Economic Activities: Producing and Trading

Setting the Scene  The following events happened on a day in March.

8:25 A.M.
Two presidential advisors are in the West Wing of the White House discussing what Eduard Shevardnadze said in 1990. Shevardnadze had been the Soviet foreign minister before the collapse of the Soviet Union. He had said the Soviet Union collapsed because of the conflict between the Kremlin and the people. The Kremlin wanted “more guns,” and the people wanted “more butter,” but it was impossible to get more of both. Something had to give, and so it did: The Soviet Union imploded.

10:13 A.M.
Bob and Jim are roommates and students at the University of Missouri Kansas City. Bob says, “I have two final exams tomorrow—biology at 9 and calculus at 2. I think it’s come down to choosing where I want to get an A. I don’t have enough study time tonight to get As in both courses.” Jim comments, “If we could only produce ‘more time’ the same way people produce more watches or more cars. I bet we could sell that for a pretty penny.”

5:55 P.M.
Karen and Larry have been married for eleven years. They have two children: a boy, James, nine years old, and a girl, Caroline, six years old. Every night, Karen cooks the dinner and Larry washes the dishes. Fact is, when Karen and Larry first got married, they decided to split the household tasks “right down the middle.” To them, this meant that Karen and Larry would each do half of everything: Karen would do half the cooking, and Larry would do half the cooking; Karen would do half the cleaning, and Larry would do half the cleaning. It hasn’t turned out that way, though. Each does 100 percent of certain tasks. In a way, each has specialized in performing certain tasks around the house.

6:25 P.M.
Jayant says to Helena, “What eBay did really wasn’t that hard.” Helena replies, “I just wish I had done it.”

Here are some questions to keep in mind as you read this chapter:

- What does a point on a production possibilities frontier have to do with the collapse of the Soviet Union?
- Why can’t Bob get As in both biology and calculus, and what does Jim’s desire to produce “more time” tell us about life?
- What led Karen and Larry to specialize in doing certain tasks?
- What did eBay do that really wasn’t that hard?

See analyzing the scene at the end of this chapter for answers to these questions.
The Production Possibilities Frontier

This section discusses the production possibilities frontier (PPF) and numerous economic concepts that can be illustrated by it.

The Straight-Line PPF: Constant Opportunity Costs

Assume the following:

1. Only two goods can be produced in an economy: computers and television sets.
2. The opportunity cost of 1 television set is 1 computer.
3. As more of one good is produced, the opportunity cost between television sets and computers is constant.

In Exhibit 1(a), we have identified six combinations of computers and television sets that can be produced in our economy. For example, combination A is 50,000 computers and 0 television sets, combination B is 40,000 computers and 10,000 television sets, and so on. We plotted these six combinations of computers and television sets in Exhibit 1(b). Each combination represents a different point in Exhibit 1(b). For example, the combination of 50,000 computers and 0 television sets is represented by point A. The line that connects points A–F is the production possibilities frontier. A production possibilities frontier (PPF) represents the combination of two goods that can be produced in a certain period of time under the conditions of a given state of technology and fully employed resources.

The production possibilities frontier is a straight line in this instance because the opportunity cost of producing computers and television sets is constant.

Straight-line PPF = Constant opportunity costs

For example, if the economy were to move from point A to point B, from B to C, and so on, the opportunity cost of each good would remain constant at 1 for 1. To illustrate, at point A, 50,000 computers and 0 television sets are produced. At point B, 40,000 computers and 10,000 television sets are produced.

Point A: 50,000 computers, 0 television sets
Point B: 40,000 computers, 10,000 television sets

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<thead>
<tr>
<th>Combination</th>
<th>Computers (thousands per year)</th>
<th>Television Sets (thousands per year)</th>
<th>Point in Part (b)</th>
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<tr>
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We conclude that for every 10,000 computers not produced, 10,000 television sets are produced—a ratio of 1 to 1. The opportunity cost—1 computer for 1 television set—that exists between points A and B also exists between points B and C, C and D, D and E, and E and F. In other words, opportunity cost is constant at 1 computer for 1 television set.

**The Bowed-Outward (Concave-Downward) PPF: Increasing Opportunity Costs**

Assume two things:

1. Only two goods can be produced in an economy: computers and television sets.
2. As more of one good is produced, the opportunity cost between computers and television sets changes.

In Exhibit 2(a), we have identified four combinations of computers and television sets that can be produced in our economy. For example, combination A is 50,000 computers and 0 television sets, combination B is 40,000 computers and 20,000 television sets, and so on. We plotted these four combinations of computers and television sets in Exhibit 2(b). Each combination represents a different point. The curved line that connects points A–D is the production possibilities frontier.

In this case, the production possibilities frontier is bowed outward (concave downward) because the opportunity cost of television sets increases as more sets are produced.

Bowed-outward PPF = Increasing opportunity costs

To illustrate, let’s start at point A, where the economy is producing 50,000 computers and 0 television sets, and move to point B, where the economy is producing 40,000 computers and 20,000 television sets.

Point A: 50,000 computers, 0 television sets
Point B: 40,000 computers, 20,000 television sets

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<thead>
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<th>Television Sets</th>
<th>Point in Part (b)</th>
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<tr>
<td>D</td>
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<td>60,000</td>
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**Q&A**

**Opportunity cost and PPF seem like two economic concepts that are linked together somehow. Are they?**

Yes. When we move from one point on the PPF to another point on the PPF, we automatically incur an opportunity cost. To illustrate, suppose we move from point C in Exhibit 1(b) to point D. Notice what happens: We get more television sets but fewer computers. What we have to “give up” to get more television sets is the opportunity cost of those additional television sets.
Law of Increasing Opportunity Costs

As more of a good is produced, the opportunity costs of producing that good increase.

Law of Increasing Opportunity Costs

We know that the shape of the production possibilities frontier depends on whether opportunity costs (1) are constant or (2) increase as more of a good is produced. In Exhibit 1(b), the production possibilities frontier is a straight line; in Exhibit 2(b), it is bowed outward (curved). In the real world, most production possibilities frontiers are bowed outward. This means that for most goods, the opportunity costs increase as more of the good is produced. This is referred to as the law of increasing opportunity costs.

But why (for most goods) do the opportunity costs increase as more of the good is produced? The answer is because people have varying abilities. For example, some people are better suited to building houses than other people are. When a construction company first starts building houses, it employs the people who are most skilled at house building. The most skilled persons can build houses at lower opportunity costs than others can. But as the construction company builds more houses, it finds that it has already employed the most skilled builders, so it must employ those who are less skilled at house building. These (less skilled) people build houses at higher opportunity costs. Where three skilled house builders could build a house in a month, as many as seven unskilled builders may be required to build it in the same length of time. Exhibit 3 summarizes the points in this section.

What is the opportunity cost of a television set over this range? We see that 20,000 more television sets are produced by moving from point A to point B but at the cost of only 10,000 computers. This means for every 1 television set produced, 1/2 computer is forfeited. Thus, the opportunity cost of 1 television set is 1/2 computer.

Now let's move from point B, where the economy is producing 40,000 computers and 20,000 television sets, to point C, where the economy is producing 25,000 computers and 40,000 television sets.

Point B: 40,000 computers, 20,000 television sets
Point C: 25,000 computers, 40,000 television sets

What is the opportunity cost of a television set over this range? In this case, 20,000 more television sets are produced by moving from point B to point C but at the cost of 15,000 computers. This means for every 1 television set produced, 3/4 computer is forfeited. Thus, the opportunity cost of 1 television set is 3/4 of a computer.

What statement can we make about the opportunity costs of producing television sets? Obviously, as the economy produces more television sets, the opportunity cost of producing television sets increases. This gives us the bowed-outward production possibilities frontier in Exhibit 2(b).
Economic Concepts Within a PPF Framework

The PPF framework is useful for illustrating and working with economic concepts. This section discusses seven economic concepts in terms of the PPF framework (see Exhibit 4).

**SCARCITY** Recall that scarcity is the condition where wants (for goods) are greater than the resources available to satisfy those wants. The finiteness of resources is graphically portrayed by the PPF in Exhibit 5. The frontier (itself) tells us: “At this point in time, that’s as far as you can go. You cannot go any farther. You are limited to choosing any combination of the two goods on the frontier or below it.”

The PPF separates the production possibilities of an economy into two regions: (1) an **attainable region**, which consists of the points on the PPF itself and all points below it (this region includes points A–F) and (2) an **unattainable region**, which consists of the points above and beyond the PPF (such as point G). Recall that scarcity implies that some things are attainable and others are unattainable. Point A on the PPF is attainable, as is point F; point G is not.
Choice and opportunity cost are also shown in Exhibit 5. Note that within the attainable region, individuals must choose the combination of the two goods they want to produce. Obviously, hundreds of different combinations exist, but let’s consider only two, represented by points A and B. Which of the two will individuals choose? They can’t be at both points; they must make a choice.

Opportunity cost is illustrated as we move from one point to another on the PPF in Exhibit 5. Suppose we are at point A and choose to move to point B. At A, we have
55,000 television sets and 5,000 cars, and at point B, we have 50,000 television sets and 15,000 cars. What is the opportunity cost of a car? Because 10,000 more cars come at a cost of 5,000 fewer television sets, the opportunity cost of 1 car is 1/2 television set.

**PRODUCTIVE EFFICIENCY** Economists often say that an economy is **productive efficient** if it is producing the maximum output with given resources and technology. In Exhibit 5, points A, B, C, D, and E are all productive efficient points. Notice that all these points lie on the production possibilities frontier. In other words, we are getting the most (in terms of output) from what we have (in terms of available resources and technology).

It follows that an economy is **productive inefficient** if it is producing less than the maximum output with given resources and technology. In Exhibit 5, point F is a productive inefficient point. It lies below the production possibilities frontier; it is below the outer limit of what is possible. In other words, we could produce more goods with the resources we have available to us. Or we can get more of one good without getting less of another good.

**Productive Efficiency**
The condition where the maximum output is produced with given resources and technology.

**Productive Inefficiency**
The condition where less than the maximum output is produced with given resources and technology. Productive inefficiency implies that more of one good can be produced without any less of another good being produced.

**CAN TECHNOLOGY ON THE FARM AFFECT THE NUMBER OF LAWYERS IN THE CITY?**

There is no doubt that an advance in technology affects the industry in which it is developed and used. For example, a technological advance in the car industry will increase the output of cars; a technological advance in the house-building industry will increase the output of houses.

But can a technological advance in one industry have ripple effects beyond the industry in which it is developed and used? With this question in mind, let’s start with some facts about farming. The United States had 32.1 million farmers in 1910, 30.5 million farmers in 1940, 9.7 million farmers in 1970, and about 4.8 million farmers in 2000. Farmers accounted for 34.9 percent of the U.S. population in 1910, 23.2 percent in 1940, 4.8 percent in 1970, and only 1.9 percent in 2005. Where did all the farmers go, and why did they leave farming?

Many farmers left farming because farming experienced major technological advances during the 20th century. Where farmers once farmed with minimal capital equipment, today they use computers, tractors, pesticides, cellular phones, and much more. As a result, more food can be produced with fewer farmers.

Because fewer farmers were needed to produce food, many farmers left the farms and entered the manufacturing and service industries. In other words, people who were once farmers (or whose parents and grandparents were farmers) began to produce cars, airplanes, television sets, and computers. They became attorneys, accountants, and police officers.

What should we learn from this? First, a technological advance in one sector of the economy may make it possible to produce goods in another sector of the economy. Technological advances in agriculture made it possible for fewer farmers to produce more food, thus releasing some farmers to produce other things. In other words, there may be more services in the world in part because of agriculture’s technological advances.

Second, technological advances may affect the composition of employment. The technological advances in agriculture resulted in (1) a smaller percentage of people working in rural areas on farms and (2) a larger percentage of people working in manufacturing and services in the cities and suburbs. (Is the growth of the suburbs in the last 50 years due in part to technological advances on farms?)
To illustrate, suppose we move from inefficient point \( F \) to efficient point \( C \). We produce more television sets and no fewer cars. What if we move from \( F \) to \( D \)? We produce more television sets and more cars. Finally, if we move from \( F \) to \( E \), we produce more cars and no fewer television sets. Thus, moving from \( F \) can give us more of at least one good and no less of another good. In short, productive inefficiency implies that gains are possible in one area without losses in another.

**UNEMPLOYED RESOURCES** When the economy exhibits productive inefficiency, it is not producing the maximum output with the available resources and technology. One reason may be that the economy is not using all its resources; that is, some of its resources are unemployed, as at point \( F \) in Exhibit 5.

When the economy exhibits productive efficiency, it is producing the maximum output with the available resources and technology. This means it is using all its resources to produce goods; its resources are fully employed, and none are unemployed. At the productive efficient points \( A-E \) in Exhibit 5, there are no unemployed resources.

**ECONOMIC GROWTH** Economic growth refers to the increased productive capabilities of an economy. It is illustrated by a shift outward in the production possibilities frontier. Two major factors that affect economic growth are (1) an increase in the quantity of resources and (2) an advance in technology.

With an increase in the quantity of resources (e.g., through a new discovery of resources), it is possible to produce a greater quantity of output. In Exhibit 6, an increase in the quantity of resources makes it possible to produce both more military goods and more civilian goods. Thus, the PPF shifts outward from PPF\(_1\) to PPF\(_2\).

**Technology** refers to the body of skills and knowledge concerning the use of resources in production. An advance in technology commonly refers to the ability to produce more output with a fixed quantity of resources or the ability to produce the same output with fewer resources.

Suppose an advance in technology allows more military goods and more civilian goods to be produced with the same quantity of resources. As a result, the PPF in Exhibit 6 shifts outward from PPF\(_1\) to PPF\(_2\). The outcome is the same as when the quantity of resources is increased.

**SELF-TEST**

(Answers to Self-Test questions are in the Self-Test Appendix.)

1. What does a straight-line production possibilities frontier (PPF) represent? What does a bowed-outward PPF represent?

2. What does the law of increasing costs have to do with a bowed-outward PPF?

3. A politician says, “If you elect me, we can get more of everything we want.” Under what condition(s) is the politician telling the truth?

4. In an economy, only one combination of goods is productive efficient. True or false? Explain your answer.

**Exchange or Trade**

**Exchange or trade** is the process of giving up one thing for something else. Usually, money is traded for goods and services. Trade is all around us; we are involved with it every day. Few of us, however, have considered the full extent of trade.
Periods Relevant to Trade

There are three time periods relevant to the trading process. We discuss these relevant time periods next.

**BEFORE THE TRADE** Before a trade is made, a person is said to be in the *ex ante* position. For example, suppose Ramona has the opportunity to trade what she has, $2,000, for something she does not have, a big-screen television set. In the ex ante position, she wonders if she will be better off with (1) the television set or with (2) $2,000 worth of other goods. If she concludes that she will be better off with the television set than with...
$2,000 worth of other goods, she will make the trade. Individuals will make a trade only if they believe ex ante (before) the trade that the trade will make them better off.

**AT THE POINT OF TRADE** Suppose Ramona now gives $2,000 to the person in possession of the television set. Does Ramona still believe she will be better off with the television set than with the $2,000? Of course she does. Her action testifies to this fact.

**AFTER THE TRADE** After a trade is made, a person is said to be in the *ex post* position.

Suppose two days have passed. Does Ramona still feel the same way about the trade as she did before the trade and at the point of trade? Maybe. Maybe not. She may look back on the trade and regret it. She may say that if she had it to do over again, she would not trade the $2,000 for the big-screen television set. In general, though, people expect a trade to make them better off, and usually, the trade meets their expectations. But there are no guarantees that a trade will meet expectations because no one in the real world can see the future.

**Trade and the Terms of Trade**

*Trade* refers to the process whereby “things” (money, goods, services, etc.) are given up to obtain something else. The *terms of trade* refer to *how much* of one thing is given up for *how much* of something else. For example, if $30 is traded for a best-selling book, the terms of trade are 1 bestseller for $30. If the price of a loaf of bread is $2.50, the terms of trade are 1 loaf of bread for $2.50. Buyers and sellers can always think of more advantageous terms of exchange. Buyers prefer lower prices, whereas sellers prefer higher prices.

**Costs of Trades**

As always, economists consider both benefits and costs. They want to determine what costs are involved in a trade and whether the costs may prevent a trade from taking place.

**UNEXPLOITED TRADES** Suppose Smith wants to buy a red 1965 Ford Mustang in excellent condition. The maximum price she is willing and able to pay for the Mustang is $30,000. Also suppose that Jones owns a red 1965 Ford Mustang in excellent condition. The minimum price he is willing and able to sell the Mustang for is $23,000. Obviously, Smith’s maximum buying price ($30,000) is greater than Jones’s minimum selling price ($23,000), so a potential trade or exchange exists.

Will the potential trade between Smith and Jones become an actual exchange? The answer to this question may depend on the transaction costs. **Transaction costs** are the costs associated with the time and effort needed to search out, negotiate, and consummate an exchange. To illustrate, neither Smith nor Jones may know that the other exists. Suppose Smith lives in Roanoke, Virginia, and Jones lives 40 miles away in Blacksburg, Virginia. Each needs to find the other, which may take time and money. Perhaps Smith can put an ad in the local Blacksburg newspaper stating that she is searching for a 1965 Ford Mustang in mint condition. Alternatively, Jones can put an ad in the local Roanoke newspaper stating that he has a 1965 Ford Mustang to sell. The ad may or may not be seen by the relevant party and then acted upon. Our point is a simple one: Transaction costs sometimes keep potential trades from turning into actual trades.
Consider another example. Suppose Kurt hates to shop for clothes because shopping takes too much time. He has to get in his car, drive to the mall, park the car, walk into the mall, look in different stores, try on different clothes, pay for the items, walk to and get back in his car, and drive home. Suppose Kurt spends an average of 2 hours when he shops, and he estimates that an hour of his time is worth $30. It follows, then, that Kurt incurs $60 worth of transaction costs when he buys clothes. Usually, he is not willing to incur the transaction costs necessary to buy a pair of trousers or a shirt.

Now, suppose we ask Kurt if he would be more willing to buy clothes if shopping was easier. Suppose, we say, the transaction costs associated with buying clothes could be lowered from $60 to less than $10. At lower transaction costs, Kurt says that he would be willing to shop more often.

How can transaction costs be lowered? Both people and computers can help lower the transaction costs of trades. For example, real estate brokers lower the transaction costs of selling and buying a house. Jim has a house to sell but doesn’t know how to find a buyer. Karen wants to buy a house but doesn’t know how to find a seller. Enter the real estate broker, who brings buyers and sellers together. In so doing, she lowers the transaction costs of buying and selling a house.

As another example, consider e-commerce on the Internet. Ursula can buy a book by getting in her car, driving to a bookstore, getting out of her car, walking into the bookstore, looking at the books on the shelves, taking a book to the cashier, paying for it, leaving the store, getting back in her car, and returning home. Or Ursula can buy a book over the Internet. She can click on one of the online booksellers, search for the book by title, read a short description of the book, and then click on 1-Click Buying. Buying on the Internet has lower transaction costs than shopping at a store because online buying requires less time and effort. Before online book buying and selling, were there potential book purchases and sales that weren’t being turned into actual book purchases and sales? There is some evidence that there were.

**TURNING POTENTIAL TRADES INTO ACTUAL TRADES** Some people are always looking for ways to earn a profit. It would seem that one way to earn a profit is to turn potential trades into actual trades by lowering transaction costs. Consider the following example.

Buyer Smith is willing to pay a maximum price of $400 for good X; Seller Jones is willing to accept a minimum price of $200 for good X. Currently, the transaction costs of the exchange are $500, evenly split between Buyer Smith and Seller Jones.

Buyer Smith thinks, “Even if I pay the lowest possible price for good X, $200, I will still have to pay $250 in transaction costs, bringing my total to $450. The maximum price I am willing to pay for good X is $400, so I will not make this purchase.”

Seller Jones thinks, “Even if I receive the highest possible price for good X, $400, I will still have to pay $250 in transaction costs, leaving me with only $150. The minimum price I am willing to accept for good X is $200, so I will not make this sale.”

This potential trade will not become an actual trade unless someone can lower the transaction costs. One role of an entrepreneur is to try to **turn potential trades into actual trades by lowering transaction costs**. Suppose Entrepreneur Brown can lower the transaction costs for Buyer Smith and Seller Jones to $10 each, asking $60 from each person for services rendered. Also, Entrepreneur Brown negotiates the price of good X at $300. Will the potential exchange become an actual exchange?

Buyer Smith thinks, “I am willing to pay a maximum of $400 for good X. If I purchase good X through Entrepreneur Brown, I will pay $300 to Seller Jones, $10 in transaction costs, and $60 to Brown. This is a total of $370, leaving me better off by $30. It is worthwhile for me to purchase good X.”
Seller Jones thinks, “I am willing to sell good X for a minimum of $200. If I sell good X through Entrepreneur Brown, I will receive $300 from Buyer Smith and will have to pay $10 in transaction costs and $60 to Brown. That will leave me with $230, or $30 better off. It is worthwhile for me to sell good X.”

Thus, an entrepreneur can earn a profit by finding a way to lower transaction costs. As a result, a potential exchange turns into an actual exchange.

**Trades and Third-Party Effects**

Consider two trades. In the first, Harriet pays 80 cents to Taylor for a pack of chewing gum. In this trade, both Harriet and Taylor are made better off (they wouldn’t have traded otherwise), and no one is made worse off.

In the second trade, Bob pays $4 to George for a pack of cigarettes. Bob takes a cigarette, lights it, and smokes it. It happens that he is near Caroline when he smokes the cigarette, and she begins to cough because she is sensitive to cigarette smoke. In this trade, both Bob, who buys the cigarettes, and George, who sells the cigarettes, are made better off. But Caroline, who had nothing to do with the trade, is made worse off. In this exchange, a third party, Caroline, is adversely affected by the exchange between George and Bob.

These examples show that some trades affect only the parties involved in the exchange, and some trades have third-party effects (someone other than the parties involved in the exchange is affected). In the cigarette example, the third-party effect was negative; there was an adverse effect on Caroline, the third party. Sometimes economists call adverse third-party effects negative externalities. A later chapter discusses this topic in detail.

**SELF-TEST**

1. What are transaction costs? Are the transaction costs of buying a house likely to be greater or less than those of buying a car? Explain your answer.
2. Smith is willing to pay a maximum of $300 for good X, and Jones is willing to sell good X for a minimum of $220. Will Smith buy good X from Jones?
3. Give an example of a trade without third-party effects. Next, give an example of a trade with third-party effects.

**Production, Trade, and Specialization**

The first section of this chapter discusses production; the second section discusses trade. From these two sections, you might conclude that production and trade are unrelated activities. However, they are not: Before you can trade, you need to produce something. This section ties production and trade together and also shows how the benefits one receives from trade can be affected by how one produces.

**Producing and Trading**

To show how a change in production can benefit traders, we eliminate anything and everything extraneous to the process. Thus, we eliminate money and consider a barter, or moneyless, economy.
In this economy, there are two individuals, Elizabeth and Brian. They live near each other, and each engages in two activities: baking bread and growing apples. Let’s suppose that within a certain period of time, Elizabeth can produce 20 loaves of bread and no apples, or 10 loaves of bread and 10 apples, or no bread and 20 apples. In other words, three points on Elizabeth’s production possibilities frontier correspond to 20 loaves of bread and no apples, 10 loaves of bread and 10 apples, and no bread and 20 apples. As a consumer, Elizabeth likes to eat both bread and apples, so she decides to produce (and consume) 10 loaves of bread and 10 apples.

Within the same time period, Brian can produce 10 loaves of bread and no apples, or 5 loaves of bread and 15 apples, or no bread and 30 apples. In other words, these three combinations correspond to three points on Brian’s production possibilities frontier. Brian, like Elizabeth, likes to eat both bread and apples, so he decides to produce and consume 5 loaves of bread and 15 apples. Exhibit 8 shows the combinations of bread and apples that Elizabeth and Brian can produce.

Elizabeth thinks that both she and Brian may be better off if each specializes in producing only one of the two goods and trading it for the other. In other words, Elizabeth should produce either bread or apples but not both. Brian thinks this may be a good idea but is not sure which good each person should specialize in producing.

An economist would advise each to produce the good that he or she can produce at a lower cost. In economics, a person who can produce a good at a lower cost than another person is said to have a comparative advantage in the production of that good.

Exhibit 8 shows that for every 10 units of bread Elizabeth does not produce, she can produce 10 apples. In other words, the opportunity cost of producing 1 loaf of bread (B) is 1 apple (A):

\[
\text{Opportunity costs for Elizabeth: } 1B = 1A \\
1A = 1B
\]

As for Brian, for every 5 loaves of bread he does not produce, he can produce 15 apples. So, for every 1 loaf of bread he does not produce, he can produce 3 apples. It follows, then, that for every 1 apple he chooses to produce, he forfeits 1/3 loaf of bread.

\[
\text{Opportunity costs for Brian: } 1B = 3A \\
1A = \frac{1}{3}B
\]

Comparing opportunity costs, we see that Elizabeth can produce bread at a lower opportunity cost than Brian can. (Elizabeth forfeits 1 apple when she produces 1 loaf of bread, whereas Brian forfeits 3 apples when he produces 1 loaf of bread.) On the other hand, Brian can produce apples at a lower opportunity cost than Elizabeth can. We conclude that Elizabeth has a comparative advantage in the production of bread, and Brian has a comparative advantage in the production of apples.

Suppose each person specializes in the production of the good in which he or she has a comparative advantage. This means Elizabeth produces only bread and produces 20 loaves. Brian produces only apples and produces 30 apples.

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<th>Elizabeth</th>
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<tr>
<td>Bread</td>
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Now suppose that Elizabeth and Brian decide to trade 8 loaves of bread for 12 apples. In other words, Elizabeth produces 20 loaves of bread and then trades 8 of the loaves for 12 apples. After the trade, Elizabeth consumes 12 loaves of bread and 12 apples. Compare this situation with what she consumed when she didn’t specialize and didn’t trade. In that situation, she consumed 10 loaves of bread and 10 apples. Clearly, Elizabeth is better off when she specializes and trades than when she does not.

This observation is not unique to us. It goes back to Adam Smith, who said that there is a direct relationship between the degree of specialization and the size of the market. Smith said:

> There are some sorts of industry, even of the lowest kind, which can be carried on nowhere but in a great town. A porter, for example, can find employment and subsistence in no other place. A village is by much too narrow a sphere for him; even an ordinary market town is scarce large enough to afford him constant occupation.1

Smith’s observation that “some sorts of industry . . . can be carried on nowhere but in a great town” seems true. Some occupations and some goods can only be found in big cities. Try to find a doorman in North Adams, Michigan (population 514) or restaurant chefs who only prepare Persian, Yugoslav, or Caribbean entrées in Ipswich, South Dakota (population 943).

Profit and a Lower Cost of Living

The last column of Exhibit 9 shows the gains from specialization and trade. One way to view these gains is in terms of Elizabeth and Brian being better off when they specialize and trade than when they do not specialize and do not trade. In short, specialization and trade make people better off.

Another way to view these gains is in terms of profit and a lower cost of living. To illustrate, let’s look again at Elizabeth. Essentially, Elizabeth undertakes two actions by specializing and trading. The first action is to produce more of one good (loaves of bread) than she produces when she does not specialize. The second action is to trade, or “sell,” some of the bread for a “price” higher than the cost of producing the bread. Specifically, she “sells” 8 of the loaves of bread (to Brian) for a “price” of 12 apples. In other words, she “sells” each loaf of bread for a “price” of 1 1/2 apples. But Elizabeth can produce a loaf of bread for a cost of 1 apple. So she “sells” the bread for a “price” (1 1/2 apples) that’s higher than her cost of producing the bread (1 apple). The difference is her profit.

Many people think that one person’s profit is another person’s loss. In other words, because Elizabeth earns a profit by specializing and trading, Brian must lose. But we know this is not the case. The cost to Brian of producing a loaf of bread is 3 apples. But he “buys” bread from Elizabeth for a “price” of only 1 1/2 apples. In other words, while Elizabeth is earning a profit, Brian’s cost of living (what he has to forfeit to get a loaf of bread) is declining.

### A Benevolent and All-Knowing Dictator Versus the Invisible Hand

Suppose a benevolent dictator governs the country where Brian and Elizabeth live. We assume that this benevolent dictator knows everything about almost every economic activity in his country. In other words, he knows Elizabeth’s and Brian’s opportunity costs of producing bread and apples.

Because the dictator is benevolent and because he wants the best for the people who live in his country, he orders Elizabeth to produce only loaves of bread and Brian to produce only apples. Next, he tells Elizabeth and Brian to trade 8 loaves of bread for 12 apples.

### Exhibit 9

<table>
<thead>
<tr>
<th></th>
<th>No Specialization and No Trade</th>
<th>Specialization and Trade</th>
<th>Gains from Specialization and Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elizabeth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption of Loaves of Bread</td>
<td>10</td>
<td>12</td>
<td>+2</td>
</tr>
<tr>
<td>Consumption of Apples</td>
<td>10</td>
<td>12</td>
<td>+2</td>
</tr>
<tr>
<td>Brian</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption of Loaves of Bread</td>
<td>5</td>
<td>8</td>
<td>+3</td>
</tr>
<tr>
<td>Consumption of Apples</td>
<td>15</td>
<td>18</td>
<td>+3</td>
</tr>
</tbody>
</table>

A comparison of the consumption of bread and apples before and after specialization and trade shows that both Elizabeth and Brian benefit from producing the good in which each has a comparative advantage and trading for the other good.
Afterward, he shows Exhibit 9 to Elizabeth and Brian. They are both surprised that they are better off having done what the benevolent dictator told them to do.

Now in the original story about Elizabeth and Brian, there was no benevolent, all-knowing dictator. There were only two people who were guided by their self-interest to specialize and trade. In other words, self-interest did for Elizabeth and Brian what the benevolent dictator did for them.

Adam Smith, the 18th-century Scottish economist and founder of modern economics, spoke about the *invisible hand* that “guided” individuals’ actions toward a positive outcome that they did not intend. That is what happened in the original story about Elizabeth and Brian. Neither intended to increase the overall output of society; each intended only to make himself or herself better off.

**SELF-TEST**

1. If George can produce either (a) 10X and 20Y or (b) 5X and 25Y, what is the opportunity cost to George of producing one more X?

2. Harriet can produce either (a) 30X and 70Y or (b) 40X and 55Y; Bill can produce either (c) 10X and 40Y or (d) 20X and 20Y. Who has a comparative advantage in the production of X? of Y? Explain your answers.

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**How Will Economics Help Me If I’m a History Major?**

I’m a history major taking my first course in economics. But quite frankly, I don’t see how economics will be of much use in my study of history. Any thoughts on the subject?

Economics often plays a major role in historical events. For example, many social scientists argue that economics played a large role in the collapse of communism. If communism had been able to produce the quantity and variety of goods and services that capitalism produces, perhaps the Soviet Union would still exist.

Fact is, understanding economics may help you understand many historical events or periods. If, as a historian, you study the Great Depression, you will need to know something about the stock market, tariffs, and more. If you study the California Gold Rush, you will need to know about supply, demand, and prices. If you study the history of prisoner-of-war camps, you will need to know about how and why people trade and about money. If you study the Boston Tea Party, you will need to know about government grants of monopoly and about taxes.

Economics can also be useful in another way. Suppose you learn in your economics course what can and cannot cause inflation. We'll say you learn that X can cause inflation and that Y cannot. Then, one day, you read an article in which a historian says that Y caused the high inflation in a certain country and that the high inflation led to a public outcry, which was then met with stiff government reprisals. Without an understanding of economics, you might be willing to accept what the historian has written. But with your understanding of economics, you might be willing to accept what the historian has written. But with your understanding of economics, you might be willing to accept what the historian has written. But with your understanding of economics, you might be willing to accept what the historian has written. But with your understanding of economics, you might be willing to accept what the historian has written. But with your understanding of economics, you might be willing to accept what the historian has written. But with your understanding of economics, you might be willing to accept what the historian has written.

In conclusion, a good understanding of economics will not only help you understand key historical events but will also help you discern inaccuracies in recorded history.
What does a point on a production possibilities frontier have to do with the collapse of the Soviet Union?

The former Soviet foreign minister said the Soviet Union had collapsed because of a conflict between the Kremlin and the Soviet people. What was the conflict? The conflict concerned where the economy of the Soviet Union chose to be located on its PPF. The Kremlin wanted a point that represented "more guns" (more military goods) and "less butter" (fewer civilian or consumer goods), whereas the people wanted a point that represented "fewer guns" and "more butter." In other words, the Kremlin wanted to be at one point on the PPF while the people wanted to be at another. It's unlikely the Soviet Union would have collapsed had the people and the Kremlin agreed on the point on the PPF to be at.

Why can't Bob get As in both biology and calculus, and what does Jim's desire to produce "more time" tell us about life?

Bob says he has to choose between an A in biology and an A in calculus. To make that statement, Bob must be thinking in terms of his PPF for "producing grades." His "grades PPF" would look like the straight line in Exhibit 1. Bob's likely biology grade is on the vertical axis (starting with an F at the origin and moving up to an A), and his calculus grade is on the horizontal axis (again starting with an F at the origin and moving across to an A). When Bob says that he must choose where he wants to get an A, he is saying that there is no point on his "grades PPF" that represents an A in both courses (given his resources, such as time, and his state of technology, such as his ability to learn the material). In other words, the point that represents two As is in his unattainable region, and the point that represents one A and, say, one B, is in his attainable region.

Jim's desire to produce "more time" tells us that he feels there is not enough of a particular resource (time) in which to accomplish all his goals. More resources mean more goals can be met and fewer tradeoffs will be incurred.

What led Karen and Larry to specialize in doing certain tasks?

In the chapter we showed (numerically) how two people (Elizabeth and Brian) could make themselves better off by specializing and trading. What holds for Elizabeth and Brian also holds for Karen and Larry.

What did eBay do that really wasn't that hard?

On any given day, 16 million items in 27,000 different categories are listed for sale on eBay.com. What does eBay do? It brings buyers and sellers together.

Consider the situation years ago when the World Wide Web did not exist. Suppose a person in London found an old Beatles' record in his attic and decided he wanted to sell it. Unbeknownst to him, a person in Los Angeles wanted to buy exactly that old Beatles' record. But alas, the record never changed hands because neither the seller nor the buyer knew how to find the other or even if the other existed. In short, the transaction costs of completing the trade were just too high.

Years later, the Web came along, and with it, eBay. What eBay actually did was use the Web to lower the transaction costs of trading. eBay basically told the world: If you're a seller and want a buyer or if you're a buyer and want a seller, come to us.

Today, the London seller of the old Beatles' record can inexpensively be matched with the Los Angeles buyer. eBay and the Web are the "matchmakers." The potential traders go online to eBay where they become actual traders. eBay charges a small fee for creating the place where buyer and seller can find each other.

chapter summary

An Economy's Production Possibilities Frontier

- An economy’s production possibilities frontier (PPF) represents the possible combinations of two goods that the economy can produce in a certain period of time under the conditions of a given state of technology and fully employed resources.

Increasing and Constant Opportunity Costs

- A straight-line PPF represents constant opportunity costs: Increased production of one good comes at constant opportunity costs.
- A bowed-outward (concave-downward) PPF represents the law of increasing opportunity costs: Increased production of one good comes at increased opportunity costs.
The Production Possibilities Frontier and Various Economic Concepts

- The PPF can be used to illustrate various economic concepts. Scarcity is illustrated by the frontier itself. Choice is illustrated by our knowing that we have to locate at some particular point either on the frontier or below it. In short, of the many attainable positions, one must be chosen. Opportunity cost is illustrated by a movement from one point on the PPF to another point on the PPF. Unemployed resources and productive inefficiency are illustrated by a point below the PPF. Productive efficiency and fully employed resources are illustrated by a point on the PPF. Economic growth is illustrated by a shift outward in the PPF.

Exchange or Trade

- The three time periods relevant to the trading process are (1) the ex ante period, which is the time before the trade is made; (2) the point of trade; and (3) the ex post period, which is the time after the trade has been made.
- There is a difference between trade and the terms of trade. Trade refers to the act of giving up one thing for something else. For example, a person may trade money for a car. The terms of trade refer to how much of one thing is traded for how much of something else. For example, how much money ($25,000? $30,000?) is traded for one car.

Transaction Costs

- Transaction costs are the costs associated with the time and effort needed to search out, negotiate, and consummate a trade. Some potential exchanges are not realized because of high transaction costs. Lowering transaction costs can turn a potential exchange into an actual exchange. One role of an entrepreneur is to try to lower transaction costs.

Comparative Advantage and Specialization

- Individuals can make themselves better off by specializing in the production of the good in which they have a comparative advantage and then trading some of that good for other goods. A person has a comparative advantage in the production of a good if he or she can produce the good at a lower opportunity cost than another person can.
- Individuals gain by specializing and trading. Specifically, they earn a profit by specializing in the production of the goods in which they have a comparative advantage.

key terms and concepts

<table>
<thead>
<tr>
<th>Production Possibilities Frontier (PPF)</th>
<th>Productive Efficiency</th>
<th>(Exchange) Trade</th>
<th>Terms of Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Law of Increasing Opportunity Costs</td>
<td>Productive Inefficiency</td>
<td>Ex Ante</td>
<td>Transaction Costs</td>
</tr>
<tr>
<td></td>
<td>Technology</td>
<td>Ex Post</td>
<td>Comparative Advantage</td>
</tr>
</tbody>
</table>

questions and problems

1. Describe how each of the following would affect the U.S. production possibilities frontier: (a) an increase in the number of illegal immigrants entering the country; (b) a war; (c) the discovery of a new oil field; (d) a decrease in the unemployment rate; (e) a law that requires individuals to enter lines of work for which they are not suited.

2. Explain how the following can be represented in a PPF framework: (a) the finiteness of resources implicit in the scarcity condition; (b) choice; (c) opportunity cost; (d) productive efficiency; (e) unemployed resources.

3. What condition must hold for the production possibilities frontier to be bowed outward (concave downward)? to be a straight line?

4. Give an example to illustrate each of the following: (a) constant opportunity costs and (b) increasing opportunity costs.

5. Why are most production possibilities frontiers for goods bowed outward (concave downward)?
6 Within a PPF framework, explain each of the following: (a) a disagreement between a person who favors more domestic welfare spending and one who favors more national defense spending; (b) an increase in the population; (c) a technological change that makes resources less specialized.

7 Some people have said that during the Cold War, the Central Intelligence Agency (CIA) regularly estimated (a) the total quantity of output produced in the Soviet Union and (b) the total quantity of civilian goods produced in the Soviet Union. Of what interest would these data, or the information that might be deduced from them, be to the CIA? (Hint: Think in terms of the PPF)

8 Suppose a nation’s PPF shifts inward as its population grows. What happens, on average, to the material standard of living of the people? Explain your answer.

9 “A nation may be able to live beyond its means, but the world cannot.” Do you agree or disagree? Explain your answer.

10 Use the PPF framework to explain something in your everyday life that was not mentioned in the chapter.

11 Describe the three time periods relevant to the trading process.

12 Are all exchanges or trades beneficial to both parties in the ex post position? Explain your answer.

13 A person who benefits from a trade can be disgruntled over the terms of trade. Do you agree or disagree? Explain your answer.

14 Give an example of a negative third-party effect (negative externality).

working with numbers and graphs

1 Tina can produce any of the following combinations of goods X and Y: (a) 100X and 0Y, (b) 50X and 25Y, and (c) 0X and 50Y. David can produce any of the following combinations of goods X and Y: (a) 50X and 0Y, (b) 25X and 40Y, and (c) 0X and 80Y. Who has a comparative advantage in the production of good X? of good Y? Explain your answer.

2 Using the data in Problem 1, prove that both Tina and David can be made better off through specialization and trade.

3 Exhibit 6 represents an advance in technology that made it possible to produce more of both military and civilian goods. Represent an advance in technology that makes it possible to produce more of only civilian goods. Does this indirectly make it possible to produce more military goods? Explain your answer.

4 In the following figure, which graph depicts a technological breakthrough in the production of good X only?

5 In the preceding figure, which graph depicts a change in the PPF that is a likely consequence of war?

6 If PPF₃ in the following graph is the relevant production possibilities frontier, then which points are unattainable? Explain your answer.

7 If PPF₁ in the preceding figure is the relevant production possibilities frontier, then which point(s) represent productive efficiency? Explain your answer.