

# 8

# International Trade



## THE EVERYWHERE PHONE

**WHAT DO AMERICANS DO** with their time? The answer, increasingly, is that they stare at small screens. According to one survey, the average American spent almost three hours a day looking at a smartphone (especially an iPhone) or a tablet, slightly more time than is spent watching TV.



Bloomberg/Getty Images



Vlad Teodorescu/Shutterstock

The production and consumption of smartphones are examples of today's hyperglobal world with its soaring levels of international trade.

Where do these small screens come from? Specifically, where does an iPhone come from?

Apple, which sells the iPhone, is an American company. But if you said that iPhones come from America, you're mostly wrong: Apple develops products, but contracts almost all of the manufacturing of those products to other companies, which are mainly overseas. But it's not really right to answer "China," either, even though that's where iPhones are assembled. You see, assembly—the last phase of iPhone production, in which the pieces are put together in the familiar metal-and-glass case—only accounts for a small fraction of the phone's value.

In fact, a study of the iPhone estimated that of the average factory price of \$229 per phone, only around \$10 stayed in the Chinese economy. A substantially larger amount went to Korean manufacturers, who supplied the display and memory chips. There were also substantial outlays for raw materials, sourced all over the world. And the biggest share of the price—more than half—consisted of Apple's profit margin, which was largely a reward for research, development, and design.

So where do iPhones come from? Lots of places. And the case of the iPhone isn't unusual: the car you drive, the clothing you wear, even the food you eat are generally the end products of complex *supply chains* that span the globe.

Has this always been true? Yes and no. Large-scale international trade isn't new. By the early twentieth century, middle-class residents of London already ate bread made from Canadian wheat and beef from the Argentine Pampas, while wearing clothing woven from Australian wool and Egyptian cotton. In recent decades, however, new technologies for transportation and

communication have interacted with pro-trade policies to produce an era of *hyperglobalization* in which international trade has soared thanks to complex chains of production like the one that puts an iPhone in front of your nose. As a result, now, more than ever before, we must have a full picture of international trade to understand how national economies work.

This chapter examines the economics of international trade. We start from the model of comparative advantage, which, as we saw in Chapter 2, explains why there are gains from international trade. We will briefly recap that model here, then turn to a more detailed examination of the causes and consequences of globalization. ●

### WHAT YOU WILL LEARN

- What is comparative advantage and why does it lead to international trade?
- What are the sources of comparative advantage?
- Who gains and who loses from international trade?
- Why do trade protections like **tariffs** and **import quotas** create inefficiency?
- Why do governments engage in **trade protection** and how do **international trade agreements** counteract this?

Goods and services purchased from other countries are **imports**; goods and services sold to other countries are **exports**.

**Globalization** is the phenomenon of growing economic linkages among countries.

## Comparative Advantage and International Trade

The United States buys smartphones—and many other goods and services—from other countries. At the same time, it sells many goods and services to other countries. Goods and services purchased from abroad are **imports**; goods and services sold abroad are **exports**.

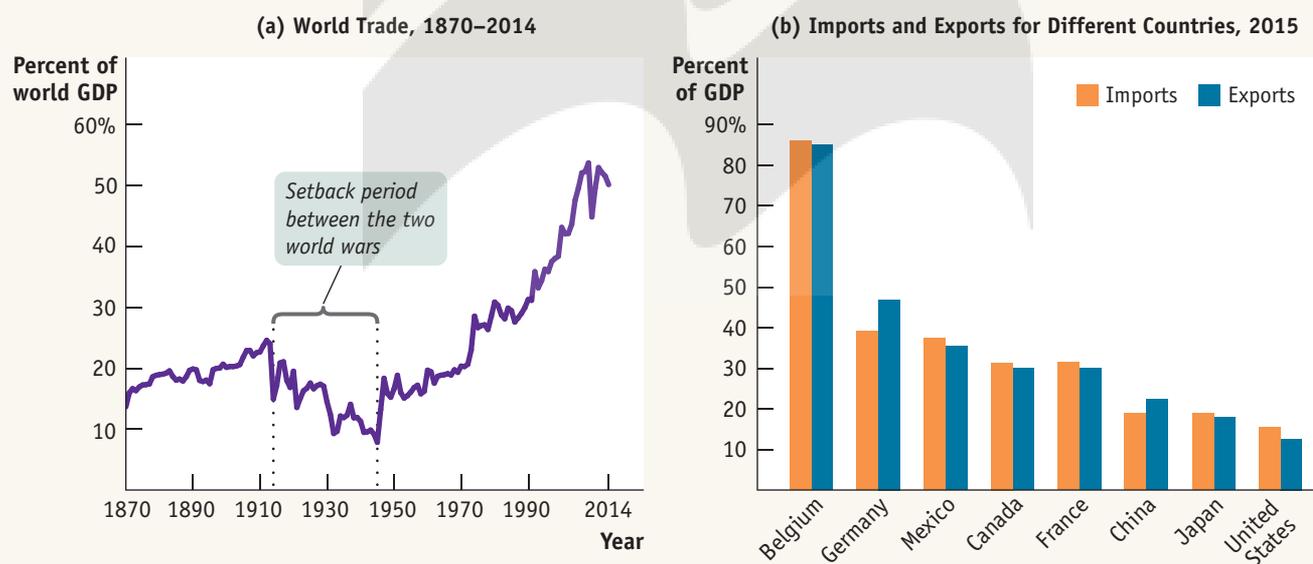
As illustrated by the opening story, international trade plays an increasingly important role in the world economy. Panel (a) of Figure 8-1 shows the ratio of goods crossing national borders to *world GDP*—the total value of goods and services produced in the world as a whole—since 1870. As you can see, the long-term trend has been upward, although there have been some periods of declining trade—for example, the sharp but brief dip in trade during the global financial crisis of 2008 and its aftermath.

Panel (b) shows imports and exports as a percentage of GDP for a number of countries. It shows that foreign trade is significantly more important for many other countries than it is for the United States.

Foreign trade isn't the only way countries interact economically. In the modern world, investors from one country often invest funds in another nation; many companies are multinational, with subsidiaries operating in several countries; and a growing number of people work in a country different from the one in which they were born. The growth of all these forms of economic linkages among countries is often called **globalization**.

Globalization isn't a new phenomenon. As you can see from panel (a) of Figure 8-1, there was rapid growth in trade between 1870 and the beginning of

FIGURE 8-1 The Growing Importance of International Trade



Panel (a) shows the long-term history of the ratio of world trade to world production. The trend has been generally upward, thanks to technological progress in transportation and communication, although there was a long setback during the period between the two world wars. Panel (b) demonstrates that international trade is significantly more important to many other countries than it is to the United States.

Data from: [panel (a)] Klasing, M. J., and P. Milionis, "Quantifying the Evolution of World Trade, 1870–1949," *Journal of International Economics* (2013); and Feenstra, Robert C., Robert Inklaar, and Marcel P. Timmer, "The Next Generation of the Penn World Table" *American Economic Review* 105, no. 10 (2015): 3150–3182, available for download at [www.ggdcc.net/pwt/](http://www.ggdcc.net/pwt/); [panel (b)] World Development Indicators.

World War I, as railroads and steamships effectively made shipping goods long distances faster and cheaper, effectively shrinking the world. This growth of trade was accompanied by large-scale international investment and migration. However, globalization went into reverse for almost 40 years after World War I, as governments imposed limits on trade of the kind analyzed later in this chapter. And by several measures, globalization didn't return to 1913 levels until the 1980s.

Since then, however, there has been a further dramatic increase in international linkages, sometimes referred to as **hyperglobalization**, exemplified by the way manufacture of iPhones and other high-tech goods involves supply chains of production that span the globe, and in which each stage of a good's production takes place in a different country—all made possible by advances in communication and transportation technology. (For a real-life example, see this chapter's business case.)

One big question in international economics is whether hyperglobalization will continue in the decades ahead. As you can see from looking closely at Figure 8-1, the big rise in the ratio of exports to world GDP leveled off around 2005. Since then, there have been many reports about companies deciding that the money they saved by buying goods from suppliers thousands of miles away is more than offset by the disadvantages of long shipping times and other inconveniences. (Even now, it takes around two weeks for a container ship from China to arrive in California, and a month to reach the East Coast.) As a result, there has been some move toward *reshoring*, bringing production closer to markets. If this turns out to be a major trend, world trade could level off or even decline as a share of world GDP, although it would remain very important.

To understand why international trade occurs and why economists believe it is beneficial to the economy, we will first review the concept of comparative advantage.

## Production Possibilities and Comparative Advantage, Revisited

To produce phones, any country must use resources—land, labor, and capital—that could have been used to produce other things. The potential production of other goods a country must forgo to produce a phone is the opportunity cost of that phone.

In some cases, it's easy to see why the opportunity cost of producing a good is especially low in a given country. Consider, for example, shrimp—much of which now comes from seafood farms in Vietnam and Thailand. It's a lot easier to produce shrimp in Vietnam, where the climate is nearly ideal and there's plenty of coastal land suitable for shellfish farming, than it is in the United States.

Conversely, other goods are not produced as easily in Vietnam as in the United States. For example, Vietnam doesn't have the base of skilled workers and technological know-how that makes the United States so good at producing high-technology goods. So the opportunity cost of a ton of shrimp, in terms of other goods such as aircraft, is much less in Vietnam than it is in the United States.

In other cases, matters are a bit less obvious. It's as easy to assemble smartphones in the United States as it is in China, and Chinese electronics workers are, if anything, less productive than their U.S. counterparts. But Chinese workers are a lot less productive than U.S. workers in other areas, such as automobile and chemical production. This means that diverting a Chinese worker into assembling phones reduces output of other goods less than diverting a U.S. worker into assembling phones. That is, the opportunity cost of smartphone assembly in China is less than it is in the United States.

**Hyperglobalization** is the phenomenon of extremely high levels of international trade.



The opportunity cost of smartphone assembly in China is lower, giving it a comparative advantage.

The **Ricardian model of international trade** analyzes international trade under the assumption that opportunity costs are constant.

Notice that we said the opportunity cost of phone *assembly*. As we've seen, most of the value of a "Chinese made" phone actually comes from other countries. For the sake of exposition, however, let's ignore that complication and consider a hypothetical case in which China makes phones from scratch.

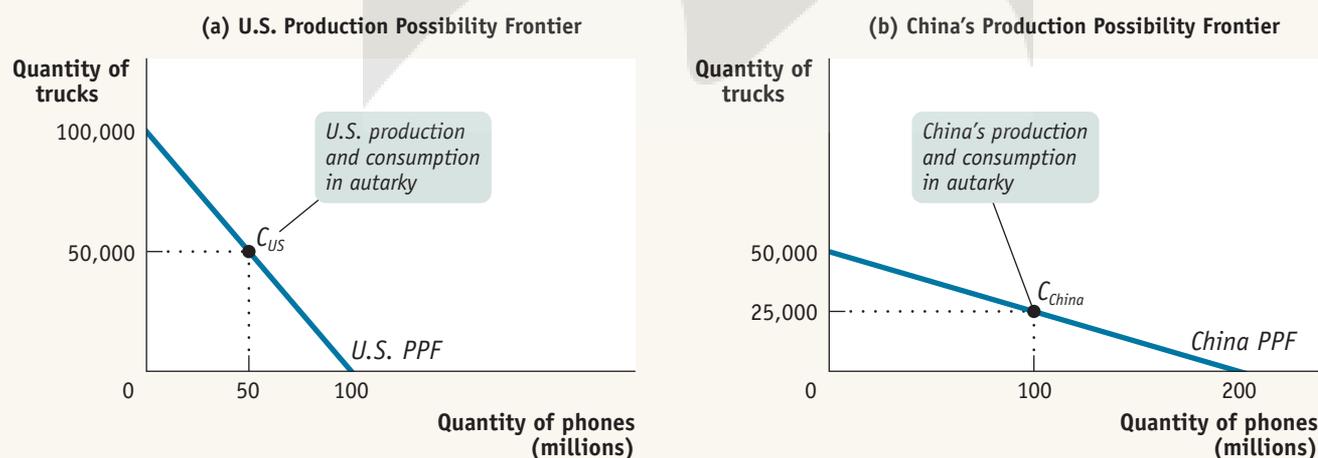
So we say that China has a comparative advantage in producing smartphones. Let's repeat the definition of comparative advantage from Chapter 2: *A country has a comparative advantage in producing a good or service if the opportunity cost of producing the good or service is lower for that country than for other countries.*

Figure 8-2 provides a hypothetical numerical example of comparative advantage in international trade. We assume that only two goods are produced and consumed, phones and Caterpillar heavy trucks. (The U.S. doesn't export many ordinary trucks, but Caterpillar, which makes earth-moving equipment, is a major exporter.) And we assume that there are only two countries in the world, the United States and China. The figure shows hypothetical production possibility frontiers for the United States and China.

As in Chapter 2, we simplify the model by assuming that the production possibility frontiers are straight lines, as shown in Figure 2-1, rather than the more realistic bowed-out shape in Figure 2-2. The straight-line shape implies that the opportunity cost of a phone in terms of trucks in each country is constant—it does not depend on how many units of each good the country produces. The analysis of international trade under the assumption that opportunity costs are constant, which makes production possibility frontiers straight lines, is known as the **Ricardian model of international trade**, named after the English economist David Ricardo, who introduced this analysis in the early nineteenth century.

In Figure 8-2 we show a situation in which the United States can produce 100,000 trucks if it produces no phones, or 100 million phones if it produces no trucks. Thus, the slope of the U.S. production possibility frontier, or *PPF*, is  $-100,000/100 = -1,000$ . That is, to produce an additional million phones, the United States must forgo the production of 1,000 trucks. Likewise, to produce one more truck, the United States must forgo 1,000 phones (equal to 1 million phones divided by 1,000 trucks).

FIGURE 8-2 Comparative Advantage and the Production Possibility Frontier



The U.S. opportunity cost of 1 million phones in terms of trucks is 1,000: for every 1 million phones, 1,000 trucks must be forgone. The Chinese opportunity cost of 1 million phones in terms of trucks is 250: for every additional 1 million phones, only 250 trucks must be forgone. As a result, the United States

has a comparative advantage in truck production, and China has a comparative advantage in phone production. In autarky, each country is forced to consume only what it produces: 50,000 trucks and 50 million phones for the United States; 25,000 trucks and 100 million phones for China.

Similarly, China can produce 50,000 trucks if it produces no phones or 200 million phones if it produces no trucks. Thus, the slope of China's PPF is  $-50,000/200 = -250$ . That is, to produce an additional million phones, China must forgo the production of 250 trucks. Likewise, to produce one more truck, China must forgo 4,000 phones (1 million phones divided by 250 trucks).

Economists use the term **autarky** to refer to a situation in which a country does not trade with other countries. We assume that in autarky the United States chooses to produce and consume 50 million phones and 50,000 trucks. We also assume that in autarky China produces 100 million phones and 25,000 trucks.

The trade-offs facing the two countries when they don't trade are summarized in Table 8-1. As you can see, the United States has a comparative advantage in the production of trucks because it has a lower opportunity cost in terms of phones than China has: producing a truck costs the United States only 1,000 phones, while it costs China 4,000 phones. Correspondingly, China has a comparative advantage in phone production: 1 million phones costs only 250 trucks, while it costs the United States 1,000 trucks.

As we learned in Chapter 2, each country can do better by engaging in trade than it could by not trading. A country can accomplish this by specializing in the production of the good in which it has a comparative advantage and exporting that good, while importing the good in which it has a comparative disadvantage.

Let's see how this works.

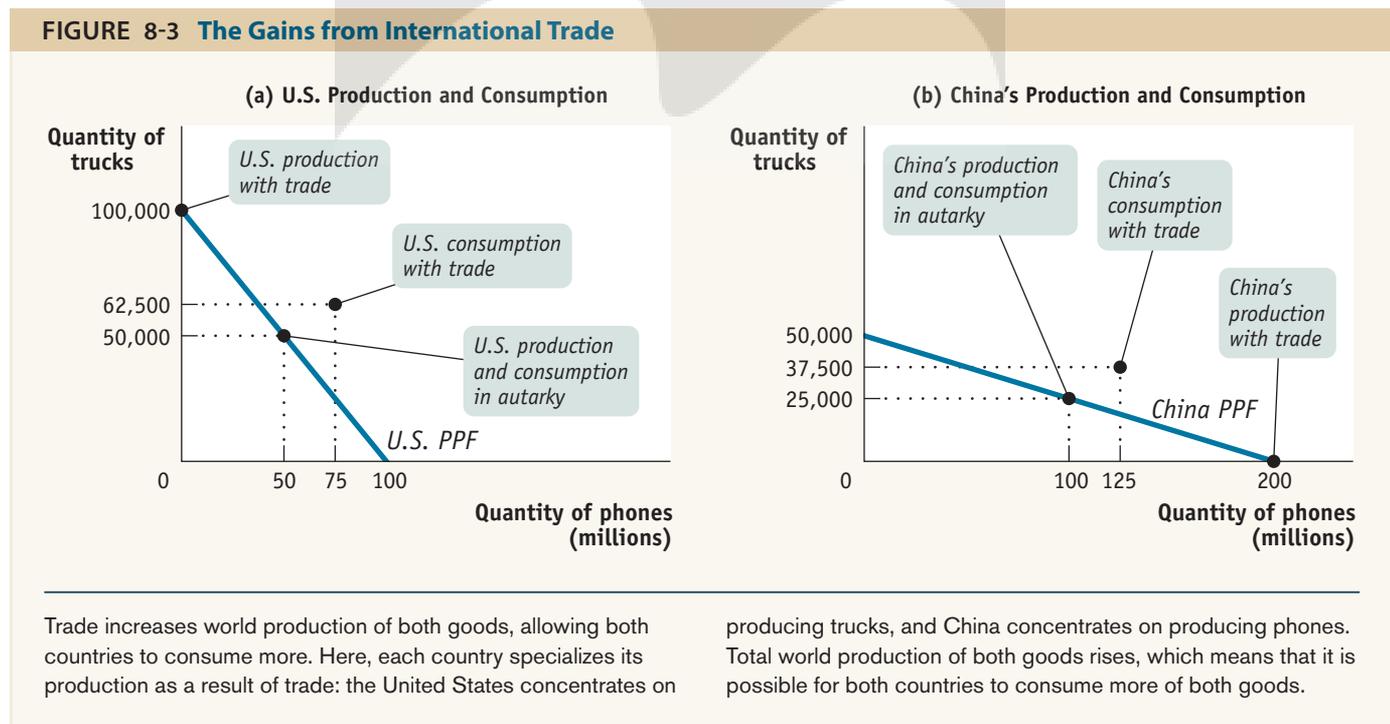
**Autarky** is a situation in which a country does not trade with other countries.

**TABLE 8-1 U.S. and Chinese Opportunity Costs of Phones and Trucks**

	U.S. Opportunity Cost		Chinese Opportunity Cost
<b>1 million phones</b>	1,000 trucks	>	250 trucks
<b>1 truck</b>	1,000 phones	<	4,000 phones

### The Gains from International Trade

Figure 8-3 illustrates how both countries can gain from specialization and trade, by showing a hypothetical rearrangement of production and consumption that allows *each* country to consume more of *both* goods. Again, panel (a) represents the United States and panel (b) represents China. In each panel we indicate again the autarky production and consumption assumed in Figure 8-2.



**TABLE 8-2** How the United States and China Gain from Trade

		In Autarky		With Trade		
		Production	Consumption	Production	Consumption	Gains from trade
United States	Million phones	50	50	0	75	+25
	Trucks	50,000	50,000	100,000	62,500	+12,500
China	Million phones	100	100	200	125	+25
	Trucks	25,000	25,000	0	37,500	+12,500

Once trade becomes possible, however, everything changes. With trade, each country can move to producing only the good in which it has a comparative advantage—trucks for the United States and phones for China. Because the world production of both goods is now higher than in autarky, trade makes it possible for each country to consume more of both goods.

Table 8-2 sums up the changes as a result of trade and shows why both countries can gain. The left part of the table shows the autarky situation, before trade, in which each country must produce the goods it consumes. The right part of the table shows what happens as a result of trade. After trade, the United States specializes in the production of trucks, producing 100,000 trucks and no phones; China specializes in the production of phones, producing 200 million phones and no trucks.

The result is a rise in total world production of both goods. As you can see in the table, gains from trade enable the United States to consume both more trucks (12,500 more) and phones (25 million more) than before, even though it no longer produces phones, because it can import phones from China. China can also consume more of both goods (12,500 more trucks and 25 million more phones), even though it no longer produces trucks, because it can import trucks from the United States.

The key to this mutual gain is the fact that trade liberates both countries from self-sufficiency—from the need to produce the same mixes of goods they consume. Because each country can concentrate on producing the good in which it has a comparative advantage, total world production rises, making a higher standard of living possible in both nations.

In this example we have simply assumed the post-trade consumption bundles of the two countries. In fact, the consumption choices of a country reflect both the preferences of its residents and the *relative prices*—the prices of one good in terms of another in international markets. Although we have not explicitly given the price of trucks in terms of phones, that price is implicit in our example: China sells the United States the 75 million phones the U.S. consumes in return for the 37,500 trucks China consumes, so 1 million phones are traded for 500 trucks. This tells us that the price of a truck on world markets must be equal to the price of 2,000 phones in our example.

One requirement that the relative price must satisfy is that no country pays a relative price greater than its opportunity cost of obtaining the good in autarky. That is, the United States won't pay more than 1,000 trucks for one million phones from China, and China won't pay more than 4,000 phones for each truck from the United States. Once this requirement is satisfied, the actual relative price in international trade is determined by supply and demand—and we'll turn to supply and demand in international trade in the next section. However, first let's look more deeply into the nature of the gains from trade.

### Comparative Advantage versus Absolute Advantage

It's easy to accept the idea that Vietnam and Thailand have a comparative advantage in shrimp production: they have a tropical climate



The tropical climates of Vietnam and Thailand give them a comparative advantage in shrimp production.

that's better suited to shrimp farming than that of the United States (even along the Gulf Coast), and they have a lot of usable coastal area. So the United States imports shrimp from Vietnam and Thailand. In other cases, however, it may be harder to understand why we import certain goods from abroad.

U.S. imports of phones from China are a case in point. There's nothing about China's climate or resources that makes it especially good at assembling electronic devices. In fact, it almost surely would take fewer hours of labor to assemble a smartphone or a tablet in the United States than in China.

Why, then, do we buy phones assembled in China? Because the gains from trade depend on *comparative advantage*, not absolute advantage. Yes, it would take less labor to assemble a phone in the United States than in China. That is, the productivity of Chinese electronics workers is less than that of their U.S. counterparts. But what determines comparative advantage is not the amount of resources used to produce a good but the opportunity cost of that good—here, the quantity of other goods forgone in order to produce a phone. And the opportunity cost of phones is lower in China than in the United States.

Here's how it works: Chinese workers have low productivity compared with U.S. workers in the electronics industry. But Chinese workers have even lower productivity compared with U.S. workers in other industries. Because Chinese labor productivity in industries other than electronics is relatively very low, producing a phone in China, even though it takes a lot of labor, does not require forgoing the production of large quantities of other goods.

In the United States, the opposite is true: very high productivity in other industries (such as automobiles) means that assembling electronic products in the United States, even though it doesn't require much labor, requires sacrificing lots of other goods. So the opportunity cost of producing electronics is less in China than in the United States. Despite its lower labor productivity, China has a comparative advantage in the production of many consumer electronics, although the United States has an absolute advantage.

The source of China's comparative advantage in consumer electronics is reflected in global markets by the wages Chinese workers are paid. That's because a country's wage rates, in general, reflect its labor productivity. In countries where labor is highly productive in many industries, employers are willing to pay high wages to attract workers, so competition among employers leads to an overall high wage rate. In countries where labor is less productive, competition for workers is less intense and wage rates are correspondingly lower.

As the Global Comparison shows, there is indeed a strong relationship between overall levels of productivity and wage rates around the world. Because China has generally low productivity, it has a relatively low wage rate. Low wages, in turn, give China a cost advantage in producing goods where its productivity is only moderately low, like consumer electronics. As a result, it's cheaper to produce these goods in China than in the United States.

The kind of trade that takes place between low-wage, low-productivity economies like China and high-wage, high-productivity economies like the United States gives rise to two common misperceptions. One, the *pauper labor fallacy*, is the belief that when a country with high wages imports goods produced by workers who are paid low wages, this must hurt the standard of living of workers in the importing country. The other, the *sweatshop labor fallacy*, is the belief that trade must be bad for workers in poor exporting countries because those workers are paid very low wages by our standards.

Both fallacies miss the nature of gains from trade: it's to the advantage of both countries if the poorer, lower-wage country exports goods in which it has a comparative advantage, even if its cost advantage in these goods depends on low wages. That is, both countries are able to achieve a higher standard of living through trade.

It's particularly important to understand that buying a good made by someone who is paid much lower wages than most U.S. workers doesn't necessarily



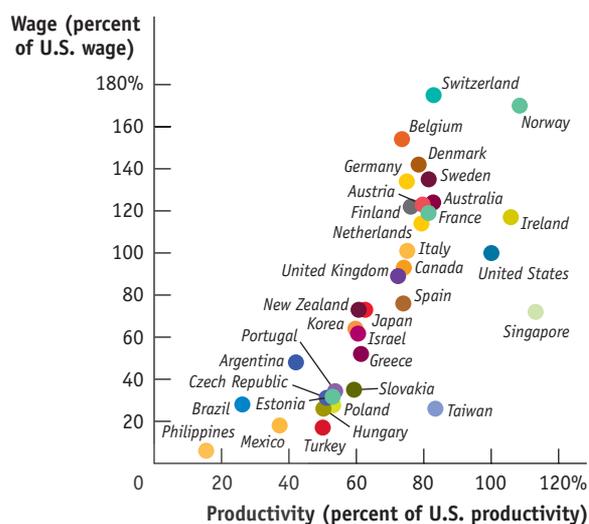
## GLOBAL COMPARISON

## PRODUCTIVITY AND WAGES AROUND THE WORLD

Is it true that both the pauper labor argument and the sweatshop labor argument are fallacies? Yes, it is. The real explanation for low wages in poor countries is low overall productivity.

The graph shows estimates of labor productivity, measured by the value of output (GDP) per worker, and wages, measured by the hourly compensation of the average worker, for several countries in 2014. Both productivity and wages are expressed as percentages of U.S. productivity and wages; for example, productivity and wages in Japan were 62% and 73%, respectively, of their U.S. levels. You can see the strong positive relationship between productivity and wages. The relationship isn't perfect. For example, Norway has higher wages than its productivity might lead you to expect. But simple comparisons of wages give a misleading sense of labor costs in poor countries: their low wage advantage is mostly offset by low productivity.

Data from: The Conference Board.



imply that you're taking advantage of that person. It depends on the alternatives. Because workers in poor countries have low productivity across the board, they are offered low wages whether they produce goods exported to America or goods sold in local markets. A job that looks terrible by rich-country standards can be a step up for someone in a poor country.

International trade that depends on low-wage exports can nonetheless raise the exporting country's standard of living. This is especially true of very-low-wage nations. For example, Bangladesh and similar countries would be much poorer than they are—their citizens might even be starving—if they weren't able to export goods such as clothing based on their low wage rates.

### Sources of Comparative Advantage

International trade is driven by comparative advantage, but where does comparative advantage come from? Economists who study international trade have found three main sources of comparative advantage: international differences in *climate*, international differences in *factor endowments*, and international differences in *technology*.

**Differences in Climate** One key reason the opportunity cost of producing shrimp in Vietnam and Thailand is less than in the United States is that shrimp need warm water—Vietnam has plenty of that, but America doesn't. In general, differences in climate play a significant role in international trade. Tropical countries export tropical products like coffee, sugar, bananas, and shrimp. Countries in the temperate zones export crops like wheat and corn. Some trade is even driven by the difference in seasons between the northern and southern hemispheres: winter deliveries of Chilean grapes and New Zealand apples have become commonplace in U.S. and European supermarkets.

**Differences in Factor Endowments** The United States does more trade with Canada than with any other country (China comes in second). Among other things, Canada sells us a lot of forest products—lumber and products derived from lumber, like pulp and paper. These exports don't reflect the special skill of



Johnner Images/Alamy

A greater endowment of forestland gives Canada a comparative advantage in forest products.

Canadian lumberjacks. Canada has a comparative advantage in forest products because its forested area is much greater compared to the size of its labor force than the ratio of forestland to the labor force in the United States.

Forestland, like labor and capital, is a *factor of production*: an input used to produce goods and services. (Recall from Chapter 2 that the factors of production are land, labor, physical capital, and human capital.) Due to history and geography, the mix of available factors of production differs among countries, providing an important source of comparative advantage. The relationship between comparative advantage and factor availability is found in an influential model of international trade, the *Heckscher–Ohlin model*, developed by two Swedish economists in the first half of the twentieth century.

Two key concepts in the model are *factor abundance* and *factor intensity*. Factor abundance refers to how large a country's supply of a factor is relative to its supply of other factors. **Factor intensity** refers to the ranking of goods according to which factor is used in relatively greater quantities in production compared to other factors. So oil refining is a capital-intensive good because it tends to use a high ratio of capital to labor, but phone production is a labor-intensive good because it tends to use a high ratio of labor to capital.

According to the **Heckscher–Ohlin model**, *a country that has an abundant supply of a factor of production will have a comparative advantage in goods whose production is intensive in that factor*. So a country that has a relative abundance of capital will have a comparative advantage in capital-intensive industries such as oil refining, but a country that has a relative abundance of labor will have a comparative advantage in labor-intensive industries such as phone production.

The basic intuition behind this result is simple and based on opportunity cost.

- The opportunity cost of a given factor—the value that the factor would generate in alternative uses—is low for a country when it is relatively abundant in that factor.
- Relative to the United States, China has an abundance of low-skilled labor.
- As a result, the opportunity cost of the production of low-skilled, labor-intensive goods is lower in China than in the United States.

World trade in clothing is the most dramatic example of the validity of the Heckscher–Ohlin model in practice. Clothing production is a labor-intensive activity: it doesn't take much physical capital, nor does it require a lot of human capital in the form of highly educated workers. So you would expect labor-abundant countries such as China and Bangladesh to have a comparative advantage in clothing production. And they do.

The fact that international trade is the result of differences in factor endowments helps explain another fact: international specialization of production is often *incomplete*. That is, a country often maintains some domestic production of a good that it imports. A good example of this is the United States and oil. Saudi Arabia exports oil to the United States because Saudi Arabia has an abundant supply of oil relative to its other factors of production; the United States exports medical devices to Saudi Arabia because it has an abundant supply of expertise in medical technology relative to its other factors of production. But the United States also produces some oil domestically because the size of its domestic oil reserves in Texas and Alaska (and now, increasingly, its oil shale reserves elsewhere) makes it economical to do so.

In our supply and demand analysis in the next section, we'll consider incomplete specialization by a country to be the norm. We should emphasize, however, that the fact that countries often incompletely specialize does not in any way change the conclusion that there are gains from trade.

The **factor intensity** of a good is a measure of which factor is used in relatively greater quantities than other factors in production.

According to the **Heckscher–Ohlin model**, a country has a comparative advantage in a good whose production is intensive in the factors that are abundantly available in that country.

FOR INQUIRING MINDS **Increasing Returns to Scale and International Trade**

Most analyses of international trade focus on how differences between countries—differences in climate, factor endowments, and technology—create national comparative advantage. However, economists have also pointed out another reason for international trade: the role of *increasing returns to scale*.

Production of a good is characterized by increasing returns to scale if the productivity of labor and other resources used in production rise with the quantity of output. For example, in an industry characterized by increasing returns to scale, increasing output by 10% might require only 8% more labor and 9% more raw materials.

Examples of industries with increasing returns to scale include auto manufacturing, oil refining, and the production of jumbo jets, all of which require large outlays of capital. Increasing returns to scale (sometimes also called economies of scale) can give rise to monopoly, a situation in which an industry is composed of only one producer, because it gives large firms a cost advantage over small ones.

But increasing returns to scale can also give rise to international trade. The logic runs as follows: if production of a good is characterized by increasing returns to scale, it makes sense to concentrate production in only a few locations, so each

location has a high level of output. But that also means production occurs in only a few countries that export the good to other countries. A commonly cited example is the North American auto industry: although both the United States and Canada produce automobiles and their components, each particular model or component tends to be produced in only one of the two countries and exported to the other.

Increasing returns to scale probably play a large role in the trade in manufactured goods between advanced countries, which is about 25% of the total value of world trade.

**Differences in Technology** In the 1970s and 1980s, Japan became by far the world's largest exporter of automobiles, selling large numbers to the United States and the rest of the world. Japan's comparative advantage in automobiles wasn't the result of climate. Nor can it easily be attributed to differences in factor endowments: aside from a scarcity of land, Japan's mix of available factors is quite similar to that in other advanced countries. Instead, Japan's comparative advantage in automobiles was based on the superior production techniques developed by its manufacturers, which allowed them to produce more cars with a given amount of labor and capital than their American or European counterparts.

Japan's comparative advantage in automobiles was a case of comparative advantage caused by differences in technology—the techniques used in production.

The causes of differences in technology are somewhat mysterious. Sometimes they seem to be based on knowledge accumulated through experience—for example, Switzerland's comparative advantage in watches reflects a long tradition of watchmaking. Sometimes they are the result of a set of innovations that for some reason occur in one country but not in others.

Technological advantage, however, is often transitory. By adopting *lean production* (techniques designed to improve manufacturing productivity through increased efficiency), American auto manufacturers have closed much of the gap in productivity with their Japanese competitors. In addition, Europe's aircraft industry has closed a similar gap with the U.S. aircraft industry. At any given point in time, however, differences in technology are a major source of comparative advantage.

**ECONOMICS >> in Action** **How Hong Kong Lost Its Shirts**

The rise of Hong Kong was one of the most improbable-sounding economic success stories of the twentieth century. When a communist regime took over China in 1949, Hong Kong—which was still at that point a British colony—became in effect a city without a hinterland, largely cut off from economic relations with the territory just over the border. Since Hong Kong had until that point made a living largely by serving as a point of entry into China, you might have expected

the city to languish. Instead, however, Hong Kong prospered, to such an extent that today the city—now returned to China, but governed as a special autonomous region—has a GDP per capita comparable to that of the United States.

During much of its ascent, Hong Kong's rise rested, above all, on its clothing industry. In 1980 Hong Kong's garment and textile sectors employed almost 450,000 workers, close to 20% of total employment. These workers overwhelmingly made apparel—shirts, trousers, dresses, and more—for export, especially to the United States.

Since then, however, the Hong Kong clothing industry has fallen sharply in size—in fact, it has almost disappeared. So, too, have Hong Kong's apparel exports. Figure 8-4 shows Hong Kong's share of U.S. apparel imports since 1989, along with the share of a relative newcomer to the industry, Bangladesh. As you can see, Hong Kong has more or less dropped off the chart, while Bangladesh's share has risen significantly in recent years.

Why did Hong Kong lose its comparative advantage in making shirts, pants, and so on? It wasn't because the city's garment workers became less productive. Instead, it was because the city got better at other things. Apparel production is a labor-intensive, relatively low-tech industry; comparative advantage in that industry has historically always rested with poor, labor-abundant economies. Hong Kong no longer fits that description; Bangladesh does. Hong Kong's garment industry was a victim of the city's success.

### >> Check Your Understanding 8-1

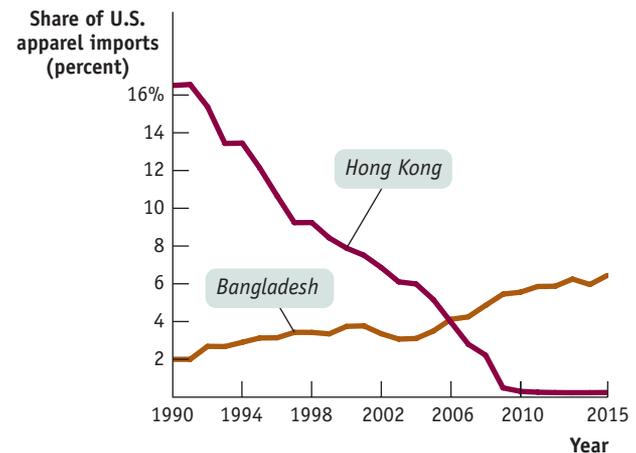
*Solutions appear at back of book.*

- In the United States, the opportunity cost of 1 ton of corn is 50 bicycles. In China, the opportunity cost of 1 bicycle is 0.01 ton of corn.
  - Determine the pattern of comparative advantage.
  - In autarky, the United States can produce 200,000 bicycles if no corn is produced, and China can produce 3,000 tons of corn if no bicycles are produced. Draw each country's production possibility frontier assuming constant opportunity cost, with tons of corn on the vertical axis and bicycles on the horizontal axis.
  - With trade, each country specializes its production. The United States consumes 1,000 tons of corn and 200,000 bicycles; China consumes 3,000 tons of corn and 100,000 bicycles. Indicate the production and consumption points on your diagrams, and use them to explain the gains from trade.
- Explain the following patterns of trade using the Heckscher–Ohlin model.
  - France exports wine to the United States, and the United States exports movies to France.
  - Brazil exports shoes to the United States, and the United States exports shoe-making machinery to Brazil.

## || Supply, Demand, and International Trade

Simple models of comparative advantage are helpful for understanding the fundamental causes of international trade. However, to analyze the effects of international trade at a more detailed level and to understand trade policy, it helps to return to the supply and demand model. We'll start by looking at the effects of imports on domestic producers and consumers, then turn to the effects of exports.

FIGURE 8-4 Education, Skill Intensity, and Trade



Data from: U.S. International Trade Administration.

### >> Quick Review

- **Imports** and **exports** account for a growing share of the U.S. economy and the economies of many other countries.
- The growth of international trade and other international linkages is known as **globalization**. Extremely high levels of international trade are known as **hyperglobalization**.
- International trade is driven by comparative advantage. **The Ricardian model of international trade** shows that trade between two countries makes both countries better off than they would be in **autarky**—that is, there are gains from international trade.
- The main sources of comparative advantage are international differences in climate, factor endowments, and technology.
- The **Heckscher–Ohlin model** shows how comparative advantage can arise from differences in factor endowments: goods differ in their **factor intensity**, and countries tend to export goods that are intensive in the factors they have in abundance.

The **domestic demand curve** shows how the quantity of a good demanded by domestic consumers depends on the price of that good.

The **domestic supply curve** shows how the quantity of a good supplied by domestic producers depends on the price of that good.

The **world price** of a good is the price at which that good can be bought or sold abroad.

## The Effects of Imports

Figure 8-5 shows the U.S. market for phones, ignoring international trade for a moment. It introduces a few new concepts: the *domestic demand curve*, the *domestic supply curve*, and the domestic or autarky price.

The **domestic demand curve** shows how the quantity of a good demanded by residents of a country depends on the price of that good. Why “domestic”? Because people living in other countries may demand the good, too. Once we introduce international trade, we need to distinguish between purchases of a good by domestic consumers and purchases by foreign consumers. So the domestic demand curve reflects only the demand of residents of our own country.

Similarly, the **domestic supply curve** shows how the quantity of a good supplied by producers inside our own country depends on the price of that good. Once we introduce international trade, we need to distinguish between the supply of domestic producers and foreign supply—supply brought in from abroad.

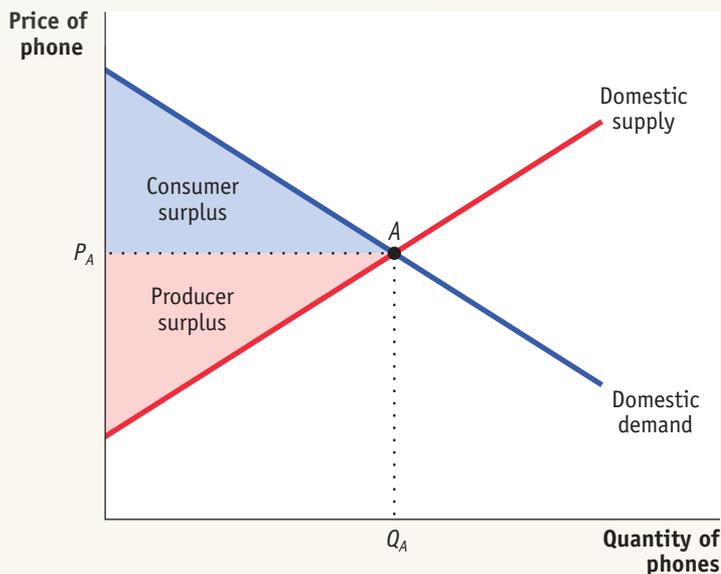
In autarky, with no international trade in phones, the equilibrium in this market would be determined by the intersection of the domestic demand and domestic supply curves, point A. The equilibrium price of phones would be  $P_A$ , and the equilibrium quantity of phones produced and consumed would be  $Q_A$ . As always, both consumers and producers gain from the existence of the domestic market. In autarky, consumer surplus would be equal to the area of the blue-shaded triangle in Figure 8-5. Producer surplus would be equal to the area of the red-shaded triangle. And total surplus would be equal to the sum of these two shaded triangles.

Now let’s imagine opening up this market to imports. To do this, we must make an assumption about the supply of imports. The simplest assumption, which we will adopt here, is that unlimited quantities of phones can be purchased from abroad at a fixed price, known as the world price of phones. Figure 8-6 shows a situation in which the **world price** of a phone,  $P_W$ , is lower than the price of a phone that would prevail in the domestic market in autarky,  $P_A$ .

Given that the world price is below the domestic price of a phone, it is profitable for importers to buy phones abroad and resell them domestically. The imported phones increase the supply of phones in the domestic market, driving

**FIGURE 8-5 Consumer and Producer Surplus in Autarky**

In the absence of trade, the domestic price is  $P_A$ , the autarky price at which the domestic supply curve and the domestic demand curve intersect. The quantity produced and consumed domestically is  $Q_A$ . Consumer surplus is represented by the blue-shaded area, and producer surplus is represented by the red-shaded area.



down the domestic market price. Phones will continue to be imported until the domestic price falls to a level equal to the world price.

The result is shown in Figure 8-6. Because of imports, the domestic price of a phone falls from  $P_A$  to  $P_W$ . The quantity of phones demanded by domestic consumers rises from  $Q_A$  to  $Q_D$ , and the quantity supplied by domestic producers falls from  $Q_A$  to  $Q_S$ . The difference between the domestic quantity demanded and the domestic quantity supplied,  $Q_D - Q_S$ , is filled by imports.

Now let's turn to the effects of imports on consumer surplus and producer surplus. Because imports of phones lead to a fall in their domestic price, consumer surplus rises and producer surplus falls. Figure 8-7 shows how this works. We label four areas:  $W$ ,  $X$ ,  $Y$ , and  $Z$ . The autarky consumer surplus we identified in Figure 8-5 corresponds to  $W$ , and the autarky producer surplus corresponds to the sum of  $X$  and  $Y$ . The fall in the domestic price to the world price leads to an increase in consumer surplus; it increases by  $X$  and  $Z$ , so consumer surplus now equals the sum of  $W$ ,  $X$ , and  $Z$ . At the same time, producers lose  $X$  in surplus, so producer surplus now equals only  $Y$ .

The table in Figure 8-7 summarizes the changes in consumer and producer surplus when the phone market is opened to imports. Consumers gain surplus equal to the areas  $X + Z$ . Producers lose surplus equal to  $X$ . So the sum of producer and consumer surplus—the total surplus generated in the phone market—increases by  $Z$ . As a result of trade, consumers gain and producers lose, but the gain to consumers exceeds the loss to producers.

This is an important result. We have just shown that opening up a market to imports leads to a net gain in total surplus, which is what we should have expected given the proposition that there are gains from international trade.

However, we have also learned that although the country as a whole gains, some groups—in this case, domestic producers of phones—lose as a result of international trade. As we'll see shortly, the fact that international trade typically creates losers as well as winners is crucial for understanding the politics of trade policy.

We turn next to the case in which a country exports a good.

**FIGURE 8-6 The Domestic Market with Imports**

Here the world price of phones,  $P_W$ , is below the autarky price,  $P_A$ . When the economy is opened to international trade, imports enter the domestic market, and the domestic price falls from the autarky price,  $P_A$ , to the world price,  $P_W$ . As the price falls, the domestic quantity demanded rises from  $Q_A$  to  $Q_D$  and the domestic quantity supplied falls from  $Q_A$  to  $Q_S$ . The difference between domestic quantity demanded and domestic quantity supplied at  $P_W$ , the quantity  $Q_D - Q_S$ , is filled by imports.

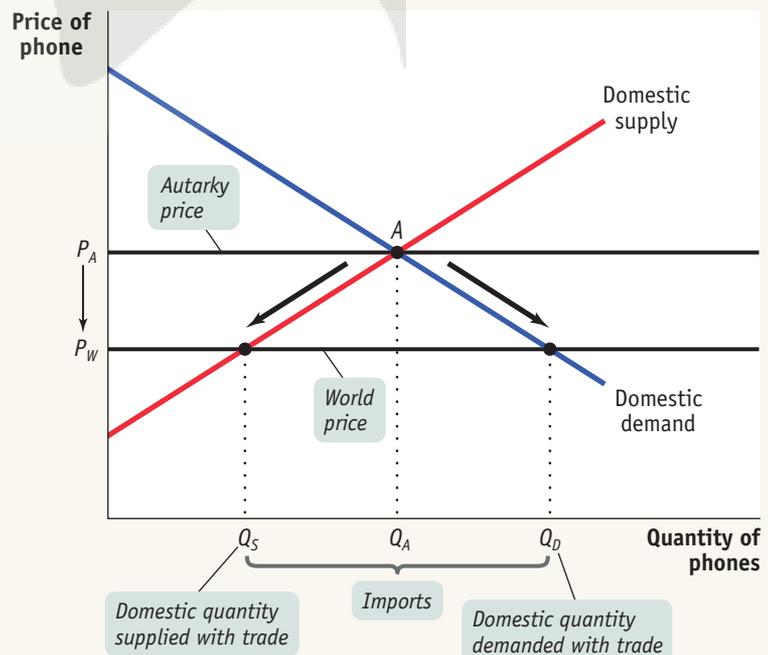
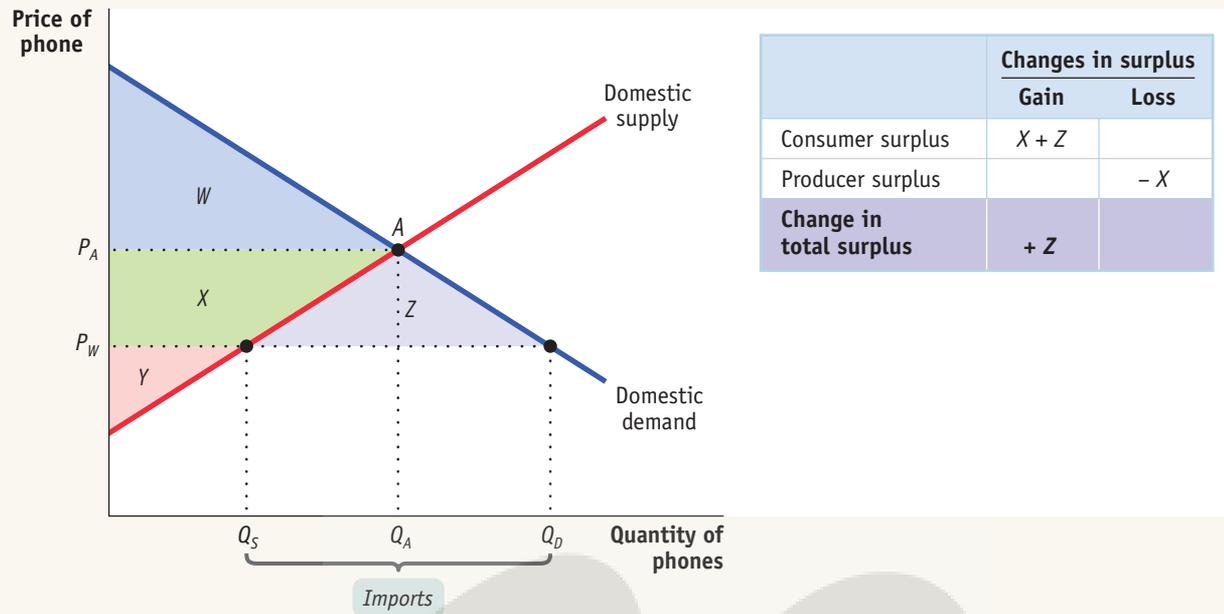


FIGURE 8-7 The Effects of Imports on Surplus



When the domestic price falls to  $P_W$  as a result of international trade, consumers gain additional surplus (areas  $X + Z$ ) and producers lose surplus (area  $X$ ).

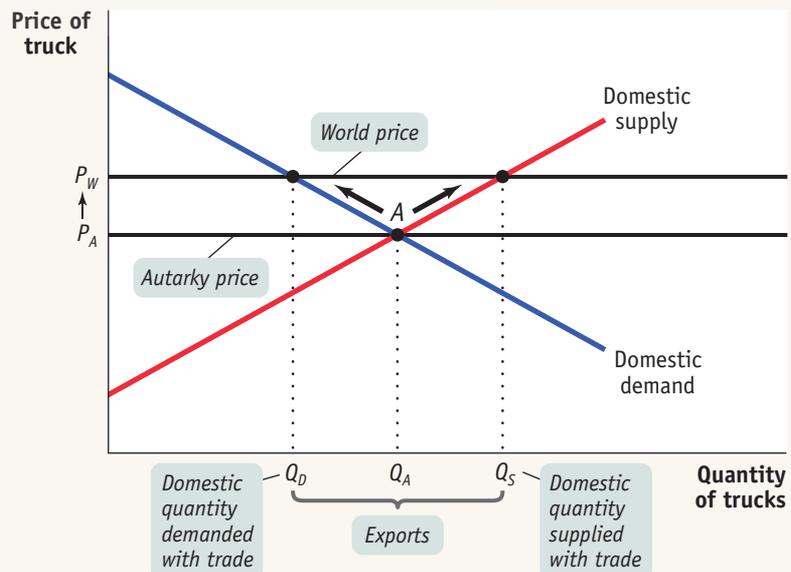
Because the gains to consumers outweigh the losses to producers, there is an increase in the total surplus in the economy as a whole (area  $Z$ ).

### The Effects of Exports

Figure 8-8 shows the effects on a country when it exports a good, in this case trucks. For this example, we assume that unlimited quantities of trucks can be sold abroad at a given world price,  $P_W$ , which is higher than the price that would prevail in the domestic market in autarky,  $P_A$ .

FIGURE 8-8 The Domestic Market with Exports

Here the world price,  $P_W$ , is greater than the autarky price,  $P_A$ . When the economy is opened to international trade, some of the domestic supply is now exported. The domestic price rises from the autarky price,  $P_A$ , to the world price,  $P_W$ . As the price rises, the domestic quantity demanded falls from  $Q_A$  to  $Q_D$  and the domestic quantity supplied rises from  $Q_A$  to  $Q_S$ . The portion of domestic production that is not consumed domestically,  $Q_S - Q_D$ , is exported.



The higher world price makes it profitable for exporters to buy trucks domestically and sell them overseas. The purchases of domestic trucks drive the domestic price up until it is equal to the world price. As a result, the quantity demanded by domestic consumers falls from  $Q_A$  to  $Q_D$  and the quantity supplied by domestic producers rises from  $Q_A$  to  $Q_S$ . This difference between domestic production and domestic consumption,  $Q_S - Q_D$ , is exported.

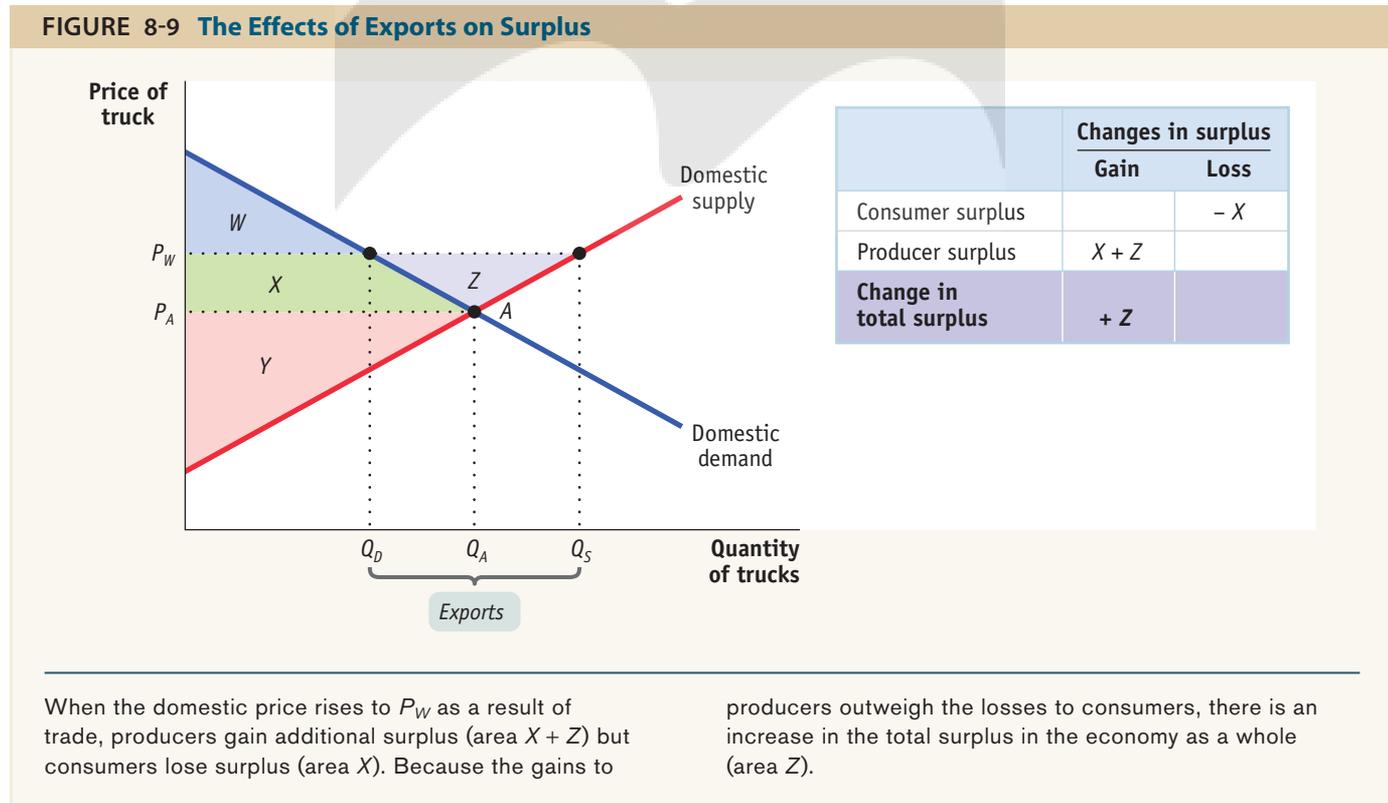
Like imports, exports lead to an overall gain in total surplus for the exporting country but also create losers as well as winners. Figure 8-9 shows the effects of truck exports on producer and consumer surplus. In the absence of trade, the price of each truck would be  $P_A$ . Consumer surplus in the absence of trade is the sum of areas  $W$  and  $X$ , and producer surplus is area  $Y$ . As a result of trade, price rises from  $P_A$  to  $P_W$ , consumer surplus falls to  $W$ , and producer surplus rises to  $Y + X + Z$ . So producers gain  $X + Z$ , consumers lose  $X$ , and, as shown in the table accompanying the figure, the economy as a whole gains total surplus in the amount of  $Z$ .

We have learned, then, that imports of a particular good hurt domestic producers of that good but help domestic consumers, whereas exports of a particular good hurt domestic consumers of that good but help domestic producers. In each case, the gains are larger than the losses.

### International Trade and Wages

So far we have focused on the effects of international trade on producers and consumers in a particular industry. For many purposes this is a very helpful approach. However, producers and consumers are not the only parts of society affected by trade—so are the owners of factors of production. In particular, the owners of labor, land, and capital employed in producing goods that are exported, or goods that compete with imported goods, can be deeply affected by trade.

Moreover, the effects of trade aren't limited to just those industries that export or compete with imports because *factors of production can often move between*



**Exporting industries** produce goods and services that are sold abroad.

**Import-competing industries** produce goods and services that are also imported.

*industries*. So now we turn our attention to the long-run effects of international trade on income distribution—how a country’s total income is allocated among its various factors of production.

To begin our analysis, consider the position of Maria, who is initially employed as an accountant in an industry that is shrinking as a result of growing international trade. Suppose, for example, that she works in the U.S. apparel (clothing) industry, which formerly employed millions of people but has largely been displaced by imports from low-wage countries. Maria is likely to find a new job in another industry, such as health care, which has been expanding rapidly over time. How will the move affect her earnings?

The answer is, there probably won’t be much effect. According to the U.S. Bureau of Labor Statistics, accountants earn roughly the same amount in health care that they do in what’s left of the apparel industry—about \$65,000 a year. So we shouldn’t think of Maria as a producer of apparel who is hurt by competition from imports. Instead, we should think of her as a worker with particular skills who is affected by imports mainly by the extent to which those imports change the wages of accountants in the economy as a whole.

The wage rate of accountants is a *factor price*—the price employers have to pay for the services of a factor of production. One key question about international trade is how it affects factor prices—not just narrowly defined factors of production like accountants, but broadly defined factors such as capital, unskilled labor, and college-educated labor.

Earlier in this chapter we described the Heckscher–Ohlin model of trade, which states that comparative advantage is determined by a country’s factor endowment. This model also suggests how international trade affects factor prices in a country: compared to autarky, international trade tends to raise the prices of factors that are abundantly available and reduce the prices of factors that are scarce.

We won’t work this out in detail, but the idea is simple. The prices of factors of production, like the prices of goods and services, are determined by supply and demand. If international trade increases the demand for a factor of production, that factor’s price will rise; if international trade reduces the demand for a factor of production, that factor’s price will fall.

Now think of a country’s industries as consisting of two kinds: **exporting industries**, which produce goods and services that are sold abroad, and **import-competing industries**, which produce goods and services that are also imported from abroad. Compared with autarky, international trade leads to higher production in exporting industries and lower production in import-competing industries. This indirectly increases the demand for factors used by exporting industries and decreases the demand for factors used by import-competing industries.

In addition, the Heckscher–Ohlin model says that a country tends to export goods that are intensive in its abundant factors and to import goods that are intensive in its scarce factors. *So international trade tends to increase the demand for factors that are abundant in our country compared with other countries, and to decrease the demand for factors that are scarce in our country compared with other countries. As a result, the prices of abundant factors tend to rise, and the prices of scarce factors tend to fall as international trade grows.*

In other words, international trade tends to redistribute income toward a country’s abundant factors and away from its less abundant factors.

U.S. exports tend to be human-capital-intensive (such as high-tech design and Hollywood movies) while U.S. imports tend to be unskilled-labor-intensive (such as phone assembly and clothing production). This suggests that the effect of international trade on the U.S. factor markets is to raise the wage rate of highly educated American workers and reduce the wage rate of unskilled American workers.

This effect has been a source of much concern in recent years. Wage inequality—the gap between the wages of high-paid and low-paid workers—has increased substantially over the last 30 years. Some economists believe that growing international trade is an important factor in that trend. If international trade has the effects predicted by the Heckscher–Ohlin model, its growth raises the wages of highly educated American workers, who already have relatively high wages, and lowers the wages of less educated American workers, who already have relatively low wages.

But keep in mind another phenomenon: trade reduces the income inequality between countries as poor countries improve their standard of living by exporting to rich countries.

How important are these effects? In some historical episodes, the impacts of international trade on factor prices have been very large. As we explain in the following Economics in Action, the opening of transatlantic trade in the late nineteenth century had a large negative impact on land rents in Europe, hurting landowners but helping workers and owners of capital.

The effects of trade on wages in the United States have generated considerable controversy in recent years. Most economists who have studied the issue agree that growing imports of labor-intensive products from newly industrializing economies, and the export of high-technology goods in return, have helped cause a widening wage gap between highly educated and less educated workers in this country. However, most economists believe that it is only one of several forces explaining the growth in American wage inequality.

## ECONOMICS >> *in Action*

### Trade, Wages, and Land Prices in the Nineteenth Century

Beginning around 1870, there was an explosive growth of world trade in agricultural products, based largely on the steam engine. Steam-powered ships could cross the ocean much more quickly and reliably than sailing ships. Until about 1860, steamships had higher costs than sailing ships, but after that costs dropped sharply. At the same time, steam-powered rail transport made it possible to bring grain and other bulk goods cheaply from the interior to ports. The result was that land-abundant countries—the United States, Canada, Argentina, and Australia—began shipping large quantities of agricultural goods to the densely populated, land-scarce countries of Europe.

This opening up of international trade led to higher prices of agricultural products, such as wheat, in exporting countries and a decline in their prices in importing countries. Notably, the difference between wheat prices in the midwestern United States and England plunged.

The change in agricultural prices created winners and losers on both sides of the Atlantic as factor prices adjusted. In England, land prices fell by half compared with average wages; landowners found their purchasing power sharply reduced, but workers benefited from cheaper food. In the United States, the reverse happened: land prices doubled compared with wages. Landowners did very well, but workers found the purchasing power of their wages dented by rising food prices.



International trade redistributes income toward a country's abundant factors and away from its less abundant factors.

**>> Quick Review**

- The intersection of the **domestic demand curve** and the **domestic supply curve** determines the domestic price of a good. When a market is opened to international trade, the domestic price is driven to equal the **world price**.
- If the world price is lower than the autarky price, trade leads to imports and the domestic price falls to the world price. There are overall gains from international trade because the gain in consumer surplus exceeds the loss in producer surplus.
- If the world price is higher than the autarky price, trade leads to exports and the domestic price rises to the world price. There are overall gains from international trade because the gain in producer surplus exceeds the loss in consumer surplus.
- Trade leads to an expansion of **exporting industries**, which increases demand for a country's abundant factors, and a contraction of **import-competing industries**, which decreases demand for its scarce factors.

An economy has **free trade** when the government does not attempt either to reduce or to increase the levels of exports and imports that occur naturally as a result of supply and demand.

Policies that limit imports are known as **trade protection** or simply as **protection**.

A **tariff** is a tax levied on imports.

**>> Check Your Understanding 8-2**

*Solutions appear at back of book.*

1. Due to a strike by truckers, trade in food between the United States and Mexico is halted. In autarky, the price of Mexican grapes is lower than that of U.S. grapes. Using a diagram of the U.S. domestic demand curve and the U.S. domestic supply curve for grapes, explain the effect of the strike on the following.
  - a. U.S. grape consumers' surplus
  - b. U.S. grape producers' surplus
  - c. U.S. total surplus
2. What effect do you think the strike will have on Mexican grape producers? Mexican grape pickers? Mexican grape consumers? U.S. grape pickers?

**|| The Effects of Trade Protection**

Ever since David Ricardo laid out the principle of comparative advantage in the early nineteenth century, most economists have advocated **free trade**. That is, they have argued that government policy should not attempt either to reduce or to increase the levels of exports and imports that occur naturally as a result of supply and demand.

Despite the free-trade arguments of economists, however, many governments use taxes and other restrictions to limit imports. Less frequently, governments offer subsidies to encourage exports. Policies that limit imports, usually with the goal of protecting domestic producers in import-competing industries from foreign competition, are known as **trade protection** or simply as **protection**.

Let's look at the two most common protectionist policies, *tariffs* and *import quotas*, then turn to the reasons governments follow these policies.

**The Effects of a Tariff**

A **tariff** is a form of excise tax, one that is levied only on sales of imported goods. For example, the U.S. government could declare that anyone bringing in phones must pay a tariff of \$100 per unit. In the distant past, tariffs were an important source of government revenue because they were relatively easy to collect. But in the modern world, tariffs are usually intended to discourage imports and protect import-competing domestic producers rather than as a source of government revenue.

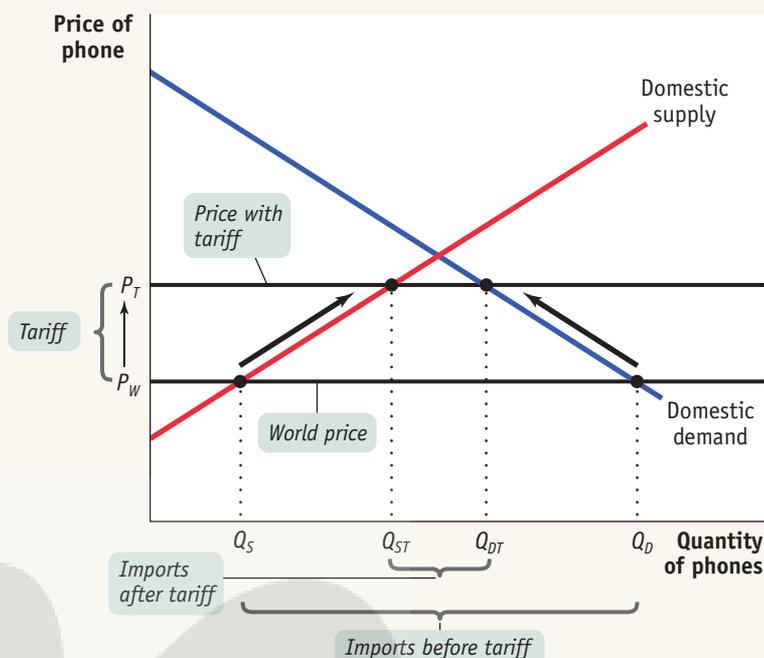
The tariff raises both the price received by domestic producers and the price paid by domestic consumers. Suppose, for example, that our country imports phones, and a phone costs \$200 on the world market. As we saw earlier, under free trade the domestic price would also be \$200. But if a tariff of \$100 per unit is imposed, the domestic price will rise to \$300, because it won't be profitable to import phones unless the price in the domestic market is high enough to compensate importers for the cost of paying the tariff.

Figure 8-10 illustrates the effects of a tariff on imports of phones. As before, we assume that  $P_W$  is the world price of a phone. Before the tariff is imposed, imports have driven the domestic price down to  $P_W$ , so that pre-tariff domestic production is  $Q_S$ , pre-tariff domestic consumption is  $Q_D$ , and pre-tariff imports are  $Q_D - Q_S$ .

Now suppose that the government imposes a tariff on each phone imported. As a consequence, it is no longer profitable to import phones unless the domestic price received by the importer is greater than or equal to the world price plus the tariff. So the domestic price rises to  $P_T$ , which is equal to the world price,  $P_W$ , plus the tariff. Domestic production rises to  $Q_{ST}$ , domestic consumption falls to  $Q_{DT}$ , and imports fall to  $Q_{DT} - Q_{ST}$ .

**FIGURE 8-10 The Effect of a Tariff**

A tariff raises the domestic price of the good from  $P_W$  to  $P_T$ . The domestic quantity demanded shrinks from  $Q_D$  to  $Q_{DT}$ , and the domestic quantity supplied increases from  $Q_S$  to  $Q_{ST}$ . As a result, imports—which had been  $Q_D - Q_S$  before the tariff was imposed—shrink to  $Q_{DT} - Q_{ST}$  after the tariff is imposed.



A tariff, then, raises domestic prices, leading to increased domestic production and reduced domestic consumption compared to the situation under free trade. Figure 8-11 shows the effects on surplus. There are three effects:

1. The higher domestic price increases producer surplus, a gain equal to area *A*.
2. The higher domestic price reduces consumer surplus, a reduction equal to the sum of areas *A*, *B*, *C*, and *D*.
3. The tariff yields revenue to the government. How much revenue? The government collects the tariff—which, remember, is equal to the difference between  $P_T$  and  $P_W$  on each of the  $Q_{DT} - Q_{ST}$  units imported. So total revenue is  $(P_T - P_W) \times (Q_{DT} - Q_{ST})$ . This is equal to area *C*.

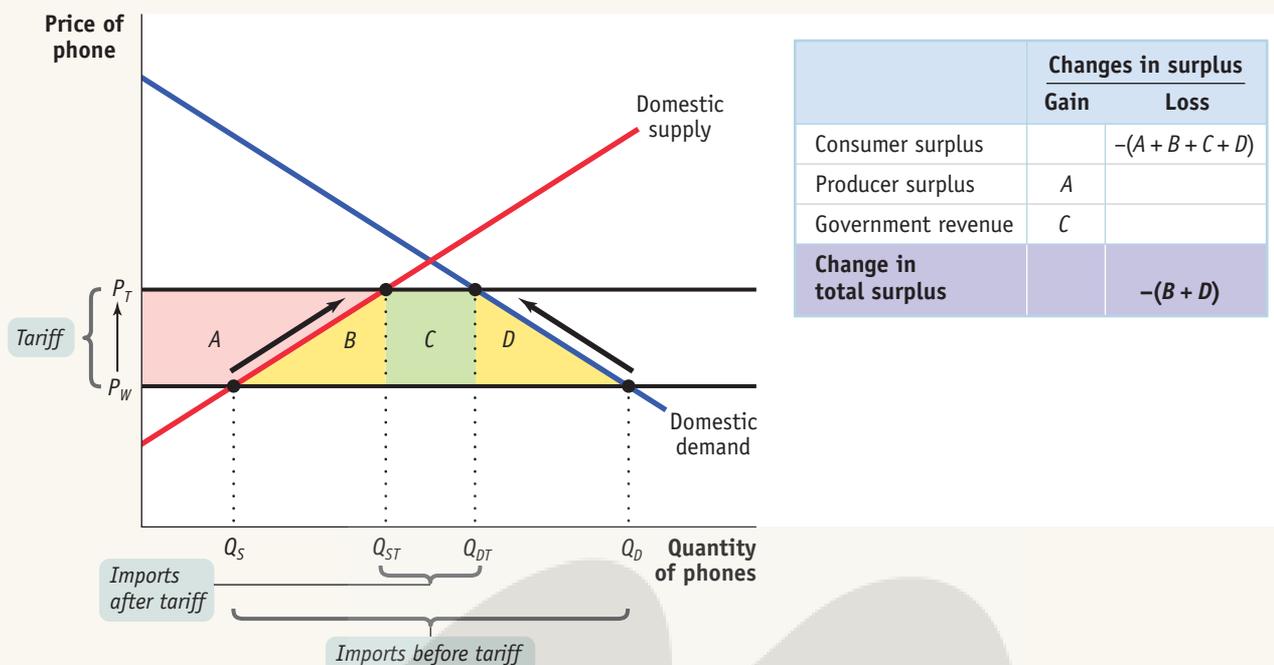
The welfare effects of a tariff are summarized in the table in Figure 8-11. Producers gain, consumers lose, and the government gains. But consumer losses are greater than the sum of producer and government gains, leading to a net reduction in total surplus equal to areas  $B + D$ .

An excise tax creates inefficiency, or deadweight loss, because it prevents mutually beneficial trades from occurring. The same is true of a tariff, where the deadweight loss imposed on society is equal to the loss in total surplus represented by areas  $B + D$ .

Tariffs generate deadweight losses because they create inefficiencies in two ways:

1. Some mutually beneficial trades go unexploited: some consumers who are willing to pay more than the world price,  $P_W$ , do not purchase the good, even though  $P_W$  is the true cost of a unit of the good to the economy. The cost of this inefficiency is represented in Figure 8-11 by area *D*.
2. The economy's resources are wasted on inefficient production: some producers whose cost exceeds  $P_W$  produce the good, even though an additional unit of the good can be purchased abroad for  $P_W$ . The cost of this inefficiency is represented in Figure 8-11 by area *B*.

FIGURE 8-11 A Tariff Reduces Total Surplus



When the domestic price rises as a result of a tariff, producers gain additional surplus (area A), the government gains revenue (area C), and consumers lose surplus (areas A + B + C + D).

Because the losses to consumers outweigh the gains to producers and the government, the economy as a whole loses surplus (areas B and D).

### The Effects of an Import Quota

An **import quota**, another form of trade protection, is a legal limit on the quantity of a good that can be imported. For example, a U.S. import quota on Chinese phones might limit the quantity imported each year to 50 million units. Import quotas are usually administered through licenses: a number of licenses are issued, each giving the license-holder the right to import a limited quantity of the good each year.

A quota on sales has the same effect as an excise tax, with one difference: the money that would otherwise have accrued to the government as tax revenue under an excise tax becomes license-holders' revenue under a quota—also known as quota rents. (*Quota rent* is defined in Chapter 5.) Similarly, an import quota has the same effect as a tariff, with one difference: the money that would otherwise have been government revenue becomes quota rents to license-holders.

Look again at Figure 8-11. An import quota that limits imports to  $Q_{DT} - Q_{ST}$  will raise the domestic price of phones by the same amount as the tariff we considered previously. That is, it will raise the domestic price from  $P_W$  to  $P_T$ . However, area C will now represent quota rents rather than government revenue.

Who receives import licenses and so collects the quota rents? In the case of U.S. import protection, the answer may surprise you: the most important import licenses—mainly for clothing, and to a lesser extent for sugar—are granted to foreign governments.

Because the quota rents for most U.S. import quotas go to foreigners, the cost to the nation of such quotas is larger than that of a comparable tariff (a tariff that leads to the same level of imports). In Figure 8-11 the net loss to the United States from such an import quota would be equal to areas  $B + C + D$ , the difference between consumer losses and producer gains.

An **import quota** is a legal limit on the quantity of a good that can be imported.

## ECONOMICS >> *in Action*

### Trade Protection in the United States

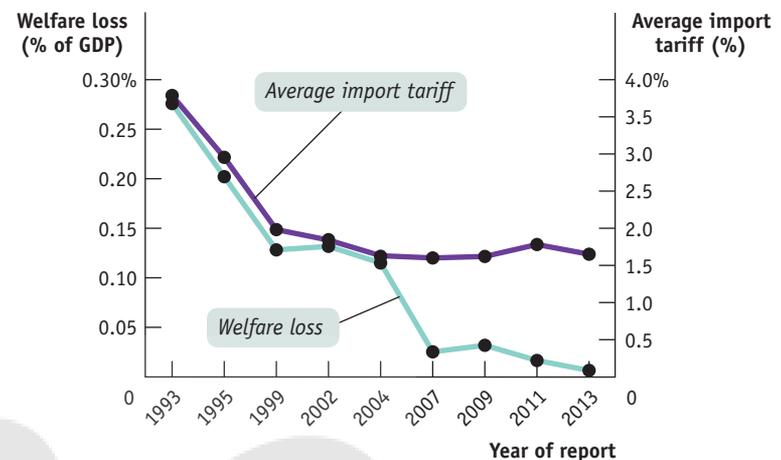
The United States today generally follows a policy of free trade, both in comparison with other countries and in comparison with its own history. Most imports are subject to either no tariff or to a low tariff. So what are the major exceptions to this rule?

Most of the remaining protection involves just two industries: clothing and sugar. Until 2005, trade in clothing and textiles around the world—not just in the United States—was limited by an elaborate system of import quotas. The end of that system led to a sharp drop in welfare losses (as shown in Figure 8-12), but the United States maintains relatively high tariffs on clothing imports.

The U.S. government also maintains a system of import quotas on sugar, which raise sugar's price above world levels and cost consumers several hundred million dollars a year.

The most important thing to know about current U.S. trade protection is how limited it really is, and how little cost it imposes on the economy. Every two years the U.S. International Trade Commission, a government agency, produces estimates of the impact of “significant trade restrictions” on U.S. welfare. As Figure 8-12 shows, over the past two decades both average tariff levels and the cost of trade restrictions as a share of national income, which weren't all that big to begin with, have fallen sharply.

**FIGURE 8-12** Tariff Rates and Estimated Welfare Losses, 1993–2013



Data from: U.S. International Trade Commission (2013); Federal Reserve Bank of St. Louis; and World Development Indicators.

### >> Check Your Understanding 8-3

Solutions appear at back of book.

- Suppose the world price of butter is \$0.50 per pound and the domestic price in autarky is \$1.00 per pound. Use a diagram similar to Figure 8-10 to show the following.
  - If there is free trade, domestic butter producers want the government to impose a tariff of no less than \$0.50 per pound. Compare the outcome with a tariff of \$0.25 per pound.
  - What happens if a tariff greater than \$0.50 per pound is imposed?
- Suppose the government imposes an import quota rather than a tariff on butter. What quota limit would generate the same quantity of imports as a tariff of \$0.50 per pound?

## || The Political Economy of Trade Protection

We have seen that international trade produces mutual benefits to the countries that engage in it. We have also seen that tariffs and import quotas, although they produce winners as well as losers, reduce total surplus. Yet many countries continue to impose tariffs and import quotas as well as to enact other protectionist measures.

To understand why trade protection takes place, we will first look at some common justifications for protection. Then we will look at the politics of trade protection. Finally, we will look at an important feature of trade protection in today's world: tariffs and import quotas are the subject of international negotiation and are policed by international organizations.

### >> Quick Review

- Most economists advocate **free trade**, although many governments engage in **trade protection** of import-competing industries. The two most common protectionist policies are tariffs and import quotas. In rare instances, governments subsidize exporting industries.
- A **tariff** is a tax on imports. It raises the domestic price above the world price, leading to a fall in trade and domestic consumption and a rise in domestic production. Domestic producers and the government gain, but domestic consumer losses more than offset this gain, leading to deadweight loss.
- An **import quota** is a legal quantity limit on imports. Its effect is like that of a tariff, except that revenues—the quota rents—accrue to the license holder, not to the domestic government.

## Arguments for Trade Protection

Advocates for tariffs and import quotas offer three common arguments:

1. The *national security* argument is based on the proposition that overseas sources of goods are vulnerable to disruption in times of international conflict; therefore, a country should protect domestic suppliers of crucial goods with the aim to be self-sufficient in those goods. In the 1960s, the United States—which had begun to import oil as domestic oil reserves ran low—had an import quota on oil, justified on national security grounds. Some people have argued that we should again have policies to discourage imports of oil, especially from the Middle East.
2. The *job creation* argument points to the additional jobs created in import-competing industries as a result of trade protection. Economists argue that these jobs are offset by the jobs lost elsewhere, such as industries that use imported inputs and now face higher input costs. But noneconomists don't always find this argument persuasive.
3. The *infant industry* argument, often raised in newly industrializing countries, holds that new industries require a temporary period of trade protection to get established. For example, in the 1950s many countries in Latin America imposed tariffs and import quotas on manufactured goods, in an effort to switch from their traditional role as exporters of raw materials to a new status as industrial countries.

In theory, the argument for infant industry protection can be compelling, particularly in high-tech industries that increase a country's overall skill level. Reality, however, is more complicated: it is most often industries that are politically influential that gain protection. In addition, governments tend to be poor predictors of the best emerging technologies. Finally, it is often very difficult to wean an industry from protection when it should be mature enough to stand on its own.

## The Politics of Trade Protection

In reality, much trade protection has little to do with the arguments just described. Instead, it reflects the political influence of import-competing producers.

We've seen that a tariff or import quota leads to gains for import-competing producers and losses for consumers. Producers, however, usually have much more influence over trade policy decisions. The producers who compete with imports of a particular good are usually a smaller, more cohesive group than the consumers of that good.

An example is the import quota on sugar. This quota hurts millions of consumers, but by and large they don't even know it exists. Meanwhile, it benefits a few thousand growers, who are very aware of these benefits and hire lobbyists to keep those benefits coming.

It would be nice to say that the main reason trade protection is so limited is that economists have convinced governments of the virtues of free trade. A more important reason, however, is the role of *international trade agreements*.

## International Trade Agreements and the World Trade Organization

When a country engages in trade protection, it hurts two groups. We've already emphasized the adverse effect on domestic consumers, but protection also hurts foreign export industries. This means that countries care about one another's trade policies: the Canadian lumber industry, for example, has a strong interest in keeping U.S. tariffs on forest products low.

Because countries care about one another's trade policies, they enter into **international trade agreements**: treaties in which a country promises to engage in less trade protection against the exports of another country in return for a promise by the other country to do the same for its own exports. Most world trade is now governed by such agreements.

Some international trade agreements involve just two countries or a small group of countries. For example, the United States, Canada, and Mexico are joined together by the **North American Free Trade Agreement**, or **NAFTA**. This agreement was signed in 1993, and by 2008 it had removed most barriers to trade among the three nations.

Most European countries are part of an even more comprehensive agreement, the **European Union**, or **EU**. Unlike members of NAFTA, the 28 members of the EU agree to charge the same tariffs on goods imported from other countries. The EU also sets rules on policies other than trade, most notably requiring that each member nation freely accept migrants from any other member, while collecting fees from member nations to pay for things like agricultural subsidies. These rules and fees are often unpopular and controversial. In June 2016, Britain held a referendum on whether to leave the EU—a proposal popularly known as *Brexit* (an abbreviation for “British exit”), which was approved by a narrow majority of voters. Negotiations over the details of Britain's exit from the EU, and its future relationship with it, were still in progress as this book went to press.

There are also global trade agreements covering most of the world. Such global agreements are overseen by the **World Trade Organization**, or **WTO**, an international organization composed of member countries—164 of them currently, accounting for the bulk of world trade. The WTO plays two roles:

1. It provides the framework for the massively complex negotiations involved in a major international trade agreement (the full text of the last major agreement, approved in 1994, was 24,000 pages long).
2. The WTO resolves disputes between its members that typically arise when one country claims that another country's policies violate its previous agreements.

An example of the WTO at work is the dispute between the United States and Brazil over American subsidies to its cotton farmers. These subsidies, in the amount of \$3 billion to \$4 billion a year, are illegal under WTO rules. Brazil argued that they artificially reduced the price of American cotton on world markets and hurt Brazilian cotton farmers. In 2005 the WTO ruled against the United States and in favor of Brazil, and the United States responded by cutting some export subsidies on cotton. However, in 2007 the WTO ruled that the United States had not done enough to fully comply, such as eliminating government loans to cotton farmers. In 2010, after Brazil threatened, in turn, to impose import tariffs on U.S.-manufactured goods, the two sides agreed to a framework for the solution to the cotton dispute.

Both Vietnam and Thailand are members of the WTO. Yet the United States has, on and off, imposed tariffs on shrimp imports from these countries. The reason this is possible is that WTO rules do allow trade protection under certain circumstances. One circumstance is where the foreign competition is “unfair” under certain technical criteria. Trade protection is also allowed as a temporary measure when a sudden surge of imports threatens to disrupt a domestic industry.

The WTO is sometimes, with great exaggeration, described as a world government. In fact, it has no army, no police, and no direct enforcement power. The grain of truth in that description is that when a country joins the WTO, it agrees to accept the organization's judgments—and these judgments apply not only to tariffs and import quotas but also to domestic policies that the organization considers trade protection disguised under another name. So in joining the WTO a country does give up some of its sovereignty.

**International trade agreements** are treaties in which a country promises to engage in less trade protection against the exports of other countries in return for a promise by other countries to do the same for its own exports.

The **North American Free Trade Agreement**, or **NAFTA**, is a trade agreement among the United States, Canada, and Mexico.

The **European Union**, or **EU**, is a customs union among 28 European nations.

The **World Trade Organization**, or **WTO**, oversees international trade agreements and rules on disputes between countries over those agreements.

**Offshore outsourcing** takes place when businesses hire people in another country to perform various tasks.

## Challenges to Globalization

The forward march of globalization over the past century is generally considered a major political and economic success. Economists and policy makers alike have viewed growing world trade, in particular, as a good thing.

We would be remiss, however, if we failed to acknowledge that many people are having second thoughts about globalization. To a large extent, these second thoughts reflect two concerns shared by many economists: worries about the effects of globalization on inequality and worries that new developments, in particular the growth in *offshore outsourcing*, are increasing economic insecurity.

**Inequality** We've already mentioned the implications of international trade for factor prices, such as wages: when wealthy countries like the United States export skill-intensive products like aircraft while importing labor-intensive products like clothing, they can expect to see the wage gap between more educated and less educated domestic workers widen. Forty years ago, this wasn't a significant concern, because most of the goods wealthy countries imported from poorer countries were raw materials or goods where comparative advantage depended on climate. Today, however, many manufactured goods are imported from relatively poor countries, with a potentially much larger effect on the distribution of income.

Trade with Asia, in particular, raises concerns among groups trying to maintain wages in rich countries. Despite its rapid economic growth and rising wages in recent years, China is still a very low-wage country compared with the United States, with hourly compensation in manufacturing only around 10% of the U.S. level. Other manufacturing exporters, such as India, Bangladesh, and Vietnam, have wage levels less than half of China's. It's hard to argue against the proposition that imports from these countries put downward pressure on the wages of less skilled U.S. workers.

**Outsourcing** Chinese exports to the United States overwhelmingly consist of labor-intensive manufactured goods. However, some U.S. workers have recently found themselves facing a new form of international competition. *Outsourcing*, in which a company hires another company to perform some task, such as running the corporate computer system, is a long-standing business practice. Until recently, however, outsourcing was normally done locally, with a company hiring another company in the same city or country.

Now, modern telecommunications increasingly make it possible to engage in **offshore outsourcing**, in which businesses hire people in another country to perform various tasks. The classic example is call centers: the person answering the phone when you call a company's 1-800 help line may well be in India, which has taken the lead in attracting offshore outsourcing. Offshore outsourcing has also spread to fields such as software design and even health care: the radiologist examining your X-rays, like the person giving you computer help, may be on another continent.

Although offshore outsourcing has come as a shock to some U.S. workers, such as programmers whose jobs have been outsourced to India, it's still relatively small compared with more traditional trade. Some economists have warned that millions or even tens of millions of workers who have never thought they could face foreign competition for their jobs may face unpleasant surprises in the not-too-distant future. However, the recent rise of reshoring jobs, as described earlier, could mitigate some of those job losses.



Nevada Wier/Getty Images

Offshore outsourcing has the potential to disrupt the job prospects of millions of U.S. workers.

Do these new challenges to globalization undermine the argument that international trade is a good thing? The great majority of economists would argue that the gains from reducing trade protection still exceed the losses. However, it has become more important than before to make sure that the gains from international trade are widely spread. And the politics of international trade are becoming increasingly difficult as the extent of trade has grown.

## ECONOMICS >> *in Action*

### Solar Disputes

Solar energy has become big business. Rapidly improving technology has drastically reduced solar power's cost compared with more conventional forms of energy, especially the cost of solar panels—the blue rectangles you can now see all across America. But who will produce tomorrow's solar panels? That's still an open question—and international trade policy will have a role in determining the answer.

In 2012 the U.S. Department of Commerce accused Chinese companies of “dumping” solar panels in the U.S. market—that is, selling them below cost. To protect the U.S. industry, the department imposed so-called anti-dumping duties—tariffs—on Chinese panels. China responded, in part, by switching part of its production to Taiwan, in effect bypassing the tariffs, so two years later the United States imposed additional tariffs on solar panels coming from Taiwan. And in 2016, the U.S. Department of Commerce imposed tariffs of 24% to 33% on imports from major Chinese manufacturers.

What motivated these protectionist actions? One answer is the infant industry argument. The modern solar panel industry is very new, based on a technology that is rapidly evolving. It's not far-fetched to argue that whichever country or countries get a head start, perhaps via government subsidies and/or unfair business practices, might end up dominating the industry once it matures. So you can make a public-interest case for actions to keep U.S. producers in the race.

At the same time, however, business self-interest tied to political influence was clearly also a factor. The campaign against Chinese solar panel exports was spearheaded by SolarWorld, a company with a factory in Oregon and a clear interest in putting barriers in the way of its competitors.

One interesting final note about globalization: while SolarWorld does employ U.S. workers, it is a German-owned company headquartered in Bonn.

### >> *Check Your Understanding* 8-4

*Solutions appear at back of book.*

1. In 2015, the United States proposed a tariff on steel imports from China. Steel is an input in a large number and variety of U.S. industries. Explain why political lobbying to eliminate these tariffs is more likely to be effective than political lobbying to eliminate tariffs on consumer goods such as sugar or clothing.
2. Over the years, the WTO has increasingly found itself adjudicating trade disputes that involve not just tariffs or quota restrictions but also restrictions based on quality, health, and environmental considerations. Why do you think this has occurred? What method would you, as a WTO official, use to decide whether a quality, health, or environmental restriction is in violation of a free-trade agreement?



International trade policy is central to the ongoing dispute between the United States and China over solar panels.

### >> *Quick Review*

- The three major justifications for trade protection are national security, job creation, and protection of infant industries.
- Despite the deadweight losses, import protections are often imposed because groups representing import-competing industries are more influential than groups of consumers.
- To further trade liberalization, countries engage in **international trade agreements**. Some agreements are among a small number of countries, such as the **North American Free Trade Agreement (NAFTA)** and the **European Union (EU)**. The **World Trade Organization (WTO)** oversees global trade agreements and referees trade disputes between members.
- Resistance to globalization has emerged in response to a surge in imports from relatively poor countries and the **offshore outsourcing** of many jobs that had been considered safe from foreign competition.

# Li & Fung: From Guangzhou to You



It's a very good bet that as you read this, you're wearing something manufactured in Asia. And if you are, it's also a good bet that the Hong Kong company Li & Fung was involved in getting your garment designed, produced, and shipped to your local store. From Levi's to Walmart, Li & Fung is a critical conduit from factories around the world to the shopping mall nearest you.

The company was founded in 1906 in Guangzhou, China. According to Victor Fung, the company's chairman, his grandfather's "value added" was that he spoke English, allowing him to serve as an interpreter in business deals between Chinese and foreigners. When Mao's Communist Party seized control in mainland China, the company moved to Hong Kong. There, as Hong Kong's market economy took off during the 1960s and 1970s, Li & Fung grew as an export broker, bringing together Hong Kong manufacturers and foreign buyers.

The real transformation of the company came, however, as Asian economies grew and changed. Hong Kong's rapid growth led to rising wages, making Li & Fung increasingly uncompetitive in garments, its main business. So the company reinvented itself: rather than being a simple broker, it became a "supply chain manager." Not only would it allocate production of a good to a manufacturer, it would also break production down, allocate production of the inputs, and then allocate final assembly of the good among its 12,000+ suppliers around the globe. Sometimes production would be done in sophisticated economies like those of Hong Kong or even Japan, where wages are high but so is quality and productivity; sometimes it would be done in less advanced locations like mainland China or Thailand, where labor is less productive but cheaper.

For example, suppose you own a U.S. retail chain and want to sell garment-washed blue jeans. Rather than simply arrange for production of the jeans, Li & Fung will work with you on their design, providing you with the latest production and style information, like what materials and colors are trendy. After the design has been finalized, Li & Fung will arrange for the creation of a prototype, find the most cost-effective way to manufacture it, and then place an order on your behalf. Through Li & Fung, the yarn

might be made in Korea and dyed in Taiwan, and the jeans sewn in Thailand or mainland China. And because production is taking place in so many locations, Li & Fung provides transport logistics as well as quality control.

Li & Fung has been enormously successful. In 2016, the company had a market value of \$5.4 billion. The company also had nearly \$20 billion in business turnover, with offices and distribution centers in more than 40 countries.

## QUESTIONS FOR THOUGHT

1. Why do you think it was profitable for Li & Fung to go beyond brokering exports to becoming a supply chain manager, breaking down the production process and sourcing the inputs from various suppliers across many countries?
2. What principle do you think underlies Li & Fung's decisions on how to allocate production of a good's inputs and its final assembly among various countries?
3. Why do you think a retailer prefers to have Li & Fung arrange international production of its jeans rather than purchase them directly from a jeans manufacturer in mainland China?
4. What is the source of Li & Fung's success? Is it based on human capital, on ownership of a natural resource, or on ownership of capital?

## SUMMARY

1. International trade is of growing importance to the United States and of even greater importance to most other countries. International trade, like trade among individuals, arises from comparative advantage: the opportunity cost of producing an additional unit of a good is lower in some countries than in others. Goods and services purchased from abroad are **imports**; those sold abroad are **exports**. Foreign trade, like other economic linkages between countries, has been growing rapidly, a phenomenon called **globalization**. **Hyperglobalization**, the phenomenon of extremely high levels of international trade, has occurred as advances in communication and transportation technology have allowed supply chains of production to span the globe.
2. The **Ricardian model of international trade** assumes that opportunity costs are constant. It shows that there are gains from trade: two countries are better off with trade than in **autarky**.
3. In practice, comparative advantage reflects differences between countries in climate, factor endowments, and technology. The **Heckscher–Ohlin model** shows how differences in factor endowments determine comparative advantage: goods differ in **factor intensity**, and countries tend to export goods that are intensive in the factors they have in abundance.
4. The **domestic demand curve** and the **domestic supply curve** determine the price of a good in autarky. When international trade occurs, the domestic price is driven to equality with the **world price**, the price at which the good is bought and sold abroad.
5. If the world price is below the autarky price, a good is imported. This leads to an increase in consumer surplus, a fall in producer surplus, and a gain in total surplus. If the world price is above the autarky price, a good is exported. This leads to an increase in producer surplus, a fall in consumer surplus, and a gain in total surplus.
6. International trade leads to expansion in **exporting industries** and contraction in **import-competing industries**. This raises the domestic demand for abundant factors of production, reduces the demand for scarce factors, and so affects factor prices, such as wages.
7. Most economists advocate **free trade**, but in practice many governments engage in **trade protection**. The two most common forms of **protection** are tariffs and quotas. In rare occasions, export industries are subsidized.
8. A **tariff** is a tax levied on imports. It raises the domestic price above the world price, hurting consumers, benefiting domestic producers, and generating government revenue. As a result, total surplus falls. An **import quota** is a legal limit on the quantity of a good that can be imported. It has the same effects as a tariff, except that the revenue goes not to the government but to those who receive import licenses.
9. Although several popular arguments have been made in favor of trade protection, in practice the main reason for protection is probably political: import-competing industries are well organized and well informed about how they gain from trade protection, while consumers are unaware of the costs they pay. Still, U.S. trade is fairly free, mainly because of the role of **international trade agreements**, in which countries agree to reduce trade protection against one another's exports. The **North American Free Trade Agreement (NAFTA)** and the **European Union (EU)** cover a small number of countries. In contrast, the **World Trade Organization (WTO)** covers a much larger number of countries, accounting for the bulk of world trade. It oversees trade negotiations and adjudicates disputes among its members.
10. In the past few years, many concerns have been raised about the effects of globalization. One issue is the increase in income inequality due to the surge in imports from relatively poor countries over the past 20 years. Another concern is the increase in **offshore outsourcing**, as many jobs that were once considered safe from foreign competition have been moved abroad.

## KEY TERMS

Imports, p. 214	Domestic demand curve, p. 224	Tariff, p. 230
Exports, p. 214	Domestic supply curve, p. 224	Import quota, p. 232
Globalization, p. 214	World price, p. 224	International trade agreements, p. 235
Hyperglobalization, p. 215	Exporting industries, p. 228	North American Free Trade Agreement (NAFTA), p. 235
Ricardian model of international trade, p. 216	Import-competing industries, p. 228	European Union (EU), p. 235
Autarky, p. 217	Free trade, p. 230	World Trade Organization (WTO), p. 235
Factor intensity, p. 221	Trade protection, p. 230	Offshore outsourcing, p. 236
Heckscher–Ohlin model, p. 221	Protection, p. 230	

## PROBLEMS

interactive activity

- Both Canada and the United States produce lumber and footballs with constant opportunity costs. The United States can produce either 10 tons of lumber and no footballs, or 1,000 footballs and no lumber, or any combination in between. Canada can produce either 8 tons of lumber and no footballs, or 400 footballs and no lumber, or any combination in between.
  - Draw the U.S. and Canadian production possibility frontiers in two separate diagrams, with footballs on the horizontal axis and lumber on the vertical axis.
  - In autarky, if the United States wants to consume 500 footballs, how much lumber can it consume at most? Label this point *A* in your diagram. Similarly, if Canada wants to consume 1 ton of lumber, how many footballs can it consume in autarky? Label this point *C* in your diagram.
  - Which country has the absolute advantage in lumber production?
  - Which country has the comparative advantage in lumber production?

Suppose each country specializes in the good in which it has the comparative advantage, and there is trade.

  - How many footballs does the United States produce? How much lumber does Canada produce?
  - Is it possible for the United States to consume 500 footballs and 7 tons of lumber? Label this point *B* in your diagram. Is it possible for Canada at the same time to consume 500 footballs and 1 ton of lumber? Label this point *D* in your diagram.

- For each of the following trade relationships, explain the likely source of the comparative advantage of each of the exporting countries.
  - The United States exports software to Venezuela, and Venezuela exports oil to the United States.
  - The United States exports airplanes to China, and China exports clothing to the United States.
  - The United States exports wheat to Colombia, and Colombia exports coffee to the United States.
- According to data from the U.S. Census Bureau, since 2000, the value of U.S. imports of men's and boy's apparel from China has more than tripled from a relatively small \$244 million in 2000 to \$926 million in 2014. What prediction does the Heckscher–Ohlin model make about the wages received by labor in China?
- Shoes are labor-intensive and satellites are capital-intensive to produce. The United States has abundant capital. China has abundant labor. According to the Heckscher–Ohlin model, which good will China export? Which good will the United States export? In the United States, what will happen to the price of labor (the wage) and to the price of capital?

- Before the North American Free Trade Agreement (NAFTA) gradually eliminated import tariffs on goods, the autarky price of tomatoes in Mexico was below the world price and in the United States was above the world price. Similarly, the autarky price of poultry in Mexico was above the world price and in the United States was below the world price. Draw diagrams with domestic supply and demand curves for each country and each of the two goods. (You will need to draw four diagrams, total.) As a result of NAFTA, the United States now imports tomatoes from Mexico and the United States now exports poultry to Mexico. How would you expect the following groups to be affected?
  - Mexican and U.S. consumers of tomatoes. Illustrate the effect on consumer surplus in your diagram.
  - Mexican and U.S. producers of tomatoes. Illustrate the effect on producer surplus in your diagram.
  - Mexican and U.S. tomato workers.
  - Mexican and U.S. consumers of poultry. Illustrate the effect on consumer surplus in your diagram.
  - Mexican and U.S. producers of poultry. Illustrate the effect on producer surplus in your diagram.
  - Mexican and U.S. poultry workers.
- The accompanying table indicates the U.S. domestic demand schedule and domestic supply schedule for commercial jet airplanes. Suppose that the world price of a commercial jet airplane is \$100 million.

Price of jet (millions)	Quantity of jets demanded	Quantity of jets supplied
\$120	100	1,000
110	150	900
100	200	800
90	250	700
80	300	600
70	350	500
60	400	400
50	450	300
40	500	200

- In autarky, how many commercial jet airplanes does the United States produce, and at what price are they bought and sold?
  - With trade, what will the price for commercial jet airplanes be? Will the United States import or export airplanes? How many?
- The accompanying table shows the U.S. domestic demand schedule and domestic supply schedule for oranges. Suppose that the world price of oranges is \$0.30 per orange.

Price of orange	Quantity of oranges demanded (thousands)	Quantity of oranges supplied (thousands)
\$1.00	2	11
0.90	4	10
0.80	6	9
0.70	8	8
0.60	10	7
0.50	12	6
0.40	14	5
0.30	16	4
0.20	18	3

- Draw the U.S. domestic supply curve and domestic demand curve.
  - With free trade, how many oranges will the United States import or export?
 

Suppose that the U.S. government imposes a tariff on oranges of \$0.20 per orange.
  - How many oranges will the United States import or export after introduction of the tariff?
  - In your diagram, shade the gain or loss to the economy as a whole from the introduction of this tariff.
- The U.S. domestic demand schedule and domestic supply schedule for oranges was given in Problem 7. Suppose that the world price of oranges is \$0.30. The United States introduces an import quota of 3,000 oranges and assigns the quota rents to foreign orange exporters.
    - Draw the domestic demand and supply curves.
    - What will the domestic price of oranges be after introduction of the quota?
    - Illustrate the area representing the quota rent on your graph. What is the value of the quota rents that foreign exporters of oranges receive?
  - The Observatory of Economic Complexity (OEC) is a data visualization that models international trade data among countries. Go to the website at [atlas.media.mit.edu](http://atlas.media.mit.edu) to answer the following questions.
    - Start by selecting “Countries” and enter “United States” in the search bar. In 2014, what was the largest exported good (in dollars) for the United States? What was the value of exports for “Planes, Helicopters, and/or Spacecraft”? What was the largest imported good for the United States?
    - Repeat the steps above for Brazil. In 2014, what was the largest exported good for Brazil? What was the value of exports for, “Planes, Helicopters, and/or Spacecraft”? What was the largest imported good for the Brazil?
- On the left sidebar click on the link “Explore on Visualization Page.” On the new page, in the left sidebar select “Exports,” under “Country” select “Brazil,” under “Partner” select “United States,” and then “Build Visualization.” What is the total value of Brazilian exports to the United States? What is Brazil’s largest exported good (in dollars) compared to the United States? What type of goods does Brazil generally export to the United States? What is the value of exports related to “Planes, Helicopters, and/or Spacecraft”?
  - Now repeat the steps from part c for exports from the United States to Brazil. Change “Country” to “United States,” change “Partner” to “Brazil,” and select “Build Visualization.” What is the total value of exports from the United States to Brazil? What is the United States’ largest export (in dollars) to Brazil? What types of goods does the United States export to Brazil? What is the value of exports related to “Planes, Helicopters, and/or Spacecraft”?
- Comparative advantage creates an opportunity for less productive economies like Bangladesh to trade with more productive economies like the United States. Using the OEC website from Problem 9, how much did Bangladesh export to the United States? What was its largest export to the United States? In general, what type of goods did Bangladesh export to the United States?
  - Once again, using the OEC website from Problems 9 and 10, identify which country has a comparative advantage for each of the following goods. For each good, include the country’s share of global exports and the total dollar value of that share.
    - Computers
    - Maple syrup
    - Soybeans
    - Cocoa beans
    - Beer
  - Over the past five years the United States has become the world’s largest producer of natural gas. But gas producers have struggled to find methods to liquefy natural gas so that it can be exported across the Atlantic. Enter Cheniere Energy, a Houston-based natural gas company that has developed a natural gas export terminal located on the Sabine Pass leading into the Gulf of Mexico. The terminal will give U.S. companies access to markets all over the world.
    - Explain how the development of a natural gas export terminal will affect the market for natural gas in the United States.
    - Assuming natural gas prices are \$3.00 per BTU, illustrate the effect of an export terminal on the demand for natural gas in the United States. Explain your findings.

- c. Assuming natural gas prices in Europe are \$6.00 per BTU, draw a diagram to illustrate how the development of a natural gas terminal in the United States will affect supply and demand in the natural gas market for Europe. Explain your findings.
- d. How will the exporting of natural gas from the United States to Europe affect consumers and producers in both places? Note that most of the natural gas in Europe originates from Russia's state-owned natural gas company, Gazprom.

13.  For this Discovering Data exercise, use FRED (fred.stlouisfed.org) to create a graph comparing exports from California, Florida, Michigan, Pennsylvania, and Washington to China. In the search bar enter "Value of exports to China from California" and select the subsequent series. Follow the steps below to add the remaining states:

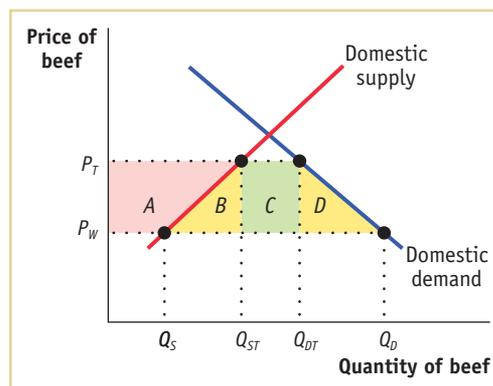
- i. Select "Edit Graph," under "Add Line" enter "Value of exports to China from Florida," then select "Add data series."
- ii. Repeat step i for Michigan, Pennsylvania, and Washington.
- iii. In the date bar start the graph with 2002-01-01.

- a. As of 2012, which two states exported the most goods to China? What were the dollar values of those exports? Which three states exported the least to China?
- b. How did exports to China change from 2002 to 2012? Construct a table to show the change in the value of exports from 2002 to 2012 for each state.

Follow the steps below to edit your graph and calculate the percent of exports to China relative to the total exports for each state:

- i. Select "Edit Graph" and under "Edit Lines" select "Edit Line 1."
  - ii. Under the heading "Customize Data" add "Value of Exports to World from California" (hint: make sure the states match) and add the series.
  - iii. In the "Formula box" enter  $100*(a/b)$  to create the percent term.
  - iv. Repeat steps i through iii for the remaining states.
- c. As a percent of total exports, rank the states in order of most to fewest exports.
- d. Washington State's largest exports to China are airplanes from Boeing, licenses for the use of Microsoft products, and the agricultural products wheat, apples, and hops. Microsoft and Boeing produce unique products at a relatively high price but many other states produce wheat, apples, and hops. The other states export largely regular goods to China. How does this situation explain the pattern of exports to China across the states?

14. The accompanying diagram illustrates the U.S. domestic demand curve and domestic supply curve for beef.



The world price of beef is  $P_W$ . The United States currently imposes an import tariff on beef, so the price of beef is  $P_T$ . Congress decides to eliminate the tariff. In terms of the areas marked in the diagram, answer the following questions.

- a. With the elimination of the tariff what is the gain/loss in consumer surplus?
  - b. With the elimination of the tariff what is the gain/loss in producer surplus?
  - c. With the elimination of the tariff what is the gain/loss to the government?
  - d. With the elimination of the tariff what is the gain/loss to the economy as a whole?
15. As the United States has opened up to trade, it has lost many of its low-skill manufacturing jobs, but it has gained jobs in high-skill industries, such as the software industry. Explain whether the United States as a whole has been made better off by trade.
16. The United States is highly protective of its agricultural (food) industry, imposing import tariffs, and sometimes quotas, on imports of agricultural goods. This chapter presented three arguments for trade protection. For each argument, discuss whether it is a valid justification for trade protection of U.S. agricultural products.
17. In World Trade Organization (WTO) negotiations, if a country agrees to reduce trade barriers (tariffs or quotas), it usually refers to this as a *concession* to other countries. Do you think that this terminology is appropriate?
18. Producers in import-competing industries often make the following argument: "Other countries have an advantage in production of certain goods purely because workers abroad are paid lower wages. In fact, American workers are much more productive than foreign workers. So import-competing industries need to be protected." Is this a valid argument? Explain your answer.

**WORK IT OUT** Interactive step-by-step help with solving this problem can be found online.

19. Assume Saudi Arabia and the United States face the production possibilities for oil and cars shown in the accompanying table.

Saudi Arabia		United States	
Quantity of oil (millions of barrels)	Quantity of cars (millions)	Quantity of oil (millions of barrels)	Quantity of cars (millions)
0	4	0	10.0
200	3	100	7.5
400	2	200	5.0
600	1	300	2.5
800	0	400	0

- What is the opportunity cost of producing a car in Saudi Arabia? In the United States? What is the opportunity cost of producing a barrel of oil in Saudi Arabia? In the United States?
- Which country has the comparative advantage in producing oil? In producing cars?
- Suppose that in autarky, Saudi Arabia produces 200 million barrels of oil and 3 million cars; and suppose that the United States produces 300 million barrels of oil and 2.5 million cars. Without trade, can Saudi Arabia produce more oil *and* more cars? Without trade, can the United States produce more oil *and* more cars? Suppose now that each country specializes in the good in which it has the comparative advantage, and the two countries trade. Also assume that for each country the value of imports must equal the value of exports.
  - What is the total quantity of oil produced? What is the total quantity of cars produced?
  - Is it possible for Saudi Arabia to consume 400 million barrels of oil and 5 million cars and for the United States to consume 400 million barrels of oil and 5 million cars?
  - Suppose that, in fact, Saudi Arabia consumes 300 million barrels of oil and 4 million cars and the United States consumes 500 million barrels of oil and 6 million cars. How many barrels of oil does the United States import? How many cars does the United States export? Suppose a car costs \$10,000 on the world market. How much, then, does a barrel of oil cost on the world market?

