Chapter

6 Tariffs

Topics to Be Covered

The Gains from Free Trade
Tariffs: An Introduction
Tariffs: An Economic Analysis
The Gains from Free Trade: One More Time
The Welfare Cost of Tariffs
Tariffs: Some Extensions

Key Words

Commercial policy
Tariff
Quota
Subsidy
Nontariff barriers
Static gains from trade
Dynamic gains from trade
Political gains from trade
Revenue effect
Protective effect
Most favored nation (MFN) status
Ad valorem tariff
Specific tariff
Compound tariff
Generalized system of preferences (GSP)
Consumer surplus
Producer surplus
Deadweight cost of the tariff
Optimal tariff
Trade (or tariff) war
Tariff escalation

So far in this textbook, we have focused our discussion on the causes and consequences of international trade. We have seen that international trade leads to the redistribution of production in an economy. It also affects the returns paid to factors of production. For both of these reasons, some individuals in every society favor government policies aimed at affecting the volume and composition

of international trade. In this chapter and the next three, we turn our attention to the role of government in the area of international trade.

Actions taken by a government to influence the volume and composition of trade flows (into or out of a country) are known as **commercial policy**. A government has a variety of options in conducting commercial policy. These options include **tariffs**, which are taxes on imports and/or exports; **quotas**, which are government-imposed limitations on the value or volume of imports or exports; **subsidies**, which are payments by a government to an industry to encourage exports or discourage imports; and **nontariff barriers**, which include a variety of government policies or regulations, such as health and safety standards, or government procurement policies that affect trade flows.

Commercial policy
Actions taken by a government to influence the quantity and composition of that country's international trade.

Tariff
A tax imposed by a government on either exports or imports.

Quota
A government-mandated limitation on either the quantity or value of trade in a product.

Subsidy
A government payment to an industry based upon the amount it engages in international trade.

Nontariff barriers
A wide range of government policies other than tariffs designed to affect the volume or composition of a country's international trade.

Static gains from trade
Increases in economic well-being, holding resources and technology constant, that accrue to a country engaging in international trade.

The next four chapters of this text provide an in-depth discussion of various forms of commercial policy. This chapter is largely devoted to a theoretical analysis of tariffs. In Chapter 7 we turn our attention to other forms of trade policy. Then, in Chapter 8, we discuss the commercial policy practices of the United States and other countries as well as various national and international initiatives to set rules on the conduct of commercial policy. Finally, in Chapter 9, we describe the formation of various regional trading blocs, such as the European Union and the North American Free Trade Area, and analyze some of the effects these agreements have on member as well as nonmember countries.

Before we begin our analysis of commercial policy, however, it is useful to return one last time to our general equilibrium model of trade to review the benefits from free-trade policies. By focusing on these benefits, we establish a basis for comparison with the benefits accruing to a country that uses commercial policies to distort trade flows.

THE GAINS FROM FREE TRADE

When a country opens its markets to free international trade, it benefits in several ways. First, it enjoys **static gains from trade**. These gains are illustrated in Figure 6.1. There we depict a country in free-trade equilibrium. Point A in the diagram is the autarky equilibrium point. If we let p_F be the free-trade international price, then we know that trade will lead to a change in both consumption and production activities within the country. In particular, consumption moves to point C, while production moves to point X. Our argument is that this is beneficial because the bundle of goods denoted by point C could never have been purchased and enjoyed in the absence of trade.

This gain to the economy can be divided into two parts: consumption gains and production gains. Beginning again in autarky at point A, suppose we open the economy up to free trade. Suppose the economy is allowed to trade at the free trade price p_F, but production is not allowed to move. Will the country be better off? The answer is yes. In the figure, we have shown this situation by drawing a price line with slope p_F through point A. Even though production remains fixed, the opportunity to trade at world prices leads the consumption point to move off the PPF to point B.* Using the CICs as indicators of community welfare, the movement to a higher CIC illustrates static consumption gains—the one-time gains from the shift from autarky to trading at world prices.

Once resources are allowed to move away from point A, the economy accrues further economic gains. These gains are reflected in the movement of the consumption point from B to C and, in terms of community welfare, from CIC_1 to CIC_2. These gains come about because productive resources are channeled into the economy's comparative-advantage industries; and because of this redistribution of resources, overall output (GNP) rises. Hence, this second increase in welfare is known as *the static production gains from trade.*

* How do we know that consumption will move up the price line from point A to point B rather than down the price line to some point, such as D, once the price changes? The answer is simple: If point D were preferable to point A, then, because the point lies inside the PPF, the economy could choose to be at that point in the absence of trade. The fact that it does not in autarky argues that it will not move there given the opportunity instead to trade.

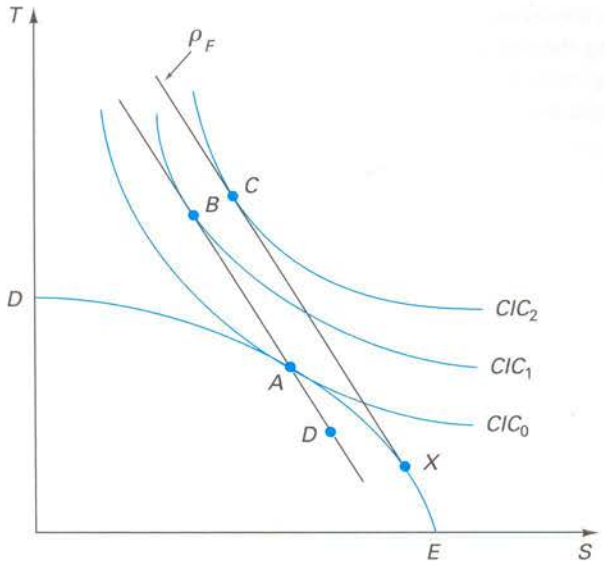

FIGURE 6.1 The Gains from Free Trade

Free trade also leads to **dynamic gains**. These refer to the relationship between trade and economic growth. An economy grows over time either because it experiences increases in its stock of productive factors or because a technological innovation helps a country's existing stock of factors become more efficient. In terms of our model, economic growth refers to an outward shift in a nation's PPF. International trade is related to economic growth in several ways.*

Dynamic gains from trade

Increases in economic well-being that accrue to an economy because trade expands the resources of a country or induces increases in the productivity of existing resources.

First, trade need not be restricted to trade in final-consumption goods. In fact, as we saw from the data in Table 1.3, the vast bulk of international trade consists of trade in raw materials and intermediate products. There is also considerable trade in capital goods. In effect, when a country imports capital goods in exchange for consumer goods, its productive capacity increases; and once capital is put in place, the country is able to produce more of all goods. To the extent that capital-goods imports lead to a higher overall capital stock than would have occurred in autarky, trade increases the overall rate of growth of the economy.†

Second, international trade may enhance the international diffusion of technological advance. Ideas developed in one country for increasing the efficiency of productive activity can be (and often are) licensed to firms in other countries. Through this process, technology is transferred from country to country. In the absence of international trade, such transfers would not take place, and economic growth would be slower.

Third, international trade is pro-competitive. That is, once a country opens to trade, local monopolies lose their power over local markets. This creates dynamic gains for two reasons. Greater competition encourages more efficient production, as the discrepancy between price and marginal cost is closed. In addition, as competition destroys industry rents, fewer resources are devoted to wasteful rent-seeking behavior.

Fourth, if economies of scale in production exist, then dynamic gains from international trade accrue because trade expands the size of the market. As the market expands, industries

* For a survey of the literature on dynamic gains, see U.S. International Trade Commission, *The Dynamic Effects of Trade Liberalization: A Survey* (Washington, D.C.: Government Printing Office, February 1993).

† Richard Baldwin provides a technique for measuring the size of this effect. He finds that the dynamic gains from the Europe 1992 initiative were almost as large as the static gains. See Richard Baldwin, "Measurable Dynamic Gains from Trade," *Journal of Political Economy* (1992).

are able to move farther down their average-cost curves, bringing down prices in the process. Moreover, expanding the size of the market may encourage industries to step up investments in research and development, since they can spread the costs of these investments over larger levels of output. These investments could, in turn, raise the overall level of technology of the country.

Finally, international trade can enlarge the pool of savings that is available to fund investment purchases. This can occur in several ways. We have seen that trade raises the real income of a country above the level that would exist in autarky. There is considerable evidence to support the hypothesis that higher levels of national income lead to higher levels of savings. Hence, trade increases the amount of national savings relative to that which would be found in autarky, and this higher level of savings leads to a greater availability of funds to finance investment spending.

Alternatively, international trade may allow a country to borrow savings from other countries. Consider a situation where a country imports more goods than it exports. Under these circumstances, the country is taking in funds from the rest of the world because its export receipts fall short of its expenditures on imports. These funds can be used to finance capital-goods imports.

In sum, a country that engages in international trade enjoys benefits both in terms of immediate improvements in standard of living and in terms of economic growth. The standard of living that is achieved surpasses that which would be available to a competitive economy that operates in autarky. In addition to economic gains from trade, a nation that trades may enjoy **political gains**. These come about because of the likelihood that as countries become more economically interdependent, they are less likely to revert to hostile actions among themselves.

Political gains from trade

Increases in economic well-being that accrue to a country because expanded trade and economic interdependency may increase the likelihood of reduced international hostility.

Despite these obvious benefits, countries apply a variety of measures aimed at altering the amount of trade from the free-trade level. Perhaps the most common method used for distorting trade is the tariff. This is a government-imposed tax on trade flows. Why do countries ignore the obvious benefits of free-trade policies? How do tariffs affect the level of trade and economic welfare of a country? The remainder of this chapter considers answers to these questions.

TARIFFS: AN INTRODUCTION

A tariff is a tax that is imposed by a government on imports or exports. Such taxes are extremely common throughout the world. They also have a long history. Virtually every country of the world imposes tariffs on at least some products. The United States has tariffs on a wide variety of imported items. It does not, however, impose tariffs on exports. This practice was forbidden in the original articles of the Constitution. (See Chapter 8 for a more complete discussion of the history of U.S. tariff policy.) Many countries do put a tax on their exports, such as Argentina on soybeans.

As we are about to demonstrate, tariffs have several effects on the economy where they are imposed. For instance, tariffs have a **revenue effect**. That is, they are a mechanism for raising government revenue. Tariffs also have a **protective effect**. Consider an import tariff. Since the tariff is applied only on imported products, foreign producers incur a cost not borne by domestic competitors. And to the extent that foreign producers pass on these higher costs to local consumers in the form of higher prices, domestic producers of similar products may find it easier to compete against their foreign rivals. Because tariffs typically provide this protective effect, advocates of tariffs, and for that matter other forms of trade barriers, are often described as *protectionists*.

Revenue effect

The amount of revenue accruing to a government from a tariff.

Protective effect

The amount by which domestic producers are able to expand their output because a tariff is in place.

Generally, both the revenue and the protective effects of a tariff will operate at the same time. However, there are special cases when only one of these effects is present. For instance, a tariff that is imposed on an imported good when no domestic producer of the same type of good exists would be a pure revenue tariff. A prohibitive tariff is one that is so high that no goods are imported and thus is an example of a purely protective tariff—in such a circumstance no government revenue is collected.

Governments in developed economies rarely, if ever, rely on tariffs as a major source of government revenue.* Consequently, it is difficult to point to an example of a pure revenue tariff collected by the United States or other major industrialized economies. On the other hand, the governments in developing economies depend heavily on trade taxes as a source of revenue. There, examples of pure revenue tariffs abound. Tariffs in developed economies primarily exist because of their protective effect.

To get a better feel for what tariffs are like, consider Table 6.1. There we reproduce one page from the 2012 U.S. tariff schedule. There are many things to note about the information

TABLE 6.1 Sample Page from the Harmonized Tariff Schedule of the United States (2012)

			Rates of Duty		
			1		2
Heading/ Subheading	**Article Description**	**Unit of Quantity**	**General**	**Special**	
2008 (con.)	Fruit, nuts, and other edible parts of plants, otherwise prepared or preserved, whether or not containing added sugar or other sweetening matter or spirit, not elsewhere specified or included (con.):				
2008.40.00	Pears		15.3%	Free (A, CA, D, E, IL, J, JO, MX, P,PE,SG) 4.5% (BH) 9.1%(OM)	35%
	In other containers each holding less than 1.4 kg	kg			
	Other	kg			
2008.50	Apricots:				
2008.50.20	Pulp	kg	10%	Free (A, BH, CA, CL, E, IL, J, JO, MA, MX, OM, P, PE, SG) 5.5% (AU)	35%
2008.50.40	Other	kg	29.8%	Free (A, CA, E, IL, J, JO, MX, P,PE) 2.9% (SG) 8.9% (BH) 17.8%(OM)	35%
2008.60.00	Cherries		6.9¢/kg + 4.5%	Free (A, BH, CA, CL, D, E, IL, J, JO, MA, MX, OM, P, PE, SG) 1.3¢/kg + 0.9% (AU)	21¢/kg + 40%
	Maraschino	kg			
	Other:				
	Sweet varieties	kg			
	Tart varieties	kg			

(Continued)

* For instance, U.S. tariff revenue accounts for less than 2 percent of federal government revenue. Similar ratios apply for other industrial countries. In developing countries, the proportions tend to be much higher. See Table 7.4.

TABLE 6.1 Continued

Heading/ Subheading	Article Description	Unit of Quantity	Rates of Duty 1 General	1 Special	2
2008.70	Peaches, including nectarines:				
2008.70.10	Nectarines		16%	Free (A, CA, D, E, IL, J, JO, MX, P,PE,SG) 4.8% (BH) 8.8% (AU) 8% (CL) 9.6%(OM)	35%
	In containers each holding less than 1.4 kg	kg			
	Other	kg			
2008.70.20	Other peaches		17%	Free (A, CA, E, IL, J, JO, MX, P,PE,SG) 5.1% (BH) 8.5% (CL) 10.2%(OM)	35%
	In containers each holding less than 1.4 kg	kg			
	Other	kg			
2008.80.00	Strawberries	kg	11.9%	Free (A,BH,CA,CL, D, E, IL, J, JO,MA, MX, P,PE,SG) 2.3% (AU) 2.3%(OM)	35%
2008.91.00	Palm hearts	kg	0.9%	Free (A, AU, BH, CA, CL, E, IL, J, JO, MA, MX,OM, P, PE,SG)	35%
2008.92	Mixtures:				
2008.92.10	In airtight containers and not containing apricots, citrus fruits, peaches or pears		5.6%	Free (A, BH, CA,D E, IL, J, JO, MA, MX, OM, P,PE,SG) 0.5%(CL) 1.1%(AU)	35%
	Prepared cereal products	kg			
	Other	kg			
2008.92.90	Other		14.9%	Free (A, BH,CA, E, IL, J, JO, MX, P,PE,SG) 8.9%(OM)	35%

in this table. First, the table is highly specific. The items from this page refer to prepared or preserved fruits, including cherries, peaches, and strawberries. As a whole, the tariff schedule lists tariffs for virtually every imaginable manufactured good, including fireworks, bicycle speedometers, blank cassette tapes, computer chips, compact disks, T-shirts, and so on. It totals more than 3,000 pages in length.*

Next, note that for every product there are three possible tariffs. The first column, known as *Column 1 General Rates of Duty,* is the duty category most commonly utilized by customs officials. Tariffs from this category are applied to goods from countries to which the United States has granted **most favored nation (MFN) status**. If the United States (or any other country) grants another country MFN status, it agrees to charge tariffs against that country's goods that are no higher than those imposed against the goods of any other country.†

Most favored nation (MFN) status

A country confers MFN status upon another country by agreeing not to charge tariffs on that country's goods that are any higher than those it imposes on the goods of any other country.

Now, consider the numbers in this column of tariffs. These rates illustrate the ways in which tariffs are calculated. For instance, tariffs may be **ad valorem**, which means that the tax is collected as a percentage of the value of the product. Most of the U.S. tariff code is expressed in ad valorem terms. For example, the MFN U.S. tariff rate on imported peach preserves is 17 percent, but the MFN rate on prepared palm hearts is only 0.9 percent. This illustrates the point we made earlier. Imported peach products compete with many domestic varieties. The tariff on these products is relatively high. Few American food processors produce canned palm hearts, and the tariff on these products is almost zero.

Ad valorem tariff

A trade tax equal to a given percentage of the selling price.

Tariffs may be **specific**. That is, the tariff may be a fixed amount of money per unit of goods traded—regardless of the value of an individual unit. Finally, tariffs may be **compound**. Such tariffs have both specific and ad valorem components. In the table, processed cherry products are protected by a compound tariff of 6.9¢ per kilogram (specific) plus 4.5 percent of the product price (ad valorem).

Specific tariff

A trade tax equal to a fixed amount of money per unit imported.

Compound tariff

A trade tax that has both a specific and an ad valorem component.

Countries that have not been granted MFN status are charged tariffs based on *Column 2 Rates of Duty.* As the numbers in the table indicate, these rates are substantially higher (sometimes 200 or 300 percent higher) than MFN rates.‡ For instance, the non-MFN tariff on processed strawberry products is 35 percent, almost three times the MFN rate.

The third set of rates, known as *Column 1 Special Rates of Duty,* are tariffs, even lower than MFN rates, that are applied to certain products from many developing countries or to products from countries with whom the United States has negotiated special trade agreements. An example of the first is the **generalized system of preferences (GSP)**, which was instituted by the United States in the early 1970s. Other industrialized countries, including Canada, the European Union (EU), and Japan, have their own GSP programs, many instituted about the same time or before the date of the U.S. plan.** The idea behind the GSP is that by charging lower tariffs on goods from developing countries, importers in the preference-granting countries such as the United States will have an incentive to expand their purchases from the preference-receiving countries. In turn, expanded exports should improve the standards of living for these countries (and raise the demand for imports from industrialized countries such as the United States!). In the table, the letter A in parentheses indicates the GSP rate. Another of the U.S. trade assistance programs is the Caribbean Basin Initiative (CBI), which was begun in the 1980s. This program applies low tariffs on certain goods coming from most nations of the Caribbean Basin. In the table, CBI rates are identified with the letter E in parentheses. For instance, processed peach

Generalized system of preferences (GSP)

A system in which industrialized countries charge preferential lower tariff rates on goods from certain developing countries.

* The U.S. tariff schedule is available online at http://www.usitc.gov/publications/docs/tata/hts/bychapter/1200htsa.pdf.

† The U.S. government now uses the term *permanent normal trade relations* (*PNTR*) to denote most favored nation status.

‡ In fact, the Column 2 rates often correspond to the tariff rates as enacted in the Smoot-Hawley tariff of 1930. In 2012, countries without U.S.-granted MFN status were Cuba and North Korea. For more on the Smoot-Hawley tariff see Global Insights 6.3 and the discussion in Chapter 8.

** Because these tariff concessions are aimed at promoting economic development, the various countries involved have agreed that the concessions do not violate MFN treatment.

products from CBI-eligible countries are allowed into the United States duty free. A third trade assistance program is the Andean Trade Preference Act (ATPA), begun in 1991. This program provides Bolivia, Colombia, Ecuador, and Peru tariff-free access to U.S. markets for many goods. The purpose of the program is to provide economic alternatives to drug-crop production. ATPA rates are identified with the letter J in parentheses. The most recent assistance program is the African Growth and Opportunity Act (AGOA), signed into law in 2000. The program offers trade incentives for African countries to continue their efforts to open their economies and build free markets. AGOA rates are identified with the letter D.

In addition to special tariffs applied to goods from developing countries, the United States grants tariff concessions to countries with which it has negotiated preferential trade agreements. In mid-2008, the United States had agreements in place with Canada and Mexico (NAFTA), Australia, Bahrain, Chile, Israel, Jordan, Morocco, Oman, Peru, Singapore, and with five Central American countries, Costa Rica, Dominican Republic, El Salvador, Honduras, and Nicaragua. These agreements provide for free trade among the signing countries, but with some tariffs going to zero only after a considerable phasing-in period. Examples of rates applied to these countries are identified in Table 6.1 with the letters AU for Australia, BH for Bahrain, CL for Chile, IL for Israel, JO for Jordan, MA for Morocco, OM for Oman, PE for Peru, SG for Singapore, CA for Canada, MX for Mexico, and P for Central America.

Before we move on, a word of caution is in order. The tariff rates listed in Table 6.1 are relatively high by U.S. standards. For many manufactured goods—for instance, most semiconductors and computers—U.S. MFN tariffs are zero. As we discuss further below, the average U.S. tariff is less than 5 percent.

TARIFFS: AN ECONOMIC ANALYSIS

To analyze the economic impact of commercial policies including tariffs, it is necessary to develop some new tools of analysis. In particular, we are going to leave our general equilibrium framework to concentrate on the market for a specific product. To avoid confusion with our earlier notation, let's consider the market for grapes (G) in country A. In Figure 6.2 we illustrate the demand curve for grapes (labeled D_G). This curve is the sum of individual demand curves for all the residents of country A. It tells us the maximum amount that people in A would be willing to pay for a given quantity of grapes (good G). For instance, if a monopolist controlled the supply of grapes in A and could sell his or her product 1 unit at a time to the highest bidder, he or she could receive P_1 for the first unit sold, P_2 for the second unit sold, and so on. It is seldom the case, however, that products are sold in such a fashion. Rather, one price exists in the market so that all individuals pay the same, even if some were willing to pay more.

Consider Figure 6.2 again. Suppose that P is the market price. The quantity purchased in the market would be Q units. Total expenditure (price times quantity) would be represented by the rectangle $0PAQ$. If, on the other hand, there had been a monopolist selling each unit for what the market would bear, the amount spent on grapes would have been the entire area under the demand curve up to Q units. The difference between what individuals would be willing to pay and the amount that they actually pay is known as **consumer surplus**. In the diagram it is the shaded triangle whose base begins at the market price.

Consumer surplus
The difference between the amount consumers are willing to pay to purchase a given quantity of goods and the amount they have to pay to purchase those goods.

Consumer surplus has an important and useful interpretation. It represents the amount of money people would have been willing to spend but did not have to spend to purchase a particular product. Thus, it provides us with a convenient measure of the gains to consumers from being able to transact in markets. Note that consumer surplus varies inversely with price. That is, if the market price of grapes were to rise to P', consumer surplus would fall. Lower market prices increase the amount of consumer surplus.

Let us turn our attention now to the other side of the market—producers. Consider Figure 6.3. There, we illustrate the market supply curve for domestic producers (labeled S_G).

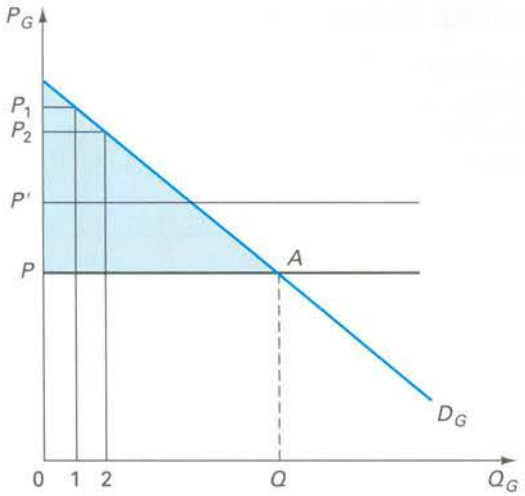

FIGURE 6.2 Consumer Surplus

This curve tells us the minimum amount of money producers would accept to place a given quantity of grapes on the market. For instance, to sell 1 unit the market price must be at least P_0. Again, suppose that the market price is P. If so, then for all units supplied to the market up to Q, the industry receives a price in excess of the minimum required to produce and market those units. The difference between what the industry receives and that minimum amount is known as **producer surplus** (shown in the graph as the shaded area). Producer surplus can also be thought of as profits plus revenue to cover the fixed costs of production. This is true because the height of the supply curve at any level of output tells us the additional (or marginal) cost to producers of making that unit. As such, it is the variable cost of that unit. In the graph, the area under the supply curve up to point Q represents total variable costs, while that area plus the shaded area represents total revenue. Thus, the shaded area is the difference between total revenue and total variable costs, or total fixed costs plus short-run profits.

Producer surplus

The difference between the price paid in the market for a good and the minimum price required by an industry to produce and market that good.

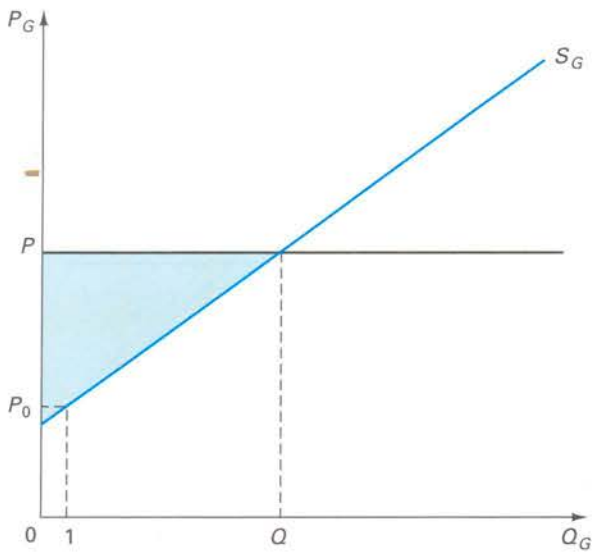

FIGURE 6.3 Producer Surplus

THE GAINS FROM FREE TRADE: ONE MORE TIME

Consumer surplus and producer surplus are tools that can be used to analyze economic policy. To illustrate that fact, let us return to a discussion of the static benefits of free trade. Let's continue to consider the market for grapes. Figure 6.4 illustrates this market for an individual country—say, country A. In autarky equilibrium, the price of grapes would be P_A, and the quantity produced would be Q_A.

Now, suppose we introduce international trade into this model. Suppose further that country A is economically small. This means that once international trade begins, consumers in A (as a group) can buy all of the grapes they want in world markets without affecting the world price. In other words, we are treating A (for the time being) as a price taker in the world market, just as an individual is in the grocery store. That is, no matter how much A's consumers choose to purchase, their decision has no bearing on the world price. Finally, we assume that the world price of grapes, P_W, is lower than P_A.

Once country A is exposed to trade, the price of grapes in A will fall to P_W. This will cause consumption to expand to Q_2 and domestic production to fall to Q_1. The difference between domestic consumption and domestic production will comprise imports.

What are the economic impacts of these changes in the grape market in country A? Clearly, consumers are better off. They are able to purchase this product at a lower price than in autarky, and they respond by purchasing more. Domestic producers are worse off. The lower price leads some suppliers to reduce the quantity supplied and others to drop out of the market.

Given that some in the economy are better off than before and some are worse off, how do we evaluate this move to free trade? The answer is through the use of producer and consumer surplus. Changes in producer surplus tell us *in dollar terms* how the fortunes of suppliers have changed. Changes in consumer surplus tell us *in dollar terms* how much consumers have benefited or lost. To analyze this or any other policy that affects the economy, the two surpluses are compared, on an equal dollar basis. That is, it is assumed that a dollar of consumer surplus has equal welfare weight to a dollar of producer surplus.

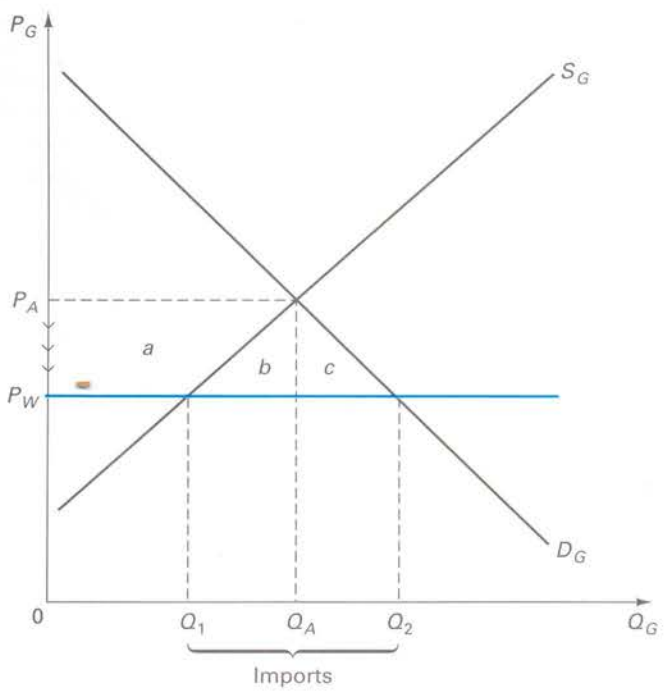

FIGURE 6.4 The Gains from Free Trade (Imports Side)

TABLE 6.2 Summary of the Welfare Effects in the Import Market of a Move to Free Trade

Change in consumer surplus	$a	+$b	+$c
Change in producer surplus	−$a		
NET WELFARE CHANGE		$b	+$c

Let us attempt such an exercise for the situation presented in Figure 6.4. Beginning from the autarky equilibrium, the move to free trade expands consumer surplus by the sum of the areas denoted by the letters *a*, *b*, and *c*. Producer surplus falls in the economy by the area represented by the letter *a*. The net effect of free trade in this instance is for welfare to rise by $+\$(b + c)$. These results are summarized in Table 6.2.

The preceding example shows the effect of free trade on the market for an importable. Let us now describe how this analysis would apply in the market for an exportable. Consider Figure 6.5. Suppose this represents the market for honey (H). In autarky, the price of H is determined solely by internal supply and demand, and consequently would equal P'_A. Suppose that the world price of H is equal to P'_W. Then, after international trade is introduced, domestic suppliers would move to expand output in response to the now higher price. At the same time, the domestic quantity demanded would fall. The new quantity supplied would be Q_4, while the new quantity demanded would be Q_3 units. The difference represents exports of H to the rest of the world.

Let's analyze the welfare implications of this scenario. Because the price has increased, consumer surplus falls. The total change in consumer surplus would be $-\$(e + f)$. The higher price, however, raises producer surplus. The increase is equal to $+\$(e + f + g)$. The net impact, then, in this market is for national welfare to rise by $+\$g$. These results are summarized in Table 6.3.

The fact that international trade produces national welfare gains in both the import market and the export market is important. It suggests, in no uncertain terms, that *free trade is better for*

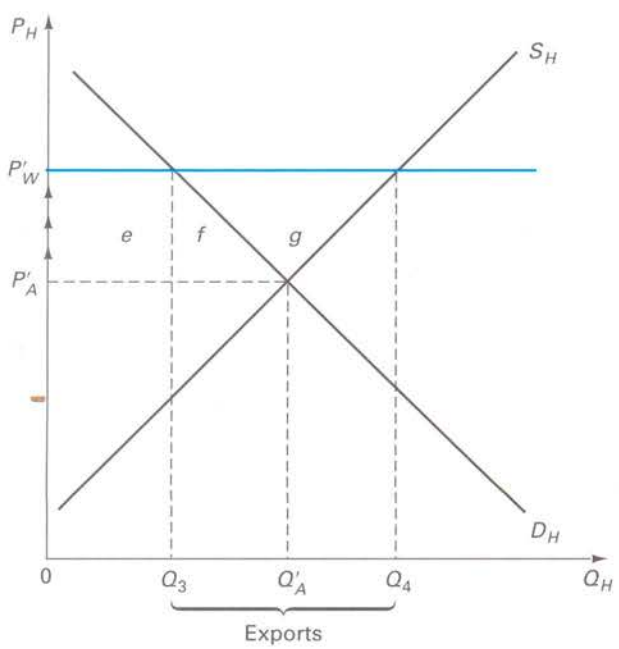

FIGURE 6.5 The Gains from Free Trade (Exports Side)

TABLE 6.3 Summary of the Welfare Effects in the Export Market of a Move to Free Trade

Change in consumer surplus	$-\$e$	$-\$f$	
Change in producer surplus	$+\$e$	$+\$f$	$+\$g$
NET WELFARE CHANGE			$\$g$

country A *than autarky.* The sum of the gains in the two markets, areas $+\$(b + c)$ in Figure 6.4 plus $\$g$ in Figure 6.5, is analytically equivalent to the movement to a higher CIC brought about by free international trade, illustrated in Figure 6.1. Now, note that we have shown that it is better for A to import G and export H than it is for A to remain in autarky. Clearly, since country B is on the opposite side of these transactions, B must also be better off from trading than from remaining in autarky.

THE WELFARE COST OF TARIFFS

Now, let's use the tools we have just developed to analyze the impact of a tariff. We'll consider the imposition of a specific tariff of t dollars on imports. Consider Figure 6.6. We illustrate again the domestic market for grapes. Suppose the government of A imposes a tariff on imports of grapes of t dollars. Because A is assumed to be a small country, nothing it can do will affect the world price of grapes. Consequently, the price A's consumers must pay for grapes rises by the full amount of the tariff, from P_W to $P_W + t$. These two prices are illustrated in the diagram.

Let's consider the effect of the tariff on production and consumption. Under free trade, domestic production was Q_1 units, while consumption was Q_2 units. Imports represented the difference between these two amounts. After the tariff, production rises from Q_1 to Q_3 units (note arrow). Why? Consider again the effect of the tariff on price. Once the tariff is imposed, it is passed through to the economy in the form of higher prices for the foreign product. Since domestic producers are selling an identical product, they find it in their interests to raise their

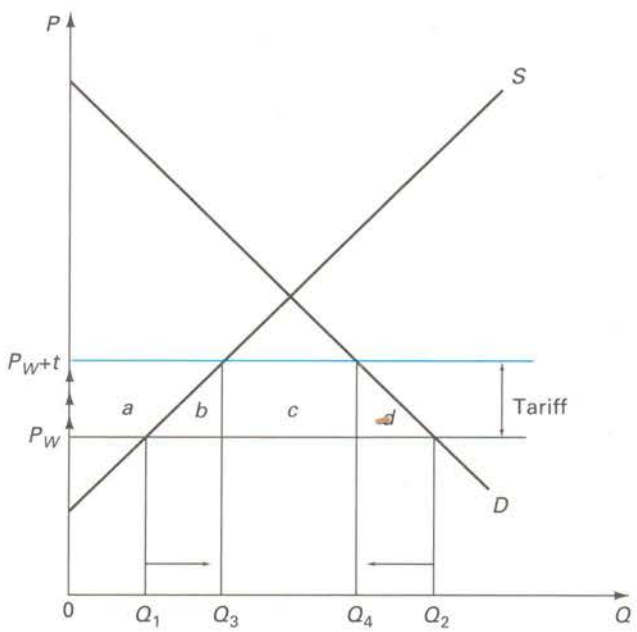

FIGURE 6.6 The Effect of an Import Tariff

prices as well; and with higher prices, marginal domestic producers who had previously found it unprofitable now enter the market.

Total consumption of grapes falls. This is due, of course, to the higher price consumers must pay for the product. With higher prices in this market, some consumers choose to switch their consumption to other products. Hence, quantity demanded falls from Q_2 to Q_4 (note arrow).

As the previous discussion has just explained and as the arrows depict in the diagram, the tariff causes a reduction in imports for two reasons. First, domestic output expands. Second, domestic consumption falls. The size of the first effect depends upon the slope (or elasticity) of the domestic supply curve. The amount of the latter depends upon the slope (or elasticity) of domestic demand. Hence, because different goods have different demand and supply characteristics, a given percentage tariff will have different effects on imports of different types of goods.

Let us turn now to the welfare cost of the tariff. Consider again Figure 6.6. Because of the imposition of the tariff, consumers must pay a higher price for the grapes they consume. This implies a loss of consumer surplus. How much is lost? Consumers lose the area under the demand curve that lies between the two price lines. In other words, they lose $\$a + \$b + \$c + \$d$. Domestic producers gain with the tariff. Their profits rise by $\$a$.

Who else gains or loses? Clearly, because the domestic government has found a new source of revenue, it gains. How much does it collect? The answer is $\$c$. Why? Consider again the diagram. The government collects $\$t$ per unit of imports. The base of area c is equal to the level of imports when the tariff is in place. The side of area c is equal to the tariff. Consequently, area c is equal to tariff proceeds. If we assume that the government of country A redistributes the tariffs it collects to the economy, then the tariff revenues represent an internal transfer of income and are not lost to the economy. Thus, in our analysis of welfare we shall treat increases (or decreases) in government revenue as having equal welfare weight for the economy as increases (or decreases) in consumer or producer surplus. The net result of the tariff is that consumers lose $\$a + \$b + \$c + \$d$; domestic producers gain $\$a$; and domestic government gains $\$c$. Netting out these changes, we see that the economy *as a whole* has lost $\$(b + d)$. This result is summarized in Table 6.4. What does it mean for an economy to lose $\$(b + d)$? How should this loss be interpreted?

The amount $\$(b + d)$ is known as the **deadweight cost of the tariff**. This, in effect, is the cost to society of imposing the tariff. And, perhaps surprisingly, it is an amount that goes to no one. It is economic waste. To see what we mean by this statement, consider Figure 6.7. There, we reproduce the information given in Figure 6.6 and add some additional notation. Area b (or, equivalently, $\$b$) is known as the *production* deadweight cost of the tariff. This amount represents the value of resources required to increase domestic output from Q_1 to Q_3, in excess of what those units could be purchased for in the world market. How do we know this? Examine the graph carefully. We have already established that, because of the tariff, profits to domestic industry will rise by $\$a$. In Figure 6.7 this amount is decomposed into two parts. Area a_1 represents the increased profits on units the industry would have sold even under free trade. That is, with free trade, domestic sales would be Q_1 units, each selling for P_W. With the tariff, each of those units now sells for $P_W + t$.

Deadweight cost of the tariff

Value of wasted resources devoted to expanded domestic production plus the value of lost satisfaction due to expenditures devoted to less-desired substitutes brought about by a tariff.

As we have already noted, the protective effect of the tariff allows the domestic industry to expand its production above free trade levels. This represents a second source of expanded profits to the domestic industry. Sales revenue rises by the amount equal to the

TABLE 6.4 Welfare Cost of a Tariff Imposed by a Small Country

Change in consumer surplus	$-\$a$	$-\$b$	$-\$c$	$-\$d$
Change in producer surplus	$\$a$			
Change in government revenue			$\$c$	
NET WELFARE CHANGE		$-\$b$		$-\$d$

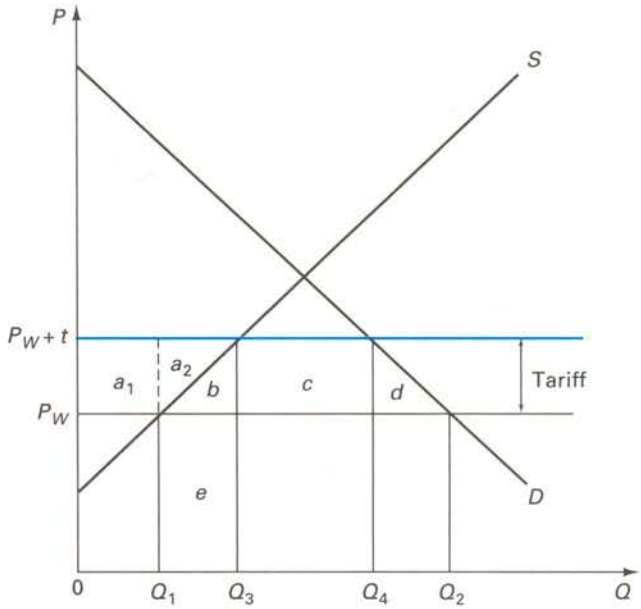

FIGURE 6.7 Deadweight Cost of the Tariff

increase in production (Q_1Q_3 units) times the price for each unit ($P_W + t$ dollars), or, as labeled in the figure, $\$a_2 + \$b + \$c$. As we have already illustrated, $\$a_2$ is the producer surplus on the expanded output. The cost of the resources required to produce that output is given by areas $b + e$. Without the tariff, those units could have been purchased in the world market for $\$e$. Hence, $\$b$ represents the cost of devoting resources to expanding production in the higher-cost domestic industry rather than having those units provided by a lower-cost foreign producer.

Area d is the *consumption* deadweight cost of the tariff. This amount represents the value of lost consumer satisfaction due to a shift in consumption to less-desired substitutes brought on by the higher price. That is, before the tax, consumers purchased Q_2 units. After the tax, consumption falls to Q_4 units. Consumers lose $\$a + \$b + \$c$ because the amount they now buy costs them more. They lose an additional $\$d$ because their consumption of this product has declined and they shift their purchases to other products. How do we know that consumers are worse off because of this latter effect? The answer is that if Q_4 had been the preferred amount prior to the tariff, consumers could have afforded to buy that many units. In fact, they chose to buy more. Thus, the change in consumption behavior brought on by the tax is the second component of the deadweight cost of the tariff.

In presenting our analysis of the economic costs of tariffs, we have focused on a perfectly competitive market where imports can be purchased in unlimited amounts at constant prices. In such markets, it is easy to carry out the welfare calculations conforming to those illustrated in the diagram. Consider area b. From geometry, we know that the area of a triangle is given by the formula 1/2 × base × height. The height of the triangle is equal to the size of the tariff, and the base of the triangle is equal to the expansion in domestic production brought about because of the tariff. Similarly, the area of triangle d is given by 1/2 × the tariff (height) × the change in domestic consumption brought about by the tariff (base). Since the reduction in imports is given by the sum of the change in domestic production (Q_1 to Q_3) and the change in consumption (Q_2 to Q_4), the total deadweight cost of the tariff is simply 1/2 × tariff × reduction in imports.*

* Note that this formula is valid only in the case where demand and supply curves are linear.

Calculation of the welfare effects of tariffs or their removal has become a commonplace activity of trade economists. The formula just described is one of several procedures used by economists both within and outside the government to calculate the economic costs of tariffs. Global Insights 6.1 presents estimates of the welfare impact of tariff protection on certain U.S. industries.*

TARIFFS: SOME EXTENSIONS

The analysis presented so far has relied on rather strict assumptions about the type of goods receiving protection and the size of the country imposing the tariff. In this section, we explore some issues that emerge when we relax these strict assumptions.

Export Tariff

As noted in the introduction to this chapter, some countries impose tariffs on some of their exports. Suppose, for instance, country A imposes an export tariff of z dollars per bushel on its exports of corn. To see what impact such an export tariff might have, consider Figure 6.8. Because we continue to assume that A is a small country, nothing it does has any impact on the world price of corn, P_W. However, if farmers in A continue to export corn, the price they receive for their product falls by z dollars, and this price, $P_W - z$, becomes the domestic price. These two prices are illustrated in the diagram.

Consider first the situation under free trade. At a price of P_W, domestic production would be Q_2 bushels, and domestic consumption would be Q_1 bushels. The difference between these two amounts represents the level of corn exports to the rest of the world. Consider now the impact of

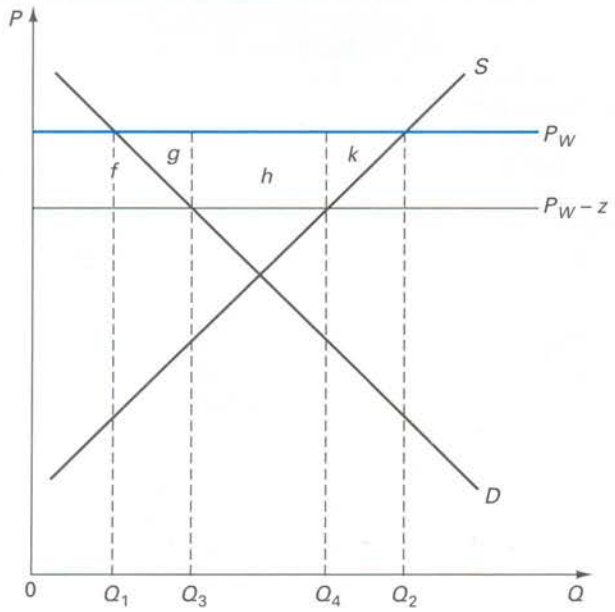

FIGURE 6.8 The Effect of an Export Tariff

* For some additional welfare estimates, see Robert Baldwin, Jack Mutti, and David Richardson, "Welfare Effects on the United States of a Significant Multilateral Tariff Reduction," *Journal of International Economics* (1980); Stephen Magee, "The Welfare Effects of Restrictions on U.S. Trade," *Brookings Papers on Economic Activity* (1972); and David Tarr and Morris Morkre, *Aggregate Costs to the United States of Tariffs and Quotas on Imports: General Tariff Cuts and Removal of Quotas on Automobiles, Steel, Sugar, and Textiles* (Washington, D.C.: U.S. Federal Trade Commission, 1984), United States International Trade Commission, *Economic Effects of Significant U.S. Import Restraints: Seventh Update* (Washington, D.C.: USITC, 2011) http://www.usitc.gov/publications/332/pub4253.pdf.

TABLE 6.5 Welfare Cost of an Export Tariff Imposed by a Small Country

Change in consumer surplus	$f			
Change in producer surplus	−$f	−$g	−$h	−$k
Change in government revenue			$h	
NET WELFARE CHANGE		−$g		−$k

the tariff. Inside country A, the price of corn falls to $P_W - z$. This causes domestic production to fall from Q_2 bushels to Q_4 bushels and domestic consumption to rise from Q_1 to Q_3 (note arrows). Because of these changes, the quantity of exports falls to Q_3Q_4 units. As was the case of import tariffs, the changes in production and consumption depend on the slopes of the supply and demand curves.

Let's turn now to the welfare impact of the tariff. Consider again Figure 6.8. Because of the export tariff, producers receive a lower price for their product, and profits must fall. In the diagram, producer surplus (i.e., profits) fall by $\$f + \$g + \$h + \$k$. A lower price at home means that consumers are better off. Consumer surplus rises by $\$f$. How much revenue does the government gain because of the tariff? The answer is $\$h$, determined by the per unit tariff of z dollars times the level of exports that prevail under the tariff. If we continue to assume that government redistributes its tariff revenue back to the economy, then the tariff represents an internal transfer. And, the deadweight cost of the tariff is given by $\$g + \$k$. This result is summarized in Table 6.5.

Global Insights 6.1

The Welfare Costs of Tariffs: Estimates from Certain U.S. Industries

Although current U.S. tariffs are quite low on average, tariffs remain high for some products. In 1994, Gary Hufbauer and Kimberly Ann Elliott from the Peterson Institute of International Economics (PIIE) published an analysis of the welfare costs of tariff protection in those industries where U.S. tariffs are especially high.* Some of their findings are presented in the table below. The information in the table includes consumer cost, the loss in consumer surplus due to the tariff (i.e., in terms of our analysis: $\$a + \$b + \$c + \$d$); producer gain, increased profits due to the tariff (i.e., $\$a$); and deadweight costs of the tariff (i.e., $\$b + \$d$). Also included in a table is a measure of the consumer cost per job "saved" because of the presence of the tariff.

The table shows that the consumer cost of protection, even on relatively small items in the total consumption basket of the U.S. economy, can be large. What is even more dramatic than the overall costs is the extraordinarily high cost imposed upon consumers in order to maintain employment levels in import-competing industries. This illustrates the relative inefficiency of a tariff as a job-creating policy measure.

The PIIE study was undertaken using U.S. industrial and tariff level data from the late 1980s. Since then, there have been significant changes in the structure of American manufacturing, and the United States has adopted the tariff reductions negotiated in the Uruguay Round. The U.S. International Trade Commission (USITC) has undertaken and then recently revised a study on the current welfare costs of remaining tariff and other trade barriers.† As it turns out, the industries identified in the PIIE study continue to benefit from significant tariff protection, and the USITC provides an updated analysis of cost to the United States of maintaining this protection. The USITC study uses a computer model of the entire U.S. economy; it then analyzes and projects what would happen to the U.S. economy by 2015 if these remaining tariffs had been removed in 2005. The findings it reports differ to some extent from the types of numbers found in the PIIE study. The following table provides a summary of some of the results.

Several things should be noticed about the results reported in this table. First, the average tariffs even for sectors identified as having high tariff protection are very low. None of

* Gary Clyde Hufbauer and Kimberly Ann Elliot, Measuring the Costs of Protection in the United States (Washington, D.C.: Institute for International Economics, 1994).

† U.S. International Trade Commission, *The Economic Effects of Significant U.S. Import Restraints* (Washington, D.C.: USITC, February 2011). Online at http://www.usitc.gov/publications/332/pub4253.pdf.

Industry	Tariff (percent)	Consumer Cost ($million)	Producer Gain ($million)	Consumer Cost per Job ($thousands)	Deadweight Cost ($million)
Rubber footwear	20.0	321.8	85.1	189.2	18.6
Women's shoes	10.0	581.7	108.3	157.2	17.0
Ceramic tiles	19.1	215.0	69.6	619.8	3.1
Luggage	16.3	326.4	24.8	1,444.3	40.2
Frozen orange juice concentrate	30.0	434.7	156.3	713.8	54.1
Glass and glassware	11.0	411.5	250.6	278.6	13.9
Chinaware	11.0	157.8	27.8	377.5	3.1
Women's purses	13.5	229.0	24.8	296.3	20.1
Costume jewelry	9.0	159.3	71.2	149.3	7.7

Source: Hufbauer and Elliott. Values in the table converted to 2005 dollars using the U.S. GDP deflator. Table constructed by the authors.

these tariffs exceeds 9.8 percent. This is because the tariff is calculated as the value of tariff revenue for that product as a percentage of the value of the imports of that product. As illustrated in Table 6.1, because of a variety of trade agreements currently in place, many goods that have relatively high nominal tariffs actually enter the United States duty free. This is true for the sectors in the table, where many statutory tariffs continue to be at levels of 20 percent or above.

Second, the sectors receiving high levels of tariff protection actually employ relatively few workers. At the end of 2011, about 11.8 million Americans held jobs in manufacturing. None of the sectors shown in the second table had an employment level equaling even 1 percent of that total. In addition, although the USITC study projects that due to technological advances, job numbers in these and many other sectors will continue to fall over time, the percentage changes in employment and output that would occur because of a hypothetical elimination of all tariffs would be very small.

Finally, although the welfare costs of continued tariffs at the industry level also are low for each of these industries, the cost per job protected continues to be very high. Again, the message is that tariffs are a very inefficient way to protect jobs.*

			Predicted Changes by 2015		
	U.S. Tariff (%)	2009 Levels Employment	Output (%)	Employment (%)	2005 Welfare Gain ($millions)
Ball and roller bearings	5.5	21,0047	–3.7	–3.7	5
Costume jewelry	5.8	817	–2.3	–2.3	12.0
Footwear & leather products	9.8	24,622	–1.6	–1.7	215
Ceramic tile	5.9	4,123	–4.4	–4.4	3
Hand tools	4.1	1,226	–0.2	–0.2	3
Glassware	3.8	3,715	–0.0	–0.0	–1
Pens and mech. pencils	4.7	99	–1.8	–1.7	8
China tableware	6.3	455	–4.0	–4.0	2

Source: USITC. Table constructed by the authors.

* Values for these costs are not reported in the table.

The deadweight costs of an export tariff have similar interpretations to those of an import tariff. Area *g* represents the consumption deadweight cost of the tariff. This is because the export tariff causes the domestic price to fall and consumption to expand beyond the levels found in free trade. The cost the economy incurs for this expanded consumption is $g, and this amount comes out of the pretariff level of profits in this industry. Area *k* represents the production deadweight cost of the tariff. This reflects the profits lost because production in the export sector falls from Q_4 units to Q_2 units. Because both of these amounts represent lost profits, it should be no surprise that in most cases, export tariffs are strongly opposed by business interests. Nonetheless, some countries continue to use them. Global Insights 6.2 discusses some recent real-world experiences with export tariffs.

Global Insights 6.2

Argentine Export Tariffs

Tariffs on exports are much less common in the world than are import tariffs. Countries sometimes rely on export tariff as a temporary measure to counter events in world markets. For instance, in 2007 and 2008 the world prices of a number of agricultural products rose dramatically. These price increases were due to a variety of factors including increased world demand from rapidly growing countries such as China, higher petroleum prices that raised the cost of distributing goods to individual markets, a worldwide move to produce products such as ethanol from corn and other grains, and major droughts in several food-producing countries. In response to these higher prices, a number of countries took measures to lower domestic prices for home consumers and/or to try to raise government revenue by taxing the higher profits being earned by commodity exporters.

India, the world's second largest exporter of rice, imposed an export tariff on basmati rice and banned the export of all other types of rice. Vietnam, Indonesia, Brazil, and Cambodia all announced temporary bans on rice exports. Russia announced an extension of extremely high export tariffs on wheat and barley. Malawi banned the export of maize to all countries except Zimbabwe. The stated goal of all these policies was to keep supplies of these products inside the respective countries to limit price increases. Whether or not these policies had that effect is open to debate, and most of these policies have since been reversed.

Since most of the policies described here involved export bans rather than taxes, government revenue appears to have been a secondary consideration. This was not true of Argentina. For most of the last decade, Argentina has relied extensively on export tariffs in order to generate government revenue. In 2002 the Argentine government imposed export tariffs on virtually all of its exports, and most of these tariffs continue to remain in place. In 2009, export tariff revenue equaled almost 16 percent of the total value of Argentine exports. Most of the products subject to the export tariffs are raw materials and agricultural products. Tariffs tend to be higher on basic commodities than on processed products. For instance, the tariff on soybean exports stands at 35 percent, while soybean meal and oil exports face a tariff of 32 percent. Sunflower seed exports are also taxed at a rate of 32 percent, while sunflower meal and oil exporters must pay a rate of 30 percent. Wheat exports are subject to a 23 percent tariff and corn exports face a 20 percent tariff. At the same time, biodiesel exports whose production relies on soybeans are charged a net 18.5 percent tariff. The pattern of higher export tariffs on raw materials and lower tariffs on processed products serves as a strong encouragement for the processing to be done inside Argentina. The Argentine government also states that it uses the proceeds from the tariffs to support programs for the urban poor and to keep food prices low.

Not surprisingly, Argentine farmers have been and continue to be outraged by these policies.* In 2008, they led a series of strikes throughout the country, shutting down highways to block trucks from delivering exports to ports and causing local food shortages, when the government announced that it would raise export tariffs to even higher levels. As the protests continued, President Kirchner announced that she would take the question of the tax increase to the Argentine Congress. At first it was thought that the Congress would support the measure, but near the time the Congress was set to vote, a quarter of a million people turned out to demonstrate in favor of the farmers. In July 2008, the Argentine Senate narrowly voted to reject the tax, and the tariff increases were rescinded.

* See, for instance, J. Webber, "Argentine wheat farmers curse government intervention," *Financial Times*, August 10, 2010.

The Optimal Tariff*

Suppose that the country that imposes a tariff is a large country in the sense that it is a significant importer (or exporter) of the product in question. In that case, as we are about to see, the imposition of a tariff could lead to a welfare improvement for the country, relative to free trade. In essence, because the country has market power, by imposing a tariff it is able to obtain the goods it continues to purchase at a lower world price. By forcing down the world price, the tariff-imposing country, in effect, shifts some of the burden of the tariff onto the exporting country.

Let's assume that country A is an economically large country. That is, A is an important world importer of a certain product—say, lumber (good L). Let country B export good L to A. Consider Figure 6.9. In the left-hand panel, we illustrate A's market for L. In the right-hand panel, we present country B's market for L. In the absence of trade, the price of L would be P_A in A and P_B in B. Simple inspection of the diagram demonstrates that if trade were allowed to occur, then B would have comparative advantage in L and would export L to A. Clearly, at any price below P_A, country A would import L; at any price above P_B, country B would export L.

The equilibrium world price is defined as the price at which the quantity that consumers in A want to import is equal to the quantity that producers in B want to export. In the diagram, this price is denoted by P_{FT}. At that price, country A's desired imports equal Q_1Q_2 units, which exactly matches B's desired exports (denoted in the right-hand panel of the diagram as $Q'_1\,Q'_2$ units). Note carefully that P_{FT} is the only possible candidate for an equilibrium free-trade price. At any price above P_{FT}, the demand for imports will fall in A, while the supply of exports from B will rise. In other words, at free-trade prices above P_{FT}, there will be an excess supply of L in world markets; excess supply will tend to force the price down. By identical reasoning, it is easy to see that at any free-trade price below P_{FT}, there will be international excess demand for L, and the market price for the good will tend to rise.

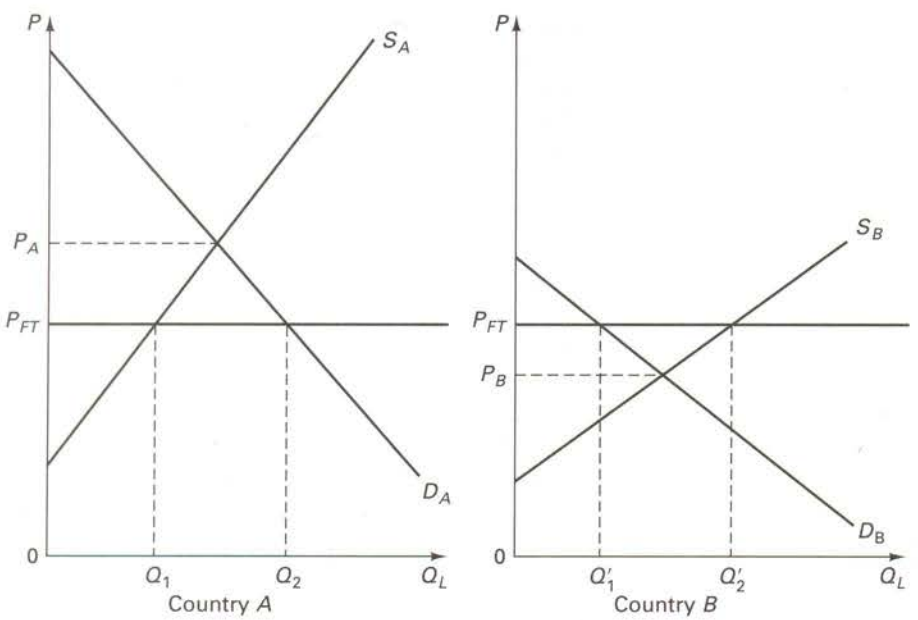

FIGURE 6.9 International Free-Trade Equilibrium

* This section may be skipped without loss of continuity.

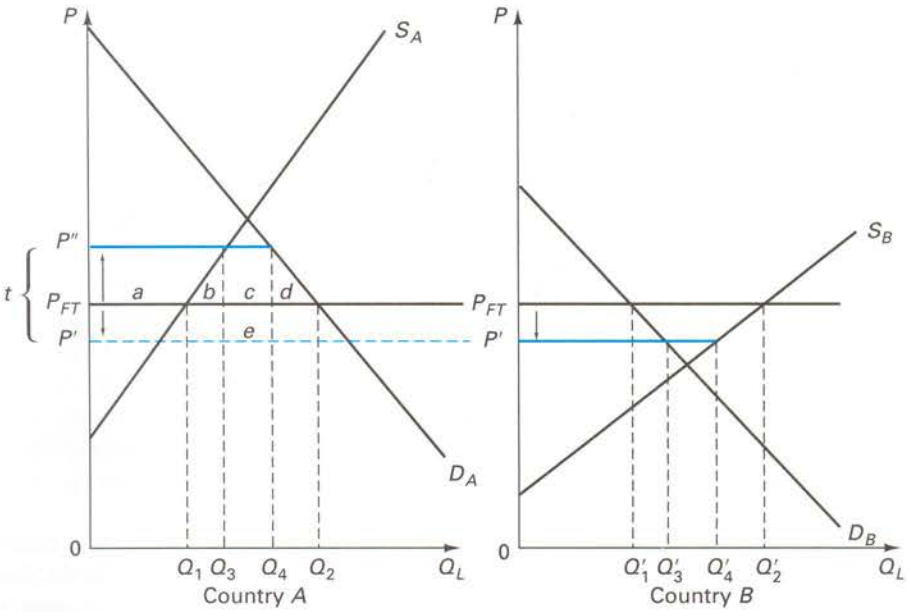

FIGURE 6.10 Illustration of a Tariff for a Large Country

The fact that the markets in A and B interact in the way just described to determine the world price is the source of A's international market power. In particular, a change in A's demand for imported units of L will have a direct effect on the world price. Increases in demand will drive the world price up; decreases in demand will drive it down. To see how this works, consider the following scenario.

Suppose that A imposes a tariff on imports of L that causes imports to fall to Q_3Q_4 units. This is illustrated in the left-hand panel of Figure 6.10 by the increase in price from P_{FT} to P''. Note, now, the effect A's tariff has on country B. Since A is an important customer of B's product, when A uses a tariff to reduce its demand, this causes the price in B to fall. As drawn, the price will fall until world trade is balanced. This occurs in country B at the price P', where B's exports equal $Q'_3Q'_4$, which exactly matches the Q_3Q_4 units of lumber demanded by A after it imposes the tariff.

With the higher price, consumers in A lose $\$a + \$b + \$c + \$d$ in consumer surplus. Producer surplus rises by the amount $\$a$. What about government revenue? How much has it risen by? The answer is that government revenue rises by $\$(c + e)$. To see that, note first that by definition the size of the tariff equals the difference between the price consumers in A pay for the product (P'') and the price producers in B receive (P'). That is, the per unit tariff of $\$t$ equals $P'' - p'$. Thus, we see that in this case the price has gone up in A, but by less than the full amount of the tariff. For example, if the tariff had been \$10 per unit, the actual price increase imposed on A's consumers would be less than \$10. What has happened is that A is such an important customer of B's product that producers in B attempt to maintain sales by absorbing some of the tariff in the form of a price reduction on its exports of L. In the new equilibrium, the price received by producers in B falls from P_{FT} to P'.

This means that the lumber that country A now imports comes into the country at a lower price. Then, once the tariff is imposed, the new price in A is $P''(= P' + t)$. This leads to a convenient interpretation of the amount $\$(c + e)$. \$c represents the tariff proceeds paid (in effect) by A's consumers to the government of A. We know this because the height of rectangle c is equal to the increase in price to A's consumers, and the base equals the level of imports. $\$e$ represents the amount of the tariff paid (in effect) by B's producers. That is, the height of

TABLE 6.6 Welfare Cost of a Tariff Imposed by a Large Country

Change in consumer surplus	$-\$a$	$-\$b$	$-\$c$	$-\$d$
Change in producer surplus	$\$a$			
Change in government revenue			$\$c$	$+\$e$
NET WELFARE CHANGE		$-\$b$		$-\$d$ $+\$e$

rectangle e represents the amount that B's producers have cut their price, and the base is equal to the level of A's imports (B's exports).

What has been the impact on A's overall welfare due to the tariff? To answer that question, we simply net out the various surpluses. This is illustrated in Table 6.6. The change in welfare in A brought about by the imposition of a tariff equals $\$e - \$(b + d)$. This amount could be positive or negative, depending upon the relative sizes of the two terms. As previously noted, $\$e$ represents the amount of the tariff revenue paid by foreigners because the world price of their exports has fallen. The larger area e is, everything else held constant, the greater is the likelihood that A's welfare has increased because of the imposition of the tariff. The amount $\$(b + d)$ represents the usual deadweight costs of the tariff. The smaller this amount is, the greater the likelihood of a welfare increase in A.

As Figure 6.10 clearly suggests, the amounts $\$b$, $\$d$, and $\$e$ depend both on the slopes of the various demand and supply curves and on the size of the tariff imposed by country A. Thus, for a given set of demand and supply curves, it should be possible for the government of A to impose a tariff that raises A's welfare to the largest extent possible. That is, the tariff would be set to a level that maximizes the area $\$e - \$(b + d)$. Such a tariff is known as A's **optimal tariff**.

Optimal tariff

The size of a tariff that raises the welfare of a tariff-imposing country by the greatest amount relative to free-trade welfare levels.

Under what conditions is a tariff likely to raise a country's welfare? First, the country must be an important participant in the world market. Countries that consume a large amount of traded goods have market power—and can affect world price by imposing import tariffs. Countries that produce a large amount of a particular traded good can influence world price, much as a monopolist can, by imposing export tariffs. Thus, market power is the most important condition for the imposition of an optimal tariff.

A country's market power is determined both by the amounts it consumes (or produces) relative to the overall size of the market and by the slopes of the demand and supply curves in the domestic markets of both the home and the foreign countries. In particular, the more elastic (inelastic) demand and supply conditions are in the home (foreign) markets, the greater the ability of the home country to impose an optimal tariff.*

A second factor that, up to now, we have not taken into account is the reaction the imposition of an optimal tariff will induce from the rest of the world. Clearly, as A's welfare rises with the imposition of a tariff, it comes at the expense of B. This is a decidedly unfriendly policy for A to undertake, and it could produce a set of retaliatory tariff measures on the part of the government of B. When the imposition of tariffs (or other forms of protection) by one country leads to increased protection in the rest of the world, we are said to be in a **trade (or tariff) war**.† Trade wars necessarily lead to a reduction in world trade, although it is unlikely that trade would ever

Trade (or tariff) war

A general reduction in world trade brought about by increases in trade barriers throughout the world.

* You are asked to prove this statement in one of the exercises at the end of the chapter.

† Trade wars are relatively uncommon. The last followed the imposition by the United States of the Smoot-Hawley Tariff in 1930. See the discussion in Global Insights 6.3 for more detail.

disappear entirely. Also, while it is theoretically possible that *A*'s welfare could remain higher than under free trade even after retaliation is imposed by *B*, there is a much higher probability that welfare in both countries would fall after retaliation has been imposed. Global Insights 6.3 considers some of the ramifications of the last great trade war, the tariff escalation following the imposition of the Smoot-Hawley Tariff of 1930.

Given the likelihood of retaliation, it is often the case that countries do not attempt to impose what would otherwise be optimal tariffs. There is no evidence, for instance, of any efforts

Global Insights 6.3

The Smoot-Hawley Tariff and Its Aftermath

Article I of the Constitution of the United States gives Congress the sole authority to "regulate commerce with foreign nations" and to "lay and collect...duties." From time to time over the first 150 years of the Republic, Congress has used this authority to revise the U.S. tariff code. The last such occasion began in early 1929 at the request of then-President Hoover. During his successful election campaign of 1928, he had promised farmers a tariff on agricultural products to try to boost sagging farm prices.* Congress set about to help President Hoover keep his promise.

At first, the tariff revisions were restricted to agricultural products. Soon, however, representatives from manufacturing states began demanding additional tariffs for industries in their districts. The process of pork-barrel politics started in earnest, with representatives promising to vote to protect industries in other districts in return for votes to protect the industries of their districts.

The process of expanding and increasing U.S. tariff barriers took considerable time and effort. In preparing this change in tariff code, the House Ways and Means Committee took over 11,000 pages of testimony. It was not until April 1930 that the bill authorizing the tariff changes, the Tariff Act of 1930, passed both houses of Congress and went to the president for his signature. This bill is also known as the Smoot-Hawley Tariff, named after the principal congressional sponsors of the legislation.

Prior to signing the bill, President Hoover received formal protests from 38 foreign governments, warning of likely retaliation to the U.S. actions. Some countries, anticipating the enactment of the bill, raised their tariffs shortly before its final passage. More than 1,000 American economists wrote the president urging him to veto the bill. On June 17, 1930, the Smoot-Hawley Tariff bill was signed and enacted into law. The result was the highest general tariff structure in the history of the United States. Average tariff levels rose to almost 60 percent of dutiable imports. Tariffs were raised on more than 12,000 products.

The reaction was immediate. Charles Kindleberger, in his history of the Great Depression, writes of the

> ...reactions of Spain, concerned about tariffs on grapes, oranges, corn, and onions, which passed the Wais tariff of July 22, 1930; of Switzerland, which objected to increased tariffs on watches, embroideries, and shoes, and undertook a boycott of U.S. exports; of Canada, reacting to tariffs on many food products, logs and timber, which...raised tariffs three times between 1930 and 1932; and of Italy, which objected to tariffs on hats and bonnets of straw, wool felt hats and olive oil, and took reprisal against United States...automobiles on 30 June 1930. New tariffs were also enacted by Cuba, Mexico, France, Australia, and New Zealand.†

Eventually, more than 40 nations raised their tariff levels, and these higher barriers, coupled with falling income levels, brought world trade virtually to a halt. By 1933, world trade was only about one-third the level it had been in 1929. U.S. exports collapsed. This is illustrated quite effectively in a diagram designed by Professor Kindleberger and presented as Figure 6.11.

International trade bottomed out in 1933, along with the Great Depression. Gradually, exports began to rise.‡ This was helped in part by negotiations to lower trade barriers on a bilateral basis with major trading partners. These talks were undertaken by President Roosevelt and authorized by Congress in the Reciprocal Trade Agreements Act of 1934. This legislation set in motion the modern era of U.S. trade policy, wherein, and from time to time, Congress cedes to the president its authority to alter trade barriers.

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* Curiously, it is doubtful how much effect these tariffs would have on raising prices, since the products they initially applied to were seldom imported into the United States.

† The World in Depression, 1929–1939 by Charles P. Kindleberger. Copyright © 1987 Charles P. Kindleberger. Published by the University of California Press. Reprinted by permission of the publisher.

‡ However, they would not return to their 1929 level until 1942.

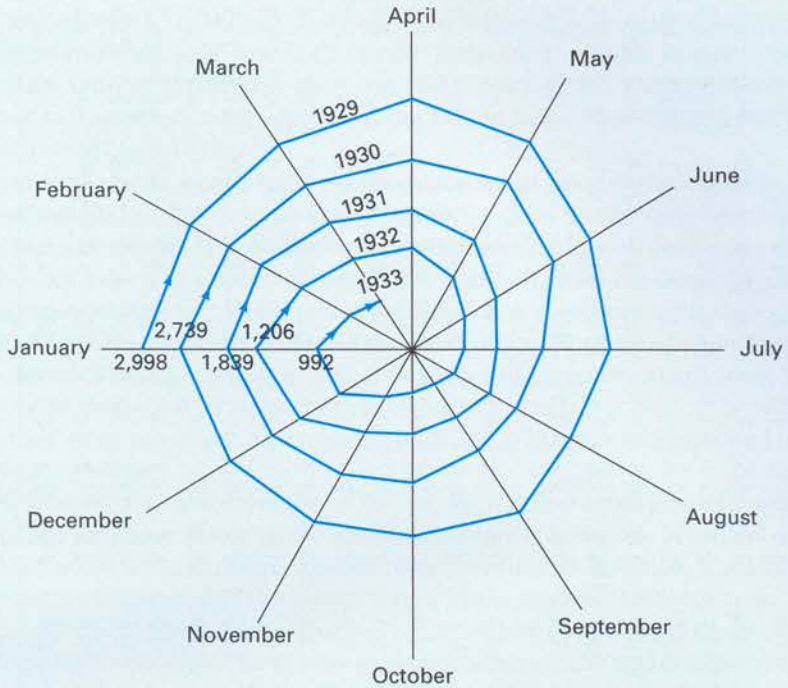

FIGURE 6.11 The Contracting Spiral of World Trade, January 1929 to March 1933 (total imports of 75 countries in millions of U.S. dollars) *Source*: The World in Depression, 1929–1939 by Charles P. Kindleberger. Copyright © 1987 Charles P. Kindleberger.

by the United States—which certainly has the market power to do so—to exploit its market power in the implementation of commercial policy.

Examples of attempts to impose optimal export tariffs are more common. The Organization of Petroleum Exporting Countries' (OPEC's) oil price increases of the 1970s, while not represented as such at the time, were qualitatively identical to attempts to raise internal (to OPEC) welfare by forcing the rest of the world to pay the tariff it had imposed.

How High Are Tariffs?

So far, we have assumed that tariffs have been imposed on only one good. In reality, there are many goods in the world, and countries tend to maintain extensive tariff structures on these products. Table 6.7 presents average MFN tariff rates as of 2006 for a number of selected countries. The first thing to note in this table is that these represent the average tariff across all goods within various product classes. Since there are often many goods within a particular product category, individual product tariffs may be very different than the averages shown in the table. In addition, because many of the countries in this table, including the United States, have negotiated a variety of trade agreements with other countries, not all imports in a particular product class may be subject to these rates. For instance, because of NAFTA, tariffs are not assessed against most goods imported from Canada and Mexico into the United States. Thus, for many countries, the tariff averages in the table may overstate the level of protection these products actually receive.

Second, tariffs differ substantially across product classes. For many countries, tariff rates on agricultural products substantially exceed tariffs on manufactured goods. Average tariffs on dairy products are often prohibitively high, equaling more than 100 percent in Canada, Japan, Norway,

TABLE 6.7 2006 Simple Average MFN Applied Tariff Rates for Selected Countries by Product Groups

	Australia	Brazil	Canada	Egypt	EU	India	Indonesia	Japan	Korea	Malaysia	Mexico	New Zealand	Norway	Sri Lanka	Switzerland	Turkey	United States	Venezuela
Animal products	0.4	8.9	29.6	18.1	25.4	33.0	4.2	15.5	22.1	0.5	16.8	1.7	207.1	26.2	141.6	127.1	2.5	17.2
Dairy products	4.3	18.3	248.6	9.8	53.8	35.0	5.0	178.1	67.5	3.4	23.5	1.5	114.7	22.9	158.2	119.2	25.0	19.3
Fruits, vegetables, plants	1.5	9.6	3.3	13.8	11.8	31.5	5.1	12.9	57.2	3.8	16.5	1.4	27.6	24.0	21.5	31.8	5.0	14.8
Coffee, tea	1.0	13.3	10.4	18.8	6.5	56.3	4.8	16.7	53.9	9.0	34.6	3.1	2.8	28.0	7.0	31.6	4.1	17.9
Cereals and preparations	1.3	11.9	20.1	22.8	25.6	37.3	5.6	76.6	134.3	5.1	20.1	3.6	66.0	23.7	35.2	31.2	3.8	17.9
Oilseeds, fats, and oils	1.5	7.8	4.9	5.3	5.9	52.5	4.2	10.8	37.6	1.7	12.8	0.8	47.0	21.4	38.3	13.3	4.6	16.0
Sugars and confectionery	1.9	16.5	5.7	14.9	32.9	48.4	8.3	27.3	19.0	2.8	70.5	1.7	40.6	18.2	39.4	86.2	20.5	17.4
Beverages and tobacco	2.4	16.7	7.2	826.8	20.2	68.9	56.0	15.5	31.7	148.1	31.8	3.5	27.6	58.2	43.6	35.9	15.9	18.6
Cotton	0.0	6.9	0.5	4.0	0.0	17.0	4.0	0.0	1.0	0.0	9.3	0.0	0.0	0.0	0.0	0.0	5.2	10.0
Other agricultural products	0.2	7.7	6.9	4.1	5.3	27.1	4.3	6.3	15.9	0.6	9.8	0.7	32.4	13.2	9.7	10.5	1.1	9.2
Fish and fish products	0.0	10.1	1.0	8.5	10.3	30.0	4.9	5.7	16.1	2.2	16.6	0.6	2.2	15.0	0.4	33.5	1.1	19.1
Minerals and metals	2.7	9.9	1.7	9.7	1.9	15.4	6.8	1.0	4.8	10.9	11.4	2.2	0.0	10.6	1.4	2.7	1.7	10.3
Petroleum	0.0	0.3	2.7	5.2	2.7	14.0	2.2	0.7	5.1	1.1	8.7	0.3	0.0	8.4	0.0	3.0	2.1	9.8
Chemicals	1.8	8.3	2.8	5.8	4.6	15.0	5.4	2.5	5.8	3.3	9.8	1.0	0.0	5.3	1.0	4.5	2.8	8.3
Wood, paper, etc.	3.4	11.0	1.1	13.6	1.1	13.5	5.3	0.9	2.4	10.7	12.3	1.6	0.0	13.8	3.9	1.1	0.4	13.2
Textiles	6.8	16.8	6.9	19.1	6.6	20.2	9.2	5.5	9.2	10.5	16.1	3.0	0.5	3.9	5.9	6.6	7.9	18.3
Clothing	15.4	20.0	17.0	38.9	11.5	22.4	14.1	9.2	12.6	16.0	35.0	16.2	9.9	14.8	4.9	11.5	11.5	29.7
Leather, footwear, etc.	5.6	14.7	5.6	14.0	4.2	15.4	7.7	15.0	7.9	13.9	18.1	4.8	0.0	19.3	1.9	4.2	4.3	15.4
Nonelectrical machinery	3.0	12.8	1.5	5.8	1.7	14.3	2.3	0.0	6.0	3.6	8.3	4.1	0.0	4.9	0.5	1.7	1.2	9.2
Electrical machinery	3.0	14.1	2.4	9.5	2.5	12.3	6.1	0.2	6.0	6.5	11.3	3.4	0.0	12.0	0.8	2.5	1.7	11.4
Transport equipment	6.2	18.1	5.8	12.9	4.1	24.8	12.3	0.0	5.4	11.5	17.3	4.6	0.0	9.9	1.5	4.3	3.1	13.6
Manufactures, n.e.s.[a]	1.4	15.8	2.8	14.2	2.4	13.9	7.2	1.1	6.4	4.9	12.7	2.3	0.0	14.0	1.1	2.5	2.1	11.3
Agriculture	1.2	10.2	17.3	66.6	15.1	37.6	8.2	24.3	47.8	12.3	18.2	1.7	61.1	23.8	43.8	42.0	5.3	15.0
Industry	3.9	12.6	3.7	12.2	3.9	16.4	6.8	2.8	6.6	7.9	13.3	3.2	0.6	9.2	2.1	4.7	3.3	12.7
All lines	3.5	12.3	5.5	19.3	5.4	19.2	6.9	5.6	12.1	8.5	14.0	3.0	8.6	11.2	7.6	9.6	3.5	13.0

Note: [a]n.e.s.—Not elsewhere specified.

Source: 2006 Tariff Profiles, World Trade Organization, www.wto.org, country pages. Constructed by authors.

Switzerland, and Turkey.* High tariffs and other forms of protection on agricultural products have a long history and provide a continuing challenge in world trade negotiations. In rich and poor countries alike, governments seem unwilling to open agricultural markets to international competition. In contrast, tariff rates on many manufactured goods tend to be quite low, averaging less than 5 percent in Australia, Canada, the European Union, Japan, New Zealand, Norway, Switzerland, Turkey, and the United States.

Another feature in the tariff structures of most countries, but not shown directly in this table, is the phenomenon that within the manufacturing sector, final goods often have higher tariff rates than intermediate goods. This is because most manufactured goods have many component parts. For instance, steel is an important component of cars. If tariffs are charged on steel, then local car manufacturers must pay higher prices for that input, thereby hurting their competitive position. To offset that impact and guarantee that their competitiveness is not eroded, car manufacturers may also seek tariffs, typically at higher rates than those on the components. This pattern is known as **tariff escalation by stages of processing**. An example of this can be seen in the table, where the tariff rates on textiles (a component of clothing) in many countries tend to be lower than the tariffs on clothing.

Tariff escalation
Tariff rates that rise with stages of processing.

The last line of Table 6.7 provides a measure of the average tariff across all goods for each of the countries. As this line shows, tariff rates differ substantially across countries. In general, tariff rates are low (less than 10 percent) for high-income countries, such as Australia, Canada, the European Union, Japan, Switzerland, and the United States. These relatively low rates reflect the general reduction in tariff levels of major industrialized countries that has occurred since the end of World War II. As the table also shows, tariff rates tend to be substantially higher in developing countries. It is a curious and unresolved phenomenon that small developing countries that have the most to lose from imposing tariffs use them extensively.

Summary

1. Tariffs are taxes imposed by countries on either imports or exports. This form of commercial policy is probably the most commonly used tool by governments around the world to regulate their trade flows.
2. The effect of import tariffs is to raise the price of these goods and hence discourage their consumption. At the same time, domestic producers of substitute goods find it easier to raise prices and profits. Thus, tariffs are said to protect domestic producers.
3. In general, tariffs lower the standard of living of a country relative to free trade, because they hurt consumers more than they help producers.
4. Tariffs can increase a country's standard of living if that country has market power in world markets. This result does not apply for most countries and for most products. Even when the requisite conditions hold, improvements in welfare depend crucially on foreign countries not retaliating with increases in their own tariffs.

Exercises

1. Prove the following proposition: Free trade is better than no trade.
2. Prove the following: Some trade (trade with tariffs) is better than no trade.
3. Suppose that a country imposes a pure revenue tariff. Diagram the welfare effects of this tariff. How do these effects differ from the usual deadweight costs analyzed in the chapter?

* In part, this is due to the fact that in recent years many countries have replaced quota restrictions on imports of agricultural products with tariffs. For more on quotas see Chapter 7.

4. The less elastic (i.e., the steeper) the domestic supply curve, the lower the production deadweight cost of any tariff. True or false? Demonstrate and explain.
5. The more elastic (i.e., the flatter) the domestic demand curve, the lower the consumption deadweight cost of any tariff. True or false? Demonstrate and explain.
6. Use the data in the first table of Global Insights 6.1 to calculate U.S. tariff revenues on costume jewelry, glass and glassware, and rubber footwear.
7. Given the following information, calculate the cost to consumers, the benefit to producers, the change in government revenue, and the deadweight costs of a proposed 10 percent tariff on personal computers.

Price of computers (free trade)	$4,000
Domestic production (free trade)	100,000
Domestic production (after tariff)	120,000
Domestic consumption (free trade)	150,000
Domestic consumption (after tariff)	140,000

8. The optimal tariff for a small country is zero. Prove this statement geometrically and then explain your results.
9. Prove that the more elastic demand and supply conditions are in a country that is large in world markets, the greater the ability of that country to impose an optimal tariff.
10. Prove that the more inelastic demand and supply conditions are in a foreign country, the greater the ability of a country that is large in world markets to impose an optimal tariff. Use this result to explain why the OPEC price increases of the 1970s had such devastating effects on the economies of the West.
11. Suppose a country imposed a specific export tariff of $t on each unit of its exports of a certain product. Describe this situation graphically, and calculate the welfare cost of this policy.
12. Use the data in Table 6.7 to compare U.S. protectionist policies with those of Japan. In what sectors are protection levels relatively equal? Where do they differ? Try to explain these patterns.
13. Suppose that the domestic demand and supply for shoes in a small open economy are given by

$$P = 80 - 2Q \text{ (demand)}$$
$$P = 8 + Q \text{ (supply)}$$

where P denotes price and Q denotes quantity.

   a. What are the autarky price of shoes and the quantity produced?
   b. What are the levels of domestic production, consumption, and imports if the world price is $10?
   c. How would your answers in part (b) change if this country were to impose a tariff of $3?

14. Consider the demand and supply curves in Exercise 13. Suppose that the world price is $50.

   a. What will be the levels of production and consumption under free trade?
   b. Will the country be an exporter or an importer if the world price is $50? How much will it want to trade?
   c. Suppose that the local government imposes a tax of $5 per unit on the quantity traded of this product. What will happen to production, consumption, and trade levels of this product?
   d. What will be the welfare costs of this policy?

References

Hufbauer, Gary Clyde, and Kimberly Ann Elliott. *Measuring the Costs of Protection in the United States.* Washington, D.C.: Institute for International Economics, 1994.

Kindleberger, Charles. *The World in Depression, 1929–1939.* Berkeley and Los Angeles: University of California Press, 1973.

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