CHAPTER

3 Comparative Advantage and the Gains from Trade

Learning Objectives

After studying this chapter, students will be able to:

- **3.1 Analyze numerical examples of absolute and comparative advantage.**
- **3.2 Draw a diagram showing gains from trade.**
- **3.3 Numerically compare and contrast absolute and comparative advantage.**
- **3.4 Explain how a country with no absolute advantage can still gain from trade.**
- **3.5 Contrast the concepts of comparative advantage and competitiveness.**
- **3.6 Discuss the economic and ethical considerations of economic restructuring caused by international trade.**

INTRODUCTION: THE GAINS FROM TRADE

LO 3.1 Analyze numerical examples of absolute and comparative advantage.

This chapter introduces the theory of comparative advantage. A simple model is used to show how nations maximize their material welfare by specializing in goods and services that have the lowest relative costs of production. The improvement in national welfare is known as the **gains from trade**. The concepts of comparative advantage and the gains from trade are two of the oldest and most widely held ideas in all of economics, yet they are often misunderstood and misinterpreted. Therefore, it is worth the effort to develop a clear understanding of both.

Adam Smith and the Attack on Economic Nationalism

The development of modern economic theory is intimately linked to the birth of international economics. In 1776, Adam Smith published *An Inquiry into the Nature and Causes of the Wealth of Nations*, a work that became the first modern statement of economic theory. In the process of laying out the basic ground rules for the efficient allocation of resources, Smith initiated a general attack on **mercantilism**, the system of nationalistic economics that dominated economic thought in the 1700s. Mercantilism stressed exports over imports, primarily as a way to obtain revenues for building armies and national construction projects.

The key mistake in mercantilist thinking was the belief that trade was a **zero sum** activity. In the eighteenth century the term *zero sum* did not exist, but it is a

convenient expression for the concept that one nation's gain is another nation's loss. A moment's reflection should be enough to see the mistake in this belief, at least as it applies to voluntary exchange. When a grocery store sells a gallon of milk or a loaf of bread, both the store and the consumer are better off. If that were not the case, the store would not sell or the consumer would not buy. Voluntary exchanges such as this are positive sum, not zero sum. In this sense, sports metaphors that have a winner and loser are usually not an apt description of trade relations. Trade is more dance than football, more rock climbing than bicycle racing.

No one in the 1770s thought that they were living in the midst of an industrial revolution, but Smith was observant enough to perceive that many improvements in the standard of living had occurred during his lifetime as a result of increasing specialization in production. When he analyzed specialization, he made one of his most important contributions to economics: the discovery that specialization depends on the size of the market.

A contemporary example may be helpful. If a car company were permitted to sell its cars and trucks only in Michigan, it would have much less revenue and would sell many fewer vehicles. It would hire fewer employees, and each person would be less specialized. As it is, the market is so large (essentially, the world) that car companies can hire engineers who completely specialize in small, even minuscule, parts of a car—door locks, for example. Your door lock engineer will know everything there is to know about the design, production, and assembly of door locks and will be able to put them into cars most efficiently. A firm that was limited to the Michigan market could never afford to hire such specialized skills and could never be as efficient.

One of the keys to Smith's story of wealth creation is access to foreign markets. If no one is willing to import, then every company is limited by the size of the national market. In some cases, that may be large enough (the United States or China), but in most cases, it is not. Small and medium-sized countries cannot efficiently produce every item they consume. Holland, for example, has always imported a large share of its goods and has depended on access to foreign markets in order to earn export revenues to pay for imports.

Smith was highly critical of trade barriers because they decrease specialization, technological progress, and wealth creation. He also recognized that imports enable a country to obtain goods that it cannot make or cannot make as cheaply, while exports are made for someone else and are useful only if they lead to imports. The modern view of trade shares Smith's dislike of trade barriers for mostly the same reasons. Although international economists recognize that there are limitations to the application of theory, in most cases a majority of economists share a preference for open markets. In Chapters 6 and 7 we will examine trade barriers in greater detail, but at this point we will develop a deeper understanding of the gains from trade by means of a simple algebraic and graphical model.

A Simple Model of Production and Trade

We will begin with one of the simplest models in economics. The conclusion of this analysis is that a policy of free trade maximizes a nation's material well-being. Later, we will examine some of the cases where real-world conditions do not conform to the assumptions of the model and where the optimality of free trade is questionable.

The basic model is often referred to as a *Ricardian model,* since it first took form in the analysis of David Ricardo. The model begins by assuming that there are only two countries, producing two goods, using one input (labor). The Ricardian model assumes that firms are price takers, or, in other words, markets are competitive, and no firm has market power. The model is static in the sense that it assumes that technology is constant and there are no learning effects of production that might make firms and industries more productive over time. Ricardo also assumed that labor is perfectly mobile between industries but perfectly immobile across national borders. Table 3.1 lists the main assumptions of the model; many of these will be relaxed in later chapters.

Absolute Productivity Advantage and the Gains from Trade

To begin, we define *productivity* in the Ricardian model. Productivity is the amount of output obtained from a unit of input. Since labor is the only input, we can define **labor productivity** as follows:

$$(\text{units of output})/(\text{hours worked})$$

If, for example, 2 loaves of bread can be produced in one hour, then productivity is as follows:

$$(2 \text{ loaves})/(1 \text{ hour})$$

or 2 loaves per hour. If four loaves are produced in two hours, then productivity is still as follows:

$$(4 \text{ loaves})/(2 \text{ hours}) = 2 \text{ loaves per hour}$$

TABLE 3.1 Assumptions of the Simple Ricardian Trade Model

Labor	■ The only input ■ Cannot migrate across borders ■ Is completely mobile between sectors ■ Fully employed
Markets	■ Two outputs ■ Perfect competition ■ No transportation or trade costs
Technology	■ Constant returns to scale ■ No changes in technology or skills

TABLE 3.2 Output per Hour Worked

	United States	Canada
Bread	2 loaves	3 loaves
Steel	3 tons	1 ton

Canada is more productive than the United States in bread production, but the United States is more productive in steel production.

Suppose that there are two goods, bread and steel, and two countries, the United States and Canada. Suppose also that each produces according to the productivities shown in Table 3.2.

The values in Table 3.2 show that productivity in the making of bread is greater in Canada than in the United States and that productivity in steel is greater in the United States. Canada has an **absolute productivity advantage** in bread because it produces more loaves per hour worked (three versus two in the United States). Using the same logic, the United States has an absolute productivity advantage in steel production.

The basis of Adam Smith's support for free trade was the belief that every country would have an absolute advantage in something and that the source of the advantage did not matter. Whether it was due to special skills in the labor force, climate and soil characteristics of the country, or the temperament of its people, there would be goods that each country could manufacture, grow, or dig out of the ground more efficiently than its trading partner. Consequently, every country could benefit from trade.

In the numerical example outlined in Table 3.2, each loaf of bread costs the United States 1.5 tons of steel. Put another way, the **opportunity cost** of bread is 1.5 tons of steel, since each unit of bread produced requires the economy to move labor out of steel production, forfeiting 1.5 tons of steel that it could have produced instead. This follows from the fact that each hour of labor can produce either 2 loaves of bread or 3 tons of steel. We can write this ratio as the barter price of bread as follows:

$$P_{us}^{b} = \frac{3 \text{ tons}}{2 \text{ loaves}} = 1.5\left(\frac{\text{tons}}{\text{loaves}}\right),$$

where b is bread and us is the country. Similarly, we can write the U.S. price of steel as the inverse as follows:

$$P_{us}^{s} = \frac{2 \text{ loaves}}{3 \text{ tons}} = 0.67\left(\frac{\text{loaves}}{\text{tons}}\right).$$

You should be able to verify that the Canadian price of bread will be 0.33 (tons/loaf) and that steel will cost 3 (loaves/ton).

If the United States can sell a ton of steel for more than 0.67 loaves of bread, it is better off. Similarly, if Canadians can obtain a ton of steel for fewer than 3 loaves of bread, they are better off. Each country will gain from trade if there is

agreement to sell steel for fewer than 3 loaves of bread but more than 0.67 loaves. Anywhere in that range, both Canadians and Americans will benefit. In the end, trade will occur at a price somewhere between these two limits as follows:

$$3.0\left(\frac{\text{loaves}}{\text{tons}}\right) > P_w^s > 0.67\left(\frac{\text{loaves}}{\text{tons}}\right),$$

where P_w^s = the world price of steel (the trade price). Without knowing more details about the demand side of the market, it is impossible to say whether the price will settle closer to 3.0 (the Canadian opportunity cost of steel) or 0.67 (the U.S. opportunity cost). The closer the price is to 0.67, the more Canada benefits from trade, and the closer it is to 3.0, the more the United States benefits. Regardless of which country benefits more, as long as the price is between these two limits, both countries benefit from trade.

CASE STUDY

Gains from Trade in Nineteenth-Century Japan

A fundamental result from international economics is that nations gain from trade. We have just shown this in a simple theoretical framework by illustrating how trade enables countries to consume a bundle of goods that is of greater value than what they can produce on their own. The key to this result is that the two trading partners have different productivities, which lead to different prices in autarky.

One question economists have struggled to answer is "How large are the gains from trade?" Does trade create a relatively small gain or a relatively large one? The answer is complicated for a couple of reasons. First, there are gains from trade opening that occur immediately and are called *static gains from trade*. But there are also gains that occur over time, called *dynamic gains from trade,* that are difficult to predict since they depend on changes in innovation and productivity. A second reason why it is hard to measure gains from trade is that all countries already trade, so most of what is measured are the potential gains from some additional amount of trade and not the benefits or gains that a country currently has from participating in trade. In our simple model, we went from no trade to some trade, but in the real world, when countries reduce their trade barriers, they go from some trade to some more trade.

Two economists (Bernhofen and Brown, *American Economic Review, 95*(1), 2005) tackled this problem in an original way by looking at the case of Japan. Japan's rulers closed their market to outsiders in 1639 when it felt threatened by Christian missionaries and their Portuguese supporters. From that time on, only the Dutch and the Chinese were permitted to trade with

Japan, and each was limited to just a handful of ships per year. In the Dutch case, by the mid-1800s, only one ship per year was allowed to trade, while the Chinese were limited to three or four junks per year. Bernhofen and Brown estimated that Japan exported goods worth about 1.2 cents per person and imported even less, around 0.4 cents per person, by the mid-1800s. Essentially, trade was nil and Japan lived in autarky.

As most Americans know from their history books, the United States decided to force open the Japanese market in the early 1850s and sent Admiral Matthew Perry to accomplish the task. Perry made first contact with Japanese officials in 1853 and signed a limited agreement in 1854. The United States continued to request further opening until a full commercial treaty was signed in 1858 and took effect on July 4, 1859. Following close on the heels of the Americans were the Dutch, Russians, British, and French, and by the mid-1860s, Japan was living under a regime of nearly free trade since its ability to limit imports with tariffs was curtailed by the foreign powers.

The Japanese case is an excellent one for measuring the static gains from trade. Japan had closed markets before it was forced to open, and after opening it was forced to practice more or less free trade. Our simple theoretical model of trade predicts that Japan should have shifted its domestic production to take advantage of the higher prices offered for its exports and that its national income should have grown in value since its export goods are worth more and its import goods cost less. Both effects seem to have occurred.

After trade began, Japanese production of silk and tea increased dramatically, and these products became major export items. Imported goods included woolen textiles (Japan had no sheep industry) and a variety of manufactured goods, such as weapons, that it did not make itself. National income seems to have grown as well. Bernhofen and Brown estimated that an upper bound on the increase was 8–9 percent of gross domestic product (GDP). This is not a huge amount, but it is not inconsequential, either, and represents only the static gains from trade. Over time, as Japanese producers adjusted to a larger market and as new technologies and products were introduced, additional gains would accrue from increased productivity and innovation.

COMPARATIVE PRODUCTIVITY ADVANTAGE AND THE GAINS FROM TRADE

LO 3.2 Draw a diagram showing gains from trade.

At this point, the obvious question to ask is what happens if a country does not have an absolute productivity advantage in anything. It is not hard to imagine an extremely poor, resource-deficient nation with low literacy and scarce capital. What can these countries produce more efficiently than the United States or Germany? Why would a rich country want to trade with them when they are

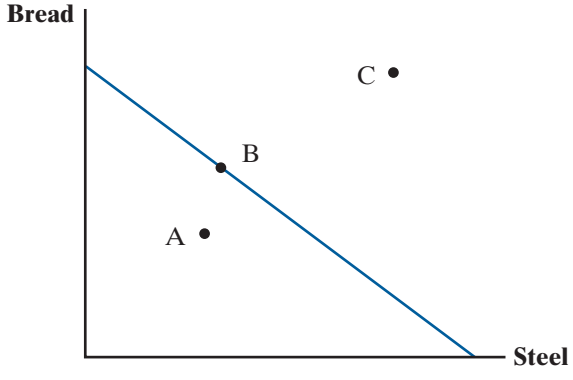
inefficient at everything? The answer is that even if a country lacks a single good in which it has an absolute productivity advantage, it can still benefit from trade. Perhaps even more surprising, high-income countries also benefit from the trade. In other words, the idea that nations benefit from trade has nothing to do with whether a country has an absolute advantage in producing a particular good. In order to see this, first we must develop a few more basic concepts.

The Production Possibilities Curve

The **production possibilities curve (PPC)** shows the trade-offs a country faces when it chooses its combination of bread and steel output. Figure 3.1 illustrates a hypothetical PPC for the United States. Point B on the PPC is an efficient point of production because it utilizes existing resources to obtain the maximum possible level of output. The assumption of full employment is equivalent to assuming that the United States is operating at a point like B that lies on its PPC. At point A, the economy is inside its production curve and is operating at an inefficient and wasteful level of output because it is not obtaining the maximum possible output from its available inputs. Point C is infeasible because resources do not permit the production of bread and steel in the combination indicated.

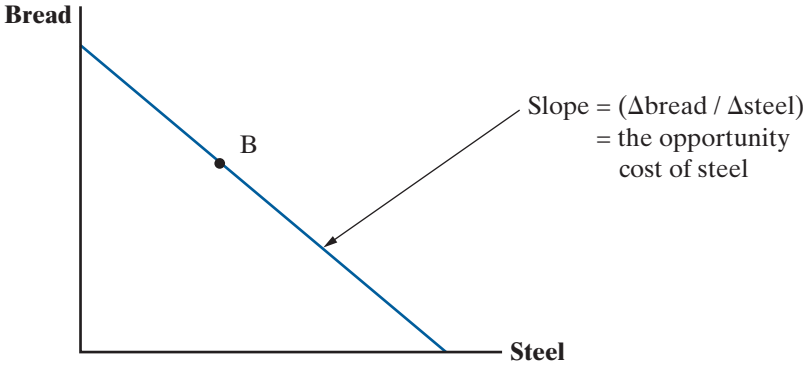
The PPC shown in Figure 3.1 is a straight line because it is assumed that the trade-off between bread and steel does not change. This follows from the assumption that labor is homogeneous and that no group of workers is more skilled than another group. The trade-off between bread and steel is another way to refer to the opportunity cost of steel. This follows from the definition of opportunity cost as the best forgone alternative: In order to produce a ton of steel, the United States gives up two-thirds of a loaf of bread. In Figure 3.2, the slope of the PPC is −0.67, the number of loaves of bread forgone (Δ bread) divided by the quantity of steel obtained (Δ steel)—written as follows:

FIGURE 3.1 A PPC for the United States



In a model with only two goods, the production possibilities curve shows the trade-offs.

FIGURE 3.2 Opportunity Costs and the Slope of the PPC



The slope of the PPC is the opportunity cost of the good on the horizontal axis. This follows from the definition of the slope as the ratio of the vertical change to the horizontal change moving along the PPC.

$$\text{Slope of the PPC} = (\Delta \text{ bread output})/(\Delta \text{ steel output})$$
$$= \text{opportunity cost of steel}$$

Relative Prices

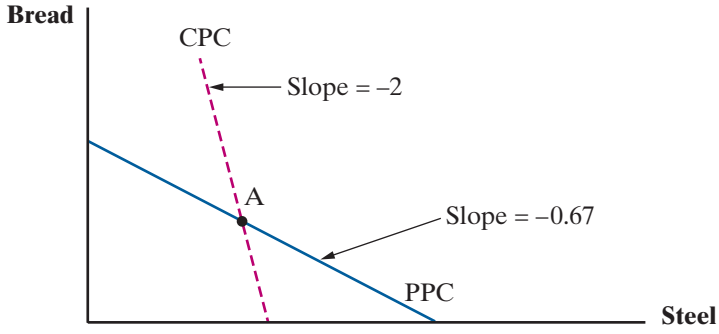
Suppose that the slope of the PPC is −0.67, as shown in Figure 3.2. If the United States does not trade, it gives up 0.67 loaves of bread for an additional ton of steel. This trade-off is called the **relative price** of steel or the opportunity cost of steel. The term *relative price* follows from the fact that it is not in monetary units but rather in units of the other good. If no trade takes place, then the relative price of a good must be equal to its opportunity cost in production.

It is easy to convert the relative price of steel into the relative price of bread: Simply take the inverse of the price of steel. In other words, if 0.67 loaves of bread is the price of 1 ton of steel in the United States, then 1.5 tons of steel is the price of 1 loaf of bread. By the same reasoning, 1.5 tons of steel is the opportunity cost of 1 loaf of bread in the United States when production is at point B or at any other point along the PPC in Figure 3.2.

The Consumption Possibilities Curve

The complete absence of trade is called **autarky**, and in this situation both the United States and Canada are limited in their consumption to the goods that they produce at home. Suppose that autarky prevails initially and the opportunity cost of steel in Canada is 3 loaves of bread per ton, and in the United States, it is 0.67 loaves per ton (as given in Table 3.1). In this case, both countries can raise their consumption levels if they trade. In particular there will be gains from trade if the price settles somewhere between the opportunity costs in Canada and in the United States. That is, the countries benefit if the following is true:

FIGURE 3.3 Production and Trade Before Specialization



If the United States produces at A and the trade price of steel is 2, then it can trade steel for bread and move its consumption bundle outside its PPC.

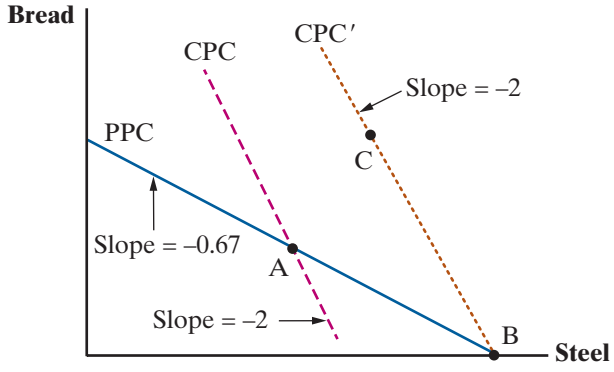
$$3.0 \text{ (loaves/ton)} > P_w^s > 0.67 \text{ (loaves/ton)}$$

Suppose that the price settles at 2 loaves per ton. In the United States, the pre-trade price was 0.67 loaves per ton. This is illustrated in Figure 3.3, where the PPC for the United States is shown with the production point at A. The trading possibilities for the United States are illustrated by the **consumption possibilities curve (CPC)**. The slope of the CPC is -2, which is the relative price of steel, or the rate at which bread and steel can be traded for each other. The CPC passes through point A because this is the combination of steel and bread that is available to trade if the United States produces at A. If the United States chooses to trade, it could move up the CPC, trading each ton of steel for 2 loaves of bread. This is a better trade-off than it gets if it tries to make more bread, since along its PPC each ton brings only two-thirds more loaves of bread. While it is always impossible to produce outside the PPC, in effect, the United States can consume outside it by trading steel for bread.

The Gains from Trade

You should wonder why the United States would choose to make bread at all, since a ton of steel not produced brings in only two-thirds of a loaf of bread. If the United States were to specialize in steel production and trade for bread, it could do much better, since it would get 2 loaves for each ton. This possibility is shown in Figure 3.4. Here, the pre-trade production point for the United States is at A. This is also its consumption point, since in the absence of trade, consumption must equal production. Point B in Figure 3.4 represents production that is completely specialized in steel. With the opening of trade, production could occur at B, and the United States could trade up along CPC′, which has a slope of -2, the same as the CPC. If the United States produces at B and moves up CPC′, it can reach a point like C, which is unambiguously superior to the consumption bundle available when production is at point A because it represents more of both bread

FIGURE 3.4 Production to Maximize Income



By specializing production at B and trading for bread, the United States obtains the largest possible consumption bundle.

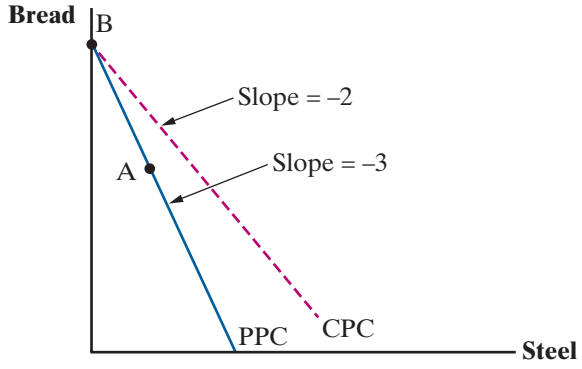
and steel. Similarly, for any combination of bread and steel that is available along the PPC or CPC if the United States produces at A and trades, there is a consumption bundle on CPC′, which represents more of both goods.

The most important thing to note about production point B is that it maximizes U.S. income. This follows from the fact that it makes available the greatest combinations of bread and steel. To see this, consider that no other point of production puts the United States on a price line that lies farther out from the origin. Every other production point on the United States' PPC lies below the CPC′, and every CPC with a slope of −2 that passes through the PPC at a point other than B also lies below CPC′. In other words, given the United States' PPC and a relative steel price of 2, the largest bundle of consumption goods is obtained when the United States specializes in steel and trades for its bread.

The United States benefits from trade, but does Canada? Unequivocally, the answer is yes. Consider Figure 3.5 where point A is Canada's pre-trade production point. Along Canada's PPC, the opportunity cost of steel is 3 loaves of bread per ton. After trade, the price settles at 2 loaves per ton. With a trade price of 2, Canada maximizes its income by moving along its PPC to where it is completely specialized in bread production. Then it can trade bread for steel at a trade price that is more favorable than its domestic trade-off of 3 loaves per ton. Canada, too, can consume at a point on CPC that is outside its PPC and above and to the right of its pre-trade equilibrium at point A. Canada, like the United States, is better off because with trade it gets a larger combination of both goods than it can produce for itself.

A numerical example will help clarify the existence of gains from trade. Suppose the relative price of steel is 2 loaves per ton. When the United States increases its steel output by 1 ton, it gives up 0.67 loaves of bread output, but it can trade the steel for 2 loaves, leaving a net gain of 1.33 loaves $(2 - 0.67 = 1.33)$. In order to meet U.S. demand for 2 more loaves of bread, Canada must give up 0.67 ton of

FIGURE 3.5 Canada's Gains from Trade



By specializing production at B and trading for steel, Canada obtains the largest possible consumption bundle.

steel production. It trades the 2 loaves for 1 ton of steel, however, leaving a net gain of 0.33 ton (1 − 0.67 = 0.33). Hence, both countries benefit from the trade.

Domestic Prices and the Trade Price

Now we know that as long as the trade price is between the pre-trade domestic prices in Canada and the United States, both countries can gain from trade. What ensures that the trade price actually settles within this range, 3.0 (loaves/ton) $> P_w^s >$ 0.67 (loaves/ton)? What would happen if, for example, P_w^s were equal to 4, or 0.5?

Consider the first case when the trade price is 4 loaves per ton of steel. At $P_w^s = 4$, the trade price of steel is greater than the production cost in each country. Clearly, the United States would want to continue to specialize in steel and trade it for bread. Nothing has changed with regard to the U.S. strategy for maximizing its consumption bundle, or income. The only difference now is that the United States gets 4 units of bread for each unit of steel, instead of 2 as before. In Canada's case, the higher price of steel makes it profitable for Canadian producers to switch to steel production. This follows because the production opportunity cost of steel is 3 loaves of bread, but each ton produced can trade for 4 loaves. By specializing in steel production and trading for bread, Canada maximizes its consumption bundle.

Finally, it should be obvious that both countries are specialized in steel production and that no one is producing bread. There is a bread shortage and a glut of steel. Consequently, bread prices rise, and steel prices fall. This goes on at least until the trade price of steel falls below the opportunity cost of production in Canada, the higher cost country. Once P_w^s is less than 3, Canadian producers switch back to bread, steel production goes down, bread is up, and trade can resume.

In the second case, where P_w^s is less than 0.67, Canada continues to specialize in bread, and the United States switches. Bread is the surplus good, steel is in short supply, and a similar dynamic causes the price to move in order to ensure

that both goods are produced. The equilibrium trade price, then, has to be within the range we specified earlier, between the opportunity costs in the two countries. In our case, this is between 0.67 and 3.0 loaves per ton.

At the extreme, the trade price could be equal to the opportunity cost in one country; for example, if the trade price of steel is 0.67 loaves per ton, then the United States is indifferent about trading. It cannot be hurt by trading, but it does not gain either, since all the gains go to Canada. Similarly, if the trade price is equal to Canada's opportunity cost, then Canada is indifferent and all the gains accrue to the United States.

Without more information we cannot say much more about the trade price. Will it be close to 0.67 or to 3.0? The answer depends on the strength of demand for each good in both countries, but we have not explicitly included demand in our model, so we cannot say. We do know that if the price is closer to 0.67, then the gains from trade are larger for Canada, and if it is closer to 3.0, the United States benefits more. Nevertheless, both countries gain as long as the price is between the two opportunity costs, and economic forces determine that the price must be in that range.

ABSOLUTE AND COMPARATIVE PRODUCTIVITY ADVANTAGE CONTRASTED

LO 3.3 Numerically compare and contrast absolute and comparative advantage.

Absolute productivity advantage is defined as having higher labor productivity. We saw that if each country has an absolute productivity advantage in one of the goods, they can both benefit by specializing in that good and trading it for the other good. Note, however, that the gains from trade did not depend in any way on each country having an absolute advantage. In fact, it was the pre-trade opportunity costs of bread and steel in each country that mattered. Opportunity costs were derived from the productivities, but since they are a ratio, vastly different levels of productivity can lead to the same trade-off.

A country has a **comparative productivity advantage** in a good, or simply a comparative advantage, if its opportunity costs of producing a good are lower than those of its trading partners. The concept of comparative advantage is based on the idea that nations maximize their material well-being when they use their resources where they have their highest value. In order to know the highest-valued usage for any resource, we must compare alternative uses. If, by comparison to that of the United States, Canada's opportunity cost of bread is lower, then it should produce more bread and trade for steel.

The distinction between absolute and comparative productivity advantages is one of the most important in economics. It is also one of the least understood, in spite of the fact that it is relatively simple. For example, it is common to read or hear comments about competitiveness that assume that if a country does not have an absolute advantage, it will not be able to sell its products abroad. Our

model explains why this logic is erroneous and why even the least productive nations export some goods.

GAINS FROM TRADE WITH NO ABSOLUTE ADVANTAGE

LO 3.4 Explain how a country with no absolute advantage can still gain from trade.

Consider the case shown in Table 3.3. Japan has an absolute advantage in both cars ($2 > 0.5$) and steel ($2 > 1$), yet it can still gain from trade, as can Malaysia, even though it lacks an absolute advantage in either good. If Japan does not trade, it is limited to its own production possibilities, which require it to give up 1 ton of steel for each car it produces. In Malaysia, each car costs 2 tons of steel. Hence, there is scope for a mutually beneficial exchange.

Japan's opportunity cost of steel production is greater than Malaysia's even though it has a higher absolute rate of productivity in steel. Therefore, if it follows its comparative advantage and maximizes its income, it will specialize in cars, the sector where its opportunity cost is lower than Malaysia's. Once trade opens, the world price of cars will be between 1 and 2 tons of steel per car, the opportunity costs of production in Japan and Malaysia, as follows:

$$1\left(\frac{\text{tons}}{\text{car}}\right) < P_w^c < 2\left(\frac{\text{tons}}{\text{car}}\right)$$

Let the price be 1.5 tons of steel per car. If Japan moves to specialize in cars with the opening of trade, it gives up 1 ton of steel for each additional car it produces. With the additional car, it can trade for 1.5 tons of steel, which is a net gain of 0.5 tons over its own production. Similarly, Malaysia gives up 0.5 cars produced for each additional ton of steel it manufactures, but it gains 0.67 cars from each ton of steel traded. Both countries benefit and are able to consume a greater amount of both goods than they could if they relied on their national production alone.

This is a very simplified example of the gains from trade, but it illustrates a fundamental principle. What matters most for the purposes of trade is not a country's absolute advantage, but rather its comparative advantage. This is a central point of international economics: Differences in absolute advantage do not eliminate gains from trade. Furthermore, although both countries gain from trade, it does not imply that their living standards or incomes are equal. Malaysia's income will

TABLE 3.3 Output per Hour Worked

	Japan	Malaysia
Cars	2	0.5
Steel	2 tons	1 ton

be less than Japan's because it produces less per hour. In effect, an hour of work in Malaysia returns the equivalent of 1 ton of steel or, through trade, 0.67 cars. Japanese workers produce 2 cars per hour worked, which is equivalent to 3 tons of steel through trade. As a result of higher absolute productivity, incomes in Japan are quite a bit higher, with or without trade.

CASE STUDY

Changing Comparative Advantage in the Republic of Korea, 1960–2010

Few countries began life with a more limited set of possibilities than the Republic of Korea (South Korea). Liberated from its forty years of colonial status (1905–1945) by the defeat of Japan in World War II, Korea was soon wracked by civil war (1950–1953) and divided into two nations. Many observers were pessimistic about the future of noncommunist South Korea. The industrial capacity of the country was mostly located in communist-controlled North Korea, and South Korea had little to offer besides the dedication and hard work of its people. Yet, over the following fifty years, few countries have grown faster.

From 1960 to 2010, per capita income in the Republic of Korea grew at the rate of 5.4 percent per year, in real terms (Table 3.4). At this rate, per capita income doubles every thirteen years.

Korea's economic strategy for the first few years after the Korean War was to limit imports and concentrate on producing import substitutes, a common strategy for developing countries in the 1950s. Korea was one of the first to recognize its limitations and to change its policies. In 1960 and 1961, political changes led to a change in economic policies and a more aggressive engagement with the world economy. Korea removed many of its restrictions on imports and began to promote export-oriented industries. Between 1960 and 2010, its trade-to-GDP ratio increased from 15.8 to 102.

Initially, Korea's export efforts were limited to the commodities on hand, mostly minerals, a few agricultural and marine products (for example,

TABLE 3.4 Indicators of the Korean Economy

	1960	1980	2000	2010
GDP per capita ($US, 2000)	1,154	3,358	11,347	16,372
Trade-to-GDP ratio	15.8	72.0	74.3	102.0

(*continued*)

seaweed), and very simple consumer goods. Over several decades after 1960, its export industries evolved several times, from simple products requiring few skills and little capital to products that required more skills and greater capital. After its first few years of exploring its comparative advantage, Korea developed competitive sectors in wigs, textiles, shoes, and plywood. With the increase in income came increases in skills and financial capital. This permitted the development of more skill- and capital-intensive industries such as steel, shipbuilding, household appliances, and electronic subassemblies. Eventually, these were followed by cars, computers, and electronics. By the first decade of the new millennium, Korea was a high-income industrial economy capable of exporting the most technologically advanced products available in several fields. Clearly, its history demonstrates that comparative advantage is not unchangeable and that it can be a vehicle for raising incomes and promoting development.

An increasing share of Korea's output was sold in world markets. Consequently, production was not limited to the growth in its own domestic market. In addition, its goods had to be competitive in quality and price. Its ability to obtain imports at world prices was also important, but standing behind Korea's competitiveness was its rapid increases in productivity. Without more output per hour of work, incomes could not have risen as fast as they did, and Korea's ability to shift its comparative advantage from low-skill to increasingly higher-skill products could not have gone forward. In turn, productivity increases require a host of complementary changes, ranging from the development of universities and research institutes to organizational changes and the raising of financial capital for investing in new machinery and equipment.

In the process of promoting exports and raising productivity, Korea encountered a number of obstacles including its own bureaucratic inflexibility, problems in marketing to foreign markets that are radically different from Korea's, and a shortage of technical management and industrial expertise. It met and overcame these obstacles, and today Korea is an example of a country that used its comparative advantage to develop its economy. At the same time, it also used the pressure of foreign competition to raise its own productivity and quality standards, which in turn raised the incomes of its citizens. Korea's success was a joint product of efforts by its government, the private sector, and a number of public-private organizations. It is an open question whether each of these played a similar role: Is Korea's success due to the wise guidance of government policies, or did those policies play a secondary (or even negative) role compared to markets and competition?

COMPARATIVE ADVANTAGE AND "COMPETITIVENESS"

LO 3.5 Contrast the concepts of comparative advantage and competitiveness.

The rhetoric of "competitiveness" is so common in our public discourse that it is useful to consider its relationship to comparative advantage. In the analysis so far, comparative advantage resulted from productivity differences between nations in autarky. In our simple model of a barter economy, wages, prices, and exchange rates were omitted. Real businesses do not barter steel for bread, however, and they cannot pay their workers by dividing up the firm's output.

In general, by ignoring money wages, money prices, and exchange rates, we assumed that all goods and labor were correctly priced. In other words, we assumed that the prices of outputs and inputs are an accurate indication of their relative scarcity. In this case, there is no difference between a nation's comparative advantage and the ability of its firms to sell goods at prices that are competitive. That is, if all markets correctly value the price of inputs and outputs, then a nation's commercial advantage is determined by its comparative advantage.

Unfortunately, markets sometimes fail to produce optimal outcomes, and at times, outputs and inputs are incorrectly priced. Sometimes, undervaluation or overvaluation of a good stems from inherent difficulties in measuring its true value or in measuring its true cost of production. For example, we usually ignore the costs of air pollution when we measure the costs of driving a car. Other times, undervaluation or overvaluation may result from government policies, as when prices are maintained at an artificially high or low level. In either case, the fact that a market price may not accurately reflect the economic value of an input or an output means that a wedge is driven between commercial or **competitive advantage** and comparative advantage.

It is often (incorrectly) argued that nations should pursue commercial advantages for their firms even if it means a misallocation of resources. In effect, this means that a country follows policies that lower living standards by failing to maximize the value of national output. In terms of Figure 3.4 and Figure 3.5, this is equivalent to asserting that the United States and Canada should each remain at a point like A, where the United States overestimates the value of producing its own bread and Canada overestimates the value of steel. Both countries end up with consumption bundles that are suboptimal from the standpoint of national welfare.

Consider a real-world example. Indonesia tried to develop an aircraft industry in spite of the fact that it lacks a comparative advantage in aircraft production. Nevertheless, through a combination of government policies (some of which paid people to buy the planes!), the price to foreigners was competitive at times. From the perspective of Indonesian national welfare and the optimal use of scarce Indonesian resources, this was a mistake. From the perspective of

a business, however, Indonesian policies made it profitable to make airplanes, even though it meant using resources in ways that were suboptimal from the national perspective.

This case illustrates the common mistake of equating nations with business enterprises. Indonesian plane manufacturers care about their subsidies and any other policy that makes them profitable. The national interest, however, is to achieve the most efficient allocation of resources possible within the framework of the nation's laws and values. It is possible to make individual firms highly profitable through subsidies or protection from international competition, while at the same time and through the same policies cause the nation's overall standard of living to be lower than it would be otherwise. Businesses are not designed to ensure that resources are efficiently allocated at the national level. If they can legally tip the playing field in their direction, they will not hesitate.

Another important distinction between nations and business enterprises is that nations do not compete with each other in any normal sense of the word. Economic relations between the United States and Canada, or any pair of nations, are not equivalent to the commercial competition that exists between companies such as Coke and Pepsi. If Canada grows, the United States does not go out of business or suffer in any identifiable way. In fact, Canadian growth would be a stimulus to U.S. growth and would create spillover benefits for Americans. Cola companies fight over a relatively static market size, but nations can all simultaneously increase their incomes.

ECONOMIC RESTRUCTURING

LO 3.6 Discuss the economic and ethical considerations of economic restructuring caused by international trade.

Economic restructuring refers to changes in the economy that may require some industries to grow and others to shrink or disappear altogether. For example, the United States has seen a dramatic decrease in the size of its steel industry and, some years later, a rebirth of a new industry based around smaller, more specialized steel mills. The car industry has been through several periods of decline and recovery and has unknown long-term prospects. In any dynamic economy, some types of economic activity will be growing, and others will be scaling back or dying. In some cases, these changes are a direct consequence of increased openness to foreign competition. For example, the influx of Japanese cars has played a major role in the reorganization and restructuring of the U.S. auto industry.

In our simple Ricardian model, after the opening of trade, the United States was able to maximize its well-being by shifting workers out of bread production and into steel production. Even though this restructuring of the economy improved overall economic welfare, it does not mean that it benefited every individual—a nation's gains from trade may be divided in different ways, and it is usually the case that some individuals benefit while others are hurt by trade.

If there are net gains from opening trade (which are measured by an increase in the consumption bundle), then it means that the economic gains of the winners are greater than the economic losses of the losers, and therefore the nation as a whole is better off. Nevertheless, opening an economy to increased foreign competition is rarely painless and usually generates a number of new problems. In the model used in this chapter, it was assumed that workers can effortlessly and without costs move back and forth between industries as one expands and the other shrinks. In reality, this is not an option. While some laid-off workers in a declining industry may quickly find new jobs, many do not. They may not know which companies need workers, or their skills may not match those that are in demand.

The model of comparative advantage does not offer a set of policies for addressing the problems of dislocated workers. Those policies have to come from another branch of economic analysis, such as labor economics, and from outside economics. It is widely recognized, however, that changes in trade patterns, whether they are due to trade agreements, a unilateral reduction in trade barriers, technological breakthroughs, or any other cause, will result in some dislocation of firms and workers. The great majority of economists support more open trading arrangements, however, because foreign trade raises living standards, increases consumer choice, lowers input costs for producers, increases competition and innovation, and leads to a wider and more rapid diffusion of technological change. Nevertheless, it is important to keep in mind that the gains from trade do not mean that every worker or every firm benefits.

Policy solutions for the problem of dislocated workers are colored by political preferences. Small government libertarians, for example, would argue that government should do very little, that it is up to the individual workers and their families to address the problem of joblessness. More progressive voices argue that the job losses associated with changing trade patterns are not always resolved by free markets and that the problems can easily reach beyond individuals to whole communities if a major industry is lost to foreign competition. Further, a policy of inaction can undermine the public's view of the legitimacy of international trade if dislocation leads to the collapse of communities and results in regional economic stagnation.

One of the great difficulties of this issue is that job loss and radical economic change are nearly always a result of more than changing trade patterns. Communication and transportation revolutions, together with computer technologies, have fundamentally changed the economies of all high-income countries and most others as well. These technological changes are deeply intertwined with changing trade patterns, but they may be less well known to the average citizen, and as a result, trade is believed to cause economic change that is more correctly seen as caused by technological advances. Research economists are actively trying to understand how technology and trade interact, how they change the location of economic activity, and how they favor or harm different occupations, industries, and regions. This issue is likely to continue to be an important topic and driver of political trends for the foreseeable future.

Regardless whether technological change or trade is the main cause of economic dislocation, the appropriate policy response is similar. As noted, small government libertarians would favor no government action in the belief that markets are best left to self-correct. A more mainstream view is that government should look for ways to compensate the losers. Given that technological change and international trade both create net benefits for the nation as a whole, there are additional resources for compensation. In addition, there are humanitarian concerns about individuals, families, and communities that are left behind by economic changes. And finally, compensation of those hurt by economic change probably undermines the growth of nationalistic anti-trade movements.

The practice of offering **trade adjustment assistance (TAA)** is common in many countries, including the United States. Usually these programs take the form of extended unemployment benefits and worker re-training. For example, the U.S. government created a special program of benefits for workers who are hurt by trade with Mexico due to the North American Free Trade Agreement (NAFTA). In 1994, the first year of NAFTA, 17,000 workers qualified for TAA under the NAFTA provision. Generally, in order to qualify for the benefits, workers must demonstrate that they were laid off as a result of imports from Mexico or Canada or because their firm relocated to one of those countries. Needless to say, it is sometimes difficult to establish a direct link between imports and job loss; a poorly managed firm may have been on its way out of business with or without imports.

The important point is that trade creates change, and it may be difficult for some people, industries, or communities to deal with it. When a nation moves along its PPC toward a different mix of industries, there is a period of transition that is painful for some. Economic restructuring does not happen overnight, and although it is desirable for the higher living standard it brings, change and transformation cost time and money.

CASE STUDY

Losing Comparative Advantage

The case study on Korea shows that comparative advantage is not fixed in time but changes as countries develop their economies. Changing comparative advantage cuts two ways, however, and some production stops being an efficient use of a country's capital and labor. In the Korean case, there are products that it exported early in its development that are no longer cost efficient to make.

Agriculture is an area where many countries experience a declining comparative advantage over time. Some agricultural crops tend to be very labor intensive, and the cost of labor rises as an economy develops. Technology may solve some of the problems of rising wages by reducing the need for labor, but other crops resist an efficient technological solution. In an ideal world, workers in industries that lose their comparative advantage would easily and quickly move to an industry where new opportunities appear.

Comparative advantage in agriculture is not the only concern countries have when thinking about their agricultural sector. Issues of food safety, food independence, and support for rural culture and society are all concerns to one degree or another, more in some countries than others.

One of the objectives of the nearly defunct Doha Round of the WTO was to create an economic environment in which low-cost agricultural producers have access to other countries' markets. The goal was to increase efficiency in the world economy by locating production where the opportunity costs are lowest while at the same time creating opportunities for developing countries. If a developing country has a comparative advantage in, say, cotton, but foreign markets are not open, it cannot fully obtain the benefits of its comparative advantage.

Cotton is not a food crop, and its treatment highlights some of the fundamental difficulties involved in persuading countries to drop trade barriers as well as the fundamental reasons why it is desirable to see barriers fall. According to the International Cotton Advisory Committee, the highest cost producers in the world include Greece, Spain, and the United States, all of which are countries classified as high-income by the World Bank. Lowest-cost producers are in sub-Saharan western Africa (for example, Burkina Faso, Mali, Benin) and central Asia (for example, Uzbekistan and Tajikistan).

Cotton is not a major item in world trade and is significantly less than one-half of one percent of total merchandise trade. Nevertheless, it is important since as many as one hundred million households depend on income earned growing cotton, and several of the low-cost producers depend on their cotton

TABLE 3.5 Low-Cost and High-Cost Cotton Producers

Country	Cotton Exports, 2014 (millions $)	Percent of Total Exports, 2014	Income per Person, 2014
Low-cost producers			
Western Africa			
Benin	475.3	23.6	890
Burkina Faso	575.3	23.1	700
Mali	639.9	30.5	650
Central Asia			
Tajikistan	154.9	14.6	1,080
Uzbekistan	840.5	6.3	2,090
High-cost producers			
Greece	418.1	1.2	22,680*
United States	4,516.1	0.3	55,200

*2013

Sources: Data from United Nations Conference on Trade and Development; World Bank,

(*continued*)

export earnings to buy essential imports such as grain. Table 3.5 compares cotton production, its share of trade, and income per person in a few of the low-cost and high-cost producers. As shown, low-cost countries produce less but depend more on cotton exports, as their very low levels of income put them close to the edge of survival and they have fewer goods to export. High-cost producers depend much less on their cotton exports and have much higher incomes.

High-cost producers like the United States and Greece depend on a variety of government interventions to keep their cotton producers in business. In Greece, direct and indirect payments, along with tariffs on imports of cotton, are administered through the European Union's Common Agricultural Program. In the United States, the Department of Agriculture administers a number of farm support programs, including payments to farmers, subsidized loans, revenue guarantees, subsidized insurance, marketing and promotion assistance, and others, while the Department of Commerce administers a set of tariffs on foreign cotton entering the U.S. market.

Rich countries that try to keep their high-cost producers in business do more than keep production going where it is less efficient. They also have the potential to harm the living standards of some of the world's poorest countries and to block one of their paths to higher incomes. By using their wealth to subsidize production, high-cost producers increase world supply and limit the ability of low-cost producers to fully exploit their comparative advantage in cotton. In sum, high-income countries find it politically difficult to give up their support for older, less efficient sectors.

Summary

- The single most important determinant of trade patterns is the opportunity cost of producing traded goods. Countries that sacrifice the least amount of alternative production when producing a particular good have the lowest opportunity cost, or a comparative advantage. The idea of comparative advantage has been one of the most enduring concepts of economic thought and has been a central theme in international economic policy since the mid-1800s.
- Nations that produce according to their comparative advantage are maximizing the benefits they receive from trade and, consequently, their national welfare. This is the same as maximizing their gains from trade.
- Comparative advantage is often confused with absolute advantage. The latter refers to the advantage a nation has if its absolute productivity in a particular product is greater than that of its trading partners. It is not necessary to have an absolute advantage in order to have a comparative advantage.

- One common fallacious argument against following comparative advantage is that workers in other countries are paid less than workers at home. This argument neglects the issue of productivity. Developing countries' wages are lower because the value of output from one hour of labor is less. Labor productivity is less because workers are generally less skilled, they have less capital on the job, and they have less capital in the surrounding economy to support their on-the-job productivity.
- Businesspeople look at the issue of trade differently than economists do because they have different objectives in mind. Businesspeople are often concerned about their ability to compete—that is, to sell a particular item in a given market at the lowest price. Their perspective is that of the firm. Economists focus on the efficient use of resources at the national or global level. The perspective is that of all firms taken together.

Vocabulary

absolute productivity advantage
autarky
comparative productivity advantage
competitive advantage
consumption possibilities curve (CPC)
economic restructuring
gains from trade
labor productivity
mercantilism
opportunity cost
production possibilities curve (PPC)
relative price
trade adjustment assistance (TAA)
zero sum

Review Questions

3.1 Use the information in the following table on labor productivities in Italy and the United Kingdom to answer questions a through f.

Output per Hour Worked

	United Kingdom	Italy
Wine	8 units	12 units
Wool	9 units	10 units

a. Is there an absolute advantage or disadvantage here for the countries? Why?
b. What is the relative advantage, which provides scope for further specialization, for Italy and the United Kingdom?
c. What are the gains of the countries' specialization?
d. What is the opportunity cost of wine and wool?