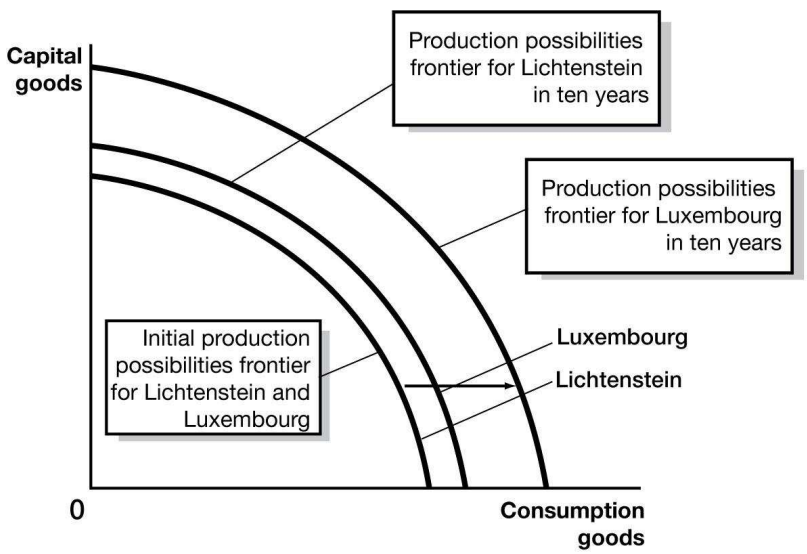
b.



c. Because it will have more machinery and equipment, Luxembourg is likely to experience more rapid growth in the future.



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.

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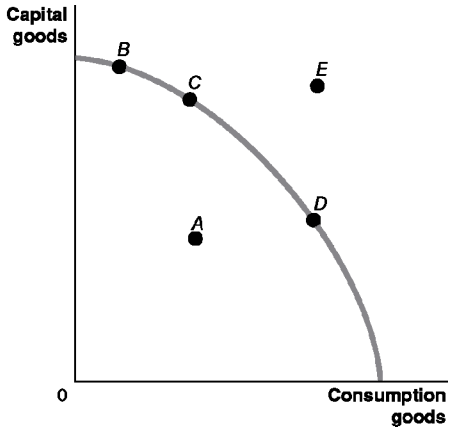
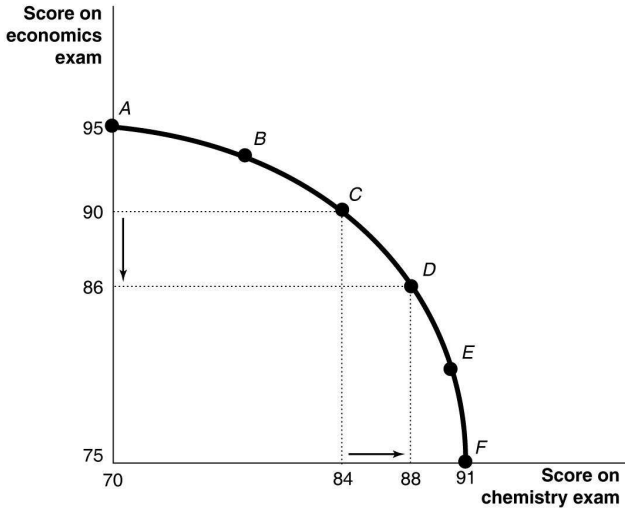
d. At point *B*, the country is devoting the most resources to producing capital goods, so production at this point is most likely to lead to the highest growth rate. The more capital goods the country produces, the greater the capacity of the country to produce goods and services in the future.



1.10 a.



If you spend all five 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 five 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. Moving from choice *C* to choice *D* increases your chemistry score by four points but lowers your economics score by four points. Therefore, the opportunity cost of increasing your chemistry score by four points is the four point decline 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, the chemistry exam is only a small portion of your grade, but the economics exam is a large portion of your grade; or if you are majoring in economics and don't care much about chemistry; or if you already have an A sewn up in chemistry, but the economics professor will replace a low exam grade with this exam grade.

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1.11 If the federal government has a fixed budget for medical research, then the opportunity cost of funding more research on heart disease is the reduction in funding for research on other diseases. The decision should be made at the margin: To maximize the benefits from government spending on medical research, the last dollar devoted to research on heart disease should result in the same marginal benefit—less disease and fewer deaths—as the last dollar spent on research for other diseases. If the additional funding for research on heart disease comes at the expense of other nonmedical research expenditures, then the opportunity cost will be different, but a similar analysis should be conducted.

1.12 State governments have limited budgets. Subsidies paid by governments for prescription drugs use revenue from taxpayers that could be used to pay for other valuable goods and services. Nearly all state governments are required to balance their budgets. Therefore, increases in spending on one worthwhile program requires either a reduction in spending on another worthwhile program or an increase in taxes. One can agree or disagree with the requirement that Medicare programs must cover every drug that has FDA approval. Although the requirement increases spending on Medicare at the expense of other government programs, you may believe that such spending is the best use of state governments' scarce resources. This is a normative issue.

1.13 Resources used to reduce pollution are not available for other uses, such as saving lives through medical research, so it is more ethical to take into account the opportunity cost of reducing pollution.

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 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 to produce more of a good or service than competitors using the same amount of resources. Comparative advantage is the ability to produce a good or service at a lower opportunity cost than competitors. It is possible to have a comparative advantage in producing a good even if someone else has an absolute advantage in producing that good (and every other good). Unless the two producers have exactly the same opportunity costs of producing two goods—the same trade-off between the two goods—one producer will have a comparative advantage in making one of the goods and the other producer will have a comparative advantage in making the other good.

2.2 The basis for trade is comparative advantage. If each party specializes in making the product for which it has the comparative advantage, they can arrange a trade that makes both of them better off. Each party will be able to obtain the product made by its trading partner at a lower opportunity cost than without trade.

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Problems and Applications

2.3 In the example 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 because 10 pounds of apples for 15 pounds of cherries is the same as 1 pound of apples for 1.5 pounds of cherries, it falls within this range. 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 *and* consumption *without* trade	8	12	9	42
Production *with* trade	20	0	0	60
Consumption *with* trade	10	10 × 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 **a.** Canada has the 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 the 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.

b. Neither country has an absolute advantage in making both goods. The United States has the absolute advantage in making shirts, but Canada has the absolute advantage in making boots. Remember, 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.

c. 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 gets half of the other'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.

2.5 Yes, the United States would have benefited from importing those products for which Britain had a comparative advantage, which, in fact, is what happened.

2.6 **a.** When the United Kingdom produces one more barrel of fish oil, it produces one barrel less 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 someone has a lower opportunity cost of producing a good, but these two countries have the same opportunity cost.

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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.

2.7 **a.** When France produces 1 more bottle of wine, it produces 2 fewer pounds of schnitzel. When Germany produces 1 more bottle of wine, it produces 3 fewer pounds of schnitzel. Therefore, France's opportunity cost of producing wine—2 pounds of schnitzel—is less than Germany's—3 pounds of schnitzel. When Germany produces 1 more pound of schnitzel, it produces 0.33 fewer bottles of wine. When France produces 1 more pound of schnitzel, it produces 0.50 fewer bottles of wine. Therefore, Germany's opportunity cost of producing schnitzel—0.33 bottles of wine—is less than that of France—0.50 bottles of wine. We can conclude that France has the comparative advantage in making wine and that Germany has the comparative advantage in making schnitzel.

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 schnitzel, and Germany will make 0 bottles of wine and 15 pounds of schnitzel. After both countries specialize, France could then trade 3 bottles of wine to Germany in exchange for 7 pounds of schnitzel. France will have the same amount of wine as they initially had, but 1 more pound of schnitzel. Germany will have 3 bottles of wine and 8 pounds of schnitzel—that is, the same amount of wine, but 2 more pounds of schnitzel. Other mutually beneficial trades are possible.

2.8 An individual or a country cannot produce beyond its production possibilities frontier. The production possibilities frontier shows the most that an individual or country can produce for a given amount of resources and technology. Without trade, an individual or country cannot consume beyond its production possibilities frontier, but with specialization and trade an individual or country can consume beyond its production possibilities frontier. In Figure 2.5, both you and your neighbor were able to consume beyond your production possibilities frontiers, and in Solved Problem 2.2, both Canada and the United States were able to consume beyond their production possibilities frontiers.

2.9 Colombia could have the comparative advantage in producing coffee if Nicaragua has an even larger absolute advantage relative to Colombia at producing another product. Say Nicaragua can produce four times more cashews than Colombia can using the same resources, then Colombia will have a comparative advantage in producing coffee.

2.10 Andrew and you are using absolute advantage, not comparative advantage, to decide what to do. Andrew has a comparative advantage at playing quarterback, even though he is five times better at selling Colts memorabilia than any other employee or player. He has an even larger absolute advantage at playing quarterback. You, as a creative and effective leader, have a comparative advantage at leading the organization. Your absolute advantage at leading is even larger than your absolute advantage at cleaning offices.

2.11 Countries benefit when they import goods and services that other countries produce at a lower cost, and export goods and services that they can produce at a lower cost than other countries can. Assuming that the sanctions "push Russia onto a path of greater self-reliance" means that Russia will have to produce some goods and services at a higher cost than its trading partners can. Therefore, the sanctions will decrease, not increase, the economic well-being of the average Russian in the long run.

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 could be more productive and, in turn, earn more income.

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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 why 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. It 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 as consumers 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 one with few government restrictions on how goods or services can be produced or sold, or 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 when they start a business.

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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 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 (George) 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 (George) supplies the factor of production (labor), while the firm (McDonald's) demands it.

d. The land market is a factor market. The household (George) supplies the 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 CEO 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 exactly the same thing. Many successful business people are, in fact, generous: Donating to charity, volunteering for activities, and otherwise acting in a generous way. These actions are not inconsistent with making business decisions that maximize profits for their companies.

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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 possibly 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 she will win the lottery, the probability that an entrepreneur will earn a high return is much more difficult for her to calculate.

3.13 The protection of property rights will increase economic growth in a developing or low-income country that adopts a market economy. 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. 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.

3.14 **a**. The farmers responded to the skyrocketing price of chemical fertilizers by switching to the organic pig manure fertilizer.

b. It appears that under Pennsylvania's Right to Farm Act, farmers have the property right to the smell of the air around their farms as long as they use practices common to agriculture.

3.15 Copyrights give the creator of a book (or film or piece of music) the exclusive right to use his or her creation, which restricts the reproduction and supply of the copyrighted material. The restriction in supply raises the price of the copyrighted material, which the British historian Macaulay likens to a tax. Governments enact copyrights to encourage authors and firms to spend time and money on the creation, research, and development necessary to create new books (or films or pieces of music).

3.16 It is difficult, perhaps impossible, to determine the most economically efficient length of time that Congress should give authors copyright protection. By providing Arthur Conan Doyle, other authors, and their descendants exclusive rights to their stories, copyright protection provides incentives for writers to write books that they might not have written if other people could freely copy their books as soon as the books were published. But long copyright periods increase the cost to authors of using other authors' characters to produce new books, movies, or television series. So consumers can lose if copyright periods are too short to provide a strong incentive to produce original books, movies, or television series, but consumers can also lose from the reduction of new books, movies, and television series based on existing characters that results from copyright periods that are too long. In the case of Sherlock Holmes, not allowing authors to use the character without paying a fee 125 years after the first story was published was almost certainly economically inefficient.

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Economics

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Microeconomics
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Chapter 2

Trade-offs, Comparative Advantage, and the Market System

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Chapter Outline

2.1 Production Possibilities Frontiers and Opportunity Costs

2.2 Comparative Advantage and Trade

2.3 The Market System

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Scarcity and trade-offs

Households, firms and governments continually face decisions about how best to use their scarce resources.

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

Scarcity requires trade-offs. Economics teaches us tools to help make good trade-offs.

Example: When deciding how to use its scarce workers and machinery, if Tesla wants to produce more Model X SUVs, those resources will not be available to produce Model S sedans.

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2.1 Production Possibilities Frontiers and Opportunity Costs

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

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

Question: Is the PPF a positive or normative tool?

Answer: Positive; it shows “what is”, not “what should be”.

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Figure 2.1 Tesla's production possibilities frontier (1 of 2)

Tesla's Production Choices at Its Fremont Plant		
Choice	Quantity of Sedans Produced	Quantity of SUVs Produced
A	80	0
B	60	20
C	40	40
D	20	60
E	0	80

Tesla can produce sedans and/or SUVs.

If it wants to produce more sedans, it must reduce the number of SUVS.

- Points on the PPF are attainable for Tesla.
- Points below the curve are inefficient.
- Points above the curve are unattainable with current resources.

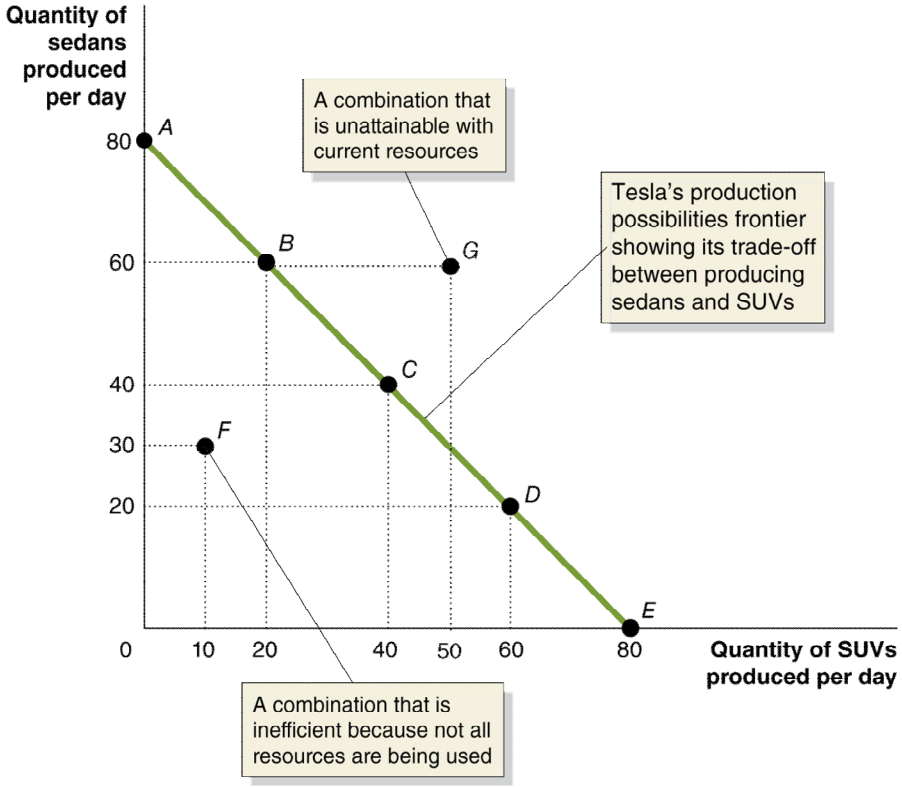

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Figure 2.1 Tesla's production possibilities frontier (2 of 2)

Tesla's Production Choices at Its Fremont Plant		
Choice	Quantity of Sedans Produced	Quantity of SUVs Produced
A	80	0
B	60	20
C	40	40
D	20	60
E	0	80

To produce 20 more SUVs (e.g. moving from A to B), Tesla must produce 20 fewer sedans.

- The 20 fewer sedans is the *opportunity cost* of producing 20 more SUVs.

<u>Opportunity cost</u>: The highest-valued alternative that must be given up to engage in an activity.

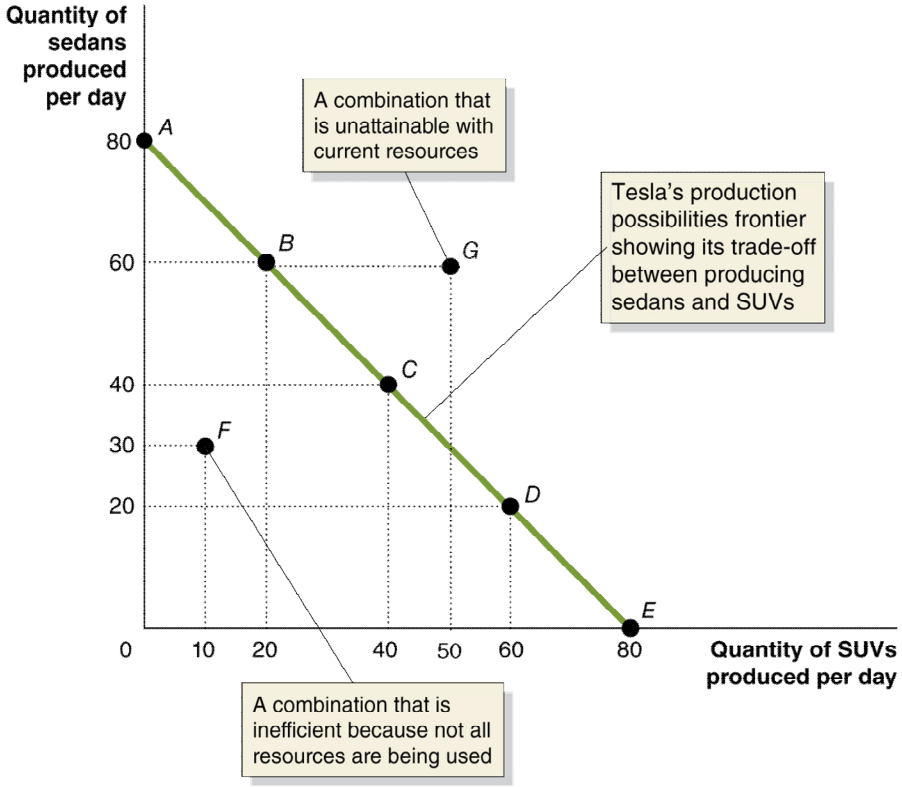

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Figure 2.2 Increasing marginal opportunity costs

On the previous slide, opportunity costs were constant.

But opportunity costs are often increasing.

Why? Some resources are better suited to one task than another. The first resources to "switch" are the one best suited to switching.

The more resources already devoted to an activity, the smaller the payoff to devoting additional resources to that activity.

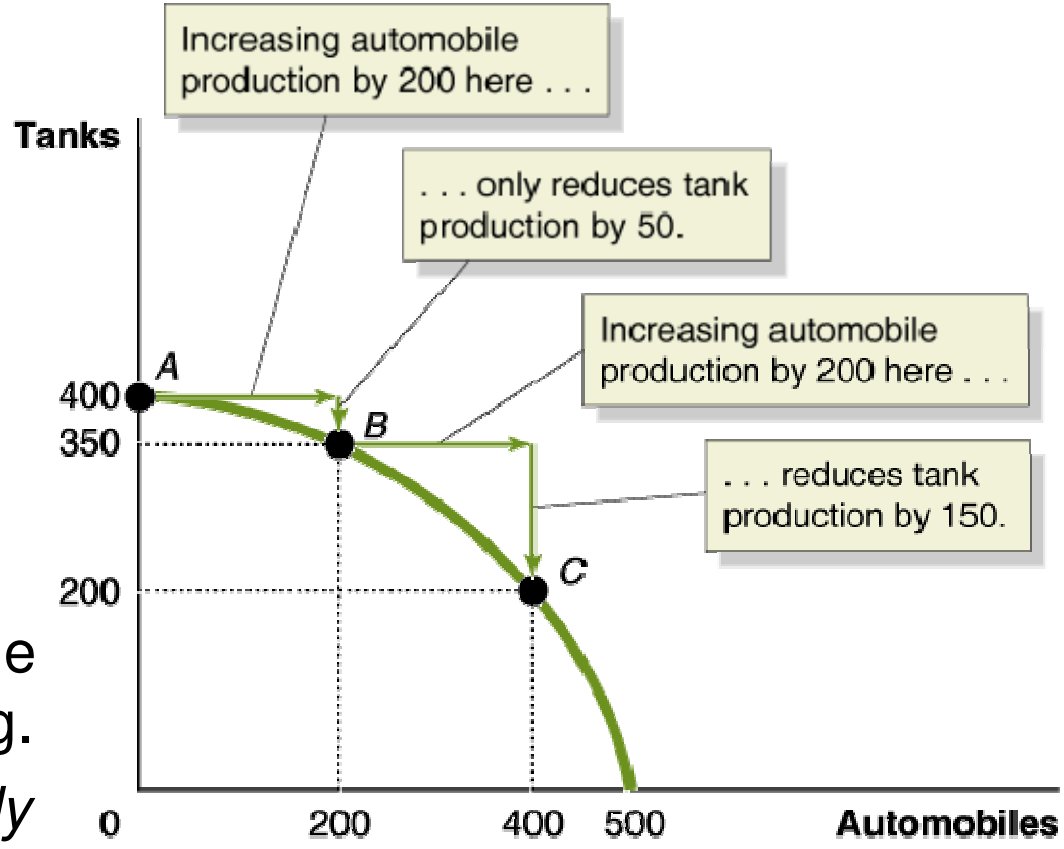

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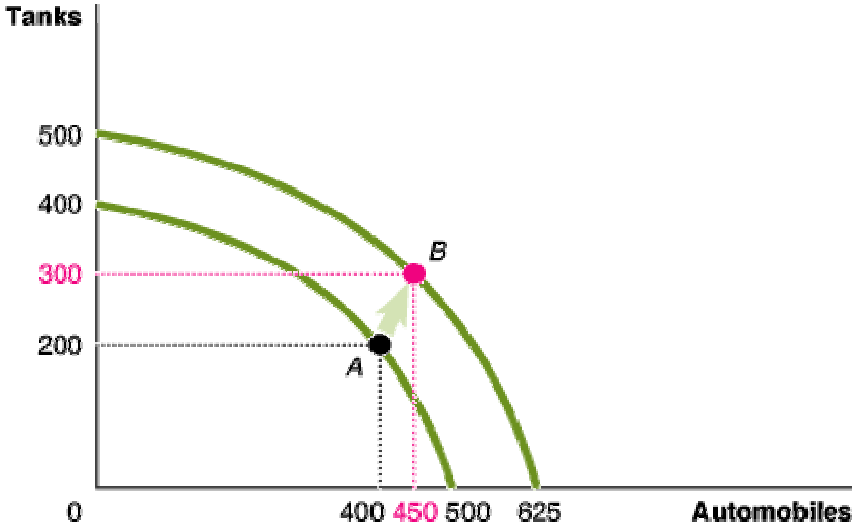
Figure 2.3 Economic growth (panel (a))



(a) Shifting out the production possibilities frontier

As more economic resources become available, the economy can move from point *A* to point *B*, producing more tanks and more automobiles.

Shifts in the production possibilities frontier represent *economic growth*.

<u>Economic growth</u>: the ability of the economy to increase the production of goods and services.

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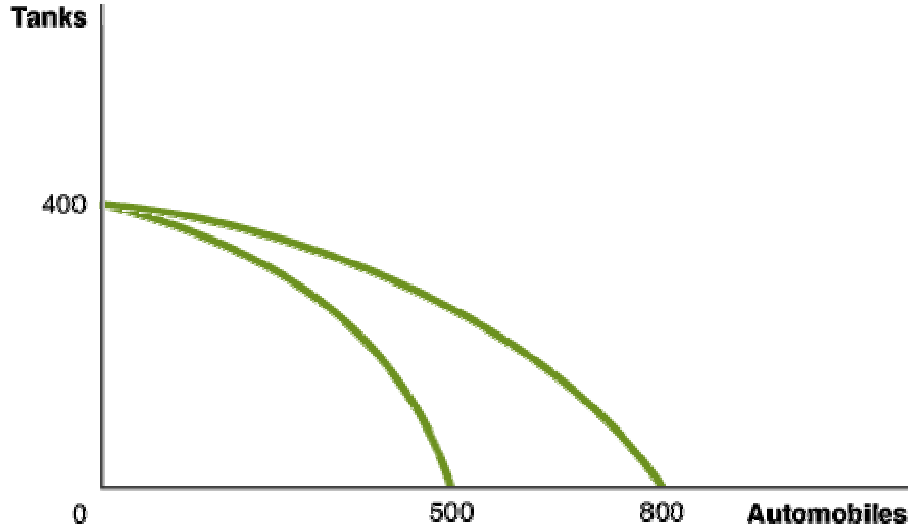
Figure 2.3 Economic growth (panel (b))

This panel shows technological improvement in the automobile industry.



(b) Technological change in the automobile industry

The quantity of tanks that can be produced remains unchanged.

As in the previous slide, many previously unattainable combinations are now attainable.

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Making the Connection: A PPF for exam grades

Suppose you have a limited amount of time to study for two exams, Economics and Accounting.

What would the production possibilities curve for the exam grades look like?

1. A straight line, like the PPF for sedans and SUVs, or
2. A bowed-outward curve, like the PPF for tanks and automobiles?

Answer: 2, the first hour spent studying economics is much more valuable (and has a lower opportunity cost) than the last hour.

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2.2 Comparative Advantage and Trade

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

You and your neighbor each have a limited time to pick apples and/or cherries.

The table shows the amount of each fruit that you could each pick, by devoting all of your time to that fruit.

	You		Your Neighbor	
	Apples	Cherries	Apples	Cherries
Devote all time to picking apples	20 pounds	0 pounds	30 pounds	0 pounds
Devote all time to picking cherries	0 pounds	20 pounds	0 pounds	60 pounds

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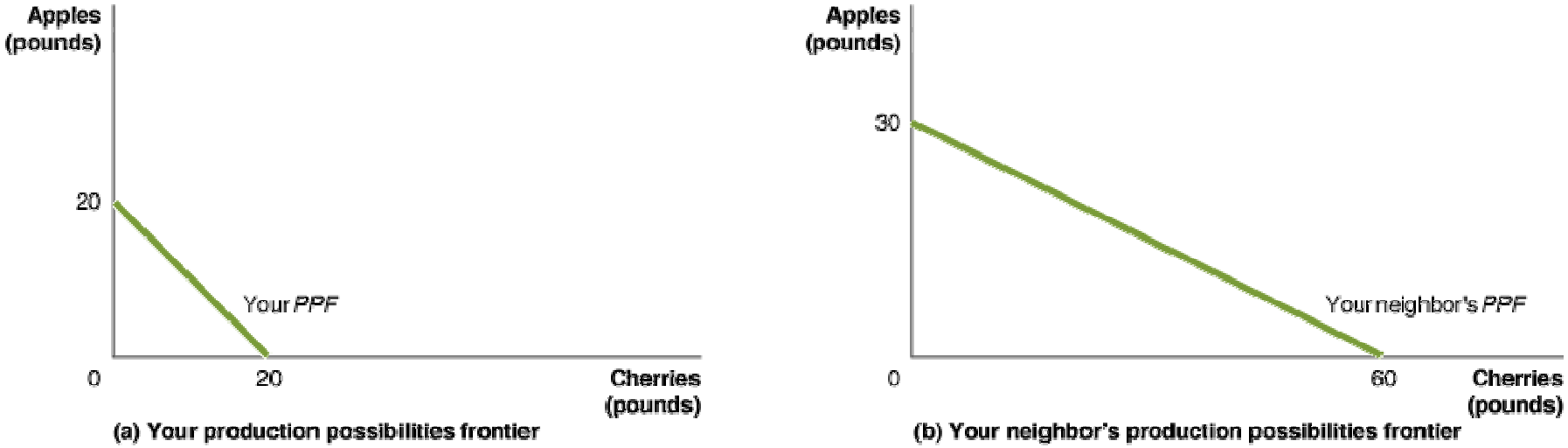
Figure 2.4 Production possibilities for you and your neighbor, without trade



If you spend all of your time picking cherries, you can pick 20 pounds of cherries; or if you spend all your time picking apples, you can pick 20 pounds of apples.

Your neighbor can similarly pick 60 pounds of cherries or 30 pounds of apples.

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Specialization and trade

What if you and your neighbor decided to specialize and *trade*?

Trade: The act of buying and selling.

Could your neighbor benefit from trade? She is better at picking both apples and cherries…

Both of you can benefit from trade, by specializing in what you are *relatively* good at. Let's see how…

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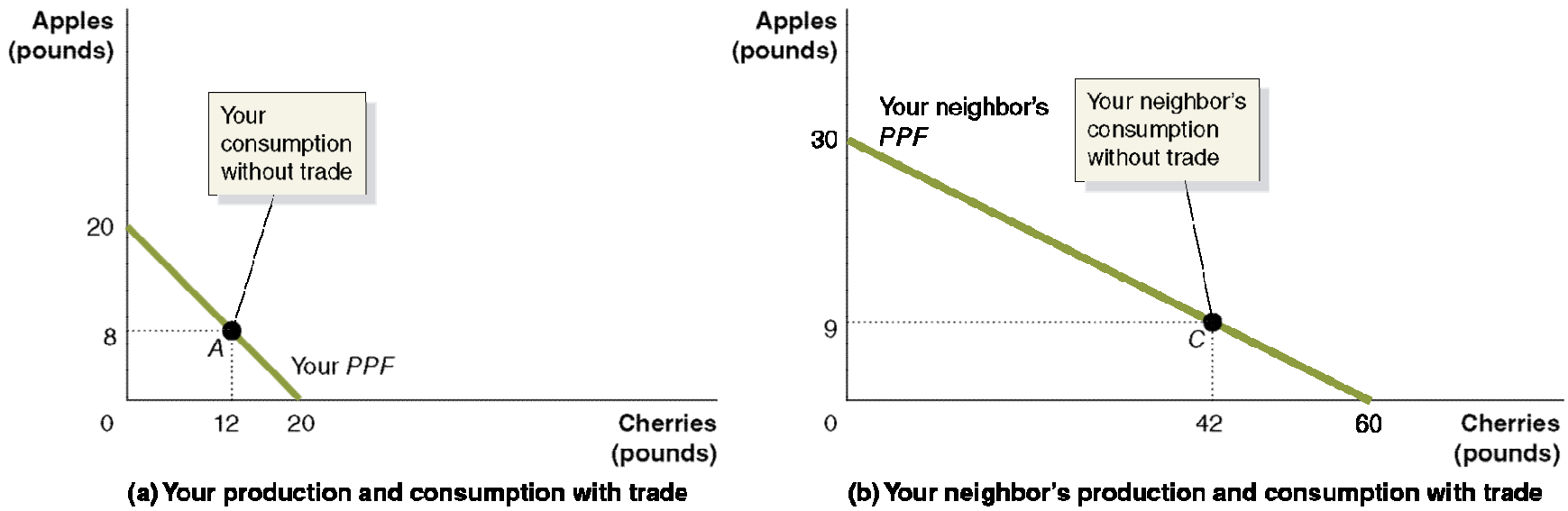
Figure 2.5 Gains from trade (1 of 3)



When you don't trade with your neighbor, let's say you pick and consume 8 pounds of apples and 12 pounds of cherries per week—point *A* in panel (a).

When your neighbor doesn't trade with you, she picks and consumes 9 pounds of apples and 42 pounds of cherries per week—point *C* in panel (b).

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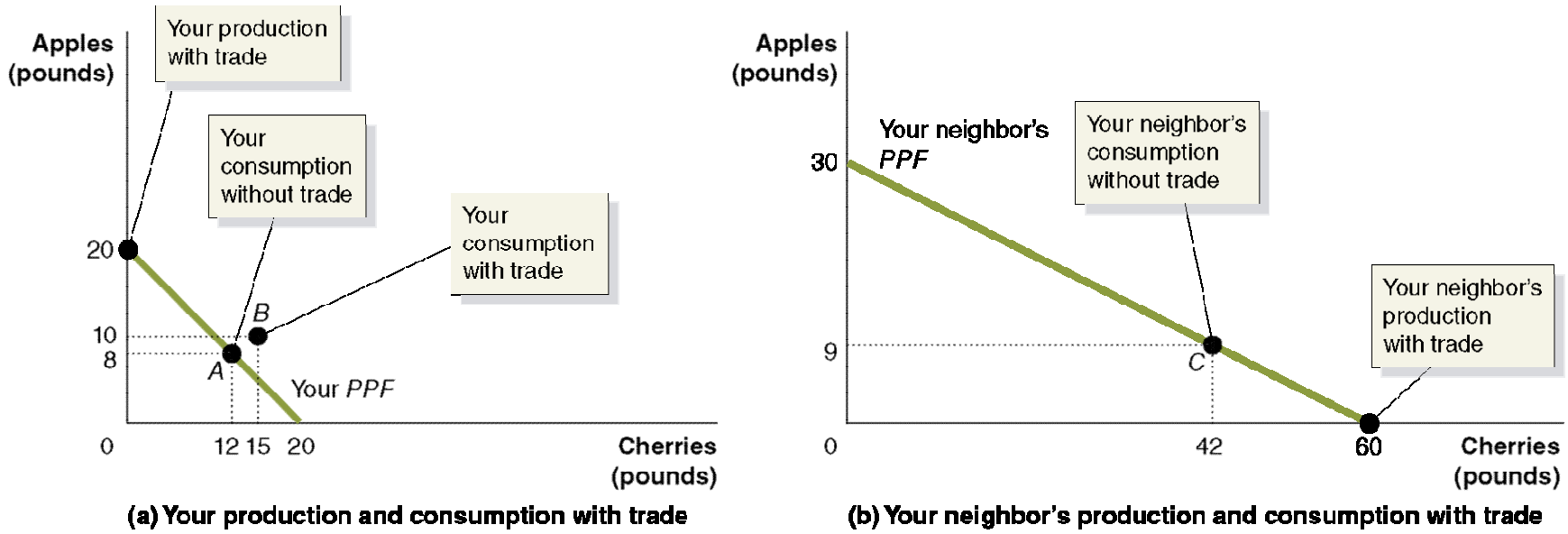
Figure 2.5 Gains from trade (2 of 3)



If you specialize in picking apples, you can pick 20 pounds. If your neighbor specializes in picking cherries, she can pick 60 pounds.

If you trade 10 pounds of your apples for 15 pounds of your neighbor's cherries, you will be able to consume 10 pounds of apples and 15 pounds of cherries— point *B* in panel (a).

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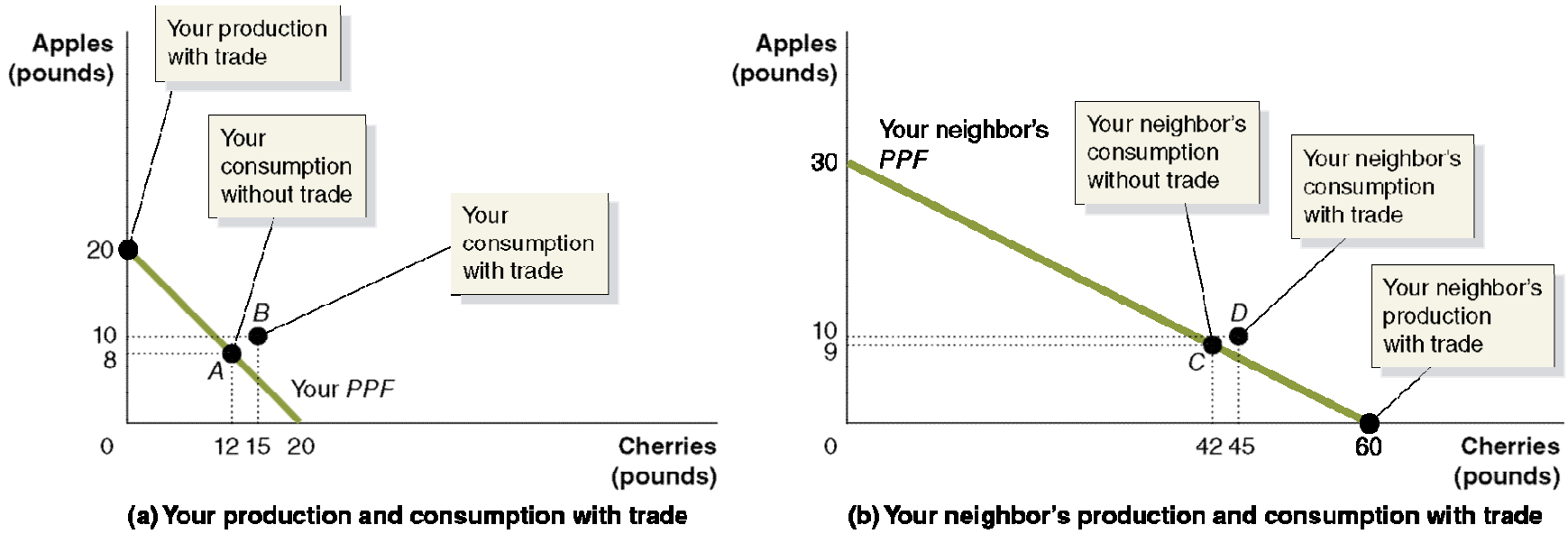
Figure 2.5 Gains from trade (3 of 3)



Your neighbor can now consume 10 pounds of apples and 45 pounds of cherries—point *D* in panel (b). You and your neighbor are both better off as a result of trade.

Note that your neighbor benefits from trade *even though she could produce more of either fruit than you could*.

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Table 2.1 A summary of the gains from trade

	You		Your Neighbor	
	Apples (in pounds)	Cherries (in pounds)	Apples (in pounds)	Cherries (in pounds)
Production *and* consumption *without* trade	8	12	9	42
Production *with* trade	20	0	0	60
Consumption *with* trade	10	15	10	45
Gains from trade (increased consumption)	2	3	1	3

Both you and your neighbor are able to consume more with trade than without.

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Explaining the gains from specialization and trade

How could both of you benefit from trade, when your neighbor was so much better than you?

Economists say your neighbor had an *absolute advantage* in both cherry- and apple-picking, but you had a *comparative advantage* in picking apples.

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.

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.

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Table 2.2 Opportunity costs of picking apples and cherries

	Opportunity Cost of Picking 1 Pound of Apples	Opportunity Cost of Picking 1 Pound of Cherries
You	1 pound of cherries	1 pound of apples
Your Neighbor	2 pounds of cherries	0.5 pound of apples

The basis for trade is comparative advantage, not absolute advantage.

Individuals, firms, and countries are better off if they specialize in producing goods and services for which they have a comparative advantage and obtain the other goods and services they need by trading.

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Making the Connection: Comparative advantage and housework

People living together have to divide up household chores.

Basic economic concepts like comparative advantage can provide useful insight in the division of labor.

Suppose Jack is faster than Jill at both cooking and laundry. However:

- Jack is MUCH faster at preparing tasty meals, while
- Jack is only a little faster at doing laundry

Jack's comparative advantage is in cooking—to cook a tasty meal, he gives up the opportunity to perform less laundry than Jill—so he should specialize in this, while Jill specializes in laundry.

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2.3 The Market System

Explain the basics of how a market system works

Two key groups participate in the modern economy:

Households consist of individuals who provide the **factors of production**: labor, capital, natural resources, and entrepreneurial ability.

- Households receive payments for these factors by selling them to firms in **factor markets**.

Firms supply goods and services to **product markets**; households buy these products from the firms.

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Figure 2.6 The Circular-flow Diagram (1 of 2)

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

Households provide factors of production to firms.

Firms provide goods and services to households.

Firms pay money to households for the factors of production.

Households pay money to firms for the goods and services.

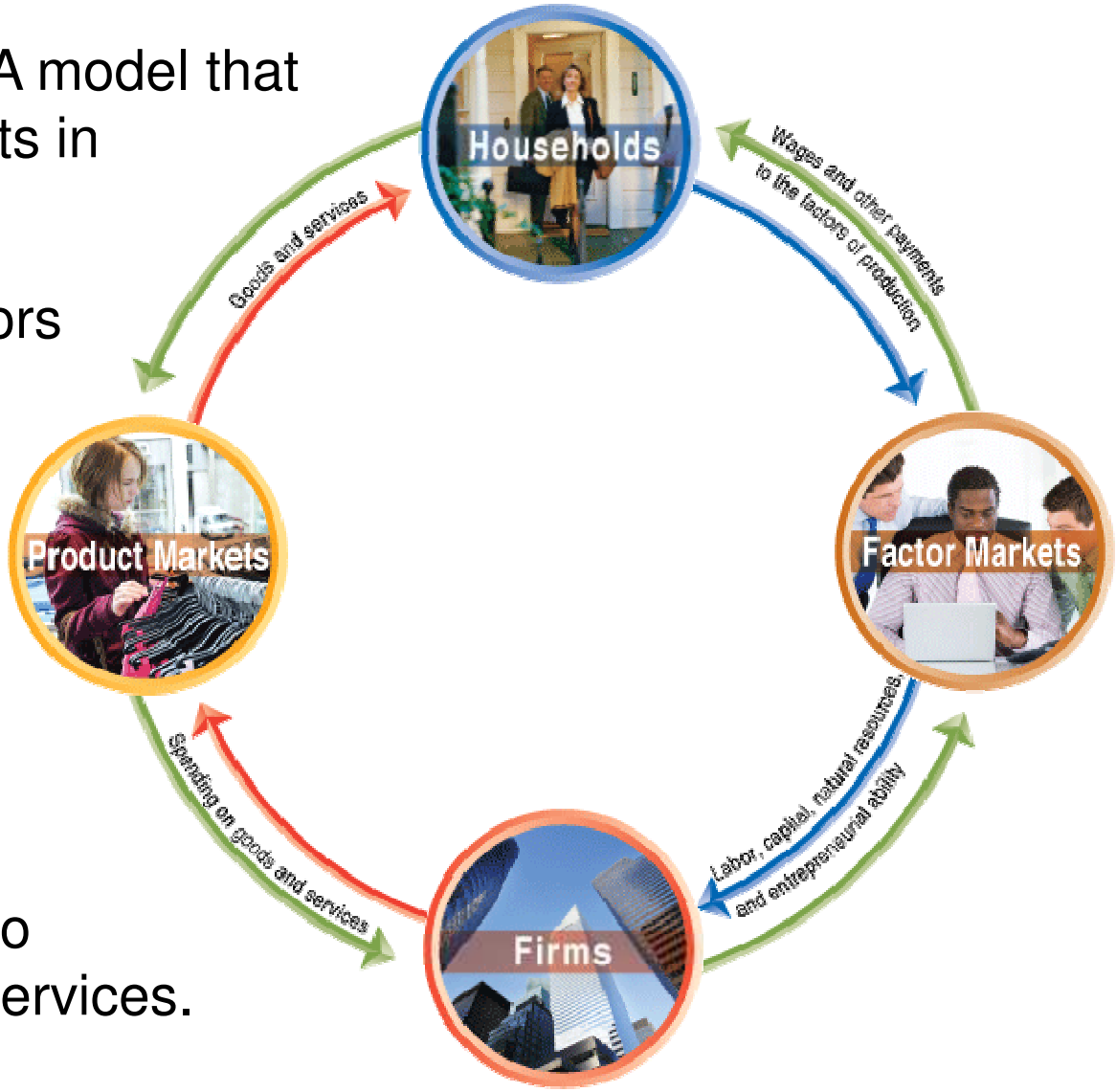

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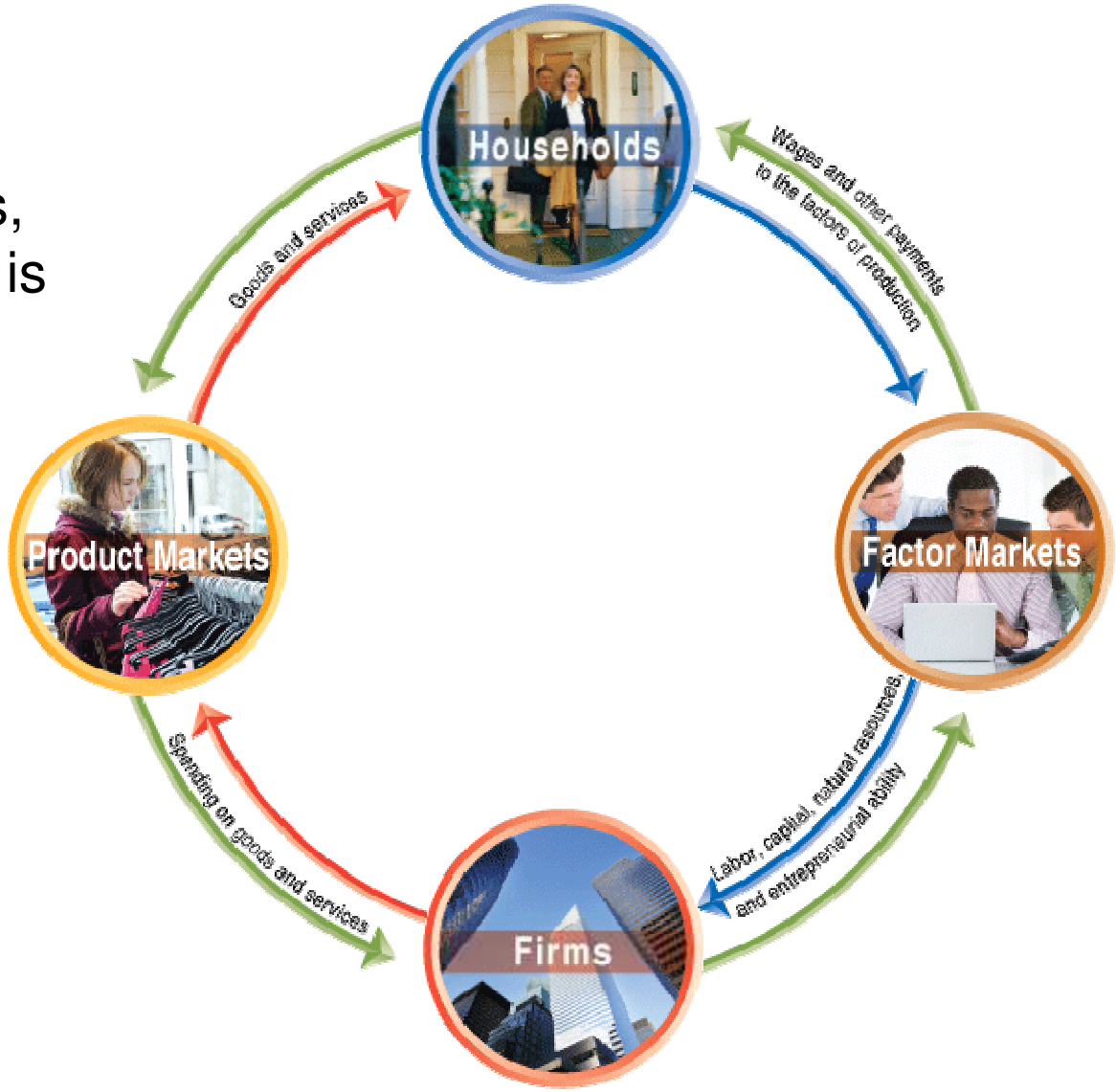
Figure 2.6 The Circular-flow Diagram (2 of 2)

Like all economic models, the circular flow diagram is a simplified version of reality:

- No government
- No financial system
- No foreign buyers and sellers of goods

We will explore these sectors in later chapters.



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The gains from free markets

A **free market** is one 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.

Countries that come closest to the free market benchmark have been more successful than those with centrally planned economies in providing their people with rising living standards.

This concept is not new: Adam Smith argued for free markets in his 1776 treatise, *An Inquiry into the Nature and Causes of the Wealth of Nations.*

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The beauty of the market mechanism

It is not immediately obvious that markets will do better than centrally-planned systems for satisfying human desires.

After all, individuals are acting only in their own *rational self-interest*.

But markets with *flexible prices* allow the collective actions of households and firms to signal the relative worth of goods and services.

In this way, the “invisible hand” allows *individual* responses to *collectively* end up satisfying the wants of consumers.

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Making the Connection: How do you make an iPad?

How do you make an iPad?

Although Apple engineers designed the iPad, Apple does not manufacture iPad components, nor does it assemble the final product.

Hundreds of firms are involved; many probably don't even know their products will be used in an iPad.

But guided by their own self-interest, they all contribute to the final product—without any desire to enrich Apple or provide enjoyment for iPad purchasers.

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The role of the entrepreneur

An **entrepreneur** is someone who operates a business, bringing together the factors of production—labor, capital, and natural resources—to produce goods and services.

The best entrepreneurs create products that consumers never even knew they wanted.

> *"If I had asked my customers what they wanted, they would have said a faster horse."*
>
> - Henry Ford

Entrepreneurs make a vital contribution to economic growth, often with considerable personal risk and sacrifice.

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Table 2.3 Important Products Introduced by Entrepreneurs at Small Firms

Entrepreneurs make a vital contribution to economic growth by

- Responding to consumer demand
- Introducing new products

Government policies encouraging entrepreneurship are likely to increase economic growth and raise standards of living.

Product	Inventor
Air conditioning	William Haviland Carrier
Airplane	Orville and Wilbur Wright
Automobile, mass produced	Henry Ford
Automobile windshield wiper	Mary Anderson
Biomagnetic imaging	Raymond Damadian
Biosynthetic insulin	Herbert Boyer
Vacuum tube (television)	Philo Farnsworth
Zipper	Gideon Sundback

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The legal basis of a successful market system

In a free market, government does not restrict how firms produce and sell goods, or how they employ factors of production.

However governments must provide a sound *legal environment* that will allow the market system to succeed, including:

Protection of private property

- When criminals can take your wages or profits, households and firms have little incentive to work hard.
- **Property rights**: the rights individuals or firms have to the exclusive use of their property, including the right to buy or sell it.

Enforcement of contracts and property rights

- Important for transactions across time to occur.
- An independent court system is critical for this.

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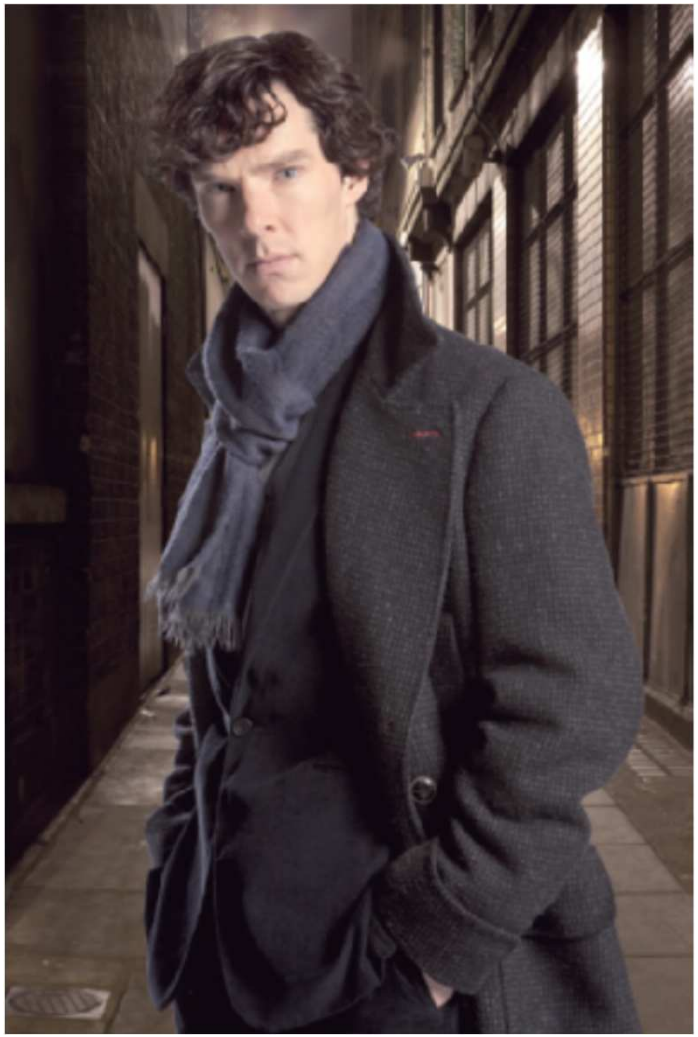
Making the Connection: An elementary case of copyright

Copyrights and patents protect the intellectual property of creators and inventors, in order to encourage innovation.

In 2011, a publisher sued the estate of Sherlock Holmes creator Sir Arthur Conan Doyle for free access to his characters for new stories.

- Federal Appeals Judge (and economist) Richard Posner granted access without payment to the characters.
- What are the consequences of this?



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