

3



INTERDEPENDENCE AND THE GAINS FROM TRADE

Consider your typical day. You wake up in the morning, and you pour yourself juice from oranges grown in Florida and coffee from beans grown in Brazil. Over breakfast, you watch a news program broadcast from New York on your television made in Japan. You get dressed in clothes made of cotton grown in Georgia and sewn in factories in Thailand. You drive to class in a car made of parts manufactured in more than a dozen countries around the world. Then you open up your economics textbook written by an author living in Massachusetts, published by a company located in Texas, and printed on paper made from trees grown in Oregon.

Every day you rely on many people from around the world, most of whom you do not know, to provide you with the goods and services that you enjoy. Such interdependence is possible because people trade with one another. Those people who provide you with goods and services are not acting out of generosity or concern for your welfare. Nor is some government agency directing them to make what you

**IN THIS CHAPTER
YOU WILL . . .**

Consider how everyone can benefit when people trade with one another

Learn the meaning of absolute advantage and comparative advantage

See how comparative advantage explains the gains from trade

Apply the theory of comparative advantage to everyday life and national policy

want and to give it to you. Instead, people provide you and other consumers with the goods and services they produce because they get something in return.

In subsequent chapters we will examine how our economy coordinates the activities of millions of people with varying tastes and abilities. As a starting point for this analysis, here we consider the reasons for economic interdependence. One of the *Ten Principles of Economics* highlighted in Chapter 1 is that trade can make everyone better off. This principle explains why people trade with their neighbors and why nations trade with other nations. In this chapter we examine this principle more closely. What exactly do people gain when they trade with one another? Why do people choose to become interdependent?



A PARABLE FOR THE MODERN ECONOMY

To understand why people choose to depend on others for goods and services and how this choice improves their lives, let's look at a simple economy. Imagine that there are two goods in the world—meat and potatoes. And there are two people in the world—a cattle rancher and a potato farmer—each of whom would like to eat both meat and potatoes.

The gains from trade are most obvious if the rancher can produce only meat and the farmer can produce only potatoes. In one scenario, the rancher and the farmer could choose to have nothing to do with each other. But after several months of eating beef roasted, boiled, broiled, and grilled, the rancher might decide that self-sufficiency is not all it's cracked up to be. The farmer, who has been eating potatoes mashed, fried, baked, and scalloped, would likely agree. It is easy to see that trade would allow them to enjoy greater variety: Each could then have a hamburger with french fries.

Although this scene illustrates most simply how everyone can benefit from trade, the gains would be similar if the rancher and the farmer were each capable of producing the other good, but only at great cost. Suppose, for example, that the potato farmer is able to raise cattle and produce meat, but that he is not very good at it. Similarly, suppose that the cattle rancher is able to grow potatoes, but that her land is not very well suited for it. In this case, it is easy to see that the farmer and the rancher can each benefit by specializing in what he or she does best and then trading with the other.

The gains from trade are less obvious, however, when one person is better at producing *every* good. For example, suppose that the rancher is better at raising cattle *and* better at growing potatoes than the farmer. In this case, should the rancher or farmer choose to remain self-sufficient? Or is there still reason for them to trade with each other? To answer this question, we need to look more closely at the factors that affect such a decision.

PRODUCTION POSSIBILITIES

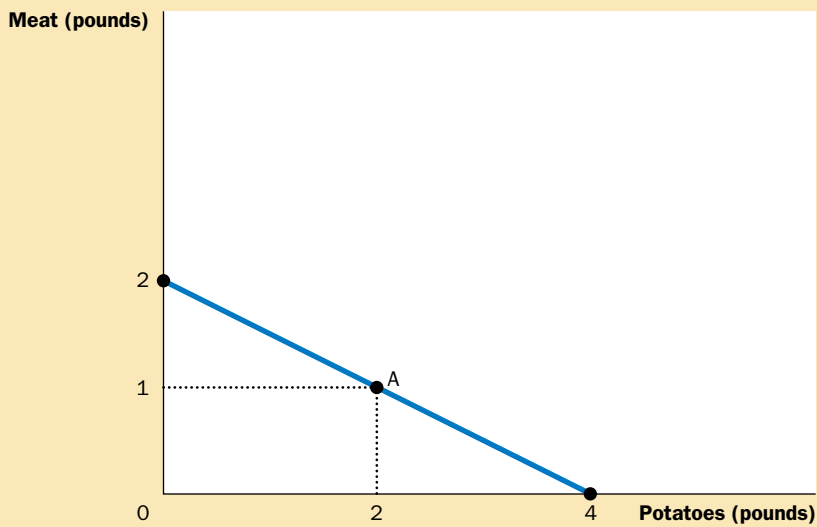
Suppose that the farmer and the rancher each work 40 hours a week and can devote this time to growing potatoes, raising cattle, or a combination of the two. Table 3-1 shows the amount of time each person requires to produce 1 pound of

	HOURS NEEDED TO MAKE 1 POUND OF:		AMOUNT PRODUCED IN 40 HOURS	
	MEAT	POTATOES	MEAT	POTATOES
FARMER	20 hours/lb	10 hours/lb	2 lbs	4 lbs
RANCHER	1 hour/lb	8 hours/lb	40 lbs	5 lbs

Table 3-1

THE PRODUCTION OPPORTUNITIES OF THE FARMER AND THE RANCHER

(a) The Farmer's Production Possibilities Frontier



(b) The Rancher's Production Possibilities Frontier

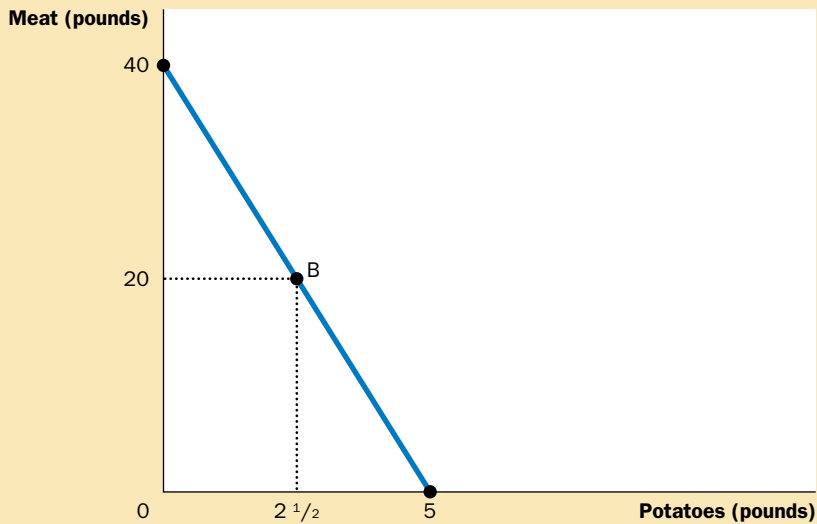


Figure 3-1

THE PRODUCTION POSSIBILITIES FRONTIER. Panel (a) shows the combinations of meat and potatoes that the farmer can produce. Panel (b) shows the combinations of meat and potatoes that the rancher can produce. Both production possibilities frontiers are derived from Table 3-1 and the assumption that the farmer and rancher each work 40 hours per week.

each good. The farmer can produce a pound of potatoes in 10 hours and a pound of meat in 20 hours. The rancher, who is more productive in both activities, can produce a pound of potatoes in 8 hours and a pound of meat in 1 hour.

Panel (a) of Figure 3-1 illustrates the amounts of meat and potatoes that the farmer can produce. If the farmer devotes all 40 hours of his time to potatoes, he produces 4 pounds of potatoes and no meat. If he devotes all his time to meat, he produces 2 pounds of meat and no potatoes. If the farmer divides his time equally between the two activities, spending 20 hours on each, he produces 2 pounds of potatoes and 1 pound of meat. The figure shows these three possible outcomes and all others in between.



This graph is the farmer's production possibilities frontier. As we discussed in Chapter 2, a production possibilities frontier shows the various mixes of output that an economy can produce. It illustrates one of the *Ten Principles of Economics* in Chapter 1: People face tradeoffs. Here the farmer faces a tradeoff between producing meat and producing potatoes. You may recall that the production possibilities frontier in Chapter 2 was drawn bowed out; in this case, the tradeoff between the two goods depends on the amounts being produced. Here, however, the farmer's technology for producing meat and potatoes (as summarized in Table 3-1) allows him to switch between one good and the other at a constant rate. In this case, the production possibilities frontier is a straight line.

Panel (b) of Figure 3-1 shows the production possibilities frontier for the rancher. If the rancher devotes all 40 hours of her time to potatoes, she produces 5 pounds of potatoes and no meat. If she devotes all her time to meat, she produces 40 pounds of meat and no potatoes. If the rancher divides her time equally, spending 20 hours on each activity, she produces 2 1/2 pounds of potatoes and 20 pounds of meat. Once again, the production possibilities frontier shows all the possible outcomes.

If the farmer and rancher choose to be self-sufficient, rather than trade with each other, then each consumes exactly what he or she produces. In this case, the production possibilities frontier is also the consumption possibilities frontier. That is, without trade, Figure 3-1 shows the possible combinations of meat and potatoes that the farmer and rancher can each consume.

Although these production possibilities frontiers are useful in showing the tradeoffs that the farmer and rancher face, they do not tell us what the farmer and rancher will actually choose to do. To determine their choices, we need to know the tastes of the farmer and the rancher. Let's suppose they choose the combinations identified by points A and B in Figure 3-1: The farmer produces and consumes 2 pounds of potatoes and 1 pound of meat, while the rancher produces and consumes 2 1/2 pounds of potatoes and 20 pounds of meat.

SPECIALIZATION AND TRADE

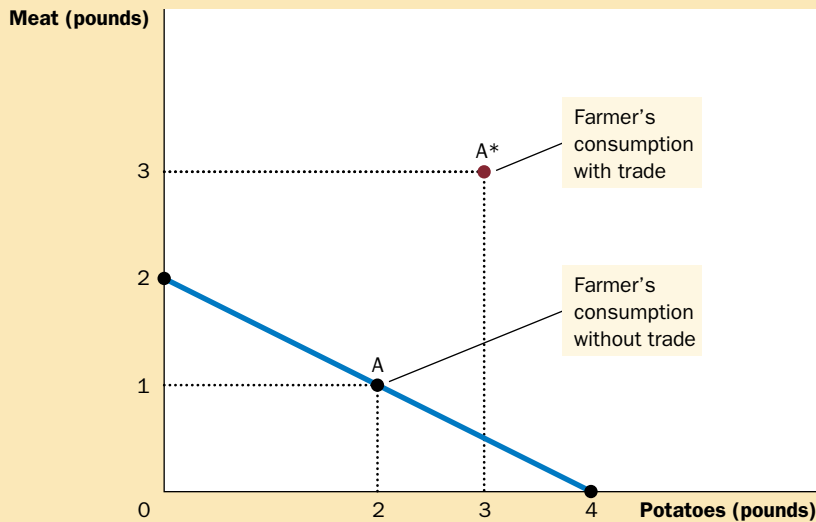
After several years of eating combination B, the rancher gets an idea and goes to talk to the farmer:

RANCHER: Farmer, my friend, have I got a deal for you! I know how to improve life for both of us. I think you should stop producing meat altogether and devote all your time to growing potatoes. According to my calculations, if you work 40 hours a week growing potatoes, you'll

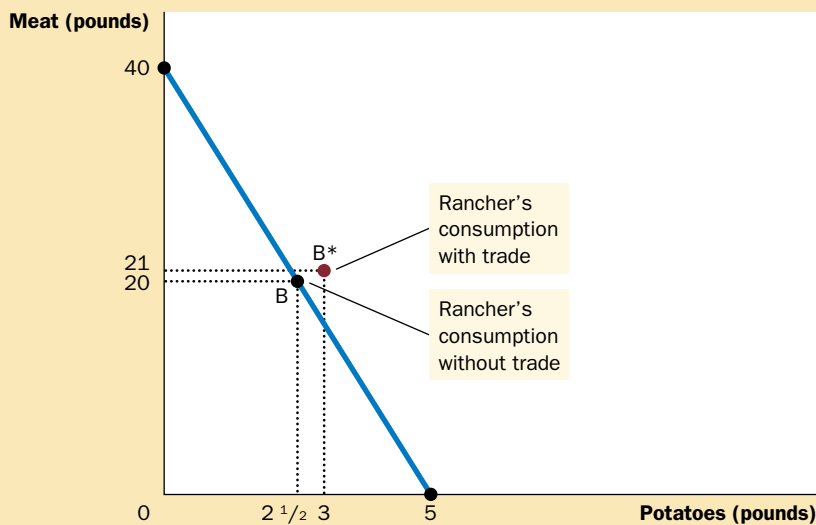
Figure 3-2

HOW TRADE EXPANDS THE SET OF CONSUMPTION OPPORTUNITIES. The proposed trade between the farmer and the rancher offers each of them a combination of meat and potatoes that would be impossible in the absence of trade. In panel (a), the farmer gets to consume at point A* rather than point A. In panel (b), the rancher gets to consume at point B* rather than point B. Trade allows each to consume more meat and more potatoes.

(a) How Trade Increases the Farmer's Consumption



(b) How Trade Increases the Rancher's Consumption



produce 4 pounds of potatoes. If you give me 1 of those 4 pounds, I'll give you 3 pounds of meat in return. In the end, you'll get to eat 3 pounds of potatoes and 3 pounds of meat every week, instead of the 2 pounds of potatoes and 1 pound of meat you now get. If you go along with my plan, you'll have more of *both* foods. [To illustrate her point, the rancher shows the farmer panel (a) of Figure 3-2.]

FARMER: (*sounding skeptical*) That seems like a good deal for me. But I don't understand why you are offering it. If the deal is so good for me, it can't be good for you too.

	THE OUTCOME WITHOUT TRADE:		THE OUTCOME WITH TRADE:			THE GAINS FROM TRADE:	
	WHAT THEY PRODUCE AND CONSUME		WHAT THEY PRODUCE	WHAT THEY TRADE	WHAT THEY CONSUME	THE INCREASE IN CONSUMPTION	
FARMER	1 lb meat	} point A	0 lbs meat	Gets 3 lbs meat	3 lbs meat	} point A*	2 lbs meat
	2 lbs potatoes		4 lbs potatoes	for 1 lb potatoes	3 lbs potatoes		1 lb potatoes
RANCHER	20 lbs meat	} point B	24 lbs meat	Gives 3 lbs meat	21 lbs meat	} point B*	1 lb meat
	2 1/2 lbs potatoes		2 lbs potatoes	for 1 lb potatoes	3 lbs potatoes		1/2 lb potatoes

Table 3-2

THE GAINS FROM TRADE: A SUMMARY

RANCHER: Oh, but it is! If I spend 24 hours a week raising cattle and 16 hours growing potatoes, I'll produce 24 pounds of meat and 2 pounds of potatoes. After I give you 3 pounds of meat in exchange for 1 pound of potatoes, I'll have 21 pounds of meat and 3 pounds of potatoes. In the end, I will also get more of both foods than I have now. [She points out panel (b) of Figure 3-2.]

FARMER: I don't know. . . . This sounds too good to be true.

RANCHER: It's really not as complicated as it seems at first. Here—I have summarized my proposal for you in a simple table. [The rancher hands the farmer a copy of Table 3-2.]

FARMER: *(after pausing to study the table)* These calculations seem correct, but I am puzzled. How can this deal make us both better off?

RANCHER: We can both benefit because trade allows each of us to specialize in doing what we do best. You will spend more time growing potatoes and less time raising cattle. I will spend more time raising cattle and less time growing potatoes. As a result of specialization and trade, each of us can consume both more meat and more potatoes without working any more hours.

QUICK QUIZ: Draw an example of a production possibilities frontier for Robinson Crusoe, a shipwrecked sailor who spends his time gathering coconuts and catching fish. Does this frontier limit Crusoe's consumption of coconuts and fish if he lives by himself? Does he face the same limits if he can trade with natives on the island?

THE PRINCIPLE OF COMPARATIVE ADVANTAGE

The rancher's explanation of the gains from trade, though correct, poses a puzzle: If the rancher is better at both raising cattle and growing potatoes, how can the farmer ever specialize in doing what he does best? The farmer doesn't seem to do

anything best. To solve this puzzle, we need to look at the principle of *comparative advantage*.

As a first step in developing this principle, consider the following question: In our example, who can produce potatoes at lower cost—the farmer or the rancher? There are two possible answers, and in these two answers lie both the solution to our puzzle and the key to understanding the gains from trade.

ABSOLUTE ADVANTAGE

One way to answer the question about the cost of producing potatoes is to compare the inputs required by the two producers. The rancher needs only 8 hours to produce a pound of potatoes, whereas the farmer needs 10 hours. Based on this information, one might conclude that the rancher has the lower cost of producing potatoes.

Economists use the term **absolute advantage** when comparing the productivity of one person, firm, or nation to that of another. The producer that requires a smaller quantity of inputs to produce a good is said to have an absolute advantage in producing that good. In our example, the rancher has an absolute advantage both in producing potatoes and in producing meat, because she requires less time than the farmer to produce a unit of either good.

absolute advantage

the comparison among producers of a good according to their productivity

OPPORTUNITY COST AND COMPARATIVE ADVANTAGE

There is another way to look at the cost of producing potatoes. Rather than comparing inputs required, we can compare the opportunity costs. Recall from Chapter 1 that the **opportunity cost** of some item is what we give up to get that item. In our example, we assumed that the farmer and the rancher each spend 40 hours a week working. Time spent producing potatoes, therefore, takes away from time available for producing meat. As the rancher and farmer change their allocations of time between producing the two goods, they move along their production possibility frontiers; in a sense, they are using one good to produce the other. The opportunity cost measures the tradeoff that each of them faces.

Let's first consider the rancher's opportunity cost. Producing 1 pound of potatoes takes her 8 hours of work. When the rancher spends that 8 hours producing potatoes, she spends 8 hours less producing meat. Because the rancher needs only 1 hour to produce 1 pound of meat, 8 hours of work would yield 8 pounds of meat. Hence, the rancher's opportunity cost of 1 pound of potatoes is 8 pounds of meat.

Now consider the farmer's opportunity cost. Producing 1 pound of potatoes takes him 10 hours. Because he needs 20 hours to produce 1 pound of meat, 10 hours would yield 1/2 pound of meat. Hence, the farmer's opportunity cost of 1 pound of potatoes is 1/2 pound of meat.

Table 3-3 shows the opportunity cost of meat and potatoes for the two producers. Notice that the opportunity cost of meat is the inverse of the opportunity cost of potatoes. Because 1 pound of potatoes costs the rancher 8 pounds of meat, 1 pound of meat costs the rancher 1/8 pound of potatoes. Similarly, because 1 pound of potatoes costs the farmer 1/2 pound of meat, 1 pound of meat costs the farmer 2 pounds of potatoes.

Economists use the term **comparative advantage** when describing the opportunity cost of two producers. The producer who has the smaller opportunity cost

opportunity cost

whatever must be given up to obtain some item

comparative advantage

the comparison among producers of a good according to their opportunity cost

Table 3-3THE OPPORTUNITY COST OF
MEAT AND POTATOES

	OPPORTUNITY COST OF:	
	1 POUND OF MEAT	1 POUND OF POTATOES
FARMER	2 lbs potatoes	1/2 lb meat
RANCHER	1/8 lb potatoes	8 lbs meat

of producing a good—that is, who has to give up less of other goods to produce it—is said to have a comparative advantage in producing that good. In our example, the farmer has a lower opportunity cost of producing potatoes than the rancher (1/2 pound versus 8 pounds of meat). The rancher has a lower opportunity cost of producing meat than the farmer (1/8 pound versus 2 pounds of potatoes). Thus, the farmer has a comparative advantage in growing potatoes, and the rancher has a comparative advantage in producing meat.

Notice that it would be impossible for the same person to have a comparative advantage in both goods. Because the opportunity cost of one good is the inverse of the opportunity cost of the other, if a person's opportunity cost of one good is relatively high, his opportunity cost of the other good must be relatively low. Comparative advantage reflects the relative opportunity cost. Unless two people have exactly the same opportunity cost, one person will have a comparative advantage in one good, and the other person will have a comparative advantage in the other good.

COMPARATIVE ADVANTAGE AND TRADE

Differences in opportunity cost and comparative advantage create the gains from trade. When each person specializes in producing the good for which he or she has a comparative advantage, total production in the economy rises, and this increase in the size of the economic pie can be used to make everyone better off. In other words, as long as two people have different opportunity costs, each can benefit from trade by obtaining a good at a price lower than his or her opportunity cost of that good.

Consider the proposed deal from the viewpoint of the farmer. The farmer gets 3 pounds of meat in exchange for 1 pound of potatoes. In other words, the farmer buys each pound of meat for a price of 1/3 pound of potatoes. This price of meat is lower than his opportunity cost for 1 pound of meat, which is 2 pounds of potatoes. Thus, the farmer benefits from the deal because he gets to buy meat at a good price.

Now consider the deal from the rancher's viewpoint. The rancher buys 1 pound of potatoes for a price of 3 pounds of meat. This price of potatoes is lower than her opportunity cost of 1 pound of potatoes, which is 8 pounds of meat. Thus, the rancher benefits because she gets to buy potatoes at a good price.

These benefits arise because each person concentrates on the activity for which he or she has the lower opportunity cost: The farmer spends more time growing potatoes, and the rancher spends more time producing meat. As a result, the total production of potatoes and the total production of meat both rise, and the farmer

FYI*The Legacy of Adam Smith and David Ricardo*

Economists have long understood the principle of comparative advantage. Here is how the great economist Adam Smith put the argument:

It is a maxim of every prudent master of a family, never to attempt to make at home what it will cost him more to make than to buy. The tailor does not attempt to make his own

shoes, but buys them of the shoemaker. The shoemaker does not attempt to make his own clothes but employs a tailor. The farmer attempts to make neither the one nor the other, but employs those different artificers. All of them find it for their interest to employ their whole industry in a way in which they have some advantage over their neighbors, and to purchase with a part of its produce, or what is the same thing, with the price of part of it, whatever else they have occasion for.

This quotation is from Smith's 1776 book, *An Inquiry into the Nature and Causes of the Wealth of Nations*, which was

a landmark in the analysis of trade and economic interdependence.

Smith's book inspired David Ricardo, a millionaire stockbroker, to become an economist. In his 1817 book, *Principles of Political Economy and Taxation*, Ricardo developed the principle of comparative advantage as we know it today. His defense of free trade was not a mere academic exercise. Ricardo put his economic beliefs to work as a member of the British Parliament, where he opposed the Corn Laws, which restricted the import of grain.

The conclusions of Adam Smith and David Ricardo on the gains from trade have held up well over time. Although economists often disagree on questions of policy, they are united in their support of free trade. Moreover, the central argument for free trade has not changed much in the past two centuries. Even though the field of economics has broadened its scope and refined its theories since the time of Smith and Ricardo, economists' opposition to trade restrictions is still based largely on the principle of comparative advantage.



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and rancher share the benefits of this increased production. The moral of the story of the farmer and the rancher should now be clear: *Trade can benefit everyone in society because it allows people to specialize in activities in which they have a comparative advantage.*

QUICK QUIZ: Robinson Crusoe can gather 10 coconuts or catch 1 fish per hour. His friend Friday can gather 30 coconuts or catch 2 fish per hour. What is Crusoe's opportunity cost of catching one fish? What is Friday's? Who has an absolute advantage in catching fish? Who has a comparative advantage in catching fish?

APPLICATIONS OF COMPARATIVE ADVANTAGE

The principle of comparative advantage explains interdependence and the gains from trade. Because interdependence is so prevalent in the modern world, the principle of comparative advantage has many applications. Here are two examples, one fanciful and one of great practical importance.

SHOULD TIGER WOODS MOW HIS OWN LAWN?

Tiger Woods spends a lot of time walking around on grass. One of the most talented golfers of all time, he can hit a drive and sink a putt in a way that most casual golfers only dream of doing. Most likely, he is talented at other activities too. For example, let's imagine that Woods can mow his lawn faster than anyone else. But just because he *can* mow his lawn fast, does this mean he *should*?

To answer this question, we can use the concepts of opportunity cost and comparative advantage. Let's say that Woods can mow his lawn in 2 hours. In that same 2 hours, he could film a television commercial for Nike and earn \$10,000. By contrast, Forrest Gump, the boy next door, can mow Woods's lawn in 4 hours. In that same 4 hours, he could work at McDonald's and earn \$20.

In this example, Woods's opportunity cost of mowing the lawn is \$10,000 and Forrest's opportunity cost is \$20. Woods has an absolute advantage in mowing lawns because he can do the work in less time. Yet Forrest has a comparative advantage in mowing lawns because he has the lower opportunity cost.

IN THE NEWS

Who has a Comparative Advantage in Producing Lamb?



A COMMON BARRIER TO FREE TRADE among countries is tariffs, which are taxes on the import of goods from abroad. In the following opinion column, economist Douglas Irwin discusses a recent example of their use.

Lamb Tariffs Fleece U.S. Consumers

BY DOUGLAS A. IRWIN

President Clinton dealt a serious blow to free trade last Wednesday, when he announced that the U.S. would impose stiff import tariffs on lamb from Australia and New Zealand. His decision undercuts

American leadership and makes a mockery of the administration's claims that it favors free and fair trade.

U.S. sheep producers have long been dependent on government. For more than half a century, until Congress enacted farm-policy reforms in 1995, they received subsidies for wool. Having lost that handout, saddled with high costs and inefficiencies, and facing domestic competition from chicken, beef, and pork, sheep producers sought to stop foreign competition by filing for import relief.

Almost all U.S. lamb imports come from Australia and New Zealand, major agricultural producers with a crushing comparative advantage. New Zealand has fewer than four million people but as many as 60 million sheep (compared with about seven million sheep in the U.S.). New Zealand's farmers have invested substantial resources in new technology and effective marketing, making them among the most efficient producers in the world. New Zealand also eliminated domestic agricultural

subsidies in the free-market reforms of the 1950s, and is a free-trading country, on track to eliminate all import tariffs by 2006.

Rather than emulate this example, the American Sheep Industry Association, among others, filed an "escape clause" petition under the Trade Act of 1974, which allows temporary "breathing space" protection to import-competing industries. Under the escape-clause provision, a petitioning industry is required to present an adjustment plan to ensure that it undertakes steps to become competitive in the future. The tariff protection is usually limited and scheduled to be phased out.

The U.S. International Trade Commission determines whether imports are a cause of "serious injury" to the domestic industry and, if so, proposes a remedy, which the president has full discretion to adopt, change or reject. In February, the ITC did not find that the domestic industry had suffered "serious injury," but rather adopted the weaker ruling that imports were "a substantial

The gains from trade in this example are tremendous. Rather than mowing his own lawn, Woods should make the commercial and hire Forrest to mow the lawn. As long as Woods pays Forrest more than \$20 and less than \$10,000, both of them are better off.

SHOULD THE UNITED STATES TRADE WITH OTHER COUNTRIES?

Just as individuals can benefit from specialization and trade with one another, as the farmer and rancher did, so can populations of people in different countries. Many of the goods that Americans enjoy are produced abroad, and many of the goods produced in the United States are sold abroad. Goods produced abroad and sold domestically are called **imports**. Goods produced domestically and sold abroad are called **exports**.

imports

goods produced abroad and sold domestically

exports

goods produced domestically and sold abroad

cause of threat of serious injury." The ITC did not propose to roll back imports, only to impose a 20% tariff (declining over four years) on imports above last year's levels.

The administration at first appeared to be considering less restrictive measures. Australia and New Zealand even offered financial assistance to the U.S. producers, and the administration delayed any announcement and appeared to be working toward a compromise. But these hopes were completely dashed with the shocking final decision, in which the administration capitulated to the demands of the sheep industry and its advocates in Congress.

The congressional charge was led by Sen. Max Baucus (D., Mont.), a member of the Agriculture Committee whose sister, a sheep producer, had appeared before the ITC to press for higher tariffs. The administration opted for . . . [the following:] On top of existing tariffs, the president imposed a 9% tariff on *all* imports in the first year (declining to 6% and then 3% in years two and three), and

a whopping 40% tariff on imports above last year's levels (dropping to 32% and 24%). . . .

The American Sheep Industry Association's president happily announced that the move will "bring some stability to the market." Whenever producers speak of bringing stability to the market, you know that consumers are getting fleeced.

The lamb decision, while little noticed at home, has been closely followed abroad. The decision undercuts the administration's free-trade rhetoric and harms its efforts to get other countries to open up their markets. Some import relief had been expected, but not so clearly protectionist as what finally materialized. The extreme decision has outraged farmers in Australia and New Zealand, and officials there have vowed to take the U.S. to a WTO dispute settlement panel.

The administration's timing could not have been worse. The decision came right after an Asia Pacific Economic Cooperation summit reaffirmed its commit-

ment to reduce trade barriers, and a few months before the World Trade Organization's November meeting in Seattle, where the WTO is to launch a new round of multilateral trade negotiations. A principal U.S. objective at the summit is the reduction of agricultural protection in Europe and elsewhere.

In 1947, facing an election the next year, President Truman courageously resisted special interest pressure and vetoed a bill to impose import quotas on wool, which would have jeopardized the first postwar multilateral trade negotiations due to start later that year. In contrast, Mr. Clinton, though a lame duck, caved in to political pressure. If the U.S., whose booming economy is the envy of the world, cannot resist protectionism, how can it expect other countries to do so?

SOURCE: *The Wall Street Journal*, July 12, 1999, p. A28.

To see how countries can benefit from trade, suppose there are two countries, the United States and Japan, and two goods, food and cars. Imagine that the two countries produce cars equally well: An American worker and a Japanese worker can each produce 1 car per month. By contrast, because the United States has more and better land, it is better at producing food: A U.S. worker can produce 2 tons of food per month, whereas a Japanese worker can produce only 1 ton of food per month.

The principle of comparative advantage states that each good should be produced by the country that has the smaller opportunity cost of producing that good. Because the opportunity cost of a car is 2 tons of food in the United States but only 1 ton of food in Japan, Japan has a comparative advantage in producing cars. Japan should produce more cars than it wants for its own use and export some of them to the United States. Similarly, because the opportunity cost of a ton of food is 1 car in Japan but only 1/2 car in the United States, the United States has a comparative advantage in producing food. The United States should produce more food than it wants to consume and export some of it to Japan. Through specialization and trade, both countries can have more food and more cars.

In reality, of course, the issues involved in trade among nations are more complex than this example suggests, as we will see in Chapter 9. Most important among these issues is that each country has many citizens with different interests. International trade can make some individuals worse off, even as it makes the country as a whole better off. When the United States exports food and imports cars, the impact on an American farmer is not the same as the impact on an American autoworker. Yet, contrary to the opinions sometimes voiced by politicians and political commentators, international trade is not like war, in which some countries win and others lose. Trade allows all countries to achieve greater prosperity.

QUICK QUIZ: Suppose that the world's fastest typist happens to be trained in brain surgery. Should he do his own typing or hire a secretary? Explain.

CONCLUSION

The principle of comparative advantage shows that trade can make everyone better off. You should now understand more fully the benefits of living in an interdependent economy. But having seen why interdependence is desirable, you might naturally ask how it is possible. How do free societies coordinate the diverse activities of all the people involved in their economies? What ensures that goods and services will get from those who should be producing them to those who should be consuming them?

In a world with only two people, such as the rancher and the farmer, the answer is simple: These two people can directly bargain and allocate resources between themselves. In the real world with billions of people, the answer is less obvious. We take up this issue in the next chapter, where we see that free societies allocate resources through the market forces of supply and demand.

Summary

- ◆ Each person consumes goods and services produced by many other people both in our country and around the world. Interdependence and trade are desirable because they allow everyone to enjoy a greater quantity and variety of goods and services.
- ◆ There are two ways to compare the ability of two people in producing a good. The person who can produce the good with the smaller quantity of inputs is said to have an *absolute advantage* in producing the good. The person who has the smaller opportunity cost of producing the good is said to have a *comparative advantage*. The gains from trade are based on comparative advantage, not absolute advantage.
- ◆ Trade makes everyone better off because it allows people to specialize in those activities in which they have a comparative advantage.
- ◆ The principle of comparative advantage applies to countries as well as to people. Economists use the principle of comparative advantage to advocate free trade among countries.

Key Concepts

absolute advantage, p. 53
opportunity cost, p. 53

comparative advantage, p. 53
imports, p. 57

exports, p. 57

Questions for Review

1. Explain how absolute advantage and comparative advantage differ.
2. Give an example in which one person has an absolute advantage in doing something but another person has a comparative advantage.
3. Is absolute advantage or comparative advantage more important for trade? Explain your reasoning, using the example in your answer to Question 2.
4. Will a nation tend to export or import goods for which it has a comparative advantage? Explain.
5. Why do economists oppose policies that restrict trade among nations?

Problems and Applications

1. Consider the farmer and the rancher from our example in this chapter. Explain why the farmer's opportunity cost of producing 1 pound of meat is 2 pounds of potatoes. Explain why the rancher's opportunity cost of producing 1 pound of meat is 1/8 pound of potatoes.
2. Maria can read 20 pages of economics in an hour. She can also read 50 pages of sociology in an hour. She spends 5 hours per day studying.
 - a. Draw Maria's production possibilities frontier for reading economics and sociology.
 - b. What is Maria's opportunity cost of reading 100 pages of sociology?
3. American and Japanese workers can each produce 4 cars a year. An American worker can produce 10 tons of grain a year, whereas a Japanese worker can produce 5 tons of grain a year. To keep things simple, assume that each country has 100 million workers.
 - a. For this situation, construct a table analogous to Table 3-1.
 - b. Graph the production possibilities frontier of the American and Japanese economies.
 - c. For the United States, what is the opportunity cost of a car? Of grain? For Japan, what is the opportunity cost of a car? Of grain? Put

this information in a table analogous to Table 3-3.

- d. Which country has an absolute advantage in producing cars? In producing grain?
 - e. Which country has a comparative advantage in producing cars? In producing grain?
 - f. Without trade, half of each country's workers produce cars and half produce grain. What quantities of cars and grain does each country produce?
 - g. Starting from a position without trade, give an example in which trade makes each country better off.
4. Pat and Kris are roommates. They spend most of their time studying (of course), but they leave some time for their favorite activities: making pizza and brewing root beer. Pat takes 4 hours to brew a gallon of root beer and 2 hours to make a pizza. Kris takes 6 hours to brew a gallon of root beer and 4 hours to make a pizza.
- a. What is each roommate's opportunity cost of making a pizza? Who has the absolute advantage in making pizza? Who has the comparative advantage in making pizza?
 - b. If Pat and Kris trade foods with each other, who will trade away pizza in exchange for root beer?
 - c. The price of pizza can be expressed in terms of gallons of root beer. What is the highest price at which pizza can be traded that would make both roommates better off? What is the lowest price? Explain.
5. Suppose that there are 10 million workers in Canada, and that each of these workers can produce either 2 cars or 30 bushels of wheat in a year.
- a. What is the opportunity cost of producing a car in Canada? What is the opportunity cost of producing a bushel of wheat in Canada? Explain the relationship between the opportunity costs of the two goods.
 - b. Draw Canada's production possibilities frontier. If Canada chooses to consume 10 million cars, how much wheat can it consume without trade? Label this point on the production possibilities frontier.
 - c. Now suppose that the United States offers to buy 10 million cars from Canada in exchange for 20 bushels of wheat per car. If Canada continues to consume 10 million cars, how much wheat does this deal allow Canada to consume? Label this point on your diagram. Should Canada accept the deal?
6. Consider a professor who is writing a book. The professor can both write the chapters and gather the needed data faster than anyone else at his university. Still, he pays a student to collect data at the library. Is this sensible? Explain.
7. England and Scotland both produce scones and sweaters. Suppose that an English worker can produce 50 scones per hour or 1 sweater per hour. Suppose that a Scottish worker can produce 40 scones per hour or 2 sweaters per hour.
- a. Which country has the absolute advantage in the production of each good? Which country has the comparative advantage?
 - b. If England and Scotland decide to trade, which commodity will Scotland trade to England? Explain.
 - c. If a Scottish worker could produce only 1 sweater per hour, would Scotland still gain from trade? Would England still gain from trade? Explain.
8. Consider once again the farmer and rancher discussed in the chapter.
- a. Suppose that a technological advance makes the farmer better at producing meat, so that he now needs only 2 hours to produce 1 pound of meat. What is his opportunity cost of meat and potatoes now? Does this alter his comparative advantage?
 - b. Is the deal that the rancher proposes—3 pounds of meat for 1 pound of potatoes—still good for the farmer? Explain.
 - c. Propose another deal to which the farmer and rancher might agree now.
9. The following table describes the production possibilities of two cities in the country of Baseballia:

	PAIRS OF RED SOCKS PER WORKER PER HOUR	PAIRS OF WHITE SOCKS PER WORKER PER HOUR
BOSTON	3	3
CHICAGO	2	1

- a. Without trade, what is the price of white socks (in terms of red socks) in Boston? What is the price in Chicago?
- b. Which city has an absolute advantage in the production of each color sock? Which city has a comparative advantage in the production of each color sock?
- c. If the cities trade with each other, which color sock will each export?

- d. What is the range of prices at which trade can occur?
10. Suppose that all goods can be produced with fewer worker hours in Germany than in France.
- In what sense is the cost of all goods lower in Germany than in France?
 - In what sense is the cost of some goods lower in France?
 - If Germany and France traded with each other, would both countries be better off as a result? Explain in the context of your answers to parts (a) and (b).
11. Are the following statements true or false? Explain in each case.
- “Two countries can achieve gains from trade even if one of the countries has an absolute advantage in the production of all goods.”
 - “Certain very talented people have a comparative advantage in everything they do.”
 - “If a certain trade is good for one person, it can’t be good for the other one.”