

chapter 2

Economic Models: Trade-Offs and Trade

Chapter Objectives

Students will learn in this chapter:

- Why models—simplified representations of reality—play a crucial role in economics.
- Three simple but important models: the production possibility frontier, comparative advantage, and the circular-flow diagram.
- The difference between positive economics, which tries to describe the economy and predict its behavior, and normative economics, which tries to prescribe economic policy.
- When economists agree, and why they sometimes disagree.

Chapter Outline

Opening Example: The Wright Brothers created a wind tunnel to test models of airplanes. Testing models is cheaper and safer than building full-scale versions. Economists use models in the same way.

I. Models in Economics: Some Important Examples

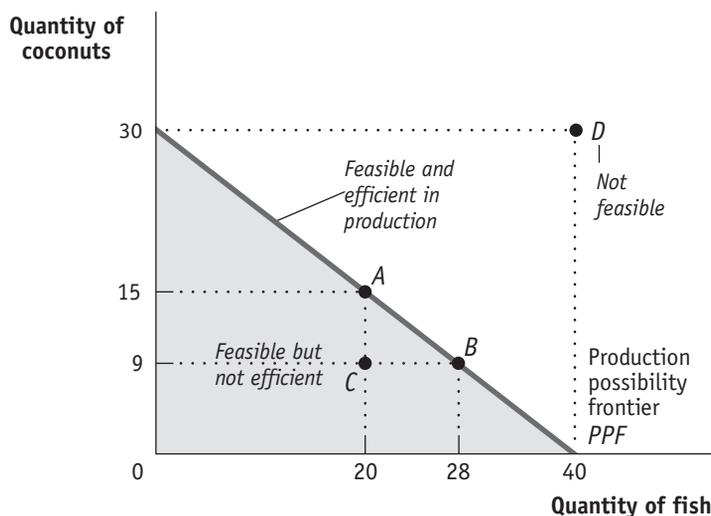
- Definition:* A **model** is a simplified representation of a real situation that is used to better understand real-life situations.
- Models allow economists to see the effects of only one change at a time.
- Definition:* The **other things equal assumption** means that all other relevant factors remain unchanged.
- Economic models make use of mathematical tools, especially graphs.

II. Trade-offs: The Production Possibility Frontier

- Definition:* The **production possibility frontier** illustrates the trade-offs facing an economy that produces only two goods. It shows the maximum quantity of one good that can be produced with available resources and technology for any given production of the other.
- The graph of the production possibilities frontier shows the possible combinations of two goods which can be produced given the scarce resources of the society.
- A point inside the frontier is a feasible combination of two goods that can be produced, but does not use all resources fully, and a point outside the frontier

is not feasible given the current amount of resources. See text Figure 2-1, shown below.

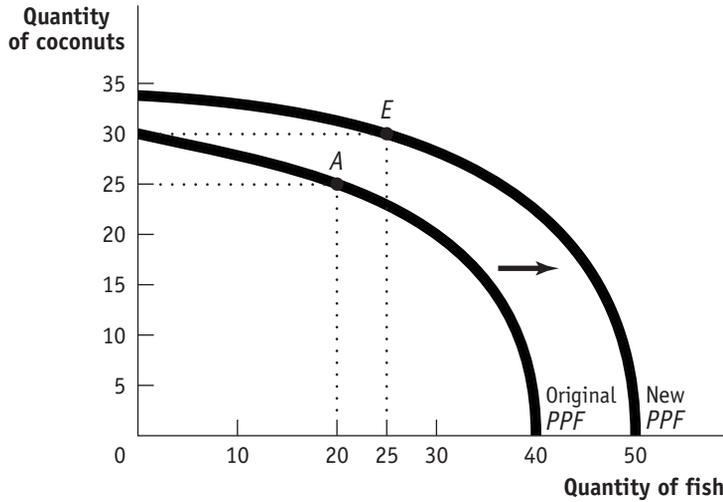
The Production Possibility Frontier



D. The production possibility model illustrates the concepts of:

1. Efficiency: Any point on the frontier represents an efficient use of resources, and any combination of goods inside the frontier represents a point of inefficiency.
 - a. If an economy produces on its production possibilities frontier, it is *efficient in production*.
 - b. An economy is *efficient in allocation* if it allocates resources so that consumers are as well off as possible.
2. Opportunity costs: The negative slope of the frontier means that an increase in the production of one good must require a sacrifice of some quantity of the other good.
3. The law of increasing costs: If the frontier is bowed out, the opportunity costs increase as more of one good is produced because resources are not easily transferable from the production of one good to another.
4. Economic growth: Over time as a society gains more resources, the production possibility frontier shifts outward. See text Figure 2-3, shown on the next page.
 - a. Economic growth comes from two basic sources: an increase in factors of production, and technology.
 - b. *Definition: Factors of production* are resources used to produce goods and services.
 - c. *Definition: Technology* is the technical means for producing goods and services.

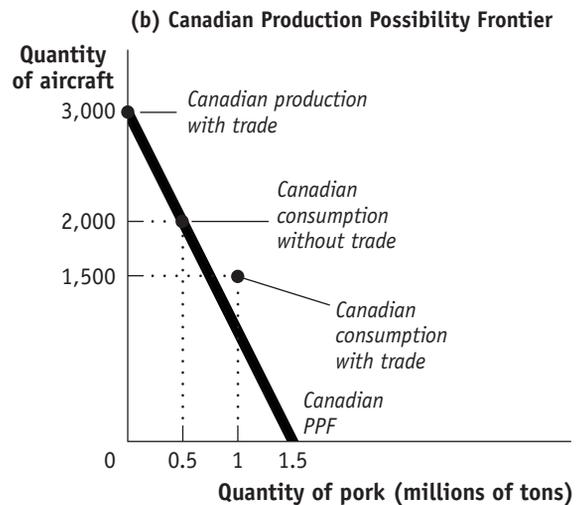
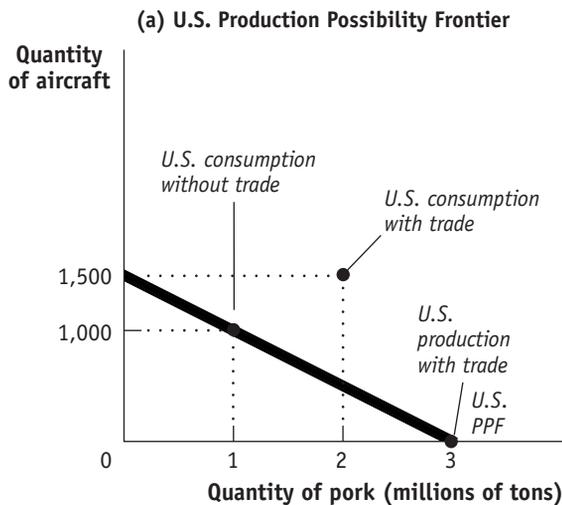
Economic Growth



III. Comparative Advantage and Gains from Trade

- A. *Definition:* An individual has a **comparative advantage** in producing a good if the opportunity cost of producing the good is lower for that individual than for other people.
- B. *Definition:* An individual has an **absolute advantage** in an activity if he or she can do it better than other people can. Having an absolute advantage is not the same thing as having a comparative advantage.
- C. Comparative advantage, not absolute advantage, is the basis for the gains from trade.
- D. The gains from trade are illustrated in text Figure 2-6 (shown below), with a straight line production possibility frontier for each of two countries:

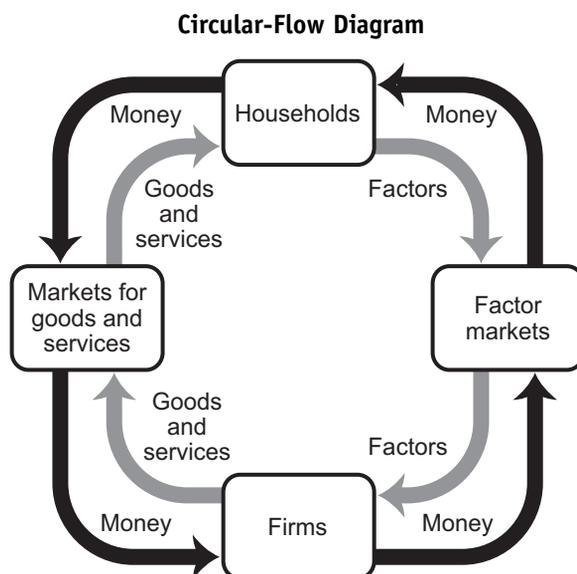
Comparative Advantage and International Trade



- E. Individuals or countries will engage in trade only if the price of the good each is obtaining from trade is less than its own opportunity cost of producing the good.

IV. Transactions: The Circular-Flow Diagram

- A. *Definition:* Trade takes the form of **barter** when people directly exchange goods they have for goods they want.
- B. *Definition:* The **circular-flow diagram** is a model that represents the transactions in an economy by flows around a circle.
- C. *Definition:* A **household** is a person or a group of people who share their income.
- D. *Definition:* A **firm** is an organization that produces goods for sale.
- E. *Definition:* Firms sell goods and services that they produce to households in **markets for goods and services**.
- F. *Definition:* Firms buy the resources they need to produce—**factors of production**—in **factor markets**.
- G. *Definition:* **Income distribution** is the way in which total income is divided among the owners of the various factors of production.
- H. The circular-flow diagram is a simplified picture of an economy, as demonstrated in text Figure 2-7, shown here.



- I. The circular-flow diagram can help us understand how the economy manages to provide jobs for a growing population.
 1. The number of jobs isn't fixed, because it depends on how much households spend; the amount households spend depends on how many people are working.

V. Positive Versus Normative Economics

- A. *Definition:* **Positive economics** is the branch of economic analysis that describes the way the economy actually works.
- B. *Definition:* **Normative economics** makes prescriptions about the way the economy should work.
- C. *Definition:* A **forecast** is a simple prediction of the future.
- D. Models are especially helpful in answering “what if” questions such as, How will revenues change with a tax cut? The answer is a predictive one, not prescriptive; it does not tell you if the policy is good or bad.

- E. Economists do engage in normative economics. Economic analysis can be used to show that some policies are clearly better than others, especially if one solution is more efficient than another. For example, most economists would favor subsidies to renters over rent control laws as a more efficient solution.

VI. When and Why Economists Disagree

- A. Because economists have used different models and made differing simplifying assumptions, they can arrive at different conclusions.
- B. Many disagreements are eventually resolved by the accumulation of evidence.
- C. Economic analysis is a method, not a set of conclusions.

Teaching Tips

Models in Economics

Creating Student Interest

Ask students why economists (and economics students) use simplified models. (Because the real world is too complex to consider everything at once. You want to use a more complicated model only if the benefits of added understanding exceed the costs of added difficulty and complexity).

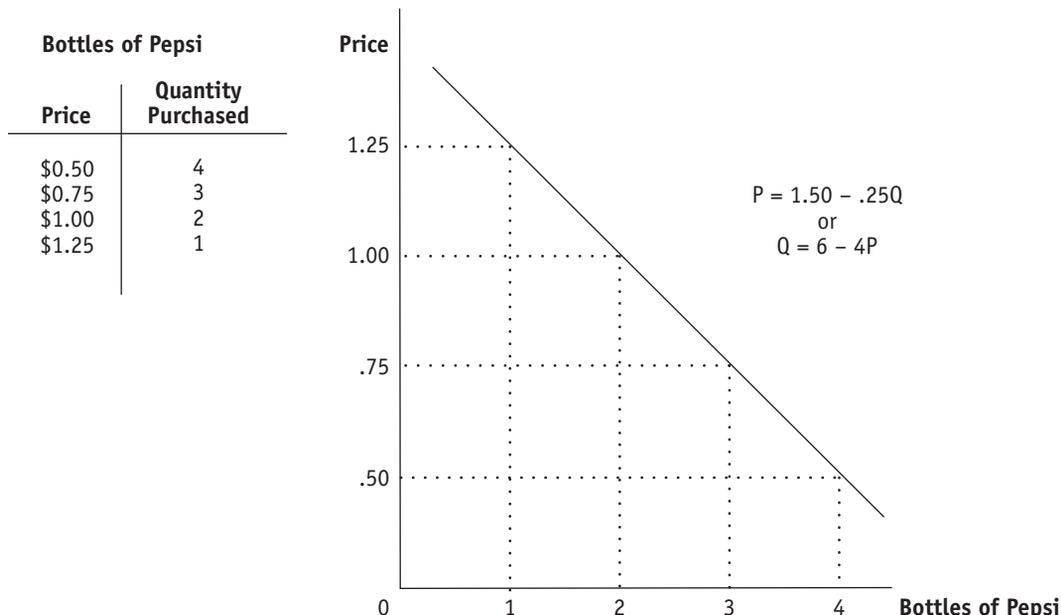
Construct a paper airplane during class. When you are finished, ask the students what you have made. Give your airplane a test flight. Have the class identify the ways the paper airplane is like a real airplane (for instance, it has wings, it flew). If they have trouble, remind them that they knew what it was, so there must have been some things in common! Have the class identify the ways it is not like a real airplane (size, weight, other details, it did not fly). The paper airplane can help an aerodynamics student learn the basic principles of flight (without the complexity of a 747), just as economic models can help students learn about the basic principles of economics. As understanding increases, so can the complexity of the models used.

An alternative to the paper airplane example is a simple “smiley face” drawn on the board or an emoticon used in text messages, :) or 😊. Use these representations to have the same discussion with students. How is the image like a real smiling face and how is it different? Why is it so useful in text messaging? (It is simplified and we all know what it means.) How might the level of complexity be increased for the smiley face model? (Add ears, hair.)

Presenting the Material

After introducing the idea of a model as a simplified representation of reality (airplane or smiley face), segue into models in economics by asking students how they think economists represent reality. Try to get students to identify types of economic models. Help them by asking what representations they see when looking through their textbook. They should be able to identify tables, graphs, and equations as representations of economic models.

Explain that in later chapters they will learn the law of demand. Ask them what happens to the amount of a good that they purchase when its price rises. Most students will know that people buy less when the price rises and buy more when the price falls. The concept will be easy for them to understand (they don’t need an economics course to figure out the law of demand!). Tell the students that they already know an important economic “law.” Show them how economists model (represent) the law of demand using a demand schedule, a graph and an equation (see next page).



Trade-offs: The Production Possibilities Frontier

Creating Student Interest

Introduce the production possibilities model by evoking the image of a person (or people) stranded on an island. This could be Robinson Crusoe, Gilligan, Tom Hanks in *Cast Away*, contestants on *Survivor*—have your students select the image that they can relate to the most. Present that as an example of the simplest economy you can imagine. Explain to students that you are going to build a model of the economy on the island. Have students list the limited resources available on the island (for example, trees, sand, water, fish, labor, entrepreneurship). Then have the class consider the immediate needs that must be met using these resources (food, shelter). Explain that the model will represent production in the island economy.

Presenting the Material

Use students “producing” grades as a simple example of a production possibility frontier. Put economics on the vertical axis of a graph and accounting on the horizontal axis. Students’ time and energy are fixed for the moment, and putting more time into one subject involves a lower grade in the other subject. (Assuming that the student is equally efficient in “producing” both subjects, the production possibilities graph is a straight line.) Points on the frontier show the possible combinations of grades that the student can achieve.

Use an example of a country that can produce wheat or airplanes. Here are the points on the production possibility frontier:

Maximum Annual Output Options	Wheat	Airplanes
A	1,000	0
B	800	150
C	600	250
D	400	325
E	200	375
F	0	400

Ask students: What is the opportunity cost of expanding production from 150 airplanes to 250 airplanes? (200 wheat.) Why is the production possibility graph negatively sloped? (Given scarcity, producing more of one good means producing less of the other.) Why is it bowed out from the origin? (Because of increasing opportunity cost.)

Comparative Advantage and Gains from Trade

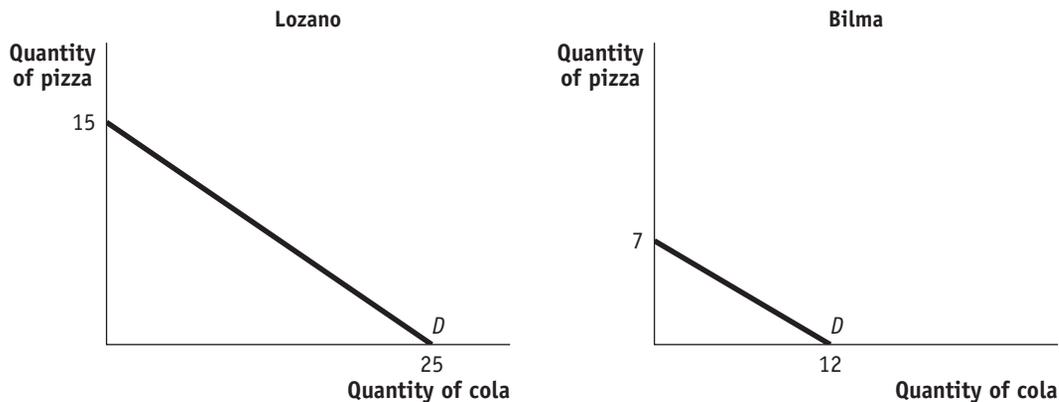
Creating Student Interest

Ask students if they agree with the idea that, if it is cheaper to buy a product from another country than to make it yourself, you should buy it from the other country.

Provoke a discussion by asking students if the U.S. economy would be better off without importing so many clothing items from China.

Presenting the Material

Give a simple example of two economies that can produce the following two goods, in the same time period, with a fixed amount of resources. Assume a straight line production possibility frontier.



Indicate that Lozano has an absolute advantage in both goods. Students often need help in seeing how to calculate the opportunity costs of producing both goods in each country. The opportunity cost of pizza in Lozano is the ratio of cola to pizza, or $25/15 = 1.67$, and the opportunity cost of pizza in Bilma is $12/7 = 1.7$. Thus, Lozano has the comparative advantage in pizza and Bilma has the comparative advantage in producing cola.

Transactions: The Circular-Flow Diagram

Creating Student Interest

Use the example of a dollar in your pocket. Explain where the dollar came from (it came from your bank account, it was put there by a direct deposit from your university). Consider where the dollar will go (you will buy lunch and leave it as a tip, it will become income for a waitress and then she will have money to spend). Ask students to think about the last dollar they spent. Where did it come from and where did it go?

Presenting the Material

Identify and define the two major components of the diagram first: households and firms. Then draw in the upper loop—the spending loop—of the circular-flow model. Use a concrete example of their spending money on clothes at a local store. Then add the bottom loop of the model, the factor market. Use a concrete example of their earning wages from a job.

Use your ample artistic skills to draw a house on the left side of the board and a factory on the right. Tell the class these represent *households* and *firms*. Create the circular-flow diagram by asking students the following series of questions. (It will help some students to see the step-by-step construction of the diagram in addition to the completed diagram in the text.)

What do households get from the firms (goods and services). Draw an arrow above the pictures from the firm to the households and label it “goods and services.”

What do the firms get in exchange for the goods and services? (payment/money). Draw a line above the pictures back from the households to the firm and label it “\$”.

What do the households provide to the firms? (worker/labor—add that they provide the other resources also). Draw a line below the pictures from the household to the firm and label it “resources”.

What do the households get from the firm in return for their labor/resources? (payments—wages, rent, interest, profit). Draw a line below the pictures back from the firm to the households and label it “wages, rent, interest, profit.”

Point out that the top flow is the *product market* (market for products) and the bottom flow is the *factor market* (market for factors of production). You may want to link changes in the size of the flows to the business cycle discussed in chapter one. During expansions, the flow increases; during recessions, it decreases.

Positive Versus Normative Economics

Creating Student Interest

Find an estimate of the average annual tuition at your institution. Write the estimate on the board and tell students you want them to know two things about this number (write them on the board): First, it is the average annual tuition at your institution. Second, this amount is too low. Tell them to write down the two statements. This should cause one or more students to express disagreement with at least one of the statements. If not, ask them if they agree with them or not (and why). Use the statements to lead in to your presentation of positive versus normative in economics.

Ask students to make a clearly biased statement concerning the economy. Then ask them to make a perfectly objective statement.

Presenting the Material

After explaining the difference between positive and normative, quiz the class by asking them to determine if each of the following statements is positive or normative. If a student identifies the statement as positive, ask how the statement could be tested. Remind them that a positive statement need not be correct, it only needs to be testable. Also remind them that even if everyone agrees with a normative statement, it is still normative.

The price of gas is too high. (Normative: what is “too high”?)

The Federal Reserve lowered interest rates yesterday. (Positive: you can test this by going to the Federal Reserve’s website or by looking at interest rates.)

The national debt should be reduced. (Normative: How can you know/test what “should” be done?)

Foreign imports are bad for the economy. (Normative: How do you define “bad”?)

Inflation is expected to rise. (Positive: You can survey people and see/test whether they *expect* inflation to rise)

Common Student Pitfalls

- **Misunderstanding comparative advantage.** Students confuse absolute advantage with comparative advantage. Explain that absolute advantage means you can produce more than someone else can. Comparative advantage means that you can produce something at less cost than someone else.

Use the example of two students working on a joint project. One student may be better at every task required to complete the project (have an absolute advantage in all tasks). However, it wouldn’t be efficient to have the one student do everything for the project while the other does nothing. There must be a task that the other student is relatively good at (has a comparative advantage). The pair should identify that task and have the students specialize accordingly.

- **The use of the term “positive.”** Students may not understand the different use of the word *positive*. Make sure they understand that it is not being used in the same way they are familiar with (the opposite of negative). There are many places where economists use generally familiar words to mean something specific to their discipline. Prepare them to get used to learning the new meanings in these cases. In this context, “positive economics” explains the way the world works. It is factual and can therefore be tested.

Case Studies in the Text

Economics in Action

Rich Nation, Poor Nation—Much of our clothing is produced in another country much poorer than the United States. The case study explains that this is because the countries have a comparative advantage in producing clothing.

Ask students the following questions:

1. Why are some countries poor? (Their workers are not as productive as workers in richer economies.)
2. Why do consumers in the United States import so much cheap clothing from poor countries? (Despite their poverty, poor countries have a comparative advantage in producing clothing relative to the United States.)

Economists in Government—This EIA discusses the various roles economists play in the Federal Government.

Ask students the following questions:

1. Why does the government hire so many economists? (Because government makes economic policies).
2. Do all the economists in government disagree with one another all of the time? (No, economists agree on a broad range of economic decisions.)

For Inquiring Minds

Models for Money—This FIM discusses economic modeling as a profession, how models are used in finance, and the case of LTCM, a fund that used financial models to make investment decisions (LTCM later closed!).

Global Comparison

Pajama Republics—Poor countries have low productivity in clothing manufacturing, but even lower productivity in other industries, thus they have a comparative advantage in clothing manufacturing.

Activities

Creating A Production Possibilities Curve (15–25 minutes)

For this activity you will need two desks, paper (this can be in half-sheets), and two staplers—capital. You will also need four or six volunteers to participate in the activity—labor. Have another student take responsibility for graphing results of the activity on the board. This activity identifies the alternative combinations of output (called widgets and whatsits) that can be produced given the available resources (capital/desks, paper and staplers, and labor/students). That is, the students will generate a production possibilities frontier. Have the non-labor students draw a production possibilities graph and label the axes. Then have the student grapher draw the graph.

Explain to students that the capital and labor will be used to produce widgets or whatsits. A widget is a piece of paper folded twice into a square and stapled. A whatsit is a piece of paper of paper folded three times. Start by having the students use all their resources to produce widgets for 30 seconds. Count the number of widgets and whatsits produced (whatsits will equal 0). Have the students graph the data point. Next have the students use all their resources to produce whatsits. Count the production and graph the data point. Finally, have the student divide the resources in half. Have one half produce widgets and the other produce whatsits. Graph this third data point. Connect the points to show the production possibilities frontier.

Increasing Your Productivity (3–5 minutes)

Pair students. After presenting the production possibility frontier for an economics and an accounting class as noted on page 16, ask students to brainstorm what will cause the frontier to shift outward? (They might become better organized and study more efficiently, or they might purchase high speed Internet access to speed up their research time, a technological innovation that would boost productivity.) Ask a few pairs to report.

From Depression to War (3–5 minutes)

Pair students and have them place three historic points on a production possibility frontier for the U.S. economy: 1932 economic depression, 1942 full war mobilization, and 1944 consumer goods are sacrificed for the production of military goods. Have them put military goods on the vertical axis and consumer goods on the horizontal axis. (1932 is inside the PPF, 1942 is on the PPF, and 1944 is a movement upward on the PPF.)

Comparative Advantage (10–15 minutes)

Pair students and ask them to do two tasks in 30 seconds, such as drawing the same-sized Xs on a page, and turning the pages of a book. The first person does the task, while the other person records the quantity produced. Given the data for both goods for both partners, have the pairs calculate their opportunity cost of producing each good.

U.S. Comparative Advantage (2–3 minutes)

Make a list on the board or overhead with student answers to this question: What comparative advantages does the United States have? Then, point out that their answers are all the top exports of the United States.

Pros and Cons of Trade (3–5 minutes)

Pair students and ask them to brainstorm the pros and cons of the following proposition: “The United States should limit imported textiles from China” or “The United States should prohibit the import of products from abroad which are made with child labor.”

Tracing the Circular Flow (5–10 minutes)

Pair students and tell them they will trace the following events through the circular flow: (a) the introduction of a new technology which boosts productivity; (b) the decision of consumers to save more money; and (c) an increase in government spending.

Simulating the Circular Flow (15–30 minutes)

In a lecture, add banks, government, and exports and imports to the circular flow. Divide the class into the following groups: households, firms, workers, sellers of raw materials, sellers of capital goods, banks, exporters, and importers. Introduce an event into this hypothetical economy: consumers decide to spend more money and save less. Give this event card to the household group. Have this group write down how it will affect them and pass it on to the next group they feel will be most immediately affected. The next group writes down its impact on them and passes it on. Make sure the event passes to each group. Have one group use the circular-flow diagram to illustrate on the board how the event affected the economy.

Positive or Normative? (3–5 minutes)

Read the following sentences to the class, and ask students to label each one as normative or positive:

- “More than 60% of women are in the labor market.” (positive)
- “Rent control laws should be implemented because they help to achieve equity or fairness in housing.” (normative)
- “Society should take measures to end gun violence.” (normative)
- “People who smoke pass on increased medical costs to the whole society.” (positive)
- “Single mothers are more than twice as likely as married mothers to be in poverty.” (positive)

Change It to Normative (5–10 minutes)

Pair students. Ask one student in each pair to write a positive economic statement of fact, and the other student to rewrite the statement as a normative one. Ask a few pairs to report.

Web Resources

The following website provides information about U.S. exports (and therefore U.S. comparative advantage).

United States International Trade Commission at <http://dataweb.usitc.gov>.

The National Association of Business Economists has the results of member surveys that indicate what economists currently agree or disagree on as well as information on careers in economics. <http://www.nabe.com/>

Appendix***Creating Student Interest***

Have students discuss the relationship between calories consumed and weight. What is the independent variable? What is the dependent variable?

Presenting the Material

Give an example of data and how a graph is set up, then explain how to interpret the graph.

Year	Health Expenditures as a Percent of GDP
1950	4.5%
1960	5.3%
1970	7.1%
1980	8.9%
1990	12.2%
2000	13.4%

(Source: *The Economics of Health and Health Care*, S. Folland, A. Goodman, and M. Stano. Prentice Hall, 2001.)

Ask students the following questions:

1. With health expenditures as a percent of GDP on the vertical axis of a graph and years on the horizontal axis of the graph, plot the data on the graph.
2. Is the line positive or negatively sloped? (It is positively sloped, as the years have increased, the percent share of GDP has increased.)
3. Is it a linear function? (No, the line is not a straight line.)
4. What does the graph not tell us? (It does not indicate what is causing the increase in health expenditures as a percent of GDP.)

Common Student Pitfalls

Students forget the basic setup of a graph; that each point on the graph refers to a specific quantity on the vertical axis and horizontal axis. Use a demand curve to illustrate: point A on the demand curve means that at a price of \$1.00, consumers will buy 200 of the good, for example. You may want to point out which axis on the graph is referred to as the vertical axis and which is the horizontal axis.

Activity

Causal Relationships (5–10 minutes)

Ask students to think of some causal relationships between health expenditures and other variables. Identify the variables that may increase or decrease health expenditures. What is the dependent variable? (Health expenditures.) What independent variables can influence total health spending as a percent of the GDP? (Some possibilities: percentage of population over 55, government mandated health programs, percentage of population who are smokers, degree of bureaucracy in medical care structure, etc.)

