Module 1
The Study of Economics

Individual Choice: The Core of Economics

Economics is the study of scarcity and choice. Every economic issue involves, at its most basic level, individual choice—decisions by individuals about what to do and what not to do. In fact, you might say that it isn’t economics if it isn’t about choice.

Step into a big store such as Walmart or Target. There are thousands of different products available, and it is extremely unlikely that you—or anyone else—could afford to buy everything you might want to have. And anyway, there’s only so much space in your room. Given the limitations on your budget and your living space, you must choose which products to buy and which to leave on the shelf.

The fact that those products are on the shelf in the first place involves choice—the store manager chose to put them there, and the manufacturers of the products chose to produce them. The economy is a system that coordinates choices about production with choices about consumption, and distributes goods and services to the people who want them. The United States has a market economy, in which production and consumption are the result of decentralized decisions by many firms and individuals.

Individual producer makes what he or she thinks will be most profitable, and each consumer buys what he or she chooses.

An alternative to a market economy is a command economy, in which industry is publicly owned and there is a central authority making production and consumption decisions. Command economies have been tried, most notably in the Soviet Union between 1917 and 1991, but they didn’t work very well. Producers in the Soviet Union routinely found themselves unable to produce because they did not have crucial raw materials, or they succeeded in producing but then found nobody wanted what the central authority had them produce. Consumers were often unable to find necessary items—command economies are famous for long lines at shops.

At the root of the problem with command economies is a lack of incentives, which are rewards or punishments that motivate particular choices. In market economies, producers are free to charge higher prices when there is a shortage of something, and to
keep the resulting profits. High prices and profits provide incentives for producers to make more of the most-needed goods and services and eliminate shortages.

In fact, economists tend to be skeptical of any attempt to change people's behavior that doesn't change their incentives. For example, a plan that calls on manufacturers to reduce pollution voluntarily probably won't be effective; a plan that gives them a financial incentive to do so is more likely to succeed.

**Property rights**, which establish ownership and grant individuals the right to trade goods and services with each other, create many of the incentives in market economies. With the right to own property comes the incentive to produce things of value, either to keep, or to trade for mutual gain. And ownership creates an incentive to put resources to their best possible use. Property rights to a lake, for example, give the owners an incentive not to pollute that lake if its use for recreation, serenity, or sale has greater value.

In any economy, the decisions of what to do with the next ton of pollution, the next hour of free time, and the next dollar of spending money are *marginal decisions*. They involve trade-offs at the margin: comparing the costs and benefits of doing a little bit more of an activity versus a little bit less. The gain from doing something one more time is called the *marginal benefit*. The cost of doing something one more time is the *marginal cost*. If the marginal benefit of making another car, reading another page, or buying another latte exceeds the marginal cost, the activity should continue. Otherwise, it should not. The study of such decisions is known as *marginal analysis*, plays a central role in economics because the formula of doing things until the marginal benefit no longer exceeds the marginal cost is the key to deciding "how much" to do of any activity.

All economic activities involve individual choice. Let's take a closer look at what this means for the study of economics.

**Resources Are Scarce**

You can't always get what you want. Almost everyone would like to have a beautiful house in a great location (and help with the housecleaning), two or three luxury cars, and frequent vacations in fancy hotels. But even in a rich country like the United States, not many families can afford all of that. So they must make choices—whether to go to Disney World this year or buy a better car, whether to make do with a small backyard or accept a longer commute in order to live where land is cheaper.

Limited income isn't the only thing that keeps people from having everything they want. Time is also in limited supply: there are only 24 hours in a day. And because the time we have is limited, choosing to spend time on one activity also means choosing not to spend time on a different activity—spending time studying for an exam means forgoing a night at the movies. Indeed, many people feel so limited by the number of hours in the day that they are willing to trade money for time. For example, convenience stores usually charge higher prices than larger supermarkets. But they fulfill a valuable role by catering to customers who would rather pay more than spend the time traveling farther to a supermarket where they might also have to wait in longer lines.

Why do individuals have to make choices? The ultimate reason is that *resources are scarce*. A *resource* is anything that can be used to produce something else. The economy's resources, sometimes called *factors of production*, can be classified into four categories: *land* (including timber, water, minerals, and all other resources that come from nature), *labor* (the effort of workers), *capital* (machinery, buildings, tools, and all other manufactured goods used to make other goods and services), and *entrepreneurship* (risk taking, innovation, and the organization of resources for production). A resource is *scarce* when there is not enough of it available to satisfy the various ways a society wants to use it. For example, there are limited supplies of oil and coal, which currently provide most of the energy used to produce and deliver everything we buy. And in a growing world economy with a rapidly increasing human population, even clean air and water have become scarce resources.

Just as individuals must make choices, the scarcity of resources means that society as a whole must make choices. One way for a society to make choices is simply to allow
The real cost of an item is its opportunity cost: what you must give up in order to get it.

them to emerge as the result of many individual choices. For example, there are only so many hours in a week, and Americans must decide how to spend their time. How many hours will they spend going to supermarkets to get lower prices rather than saving time by shopping at convenience stores? The answer is the sum of individual decisions: each of the millions of individuals in the economy makes his or her own choice about where to shop, and society’s choice is simply the sum of those individual decisions.

For various reasons, there are some decisions that a society decides are best not left to individual choice. For example, two of the authors live in an area that until recently was mainly farmland but is now being rapidly built up. Most local residents feel that the community would be a more pleasant place to live if some of the land were left undeveloped. But no individual has an incentive to keep his or her land as open space, rather than sell it to a developer. So a trend has emerged in many communities across the United States of local governments purchasing undeveloped land and preserving it as open space. Decisions about how to use scarce resources are often best left to individuals but sometimes should be made at a higher, community-wide, level.

Opportunity Cost: The Real Cost of Something Is What You Must Give Up to Get It

Suppose it is the last term before you graduate and you must decide which college to attend. You have narrowed your choices to a small liberal arts college near home or a large state university several hours away. If you decide to attend the local liberal arts college, what is the cost of that decision? Of course, you will have to pay for tuition, books, and housing, no matter which college you choose. Added to the cost of choosing the local college is the forgone opportunity to attend the large state university, your next best alternative. Economists call the value of what you must give up when you make a particular choice an opportunity cost.

Opportunity costs are crucial to individual choice because, in the end, all costs are opportunity costs. That’s because with every choice, an alternative is forgone—money or time spent on one thing can’t be spent on another. If you spend $15 on a pizza, you forgo the opportunity to spend that $15 on a steak. If you spend Saturday afternoon at the park, you can’t spend Saturday afternoon doing homework. And if you attend one school, you can’t attend another.

The park and school examples show that economists are concerned with more than just costs paid in dollars and cents. The forgone opportunity to do homework has no direct monetary cost, but it is an opportunity cost nonetheless. And if the local college and the state university have the same tuition and fees, the cost of choosing one school over the other has nothing to do with payments and everything to do with forgone opportunities.

Now suppose tuition and fees at the state university are $5,000 less than at the local college. In that case, what you give up to attend the local college is the ability to attend the state university plus the enjoyment you could have gained from spending $5,000 on other things. So the opportunity cost of a choice includes all the costs, whether or not they are monetary costs, of making that choice.

The choice to go to college at all provides an important final example of opportunity costs. High school graduates can either go to college or seek immediate employment. Even with a full scholarship that would make college “free” in terms of monetary costs, going to college would still be an expensive proposition because most young people, if they were not in college, would have a job. By going to college, students forgo the income they could have earned if they had gone straight to work instead. Therefore, the opportunity cost of attending college is the value of all necessary monetary payments for tuition and fees plus the forgone income from the best available job that could take the place of going to college.

For most people the value of a college degree far exceeds the value of alternative earnings, with notable exceptions. The opportunity cost of going to college is high for people who could earn a lot during what would otherwise be their college years. Basketball
star LeBron James bypassed college because the opportunity cost would have included his $13 million contract with the Cleveland Cavaliers and even more from corporate sponsors Nike and Coca-Cola. Golfer Tiger Woods, Microsoft co-founder Bill Gates, and actor Matt Damon are among the high achievers who decided the opportunity cost of completing college was too much to swallow.

## Microeconomics Versus Macroeconomics

We have presented economics as the study of choices and described how, at its most basic level, economics is about individual choice. The branch of economics concerned with how individuals make decisions and how these decisions interact is called microeconomics. Microeconomics focuses on choices made by individuals, households, or firms—the smaller parts that make up the economy as a whole.

Macroeconomics focuses on the bigger picture—the overall ups and downs of the economy. When you study macroeconomics, you learn how economists explain these fluctuations and how governments can use economic policy to minimize the damage they cause. Macroeconomics focuses on economic aggregates—economic measures such as the unemployment rate, the inflation rate, and gross domestic product—that summarize data across many different markets.

Table 1.1 lists some typical questions that involve economics. A microeconomic version of the question appears on the left, paired with a similar macroeconomic question on the right. By comparing the questions, you can begin to get a sense of the difference between microeconomics and macroeconomics.

<table>
<thead>
<tr>
<th>Microeconomic Questions</th>
<th>Macroeconomic Questions</th>
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<tbody>
<tr>
<td>Should I go to college or get a job after high school?</td>
<td>How many people are employed in the economy as a whole this year?</td>
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<td>What determines the salary that Citibank offers to a new college graduate?</td>
<td>What determines the overall salary levels paid to workers in a given year?</td>
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<td>What determines the cost to a high school offering a new course?</td>
<td>What determines the overall level of prices in the economy as a whole?</td>
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<tr>
<td>What government policies should be adopted to make it easier for low-income students to attend college?</td>
<td>What government policies should be adopted to promote employment and growth in the economy as a whole?</td>
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<tr>
<td>What determines the number of iPhones exported to France?</td>
<td>What determines the overall trade in goods, services, and financial assets between the United States and the rest of the world?</td>
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As these questions illustrate, microeconomics focuses on how individuals and firms make decisions, and the consequences of those decisions. For example, a school will use microeconomics to determine how much it would cost to offer a new course, which includes the instructor’s salary, the cost of class materials, and so on. By weighing the costs and benefits, the school can then decide whether or not to offer the course. Macroeconomics, in contrast, examines the overall behavior of the economy—how the actions of all of the individuals and firms in the economy interact to produce a particular economy-wide level of economic performance. For example, macroeconomics is concerned with the general level of prices in the economy and how high or low they are relative to prices last year, rather than with the price of a particular good or service.
Positive Versus Normative Economics

Economic analysis, as we will see throughout this book, draws on a set of basic economic principles. But how are these principles applied? That depends on the purpose of the analysis. Economic analysis that is used to answer questions about the way the world works, questions that have definite right and wrong answers, is known as positive economics. In contrast, economic analysis that involves saying how the world should work is known as normative economics.

Imagine that you are an economic adviser to the governor of your state and the governor is considering a change to the toll charged along the state turnpike. Below are three questions the governor might ask you.

1. How much revenue will the tolls yield next year?
2. How much would that revenue increase if the toll were raised from $1.00 to $1.50?
3. Should the toll be raised, bearing in mind that a toll increase would likely reduce traffic and air pollution near the road but impose some financial hardship on frequent commuters?

There is a big difference between the first two questions and the third one. The first two are questions about facts. Your forecast of next year's toll revenue without any increase will be proved right or wrong when the numbers actually come in. Your estimate of the impact of a change in the toll is a little harder to check—the increase in revenue depends on other factors besides the toll, and it may be hard to disentangle the causes of any change in revenue. Still, in principle there is only one right answer.

But the question of whether or not tolls should be raised may not have a "right" answer—two people who agree on the effects of a higher toll could still disagree about whether raising the toll is a good idea. For example, someone who lives near the turnpike but doesn't commute on it will care a lot about noise and air pollution but not so much about commuting costs. A regular commuter who doesn't live near the turnpike will have the opposite priorities.

This example highlights a key distinction between the two roles of economic analysis and presents another way to think about the distinction between positive and normative analysis: positive economics is about description, and normative economics is about prescription. Positive economics occupies most of the time and effort of the economics profession.

Looking back at the three questions the governor might ask, it is worth noting a subtle but important difference between questions 1 and 2. Question 1 asks for a simple prediction about next year's revenue—a forecast. Question 2 is a "what if" question, asking how revenue would change if the toll were to change. Economists are often called upon to answer both types of questions. Economic models, which provide simplified representations of reality such as graphs or equations, are especially useful for answering "what if" questions.

The answers to such questions often serve as a guide to policy, but they are still predictions, not prescriptions. That is, they tell you what will happen if a policy is changed, but they don't tell you whether or not that result is good. Suppose that your economic model tells you that the governor's proposed increase in highway tolls will raise property values in communities near the road but will tax or inconvenience people who currently use the turnpike to get to work. Does that information make this proposed toll increase a good idea or a bad one? It depends on whom you ask. As we've just seen, someone who is very concerned with the communities near the road will support the increase, but someone who is very concerned with the welfare of drivers will feel differently. That's a value judgment—it's not a question of positive economic analysis.

Still, economists often do engage in normative economics and give policy advice. How can they do this when there may be no "right" answer? One answer is that economists are also citizens, and we all have our opinions. But economic analysis can often be used to show that some policies are clearly better than others, regardless of individual opinions.
Suppose that policies A and B achieve the same goal, but policy A makes everyone better off than policy B—or at least makes some people better off without making other people worse off. Then A is clearly more efficient than B. That's not a value judgment: we're talking about how best to achieve a goal, not about the goal itself.

For example, two different policies have been used to help low-income families obtain housing: rent control, which limits the rents landlords are allowed to charge, and rent subsidies, which provide families with additional money with which to pay rent. Almost all economists agree that subsidies are the more efficient policy. (In a later module we'll see why this is so.) And so the great majority of economists, whatever their personal politics, favor subsidies over rent control.

When policies can be clearly ranked in this way, then economists generally agree. But it is no secret that economists sometimes disagree.

**When and Why Economists Disagree**

Economists have a reputation for arguing with each other. Where does this reputation come from?

One important answer is that media coverage tends to exaggerate the real differences in views among economists. If nearly all economists agree on an issue—for example, the proposition that rent controls lead to housing shortages—reporters and editors are likely to conclude that there is no story worth covering, and so the professional consensus tends to go unreported. But when there is some issue on which prominent economists take opposing sides—for example, whether cutting taxes right now would help the economy—that does make a good news story. So you hear much more about the areas of disagreement among economists than you do about the many areas of agreement.

It is also worth remembering that economics is, unavoidably, often tied up in politics. On a number of issues, powerful interest groups know what opinions they want to hear. Therefore, they have an incentive to find and promote economists who profess those opinions, which gives these economists a prominence and visibility out of proportion to their support among their colleagues.

Although the appearance of disagreement among economists exceeds the reality, it remains true that economists often do disagree about important things. For example, some highly respected economists argue vehemently that the U.S. government should replace the income tax with a value-added tax (a national sales tax, which is the main source of government revenue in many European countries). Other equally respected economists disagree. What are the sources of this difference of opinion?

One important source of differences is in values: as in any diverse group of individuals, reasonable people can differ. In comparison to an income tax, a value-added tax typically falls more heavily on people with low incomes. So an economist who values a society with more social and income equality will likely oppose a value-added tax. An economist with different values will be less likely to oppose it.

A second important source of differences arises from the way economists conduct economic analysis. Economists base their conclusions on models formed by making simplifying assumptions about reality. Two economists can legitimately disagree about which simplifications are appropriate—and therefore arrive at different conclusions.

Suppose that the U.S. government was considering a value-added tax. Economist A may rely on a simplification of reality that focuses on the administrative costs of tax systems—that is, the costs of monitoring compliance, processing tax forms, collecting the tax, and so on. This economist might then point to the well-known high costs of administering a value-added tax and argue against the change. But economist B may think that the right way to approach the question is to ignore the administrative...
When Economists Agree

"If all the economists in the world were laid end to end, they still couldn’t reach a conclusion.”

So goes one popular economist joke. But do economists really disagree that much?

Not according to a classic survey of members of the American Economic Association, reported in the May 1992 issue of the American Economic Review. The authors asked respondents to agree or disagree with a number of statements about the economy; what they found was a high level of agreement among professional economists on many of the statements. At the top of the list, with more than 90% of the economists agreeing, were the statements "Tariffs and import quotas usually reduce general economic welfare" and "A ceiling on rents reduces the quantity and quality of housing available.” What’s striking about these two statements is that many noneconomists disagree: tariffs and import quotas to keep out foreign-produced goods are favored by many voters, and proposals to do away with rent control in cities like New York and San Francisco have met fierce political opposition.

So is the stereotype of quarreling economists a myth? Not entirely. Economists do disagree quite a lot on some issues, especially in macroeconomics, but they also find a great deal of common ground.

costs and focus on how the proposed law would change individual savings behavior. This economist might point to studies suggesting that value-added taxes promote higher consumer saving, a desirable result. Because the economists have made different simplifying assumptions, they arrive at different conclusions. And so the two economists may find themselves on different sides of the issue.

Most such disputes are eventually resolved by the accumulation of evidence that shows which of the various simplifying assumptions made by economists does a better job of fitting the facts. However, in economics, as in any science, it can take a long time before research settles important disputes—decades, in some cases. And since the economy is always changing in ways that make old approaches invalid or raise new policy questions, there are always new issues on which economists disagree. The policy maker must then decide which economist to believe.

Module AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. What are the four categories of resources? Give an example of a resource from each category.

2. What type of resource is each of the following?
   a. time spent flipping hamburgers at a restaurant
   b. a bulldozer
   c. a river

3. You make $45,000 per year at your current job with Whiz Kids Consultants. You are considering a job offer from Brainiacs, Inc., which would pay you $50,000 per year. Which of the following are elements of the opportunity cost of accepting the new job at Brainiacs, Inc.? Answer yes or no, and explain your answer.
   a. the increased time spent commuting to your new job
   b. the $45,000 salary from your old job
   c. the more spacious office at your new job

4. Identify each of the following statements as positive or normative, and explain your answer.
   a. Society should take measures to prevent people from engaging in dangerous personal behavior.
   b. People who engage in dangerous personal behavior impose higher costs on society through higher medical costs.
Tackle the Test: Multiple-Choice Questions

1. Which of the following is an example of a resource?
   I. petroleum
   II. a factory
   III. a cheeseburger dinner
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III

2. Which of the following situations represent(s) resource scarcity?
   I. Rapidly growing economies experience increasing levels of water pollution.
   II. There is a finite amount of petroleum in the physical environment.
   III. Cassette tapes are no longer being produced.
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III

3. Suppose that you prefer reading a book you already own to watching TV and that you prefer watching TV to listening to music. If these are your only three choices, what is the opportunity cost of reading?

4. Which of the following statements is/are normative?
   I. The price of gasoline is rising.
   II. The price of gasoline is too high.
   III. Gas prices are expected to fall in the near future.
   a. I only
   b. II only
   c. I or III only
   d. I and III only
   e. I, II, and III

5. Which of the following questions is studied in microeconomics?
   a. Should I go to college or get a job after I graduate?
   b. What government policies should be adopted to promote employment in the economy?
   c. How many people are employed in the economy this year?
   d. Has the overall level of prices in the economy increased or decreased this year?
   e. What determines the overall salary levels paid to workers in a given year?

Tackle the Test: Free-Response Questions

1. Define resources, and list the four categories of resources. What characteristic of resources results in the need to make choices?

Answer (6 points)
1 point: Resources are anything that can be used to produce something else.
1 point each: The four categories of the economy's resources are land, labor, capital, and entrepreneurship.
1 point: The characteristic that results in the need to make choices is scarcity.

2. In what type of economic analysis do questions have a "right" or "wrong" answer? In what type of economic analysis do questions not necessarily have a "right" answer? On what type of economic analysis do economists tend to disagree most frequently? Why might economists disagree? Explain.
What you will learn in this module:

- The importance of trade-offs in economic analysis
- What the production possibilities curve model tells us about efficiency, opportunity cost, and economic growth
- The two sources of economic growth—increases in the availability of resources and improvements in technology

Module 3
The Production Possibilities Curve Model

A good economic model can be a tremendous aid to understanding. In this module, we look at the production possibilities curve, a model that helps economists think about the trade-offs every economy faces. The production possibilities curve helps us understand three important aspects of the real economy: efficiency, opportunity cost, and economic growth.

Trade-offs: The Production Possibilities Curve

The 2000 hit movie Cast Away, starring Tom Hanks, was an update of the classic story of Robinson Crusoe, the hero of Daniel Defoe’s eighteenth-century novel. Hanks played the role of a sole survivor of a plane crash who was stranded on a remote island. As in the original story of Robinson Crusoe, the Hanks character had limited resources: the natural resources of the island, a few items he managed to salvage from the plane, and, of course, his own time and effort. With only these resources, he had to make a life. In effect, he became a one-man economy.

One of the important principles of economics we introduced in Module 1 was that resources are scarce. As a result, any economy—whether it contains one person or millions of people—faces trade-offs. You make a trade-off when you give up something in order to have something else. For example, if a castaway devotes more resources to catching fish, he benefits by catching more fish, but he cannot use those same resources to gather coconuts, so the trade-off is that he has fewer coconuts.

To think about the trade-offs necessary in any economy, economists often use the production possibilities curve model. The idea behind this model is to improve our understanding of trade-offs by considering a simplified economy that produces only two goods. This simplification enables us to show the trade-offs graphically.

Figure 3.1 shows a hypothetical production possibilities curve for Tom, a castaway alone on an island, who must make a trade-off between fish production and coconut...
The Production Possibilities Curve

The production possibilities curve illustrates the trade-offs facing an economy that produces two goods. It shows the maximum quantity of one good that can be produced, given the quantity of the other good produced. Here, the maximum quantity of coconuts that Tom can gather depends on the quantity of fish he catches, and vice versa. His feasible production is shown by the area inside or on the curve. Production at point C is feasible but not efficient. Points A and B are feasible and efficient in production, but point D is not feasible.

The curve shows the maximum quantity of fish Tom can catch during a week given the quantity of coconuts he gathers, and vice versa. That is, it answers questions of the form, “What is the maximum quantity of fish Tom can catch if he also gathers 9 (or 15, or 30) coconuts?”

There is a crucial distinction between points inside or on the production possibilities curve (the shaded area) and points outside the production possibilities curve. If a production point lies inside or on the curve—like point C, at which Tom catches 20 fish and gathers 9 coconuts—it is feasible. After all, the curve tells us that if Tom catches 20 fish, he could also gather a maximum of 15 coconuts, so he could certainly gather 9 coconuts. However, a production point that lies outside the curve—such as point D, which would have Tom catching 40 fish and gathering 30 coconuts—isn’t feasible.

In Figure 3.1 the production possibilities curve intersects the horizontal axis at 40 fish. This means that if Tom devoted all his resources to catching fish, he would catch 40 fish per week but would have no resources left over to gather coconuts. The production possibilities curve intersects the vertical axis at 30 coconuts. This means that if Tom devoted all his resources to gathering coconuts, he could gather 30 coconuts per week but would have no resources left over to catch fish. Thus, if Tom wants 30 coconuts, the trade-off is that he can’t have any fish.

The curve also shows less extreme trade-offs. For example, if Tom decides to catch 20 fish, he would be able to gather at most 15 coconuts; this production choice is illustrated by point A. If Tom decides to catch 28 fish, he could gather at most 9 coconuts, as shown by point B.

Thinking in terms of a production possibilities curve simplifies the complexities of reality. The real-world economy produces millions of different goods. Even a castaway on an island would produce more than two different items (for example, he would need clothing and housing as well as food). But in this model we imagine an economy that produces only two goods, because in a model with many goods, it would be much harder to study trade-offs, efficiency, and economic growth.

Efficiency

The production possibilities curve is useful for illustrating the general economic concept of efficiency. An economy is efficient if there are no missed opportunities—meaning that there is no way to make some people better off without making other people worse off. For example, suppose a course you are taking meets in a classroom that is...
A crowded classroom reflects inefficiency if switching to a larger classroom would make some students better off without making anyone worse off.

too small for the number of students—some may be forced to sit on the floor or stand—despite the fact that a larger classroom nearby is empty during the same period. Economists would say that this is an inefficient use of resources because there is a way to make some people better off without making anyone worse off—after all, the larger classroom is empty. The school is not using its resources efficiently. When an economy is using all of its resources efficiently, the only way one person can be made better off is by rearranging the use of resources in such a way that the change makes someone else worse off. So in our classroom example, if all larger classrooms were already fully occupied, we could say that the school was run in an efficient way; your classmates could be made better off only by making people in the larger classroom worse off—by moving them to the room that is too small.

Returning to our castaway example, as long as Tom produces a combination of coconuts and fish that is on the production possibilities curve, his production is efficient. At point A, the 15 coconuts he gathers are the maximum quantity he can get given that he has chosen to catch 20 fish; at point B, the 9 coconuts he gathers are the maximum he can get given his choice to catch 28 fish; and so on. If an economy is producing at a point on its production possibilities curve, we say that the economy is efficient in production.

But suppose that for some reason Tom was at point C, producing 20 fish and 9 coconuts. Then this one-person economy would definitely not be efficient in production, and would therefore be inefficient: it is missing the opportunity to produce more of both goods.

Another example of inefficiency in production occurs when people in an economy are involuntarily unemployed: they want to work but are unable to find jobs. When that happens, the economy is not efficient in production because it could produce more output if those people were employed. The production possibilities curve shows the amount that can possibly be produced if all resources are fully employed. In other words, changes in unemployment move the economy closer to, or further away from, the production possibilities curve (PPC). But the curve itself is determined by what would be possible if there were full employment in the economy. Greater unemployment is represented by points farther below the PPC—the economy is not reaching its possibilities if it is not using all of its resources. Lower unemployment is represented by points closer to the PPC—as unemployment decreases, the economy moves closer to reaching its possibilities.

Although the production possibilities curve helps clarify what it means for an economy to be efficient in production, it's important to understand that efficiency in production is only part of what's required for the economy as a whole to be efficient. Efficiency also requires that the economy allocate its resources so that consumers are as well off as possible. If an economy does this, we say that it is efficient in allocation. To see why efficiency in allocation is as important as efficiency in production, notice that points A and B in Figure 3.1 both represent situations in which the economy is efficient in production, because in each case it can't produce more of one good without producing less of the other. But these two situations may not be equally desirable. Suppose that Tom prefers point B to point A—that is, he would rather consume 28 fish and 9 coconuts than 20 fish and 15 coconuts. Then point A is inefficient from the point of view of the economy as a whole: it's possible to make Tom better off without making anyone else worse off. (Of course, in this castaway economy there isn't anyone else; Tom is all alone.)

This example shows that efficiency for the economy as a whole requires both efficiency in production and efficiency in allocation. To be efficient, an economy must produce as much of each good as it can, given the production of other goods, and it must also produce the mix of goods that people want to consume.
Opportunity Cost

The production possibilities curve is also useful as a reminder that the true cost of any good is not only its price, but also everything else in addition to money that must be given up in order to get that good—the opportunity cost. If, for example, Tom decides to go from point A to point B, he will produce 8 more fish but 6 fewer coconuts. So the opportunity cost of those 8 fish is the 6 coconuts not gathered. Since 8 extra fish have an opportunity cost of 6 coconuts, 1 fish has an opportunity cost of \( \frac{6}{8} = \frac{3}{4} \) of a coconut.

Is the opportunity cost of an extra fish in terms of coconuts always the same, no matter how many fish Tom catches? In the example illustrated by Figure 3.1, the answer is yes. If Tom increases his catch from 28 to 40 fish, an increase of 12, the number of coconuts he gathers falls from 9 to zero. So his opportunity cost per additional fish is \( \frac{9}{12} = \frac{3}{4} \) of a coconut, the same as it was when his catch went from 20 fish to 28. However, the fact that in this example the opportunity cost of an additional fish in terms of coconuts is always the same is a result of an assumption we've made, an assumption that's reflected in the way Figure 3.1 is drawn. Specifically, whenever we assume that the opportunity cost of an additional unit of a good doesn't change regardless of the output mix, the production possibilities curve is a straight line.

Moreover, as you might have already guessed, the slope of a straight-line production possibilities curve is equal to the opportunity cost—specifically, the opportunity cost for the good measured on the horizontal axis in terms of the good measured on the vertical axis. In Figure 3.1, the production possibilities curve has a constant slope of \(-\frac{3}{4}\), implying that Tom faces a constant opportunity cost per fish equal to \( \frac{3}{4} \) of a coconut. (A review of how to calculate the slope of a straight line is found in the Section I Appendix.) This is the simplest case, but the production possibilities curve model can also be used to examine situations in which opportunity costs change as the mix of output changes.

Figure 3.2 illustrates a different assumption, a case in which Tom faces increasing opportunity cost. Here, the more fish he catches, the more coconuts he has to give up to catch an additional fish, and vice versa. For example, to go from producing zero fish to producing 20 fish, he has to give up 5 coconuts. That is, the opportunity cost of those 20 fish is 5 coconuts. But to increase his fish production from 20 to 40—that is, to produce an additional 20 fish—he must give up 25 more coconuts, a much higher opportunity cost. As you can see in Figure 3.2, when opportunity costs are increasing rather

### Increasing Opportunity Cost

The bowed-out shape of the production possibilities curve reflects increasing opportunity cost. In this example, to produce the first 20 fish, Tom must give up 5 coconuts. But to produce an additional 20 fish, he must give up 25 more coconuts.
than constant, the production possibilities curve is a bowed-out curve rather than a straight line.

Although it's often useful to work with the simple assumption that the production possibilities curve is a straight line, economists believe that in reality, opportunity costs are typically increasing. When only a small amount of a good is produced, the opportunity cost of producing that good is relatively low because the economy needs to use only those resources that are especially well suited for its production. For example, if an economy grows only a small amount of corn, that corn can be grown in places where the soil and climate are perfect for growing corn but less suitable for growing anything else, such as wheat. So growing that corn involves giving up only a small amount of potential wheat output. Once the economy grows a lot of corn, however, land that is well suited for wheat but isn't so great for corn must be used to produce corn anyway. As a result, the additional corn production involves sacrificing considerably more wheat production. In other words, as more of a good is produced, its opportunity cost typically rises because well-suited inputs are used up and less adaptable inputs must be used instead.

**Economic Growth**

Finally, the production possibilities curve helps us understand what it means to talk about economic growth. We introduced the concept of economic growth in Module 2, saying that it allows a **sustained rise in aggregate output**. We learned that economic growth is one of the fundamental features of the economy. But are we really justified in saying that the economy has grown over time? After all, although the U.S. economy produces more of many things than it did a century ago, it produces less of other things—for example, horse-drawn carriages. In other words, production of many goods is actually down. So how can we say for sure that the economy as a whole has grown?

The answer, illustrated in Figure 3.3, is that economic growth means an **expansion of the economy's production possibilities**: the economy can produce more of everything. For example, if Tom's production is initially at point A (20 fish and 25 coconuts), economic growth means that he could move to point E (25 fish and 30 coconuts). Point E lies outside the original curve, so in the production possibilities curve model, growth is shown as an outward shift of the curve. Unless the PPC shifts outward, the points beyond the PPC are unattainable. Those points beyond a given PPC are beyond the economy's possibilities.
What can cause the production possibilities curve to shift outward? There are two general sources of economic growth. One is an increase in the resources used to produce goods and services: labor, land, capital, and entrepreneurship. To see how adding to an economy's resources leads to economic growth, suppose that Tom finds a fishing net washed ashore on the beach. The fishing net is a resource he can use to produce more fish in the course of a day spent fishing. We can't say how many more fish Tom will catch; that depends on how much time he decides to spend fishing now that he has the net. But because the net makes his fishing more productive, he can catch more fish without reducing the number of coconuts he gathers, or he can gather more coconuts without reducing his fish catch. So his production possibilities curve shifts outward.

The other source of economic growth is progress in **technology**, the technical means for the production of goods and services. Suppose Tom figures out a better way either to catch fish or to gather coconuts—say, by inventing a fishing hook or a wagon for transporting coconuts. Either invention would shift his production possibilities curve outward. However, the shift would not be a simple outward expansion of every point along the PPC. Technology specific to the production of only one good has no effect if all resources are devoted to the other good: a fishing hook will be of no use if Tom produces nothing but coconuts. So the point on the PPC that represents the number of coconuts that can be produced if there is no fishing will not change. In real-world economies, innovations in the techniques we use to produce goods and services have been a crucial force behind economic growth.

Again, economic growth means an increase in what the economy *can* produce. What the economy actually produces depends on the choices people make. After his production possibilities expand, Tom might not choose to produce both more fish and more coconuts; he might choose to increase production of only one good, or he might even choose to produce less of one good. For example, if he gets better at catching fish, he might decide to go on an all-fish diet and skip the coconuts, just as the introduction of motor vehicles led most people to give up horse-drawn carriages. But even if, for some reason, he chooses to produce either fewer coconuts or fewer fish than before, we would still say that his economy has grown, because he *could* have produced more of everything. If an economy's PPC shifts inward, the economy has become smaller. This could happen if the economy loses resources or technology (for example, if it experiences war or a natural disaster).

The production possibilities curve is a very simplified model of an economy, yet it teaches us important lessons about real-life economies. It gives us our first clear sense of what constitutes economic efficiency, it illustrates the concept of opportunity cost, and it makes clear what economic growth is all about.

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**Module 3 Review**

*Solutions appear at the back of the book.***

**Check Your Understanding**

1. True or false? Explain your answer.
   a. An increase in the amount of resources available to Tom for use in producing coconuts and fish does not change his production possibilities curve.
   b. A technological change that allows Tom to catch more fish relative to any amount of coconuts gathered results in a change in his production possibilities curve.

2. c. Points inside a production possibilities curve are efficient and points outside a production possibilities curve are inefficient.
Tackle the Test: Multiple-Choice Questions

Refer to the graph above to answer the following questions.

1. Which point(s) on the graph represent efficiency in production?
   a. B and C  
   b. A and D  
   c. A, B, C, and D  
   d. A, B, C, D, and E  
   e. A, B, C, D, E, and F

2. For this economy, an increase in the quantity of capital goods produced without a corresponding decrease in the quantity of consumer goods produced
   a. cannot happen because there is always an opportunity cost.  
   b. is represented by a movement from point E to point A.  
   c. is represented by a movement from point C to point B.  
   d. is represented by a movement from point E to point B.  
   e. is only possible with an increase in resources or technology.

3. An increase in unemployment could be represented by a movement from point
   a. D to point C.  
   b. B to point A.  
   c. C to point F.  
   d. B to point E.  
   e. E to point B.

4. Which of the following might allow this economy to move from point B to point F?
   a. more workers  
   b. discovery of new resources  
   c. building new factories  
   d. technological advances  
   e. all of the above

5. This production possibilities curve shows the trade-off between consumer goods and capital goods. Since capital goods are a resource, an increase in the production of capital goods today will increase the economy’s production possibilities in the future. Therefore, all other things equal (ceteris paribus), producing at which point today will result in the largest outward shift of the PPC in the future?
   a. A  
   b. B  
   c. C  
   d. D  
   e. E

---

Tackle the Test: Free-Response Questions

1. Refer to the graph below. Assume that the country is producing at point C.

   a. Does this country’s production possibilities curve exhibit increasing opportunity costs? Explain.
   b. If this country were to go to war, the most likely move would be from point C to which point? Explain.
   c. If the economy entered into a recession, the country would move from point C to which point? Explain.

   Answer (6 points)
   1 point: Yes
   1 point: The PPC is concave (bowed outward), so with each additional unit of butter produced, the opportunity cost in terms of gun production (indicated by the slope of the line) increases. Likewise, as more guns are produced, the opportunity cost in terms of butter increases.
   1 point: B
   1 point: The country would choose an efficient point with more (but not all) military goods with which to fight the war. Point A would be an unlikely choice because at that point there is no production of any social goods, some of which are needed to maintain a minimal standard of living.
   1 point: E
   1 point: A recession, which causes unemployment, is represented by a point below the PPC.

2. Assume that an economy can choose between producing food and producing shelter at a constant opportunity cost. Draw a correctly labeled production possibilities curve for the economy. On your graph:
   a. Use the letter E to label one of the points that is efficient in production.
   b. Use the letter U to label one of the points at which there might be unemployment.
   c. Use the letter I to label one of the points that is not feasible.
Module 4
Comparative Advantage and Trade

Gains from Trade

A family could try to take care of all its own needs—growing its own food, sewing its own clothing, providing itself with entertainment, and writing its own economics textbooks. But trying to live that way would be very hard. The key to a much better standard of living for everyone is trade, in which people divide tasks among themselves and each person provides a good or service that other people want in return for different goods and services that he or she wants.

The reason we have an economy, but not many self-sufficient individuals, is that there are gains from trade: by dividing tasks and trading, two people (or 7 billion people) can each get more of what they want than they could get by being self-sufficient. Gains from trade arise, in particular, from this division of tasks, which economists call specialization—a situation in which different people each engage in a different task.

The advantages of specialization, and the resulting gains from trade, were the starting point for Adam Smith’s 1776 book The Wealth of Nations, which many regard as the beginning of economics as a discipline. Smith’s book begins with a description of an eighteenth-century pin factory where, rather than each of the 10 workers making a pin from start to finish, each worker specialized in one of the many steps in pin-making:

One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on, is a particular business, to whiten the pins is another; it is even a trade by itself to put them into the paper; and the important business of making a pin is, in this manner, divided into about eighteen distinct operations. . . . Those ten persons, therefore, could make among them upwards of forty-eight thousand pins in a day. But if they had all wrought separately and independently, and without any of them having been educated to this particular business, they certainly could not each of them have made twenty, perhaps not one pin a day. . . .

The same principle applies when we look at how people divide tasks among themselves and trade in an economy. The economy, as a whole, can produce more when each person specializes in a task and trades with others.
The benefits of specialization are the reason a person typically focuses on the production of only one type of good or service. It takes many years of study and experience to become a doctor; it also takes many years of study and experience to become a commercial airline pilot. Many doctors might have the potential to become excellent pilots, and vice versa, but it is very unlikely that anyone who decided to pursue both careers would be as good a pilot or as good a doctor as someone who specialized in only one of those professions. So it is to everyone’s advantage when individuals specialize in their career choices.

Markets are what allow a doctor and a pilot to specialize in their respective fields. Because markets for commercial flights and for doctors’ services exist, a doctor is assured that she can find a flight and a pilot is assured that he can find a doctor. As long as individuals know that they can find the goods and services that they want in the market, they are willing to forgo self-sufficiency and are willing to specialize.

**Comparative Advantage and Gains from Trade**

The production possibilities curve model is particularly useful for illustrating gains from trade—trade based on comparative advantage. Let’s stick with Tom stranded on his island, but now let’s suppose that a second castaway, who just happens to be named Hank, is washed ashore. Can they benefit from trading with each other?

It’s obvious that there will be potential gains from trade if the two castaways do different things particularly well. For example, if Tom is a skilled fisherman and Hank is very good at climbing trees, clearly it makes sense for Tom to catch fish and Hank to gather coconuts—and for the two men to trade the products of their efforts.

But one of the most important insights in all of economics is that there are gains from trade even if one of the trading parties isn’t especially good at anything. Suppose, for example, that Hank is less well suited to primitive life than Tom; he’s not nearly as good at catching fish, and compared to Tom, even his coconut-gathering leaves something to be desired. Nonetheless, what we’ll see is that both Tom and Hank can live better by trading with each other than either could alone.

For the purposes of this example, let’s go back to the simple case of straight-line production possibilities curves. Tom’s production possibilities are represented by the production possibilities curve in panel (a) of Figure 4.1, which is the same as the

![Production Possibilities for Two Castaways](image)

Here, each of the two castaways has a constant opportunity cost of fish and a straight-line production possibilities curve. In Tom’s case, each fish always has an opportunity cost of \(\frac{1}{3}\) of a coconut. In Hank’s case, each fish always has an opportunity cost of 2 coconuts.
production possibilities curve in Figure 3.1 (page 17). According to this PPC, Tom could catch 40 fish, but only if he gathered no coconuts, and he could gather 30 coconuts, but only if he caught no fish. Recall that this means that the slope of his production possibilities curve is $-\frac{3}{4}$; his opportunity cost of 1 fish is $\frac{3}{4}$ of a coconut.

Panel (b) of Figure 4.1 shows Hank’s production possibilities. Like Tom’s, Hank’s production possibilities curve is a straight line, implying a constant opportunity cost of fish in terms of coconuts. His production possibilities curve has a constant slope of $-2$. Hank is less productive all around: at most he can produce 10 fish or 20 coconuts. But he is particularly bad at fishing: whereas Tom sacrifices $\frac{3}{4}$ of a coconut per fish caught, for Hank the opportunity cost of a fish is 2 whole coconuts. Table 4.1 summarizes the two castaways’ opportunity costs of fish and coconuts.

| Table 4.1 |
| Tom’s and Hank’s Opportunity Costs of Fish and Coconuts |

<table>
<thead>
<tr>
<th></th>
<th>Tom’s Opportunity Cost</th>
<th>Hank’s Opportunity Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>One fish</td>
<td>3/4 coconut</td>
<td>2 coconuts</td>
</tr>
<tr>
<td>One coconut</td>
<td>4/3 fish</td>
<td>1/2 fish</td>
</tr>
</tbody>
</table>

Now, Tom and Hank could go their separate ways, each living on his own side of the island, catching his own fish and gathering his own coconuts. Let’s suppose that they start out that way and make the consumption choices shown in Figure 4.1: in the absence of trade, Tom consumes 28 fish and 9 coconuts per week, while Hank consumes 6 fish and 8 coconuts.

But is this the best they can do? No, it isn’t. Given that the two castaways have different opportunity costs, they can strike a deal that makes both of them better off.

Table 4.2 shows how such a deal works: Tom specializes in the production of fish, catching 40 per week, and gives 10 to Hank. Meanwhile, Hank specializes in the production of coconuts, gathering 20 per week, and gives 10 to Tom. The result is shown in Figure 4.2 on the next page. Tom now consumes more of both goods than before: instead of 28 fish and 9 coconuts, he consumes 30 fish and 10 coconuts. Hank also consumes more, going from 6 fish and 8 coconuts to 10 fish and 10 coconuts. As Table 4.2 also shows, both Tom and Hank experience gains from trade: Tom’s consumption of fish increases by two, and his consumption of coconuts increases by one. Hank’s consumption of fish increases by four, and his consumption of coconuts increases by two.

| Table 4.2 |
| How the Castaways Gain from Trade |

<table>
<thead>
<tr>
<th></th>
<th>Without Trade</th>
<th>With Trade</th>
<th>Gains from Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Production</td>
<td>Consumption</td>
<td>Production</td>
</tr>
<tr>
<td>Tom</td>
<td>28</td>
<td>28</td>
<td>40</td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coconuts</td>
<td>9</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Hank</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Fish</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Coconuts</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

So both castaways are better off when they each specialize in what they are good at and trade with each other. It’s a good idea for Tom to catch the fish for both of them, because his opportunity cost of a fish is only $\frac{3}{4}$ of a coconut not gathered versus 2 coconuts for Hank. Correspondingly, it’s a good idea for Hank to gather coconuts for both of them.
Comparative Advantage and Gains from Trade

(a) Tom’s Production and Consumption

(b) Hank’s Production and Consumption

By specializing and trading, the two castaways can produce and consume more of both goods. Tom specializes in catching fish, his comparative advantage, and Hank—who has an absolute disadvantage in both goods but a comparative advantage in coconuts—specializes in gathering coconuts. The result is that each castaway can consume more of both goods than either could without trade.

Or we could describe the situation in a different way. Because Tom is so good at catching fish, his opportunity cost of gathering coconuts is high: 3 of a fish not caught for every coconut gathered. Because Hank is a pretty poor fisherman, his opportunity cost of gathering coconuts is much less, only 1/3 of a fish per coconut.

An individual has a comparative advantage in producing something if the opportunity cost of that production is lower for that individual than for other people. In other words, Hank has a comparative advantage over Tom in producing a particular good or service if Hank’s opportunity cost of producing that good or service is lower than Tom’s. In this case, Hank has a comparative advantage in gathering coconuts and Tom has a comparative advantage in catching fish.

One point of clarification needs to be made before we proceed further. You may have wondered why Tom and Hank traded 10 fish for 10 coconuts. Why not some other deal, like trading 15 coconuts for 5 fish? The answer to that question has two parts. First, there may indeed be deals other than 10 fish for 10 coconuts that Tom and Hank are willing to agree to. Second, there are some deals that we can, however, safely rule out—such as 15 coconuts for 5 fish. To understand why, reexamine Table 4.1 and consider Hank first. When Hank works on his own without trading with Tom, his opportunity cost of 1 fish is 2 coconuts. Therefore, it’s clear that Hank will not accept any deal with Tom in which he must give up more than 2 coconuts per fish—otherwise, he’s better off not trading at all. So we can rule out a deal that requires Hank to pay 3 coconuts per fish—such as trading 15 coconuts for 5 fish. But Hank will accept a trade in which he pays less than 2 coconuts per fish—such as paying 1 coconut for 1 fish. Likewise, Tom will reject a deal that requires him to give up more than 5/3 of a fish per coconut. For example, Tom would refuse a trade that required him to give up 10 fish for 6 coconuts. But he will accept a deal where he pays less than 5/3 of a fish per coconut—and 1 fish for 1 coconut works. You can check for yourself why a trade of 1 fish for 1 1/2 coconuts would also be acceptable to both Tom and Hank. So the point to remember is that Tom and Hank will be willing to engage in a trade only if the “price” of the good each person is obtaining from the trade is less than his own opportunity cost.
of producing the good himself. Moreover, that's a general statement that is true whenever two parties trade voluntarily.

The story of Tom and Hank clearly simplifies reality. Yet it teaches us some very important lessons that also apply to the real economy.

First, the model provides a clear illustration of the gains from trade. By agreeing to specialize and provide goods to each other, Tom and Hank can produce more; therefore, both are better off than if each tried to be self-sufficient.

Second, the model demonstrates a very important point that is often overlooked in real-world arguments: as long as people have different opportunity costs, everyone has a comparative advantage in something, and everyone has a comparative disadvantage in something.

Notice that in our example Tom is actually better than Hank at producing both goods: Tom can catch more fish in a week, and he can also gather more coconuts. That is, Tom has an absolute advantage in both activities: he can produce more output with a given amount of input (in this case, his time) than Hank. You might therefore be tempted to think that Tom has nothing to gain from trading with less competent Hank.

But we've just seen that Tom can indeed benefit from a deal with Hank, because comparative, not absolute, advantage is the basis for mutual gain. It doesn't matter that it takes Hank more time to gather a coconut; what matters is that for him the opportunity cost of that coconut in terms of fish is lower. So Hank, despite his absolute disadvantage, even in coconuts, has a comparative advantage in coconut-gathering. Meanwhile Tom, who can use his time better by catching fish, has a comparative disadvantage in coconut-gathering.

If comparative advantage were relevant only to castaways, it might not be that interesting. However, the idea of comparative advantage applies to many activities in the

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**Rich Nation, Poor Nation**

Try taking off your clothes—at a suitable time and in a suitable place, of course—and take a look at the labels inside that say where the clothes were made. It's a very good bet that much, if not most, of your clothing was manufactured overseas, in a country that is much poorer than the United States is—say, in El Salvador, Sri Lanka, or Bangladesh.

Why are these countries so much poorer than the United States? The immediate reason is that their economies are much less productive—firms in these countries are just not able to produce as much from a given quantity of resources as comparable firms in the United States or other wealthy countries. Why countries differ so much in productivity is a deep question—indeed, one of the main questions that preoccupy economists. But in any case, the difference in productivity is a fact.

But if the economies of these countries are so much less productive than ours, how is it that they make so much of our clothing? Why don't we do it for ourselves?

The answer is “comparative advantage.” Just about every industry in Bangladesh is much less productive than the corresponding industry in the United States. But the productivity difference between rich and poor countries varies across goods; there is a very great difference in the production of sophisticated goods such as aircraft but not as great a difference in the production of simpler goods such as clothing. So Bangladesh's position with regard to clothing production is like Hank's position with respect to coconut gathering: he's not as good at it as his fellow castaway is, but it's the thing he does comparatively well.

Although Bangladesh is at an absolute disadvantage compared with the United States in almost everything, it has a comparative advantage in clothing production. Although less productive than American workers, Bangladeshi workers have a comparative advantage in clothing production.

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Although less productive than American workers, Bangladeshi workers have a comparative advantage in clothing production. This means that both the United States and Bangladesh are able to consume more because they specialize in producing different things, with Bangladesh supplying our clothing and the United States supplying Bangladesh with more sophisticated goods.
economy. Perhaps its most important application is in trade—not between individuals, but between countries. So let's look briefly at how the model of comparative advantage helps in understanding both the causes and the effects of international trade.

**Comparative Advantage and International Trade**

Look at the label on a manufactured good sold in the United States, and there's a good chance you will find that it was produced in some other country—in China or Japan or even in Canada. On the other hand, many U.S. industries sell a large portion of their output overseas. (This is particularly true for the agriculture, high technology, and entertainment industries.)

Should we celebrate this international exchange of goods and services, or should it cause us concern? Politicians and the public often question the desirability of international trade, arguing that the nation should produce goods for itself rather than buy them from foreigners. Industries around the world demand protection from foreign competition: Japanese farmers want to keep out American rice, and American steelworkers want to keep out European steel. These demands are often supported by public opinion.

Economists, however, have a very positive view of international trade. Why? Because they view it in terms of comparative advantage.

Figure 4.3 shows, with a simple example, how international trade can be interpreted in terms of comparative advantage. Although the example is hypothetical, it is based on an actual pattern of international trade: American exports of pork to Canada and Canadian exports of aircraft to the United States. Panels (a) and (b) illustrate hypothetical production possibilities curves for the United States and Canada, with pork measured on the horizontal axis and aircraft measured on the vertical axis. The U.S. production possibilities curve is flatter than the Canadian production possibilities curve, implying that producing one more ton of pork costs fewer aircraft in the

![Diagram](image_url)

**Comparative Advantage and International Trade**

(a) U.S. Production Possibilities Curve

- U.S. production with trade
- U.S. consumption without trade

(b) Canadian Production Possibilities Curve

- Canadian production with trade
- Canadian consumption without trade

In this hypothetical example, Canada and the United States produce only two goods: pork and aircraft. Aircraft are measured on the vertical axis and pork on the horizontal axis. Panel (a) shows the U.S. production possibilities curve. It is relatively flat, implying that the United States has a comparative advantage in pork production. Panel (b) shows the Canadian production possibilities curve. It is relatively steep, implying that Canada has a comparative advantage in aircraft production. Just like two individuals, both countries gain from specialization and trade.
United States than it does in Canada. This means that the United States has a comparative advantage in pork and Canada has a comparative advantage in aircraft.

Although the consumption points in Figure 4.3 are hypothetical, they illustrate a general principle: just like the example of Tom and Hank, the United States and Canada can both achieve mutual gains from trade. If the United States concentrates on producing pork and ships some of its output to Canada, while Canada concentrates on aircraft and ships some of its output to the United States, both countries can consume more than if they insisted on being self-sufficient.

Moreover, these mutual gains don’t depend on each country’s being better at producing one kind of good. Even if one country has, say, higher output per person-hour in both industries—that is, even if one country has an absolute advantage in both industries—there are still mutual gains from trade.

**Module Review**

**Check Your Understanding**

1. In Italy, an automobile can be produced by 8 workers in one day and a washing machine by 3 workers in one day. In the United States, an automobile can be produced by 6 workers in one day, and a washing machine by 2 workers in one day.
   a. Which country has an absolute advantage in the production of automobiles? In washing machines?
   b. Which country has a comparative advantage in the production of washing machines? In automobiles?
   c. What type of specialization results in the greatest gains from trade between the two countries?

2. Refer to the story of Tom and Hank illustrated by Figure 4.1 in the text. Explain why Tom and Hank are willing to engage in a trade of 1 fish for 1½ coconuts.

**Tackle the Test: Multiple-Choice Questions**

Refer to the graph below to answer the following questions.

![Graph](image)

1. Use the graph to determine which country has an absolute advantage in producing each good.
   - Absolute advantage in wheat production
     - a. Country A
     - b. Country A
     - c. Country B
     - d. Country B
     - e. Country A
   - Absolute advantage in textile production
     - a. Country B
     - b. Country A
     - c. Country A
     - d. Country B
     - e. Neither Country

2. For country A, the opportunity cost of a bushel of wheat is
   - a. ½ units of textiles
   - b. ⅛ units of textiles
   - c. 1½ units of textiles
   - d. 1⅛ units of textiles
   - e. 2 units of textiles

3. Use the graph to determine which country has a comparative advantage in producing each good.
   - Comparative advantage in wheat production
     - a. Country A
     - b. Country B
     - c. Country A
     - d. Country B
     - e. Country A
   - Comparative advantage in textile production
     - a. Country B
     - b. Country A
     - c. Country A
     - d. Country B
     - e. Neither Country

4. If the two countries specialize and trade, which of the choices below describes the countries’ imports?
   - Import Wheat
     - a. Country A
     - b. Country A
     - c. Country B
     - d. Country B
     - e. Neither Country
   - Import Textiles
     - a. Country A
     - b. Country B
     - c. Country B
     - d. Country A
     - e. Country B
5. What is the highest price Country B is willing to pay to buy wheat from Country A?
   a. ½ units of textiles
   b. ⅓ units of textiles
   c. 1 unit of textiles
d. 1½ units of textiles
e. 2 units of textiles

Tackle the Test: Free-Response Questions

1. Refer to the graph below to answer the following questions.

   ![Graph of PPCs for Country A and Country B]

   Quantity of corn (bushels)
   Quantity of computers

   a. What is the opportunity cost of a bushel of corn in each country?
b. Which country has an absolute advantage in computer production? Explain.
c. Which country has a comparative advantage in corn production? Explain.
d. If each country specializes, what good will Country B import? Explain.
e. What is the minimum price Country A will accept to export corn to Country B? Explain.

Answer (9 points)

1 point: Country A, ¼ computers; Country B, 1¼ computers
1 point: Country B
1 point: Because Country B can produce more computers than Country A (500 versus 200)
1 point: Country A
1 point: Because Country A can produce corn at a lower opportunity cost (¼ versus 1¼ computers)
1 point: Corn
1 point: Country B has a comparative advantage in the production of computers, so it will produce computers and import corn (Country A has a comparative advantage in corn production, so it will specialize in corn and import computers from Country B).
1 point: ¼ computers
1 point: Country A's opportunity cost of producing corn is ¼ computers, so that is the lowest price they will accept to sell corn to Country B.

2. Refer to the table below to answer the following questions. These two countries are producing textiles and wheat using equal amounts of resources.

<table>
<thead>
<tr>
<th></th>
<th>Weekly output per worker</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Country A</td>
</tr>
<tr>
<td>Bushels of Wheat</td>
<td>15</td>
</tr>
<tr>
<td>Units of Textiles</td>
<td>60</td>
</tr>
</tbody>
</table>

a. What is the opportunity cost of producing a bushel of wheat for each country?
b. Which country has the absolute advantage in wheat production?
c. Which country has the comparative advantage in textile production? Explain.
Summary

The Study of Economics

1. Everyone has to make choices about what to do and what not to do. Individual choice is the basis of economics—if it doesn’t involve choice, it isn’t economics. The economy is a system that coordinates choices about production and consumption. In a market economy, these choices are made by many firms and individuals. In a command economy, these choices are made by a central authority. Incentives are rewards or punishments that motivate particular choices, and can be lacking in a command economy where producers cannot set their own prices or keep their own profits. Property rights create incentives in market economies by establishing ownership and granting individuals the right to trade goods and services for mutual gain. In any economy, decisions are informed by marginal analysis—the study of the costs and benefits of doing something a little bit more or a little bit less.

2. The reason choices must be made is that resources—anything that can be used to produce something else—are scarce. The four categories of resources are land, labor, capital, and entrepreneurship. Individuals are limited in their choices by money and time; economies are limited by their supplies of resources.

3. Because you must choose among limited alternatives, the true cost of anything is what you must give up to get it—all costs are opportunity costs.

4. Economists use economic models for both positive economics, which describes how the economy works, and for normative economics, which prescribes how the economy should work. Positive economics often involves making forecasts. Economics can determine correct answers for positive questions, but typically not for normative questions, which involve value judgments. Exceptions occur when policies designed to achieve a certain prescription can be clearly ranked in terms of efficiency.

5. There are two main reasons economists disagree. One, they may disagree about which simplifications to make in a model. Two, economists may disagree—like everyone else—about values.

6. Microeconomics is the branch of economics that studies how people make decisions and how those decisions interact. Macroeconomics is concerned with the overall ups and downs of the economy, and focuses on economic aggregates such as the unemployment rate and gross domestic product, that summarize data across many different markets.

Introduction to Macroeconomics

7. Economies experience ups and downs in economic activity. This pattern is called the business cycle.

8. With respect to the business cycle, economists are interested in the levels of aggregate output, unemployment and inflation.

9. Over longer periods of time, economists focus on economic growth.

10. Almost all economics is based on models, “thought experiments” or simplified versions of reality, many of which use analytical tools such as mathematics and graphs. An important assumption in economic models is the other things equal (ceteris paribus) assumption, which allows analysis of the effect of change in one factor by holding all other relevant factors unchanged.

The Production Possibilities Curve Model

11. One important economic model is the production possibilities curve, which illustrates the trade-offs facing an economy that produces only two goods. The production possibilities curve illustrates three elements: opportunity cost (showing how much less of one good must be produced if more of the other good is produced), efficiency (an economy is efficient in production if it produces on the production possibilities curve and efficient in allocation if it produces the mix of goods and services that people want to consume), and economic growth (an outward shift of the production possibilities curve).

12. There are two basic sources of growth in the production possibilities curve model: an increase in resources and improved technology.

13. There are gains from trade: by engaging in the trade of goods and services with one another, the members of an economy can all be made better off. Underlying gains from trade are the advantages of specialization, of having individuals specialize in the tasks they are comparatively good at.

Comparative Advantage and Trade

14. Comparative advantage explains the source of gains from trade between individuals and countries. Everyone has a comparative advantage in something—some good or service in which that person has a lower opportunity cost than everyone else. But it is often confused with absolute advantage, an ability to produce more of a particular good or service than anyone else. This confusion leads some to erroneously conclude that there are no gains from trade between people or countries.
Key Terms

Economics, p. 2
Individual choice, p. 2
Economy, p. 2
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Command economy, p. 2
Incentives, p. 2
Property rights, p. 3
Marginal analysis, p. 3
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Problems

1. Imagine a firm that manufactures textiles (pants and shirts). List the four categories of resources, and for each category, give an example of a specific resource that the firm might use to manufacture textiles.

2. Describe some of the opportunity costs of the following choices.
   a. Attend college instead of taking a job.
   b. Watch a movie instead of studying for an exam.
   c. Ride the bus instead of driving your car.

3. Use the concept of opportunity cost to explain the following situations.
   a. More people choose to get graduate degrees when the job market is poor.
   b. More people choose to do their own home repairs when the economy is slow and hourly wages are down.
   c. There are more parks in suburban areas than in urban areas.
   d. Convenience stores, which have higher prices than supermarkets, cater to busy people.

4. A representative of the U.S. clothing industry recently made this statement: “Workers in Asia often work in sweatshop conditions earning only pennies an hour. American workers are more productive and, as a result, earn higher wages. In order to preserve the dignity of the American workplace, the government should enact legislation banning imports of low-wage Asian clothing.”
   a. Which parts of this quotation are positive statements?
   b. Is the policy that is being advocated consistent with the statement about the wages and productivities of American and Asian workers?
   c. Would such a policy make some Americans better off without making any other Americans worse off? That is, would this policy be efficient from the viewpoint of all Americans?
   d. Would low-wage Asian workers benefit from or be hurt by such a policy?

5. Are the following statements true or false? Explain your answers.
   a. “When people must pay higher taxes on their wage earnings, it reduces their incentive to work” is a positive statement.
   b. “We should lower taxes to encourage more work” is a positive statement.
   c. Economics cannot always be used to determine what society ought to do.
   d. “The system of public education in this country generates greater benefits to society than the cost of running the system” is a normative statement.
   e. All disagreements among economists are generated by the media.

6. Why do we consider a business-cycle expansion to be different from economic growth?

7. Evaluate this statement: “It is easier to build an economic model that accurately reflects events that have already occurred than to build an economic model to forecast future events.” Do you think that this is true or not? Why? What does this imply about the difficulties of building good economic models?

8. Suppose Atlantis is a small, isolated island in the South Atlantic. The inhabitants grow potatoes and catch fish. The accompanying table shows the maximum annual output combinations of potatoes and fish that can be produced. Obviously, given their limited resources and available technology, as they use more of their resources for potato production, there are fewer resources available for catching fish.

<table>
<thead>
<tr>
<th>Maximum annual output options</th>
<th>Quantity of potatoes (pounds)</th>
<th>Quantity of fish (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1,000</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>800</td>
<td>300</td>
</tr>
<tr>
<td>C</td>
<td>600</td>
<td>500</td>
</tr>
<tr>
<td>D</td>
<td>400</td>
<td>600</td>
</tr>
<tr>
<td>E</td>
<td>200</td>
<td>650</td>
</tr>
<tr>
<td>F</td>
<td>0</td>
<td>675</td>
</tr>
</tbody>
</table>

section I Basic Economic Concepts
a. Draw a production possibilities curve with potatoes on the horizontal axis and fish on the vertical axis, and illustrate these options, showing points A–F.
b. Can Atlantis produce 500 pounds of fish and 800 pounds of potatoes? Explain. Where would this point lie relative to the production possibilities curve?
c. What is the opportunity cost of increasing the annual output of potatoes from 600 to 800 pounds?
d. What is the opportunity cost of increasing the annual output of potatoes from 200 to 400 pounds?
e. Explain why the answers to parts c and d are not the same. What does this imply about the slope of the production possibilities curve?

9. Two important industries on the island of Bermuda are fishing and tourism. According to data from the World Resources Institute and the Bermuda Department of Statistics, in the year 2000 the 307 registered fishermen in Bermuda caught 286 metric tons of marine fish. And the 3,409 people employed by hotels produced 538,000 hotel stays (measured by the number of visitor arrivals). Suppose that this production point is efficient in production. Assume also that the opportunity cost of one additional metric ton of fish is 2,000 hotel stays and that this opportunity cost is constant (the opportunity cost does not change).

a. If all 307 registered fishermen were to be employed by hotels (in addition to the 3,409 people already working in hotels), how many hotel stays could Bermuda produce?
b. If all 3,409 hotel employees were to become fishermen (in addition to the 307 fishermen already working in the fishing industry), how many metric tons of fish could Bermuda produce?
c. Draw a production possibilities curve for Bermuda, with fish on the horizontal axis and hotel stays on the vertical axis, and label Bermuda’s actual production point for the year 2000.

10. In the ancient country of Roma, only two goods, spaghetti and meatballs, are produced. There are two tribes in Roma, the Tivoli and the Frivoli. By themselves, the Tivoli each month can produce either 30 pounds of spaghetti and no meatballs, or 50 pounds of meatballs and no spaghetti, or any combination in between. The Frivoli, by themselves, each month can produce 40 pounds of spaghetti and no meatballs, or 30 pounds of meatballs and no spaghetti, or any combination in between.

a. Assume that all production possibilities curves are straight lines. Draw a diagram showing the monthly production possibilities curve for the Tivoli and another showing the monthly production possibilities curve for the Frivoli.
b. Which tribe has the comparative advantage in spaghetti production? In meatball production?

In A.D. 100, the Frivoli discovered a new technique for making meatballs that doubled the quantity of meatballs they could produce each month.
c. Draw the new monthly production possibilities curve for the Frivoli.
d. After the innovation, which tribe had an absolute advantage in producing meatballs? In producing spaghetti? Which had the comparative advantage in meatball production? In spaghetti production?

11. According to data from the U.S. Department of Agriculture’s National Agricultural Statistics Service, 124 million acres of land in the United States were used for wheat or corn farming in 2004. Of those 124 million acres, farmers used 50 million acres to grow 2.158 billion bushels of wheat, and 74 million acres of land to grow 11.807 billion bushels of corn. Suppose that U.S. wheat and corn farming is efficient in production. At that production point, the opportunity cost of producing one additional bushel of wheat is 1.7 fewer bushels of corn. However, farmers have increasing opportunity costs, so additional bushels of wheat have an opportunity cost greater than 1.7 bushels of corn. For each of the production points described below, decide whether that production point is (i) feasible and efficient in production, (ii) feasible but not efficient in production, (iii) not feasible, or (iv) uncertain as to whether or not it is feasible.

a. From their original production point, farmers use 40 million acres of land to produce 1.8 billion bushels of wheat, and they use 60 million acres of land to produce 9 billion bushels of corn. The remaining 24 million acres are left unused.
b. From their original production point, farmers transfer 40 million acres of land from corn to wheat production. They now produce 3.158 billion bushels of wheat and 10.107 billion bushels of corn.
c. From their original production point, farmers reduce their production of wheat to 2 billion bushels and increase their production of corn to 12.044 billion bushels. Along the production possibilities curve, the opportunity cost of going from 11.807 billion bushels of corn to 12.044 billion bushels of corn is 0.666 bushel of wheat per bushel of corn.

12. The Hatfield family lives on the east side of the Hataootchee River, and the McCoy family lives on the west side. Each family’s diet consists of fried chicken and corn-on-the-cob, and each is self-sufficient, raising their own chickens and growing their own corn. Explain the conditions under which each of the following statements would be true.

a. The two families are made better off when the Hatfields specialize in raising chickens, the McCoys specialize in growing corn, and the two families trade.
b. The two families are made better off when the McCoys specialize in raising chickens, the Hatfields specialize in growing corn, and the two families trade.

13. According to the U.S. Census Bureau, in July 2006 the United States exported aircraft worth $1 billion to China and imported aircraft worth only $19,000 from China. During the same month, however, the United States imported $83 million worth of men’s trousers, slacks, and jeans from China but exported only $8,000 worth of trousers, slacks, and jeans to China. Using what you have learned about how trade is determined by comparative advantage, answer the following questions.

a. Which country has the comparative advantage in aircraft production? In production of trousers, slacks, and jeans?
b. Can you determine which country has the absolute advantage in aircraft production? In production of trousers, slacks, and jeans?

14. Peter Pundit, an economics reporter, states that the European Union (EU) is increasing its productivity very rapidly in all industries. He claims that this productivity advance is so rapid that output from the EU in these industries will soon exceed that of the United States. As a result, the United States will no longer benefit from trade with the EU.

a. Do you think Peter Pundit is correct or not? If not, what do you think is the source of his mistake?
b. If the EU and the United States continue to trade, what do you think will characterize the goods that the EU exports to the United States and the goods that the United States exports to the EU?