CHAPTER 8

The Instruments of Trade Policy

Previous chapters have answered the question, "Why do nations trade?" by *describing* the causes and effects of international trade and the functioning of a trading world economy. While this question is interesting in itself, its answer is much more interesting if it helps answer the question, "What should a nation's trade policy be?" Should the United States use a tariff or an import quota to protect its automobile industry against competition from Japan and South Korea? Who will benefit and who will lose from an import quota? Will the benefits outweigh the costs?

This chapter examines the policies that governments adopt toward international trade, policies that involve a number of different actions. These actions include taxes on some international transactions, subsidies for other transactions, legal limits on the value or volume of particular imports, and many other measures. The chapter provides a framework for understanding the effects of the most important instruments of trade policy.

Learning Goals

After reading this chapter, you will be able to:

- Evaluate the costs and benefits of tariffs, their welfare effects, and winners and losers from tariff policies.
- Discuss what export subsidies and agricultural subsidies are, and explain how they affect trade in agriculture in the United States and the European Union.
- Recognize the effect of voluntary export restraints on both importing and exporting countries, and describe how the welfare effects of VERs compare with tariff and quota policies.

Basic Tariff Analysis

A tariff, the simplest of trade policies, is a tax levied when a good is imported. **Specific tariffs** are levied as a fixed charge for each unit of goods imported (for example, $3 per barrel of oil). **Ad valorem tariffs** are taxes that are levied as a fraction of the value of the imported goods (for example, a 25 percent U.S. tariff on imported trucks). In either case the effect of the tariff is to raise the cost of shipping goods to a country.

Tariffs are the oldest form of trade policy and have traditionally been used as a source of government income. Until the introduction of the income tax, for instance, the U.S. government raised most of its revenue from tariffs. Their true purpose, however, has usually been not only to provide revenue but to protect particular domestic sectors. In the early 19th century the United Kingdom used tariffs (the famous Corn Laws) to protect its agriculture from import competition. In the late 19th century both Germany and the United States protected their new industrial sectors by imposing tariffs on imports of manufactured goods. The importance of tariffs has declined in modern times, because modern governments usually prefer to protect domestic industries through a variety of **nontariff barriers,** such as **import quotas** (limitations on the quantity of imports) and **export restraints** (limitations on the quantity of exports—usually imposed by the exporting country at the importing country's request). Nonetheless, an understanding of the effects of a tariff remains a vital basis for understanding other trade policies.

In developing the theory of trade in Chapters 3 through 7 we adopted a *general equilibrium* perspective. That is, we were keenly aware that events in one part of the economy have repercussions elsewhere. However, in many (though not all) cases trade policies toward one sector can be reasonably well understood without going into detail about the repercussions of that policy in the rest of the economy. For the most part, then, trade policy can be examined in a *partial equilibrium* framework. When the effects on the economy as a whole become crucial, we will refer back to general equilibrium analysis.

Supply, Demand, and Trade in a Single Industry

Let's suppose there are two countries, Home and Foreign, both of which consume and produce wheat, which can be costlessly transported between the countries. In each country wheat is a simple competitive industry in which the supply and demand curves are functions of the market price. Normally Home supply and demand will depend on the price in terms of Home currency, and Foreign supply and demand will depend on the price in terms of Foreign currency, but we assume that the exchange rate between the currencies is not affected by whatever trade policy is undertaken in this market. Thus we quote prices in both markets in terms of Home currency.

Trade will arise in such a market if prices are different in the absence of trade. Suppose that in the absence of trade the price of wheat is higher in Home than it is in Foreign. Now allow foreign trade. Since the price of wheat in Home exceeds the price in Foreign, shippers begin to move wheat from Foreign to Home. The export of wheat raises its price in Foreign and lowers its price in Home until the difference in prices has been eliminated.

To determine the world price and the quantity traded, it is helpful to define two new curves: the Home **import demand curve** and the Foreign **export supply curve,** which are derived from the underlying domestic supply and demand curves. Home import demand is the excess of what Home consumers demand over what Home producers supply; Foreign export supply is the excess of what Foreign producers supply over what Foreign consumers demand.

Figure 8-1 shows how the Home import demand curve is derived. At the price P^1 Home consumers demand D^1, while Home producers supply only S^1, so Home import demand is $D^1 - S^1$. If we raise the price to P^2, Home consumers demand only D^2, while Home producers raise the amount they supply to S^2, so import demand falls to $D^2 - S^2$. These price quantity combinations are plotted as points 1 and 2 in the right-hand panel of Figure 8-1. The import demand curve MD is downward sloping because as price increases, the quantity of imports demanded declines. At P_A, Home supply and demand are equal in the absence of trade, so the Home import demand curve intercepts the price axis at P_A (import demand = zero at P_A).

Figure 8-1

Deriving Home's Import Demand Curve

As the price of the good increases, Home consumers demand less, while Home producers supply more, so that the demand for imports declines.

Figure 8-2 shows how the Foreign export supply curve XS is derived. At P^1 Foreign producers supply S^{*1}, while Foreign consumers demand only D^{*1}, so the amount of the total supply available for export is $S^{*1} - D^{*1}$. At P^2 Foreign producers raise the quantity they supply to S^{*2} and Foreign consumers lower the amount they demand to D^{*2}, so the quantity of the total supply available to export rises to $S^{*2} - D^{*2}$. Because the supply of goods available for export rises as the price rises, the Foreign export supply curve is upward sloping. At P_A^*, supply and demand would be equal in the absence of trade, so the Foreign export supply curve intersects the price axis at P_A^* (export supply = zero at P_A^*).

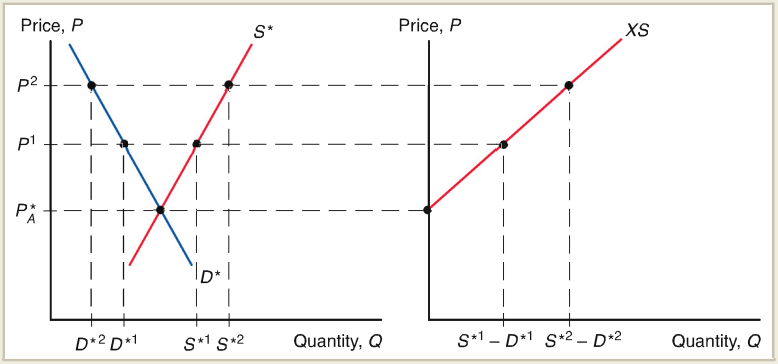


Figure 8-2

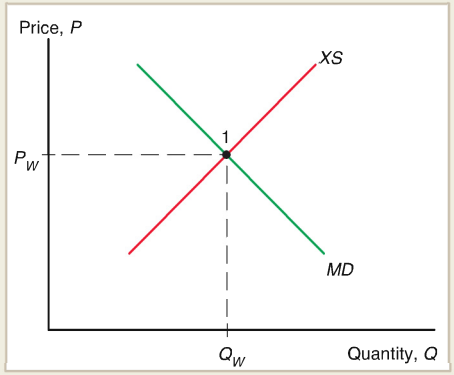
Deriving Foreign's Export Supply Curve

As the price of the good rises, Foreign producers supply more while Foreign consumers demand less, so that the supply available for export rises.

Figure 8-3

World Equilibrium

The equilibrium world price is where Home import demand (*MD* curve) equals Foreign export supply (*XS* curve).



World equilibrium occurs when Home import demand equals Foreign export supply (Figure 8-3). At the price P_W, where the two curves cross, world supply equals world demand. At the equilibrium point 1 in Figure 8-3,

$$\text{Home demand} - \text{Home supply} = \text{Foreign supply} - \text{Foreign demand}.$$

By adding and subtracting from both sides, this equation can be rearranged to say that

$$\text{Home demand} + \text{Foreign demand} = \text{Home supply} + \text{Foreign supply}$$

or, in other words,

$$\text{World demand} = \text{World supply}.$$

Effects of a Tariff

From the point of view of someone shipping goods, a tariff is just like a cost of transportation. If Home imposes a tax of $2 on every bushel of wheat imported, shippers will be unwilling to move the wheat unless the price difference between the two markets is at least $2.

Figure 8-4 illustrates the effects of a specific tariff of $$t$ per unit of wheat (shown as t in the figure). In the absence of a tariff, the price of wheat would be equalized at P_W in both Home and Foreign as seen at point 1 in the middle panel, which illustrates the world market. With the tariff in place, however, shippers are not willing to move wheat from Foreign to Home unless the Home price exceeds the Foreign price by at least $$t$. If no wheat is being shipped, however, there will be an excess demand for wheat in Home and an excess supply in Foreign. Thus the price in Home will rise and that in Foreign will fall until the price difference is $$t$.

Introducing a tariff, then, drives a wedge between the prices in the two markets. The tariff raises the price in Home to P_T and lowers the price in Foreign to $P_T^* = P_T - t$. In Home producers supply more at the higher price, while consumers demand less, so that fewer imports are demanded (as you can see in the move from point 1 to point 2 on the *MD* curve). In Foreign the lower price leads to reduced supply and increased demand, and thus a smaller export supply (as seen in the move from point 1 to point 3 on the *XS* curve). Thus the volume of wheat traded declines from Q_W, the free trade volume, to Q_T, the volume with a tariff. At the trade volume Q_T, Home import demand equals Foreign export supply when $P_T - P_T^* = t$.

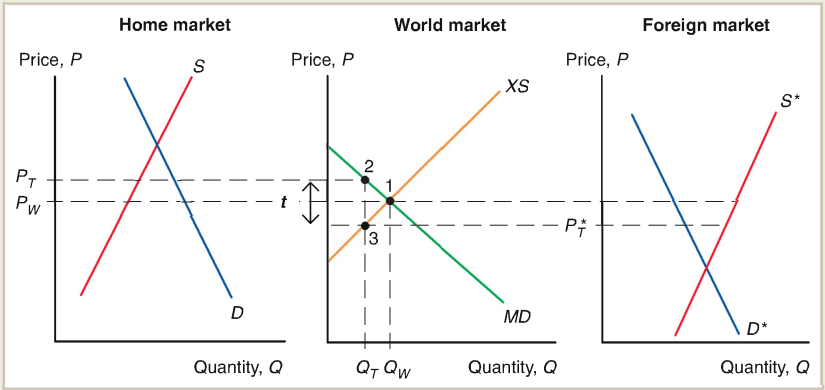


Figure 8-4

Effects of a Tariff

A tariff raises the price in Home while lowering the price in Foreign. The volume traded declines.

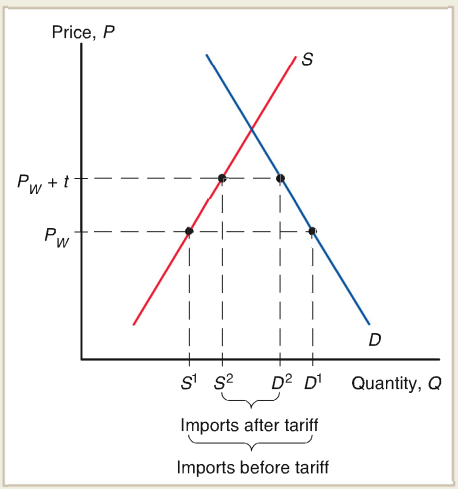
The increase in the price in Home, from P_W to P_T, is less than the amount of the tariff, because part of the tariff is reflected in a decline in Foreign's export price and so is not passed on to Home consumers. This is the normal result of a tariff and of any trade policy that limits imports. The size of this effect on the exporters' price, however, is often in practice very small. When a small country imposes a tariff, its share of the world market for the goods it imports is usually minor to begin with, so that its import reduction has very little effect on the world (foreign export) price.

The effects of a tariff in the "small country" case where a country cannot affect foreign export prices are illustrated in Figure 8-5. In this case a tariff raises the price of the imported

Figure 8-5

A Tariff in a Small Country

When a country is small, a tariff it imposes cannot lower the foreign price of the good it imports. As a result, the price of the import rises from P_W to $P_W + t$ and the quantity of imports demanded falls from $D^1 - S^1$ to $D^2 - S^2$.



good in the country imposing the tariff by the full amount of the tariff, from P_W to $P_W + t$. Production of the imported good rises from S^1 to S^2, while consumption of the good falls from D^1 to D^2. As a result of the tariff, then, imports fall in the country imposing the tariff.

Measuring the Amount of Protection

A tariff on an imported good raises the price received by domestic producers of that good. This effect is often the tariff's principal objective—to *protect* domestic producers from the low prices that would result from import competition. In analyzing trade policy in practice, it is important to ask how much protection a tariff or other trade policy actually provides. The answer is usually expressed as a percentage of the price that would prevail under free trade. An import quota on sugar could, for example, raise the price received by U.S. sugar producers by 45 percent.

Measuring protection would seem to be straightforward in the case of a tariff: If the tariff is an ad valorem tax proportional to the value of the imports, the tariff rate itself should measure the amount of protection; if the tariff is specific, dividing the tariff by the price net of the tariff gives us the ad valorem equivalent.

There are two problems in trying to calculate the rate of protection this simply. First, if the small country assumption is not a good approximation, part of the effect of a tariff will be to lower foreign export prices rather than to raise domestic prices. This effect of trade policies on foreign export prices is sometimes significant.[1]

The second problem is that tariffs may have very different effects on different stages of production of a good. A simple example illustrates this point.

Suppose that an automobile sells on the world market for $8,000 and that the parts out of which that automobile is made sell for $6,000. Let's compare two countries: one that wants to develop an auto assembly industry and one that already has an assembly industry and wants to develop a parts industry.

To encourage a domestic auto industry, the first country places a 25 percent tariff on imported autos, allowing domestic assemblers to charge $10,000 instead of $8,000. In this case it would be wrong to say that the assemblers receive only 25 percent protection. Before the tariff, domestic assembly would take place only if it could be done for $2,000 (the difference between the $8,000 price of a completed automobile and the $6,000 cost of parts) or less; now it will take place even if it costs as much as $4,000 (the difference between the $10,000 price and the cost of parts). That is, the 25 percent tariff rate provides assemblers with an **effective rate of protection** of 100 percent.

Now suppose the second country, to encourage domestic production of parts, imposes a 10 percent tariff on imported parts, raising the cost of parts of domestic assemblers from $6,000 to $6,600. Even though there is no change in the tariff on assembled automobiles, this policy makes it less advantageous to assemble domestically. Before the tariff it would have been worth assembling a car locally if it could be done for $2,000 ($8,000 − $6,000); after the tariff local assembly takes place only if it can be done for $1,400 ($8,000 − $6,600). The tariff on parts, then, while providing positive protection to parts manufacturers, provides negative effective protection to assembly at the rate of −30 percent (−600/2,000).

Reasoning similar to that seen in this example has led economists to make elaborate calculations to measure the degree of effective protection actually provided to particular industries

[1] In theory (though rarely in practice) a tariff could actually lower the price received by domestic producers (the Metzler paradox discussed in Chapter 5).

by tariffs and other trade policies. Trade policies aimed at promoting economic development, for example (Chapter 10), often lead to rates of effective protection much higher than the tariff rates themselves.[2]

Costs and Benefits of a Tariff

A tariff raises the price of a good in the importing country and lowers it in the exporting country. As a result of these price changes, consumers lose in the importing country and gain in the exporting country. Producers gain in the importing country and lose in the exporting country. In addition, the government imposing the tariff gains revenue. To compare these costs and benefits, it is necessary to quantify them. The method for measuring costs and benefits of a tariff depends on two concepts common to much microeconomic analysis: consumer and producer surplus.

Consumer and Producer Surplus

Consumer surplus measures the amount a consumer gains from a purchase by the difference between the price he actually pays and the price he would have been willing to pay. If, for example, a consumer would have been willing to pay \$8 for a bushel of wheat but the price is only \$3, the consumer surplus gained by the purchase is \$5.

Consumer surplus can be derived from the market demand curve (Figure 8-6). For example, suppose the maximum price at which consumers will buy 10 units of a good is \$10. Then the 10th unit of the good purchased must be worth \$10 to consumers. If it were worth less, they would not purchase it; if it were worth more, they would have been willing to purchase it even if the price were higher. Now suppose that to get consumers to buy 11 units the price must be cut to \$9. Then the 11th unit must be worth only \$9 to consumers.

Suppose that the price is \$9. Then consumers are just willing to purchase the 11th unit of the good and thus receive no consumer surplus from their purchase of that unit. They would have been willing to pay \$10 for the 10th unit, however, and thus receive \$1 in consumer surplus from that unit. They would have been willing to pay \$12 for the 9th unit; if so, they receive \$3 of consumer surplus on that unit, and so on.

Generalizing from this example, if P is the price of a good and Q the quantity demanded at that price, then consumer surplus is calculated by subtracting P times Q from the area under the demand curve up to Q (Figure 8-7). If the price is P^1, the quantity demanded is Q^1 and the consumer surplus is measured by the area labeled a. If the price falls to P^2, the quantity demanded rises to Q^2 and consumer surplus rises to equal a plus the additional area b.

Producer surplus is an analogous concept. A producer willing to sell a good for \$2 but receiving a price of \$5 gains a producer surplus of \$3. The same procedure used to derive consumer surplus from the demand curve can be used to derive producer surplus from the supply curve. If P is the price and Q the quantity supplied at that price, then producer

[2] The effective rate of protection for a sector is formally defined as $(V_T - V_W)/V_W$, where V_W is value added in the sector at world prices and V_T value added in the presence of trade policies. In terms of our example, let P_A be the world price of an assembled automobile, P_C the world price of its components, t_A the ad valorem tariff rate on imported autos, and t_C the ad valorem tariff rate on components. You can check that if the tariffs don't affect world prices, they provide assemblers with an effective protection rate of

$$\frac{V_T - V_W}{V_W} = t_A + P_C\left(\frac{t_A - t_C}{P_A - P_C}\right).$$

Figure 8-6

Deriving Consumer Surplus from the Demand Curve

Consumer surplus on each unit sold is the difference between the actual price and what consumers would have been willing to pay.

surplus is P times Q minus the area under the supply curve up to Q (Figure 8-8). If the price is P^1, the quantity supplied will be Q^1, and producer surplus is measured by the area c. If the price rises to P^2, the quantity supplied rises to Q^2, and producer surplus rises to equal c plus the additional area d.

Some of the difficulties related to the concepts of consumer and producer surplus are technical issues of calculation that we can safely disregard. More important is the question of whether the direct gains to producers and consumers in a given market accurately measure the *social* gains. Additional benefits and costs not captured by consumer and producer surplus are at the core of the case for trade policy activism discussed in Chapter 9.

Figure 8-7

Geometry of Consumer Surplus

Consumer surplus is equal to the area under the demand curve and above the price.

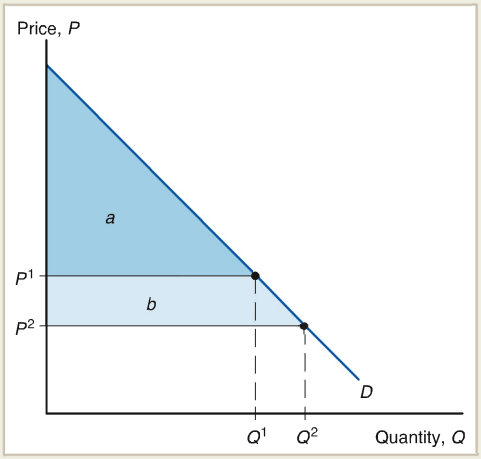
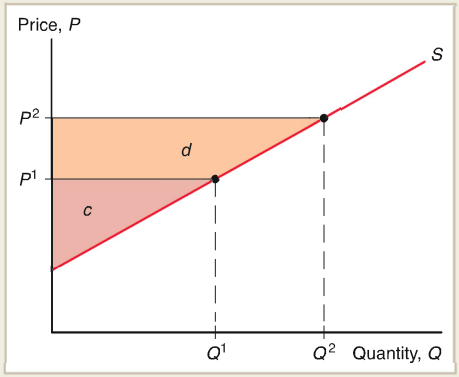


Figure 8-8

Geometry of Producer Surplus

Producer surplus is equal to the area above the supply curve and below the price.



For now, however, we will focus on costs and benefits as measured by consumer and producer surplus.

Measuring the Costs and Benefits

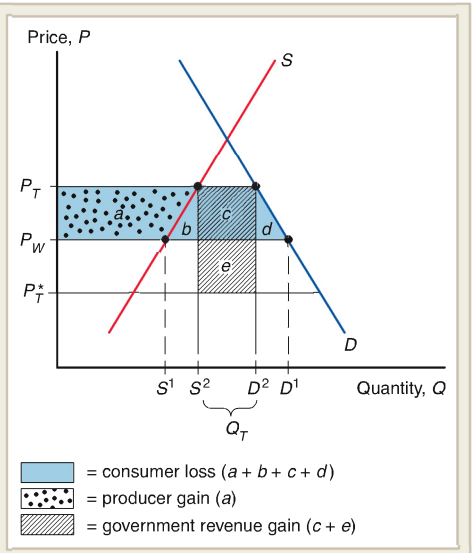
Figure 8-9 illustrates the costs and benefits of a tariff for the importing country.

The tariff raises the domestic price from P_W to P_T but lowers the foreign export price from P_W to P_T^* (refer back to Figure 8-4). Domestic production rises from S^1 to S^2, while domestic consumption falls from D^1 to D^2. The costs and benefits to different groups can be expressed as sums of the areas of five regions, labeled *a*, *b*, *c*, *d*, *e*.

Figure 8-9

Costs and Benefits of a Tariff for the Importing Country

The costs and benefits to different groups can be represented as sums of the five areas *a*, *b*, *c*, *d*, and *e*.



Consider first the gain to domestic producers. They receive a higher price and therefore have higher producer surplus. As we saw in Figure 8-8, producer surplus is equal to the area below the price but above the supply curve. Before the tariff, producer surplus was equal to the area below P_W but above the supply curve; with the price rising to P_T, this surplus rises by the area labeled a. That is, producers gain from the tariff.

Domestic consumers also face a higher price, which makes them worse off. As we saw in Figure 8-7, consumer surplus is equal to the area above the price but below the demand curve. Since the price consumers face rises from P_W to P_T, the consumer surplus falls by the area indicated by $a + b + c + d$. So consumers are hurt by the tariff.

There is a third player here as well: the government. The government gains by collecting tariff revenue. This is equal to the tariff rate t times the volume of imports $Q_T = D^2 - S^2$. Since $t = P_T - P_T^*$, the government's revenue is equal to the sum of the two areas c and e.

Since these gains and losses accrue to different people, the overall cost-benefit evaluation of a tariff depends on how much we value a dollar's worth of benefit to each group. If, for example, the producer gain accrues mostly to wealthy owners of resources, while the consumers are poorer than average, the tariff will be viewed differently than if the good is a luxury bought by the affluent but produced by low-wage workers. Further ambiguity is introduced by the role of the government: Will it use its revenue to finance vitally needed public services or waste it on $1,000 toilet seats? Despite these problems, it is common for analysts of trade policy to attempt to compute the net effect of a tariff on national welfare by assuming that at the margin a dollar's worth of gain or loss to each group is of the same social worth.

Let's look, then, at the net effect of a tariff on welfare. The net cost of a tariff is

$$\text{Consumer loss} - \text{producer gain} - \text{government revenue}, \tag{8-1}$$

or, replacing these concepts by the areas in Figure 8-9,

$$(a + b + c + d) - a - (c + e) = b + d - e. \tag{8-2}$$

That is, there are two "triangles" whose area measures loss to the nation as a whole and a "rectangle" whose area measures an offsetting gain. A useful way to interpret these gains and losses is the following: The loss triangles represent the **efficiency loss** that arises because a tariff distorts incentives to consume and produce, which the rectangle represents the **terms of trade gain** that arise because a tariff lowers foreign export prices.

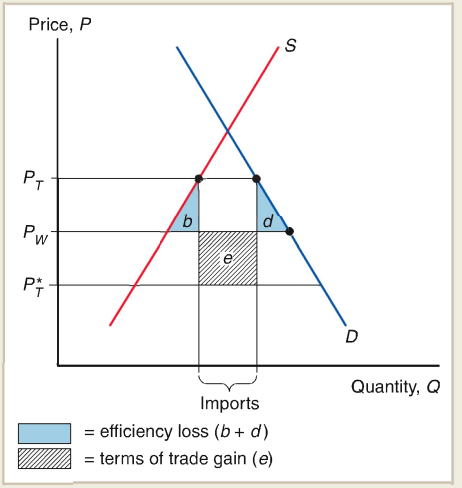
The gain depends on the ability of the tariff-imposing country to drive down foreign export prices. If the country cannot affect world prices (the "small country" case illustrated in Figure 8-5), region e, which represents the terms of trade gain, disappears, and it is clear that the tariff reduces welfare. It distorts the incentives of both producers and consumers by inducing them to act as if imports were more expensive than they actually are. The cost of an additional unit of consumption to the economy is the price of an additional unit of imports, yet because the tariff raises the domestic price above the world price, consumers reduce their consumption to the point where that marginal unit yields them welfare equal to the tariff-inclusive domestic price. The value of an additional unit of production to the economy is the price of the unit of imports it saves, yet domestic producers expand production to the point where the marginal cost is equal to the tariff-inclusive price. Thus the economy produces at home additional units of the good that it could purchase more cheaply abroad.

The net welfare effects of a tariff, then, are summarized in Figure 8-10. The negative effects consist of the two triangles b and d. The first triangle is a **production distortion loss,** resulting from the fact that the tariff leads domestic producers to produce too much of this good. The second triangle is a domestic **consumption distortion loss,** resulting from

Figure 8-10

Net Welfare Effects of a Tariff

The colored triangles represent efficiency losses, while the rectangle represents a terms of trade gain.



the fact that a tariff leads consumers to consume too little of the good. Against these losses must be set the terms of trade gain measured by the rectangle e, which results from the decline in the foreign export price caused by a tariff. In the important case of a small country that cannot significantly affect foreign prices, this last effect drops out, so that the costs of a tariff unambiguously exceed its benefits.

Other Instruments of Trade Policy

Tariffs are the simplest trade policies, but in the modern world most government intervention in international trade takes other forms, such as export subsidies, import quotas, voluntary export restraints, and local content requirements. Fortunately, once we understand tariffs it is not too difficult to understand these other trade instruments.

Export Subsidies: Theory

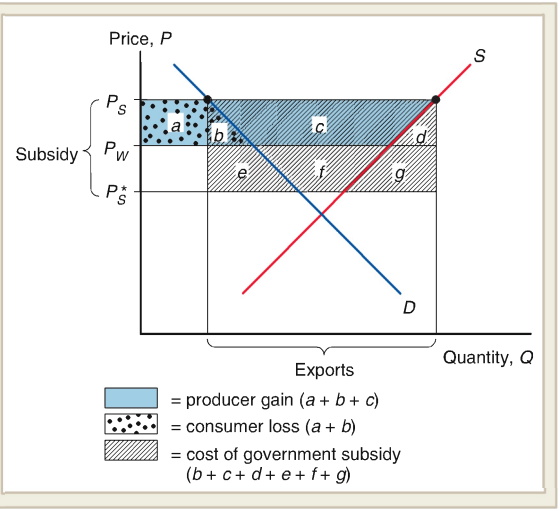
An **export subsidy** is a payment to a firm or individual that ships a good abroad. Like a tariff, an export subsidy can be either specific (a fixed sum per unit) or ad valorem (a proportion of the value exported). When the government offers an export subsidy, shippers will export the good up to the point where the domestic price exceeds the foreign price by the amount of the subsidy.

The effects of an export subsidy on prices are exactly the reverse of those of a tariff (Figure 8-11). The price in the exporting country rises from P_W to P_S, but because the price in the importing country falls from P_W to P_S^*, the price rise is less than the subsidy. In the exporting country, consumers are hurt, producers gain, and the government loses because it must expend money on the subsidy. The consumer loss is the area $a + b$; the producer gain is the area $a + b + c$; the government subsidy (the amount of exports times the amount of the subsidy) is the area $b + c + d + e + f + g$. The net welfare loss is therefore the sum of the areas $b + d + e + f + g$. Of these, b and d represent consumption and production distortion losses of the same kind that a tariff produces. In addition, and in contrast

Figure 8-11

Effects of an Export Subsidy

An export subsidy raises prices in the exporting country while lowering them in the importing country.



to a tariff, the export subsidy *worsens* the terms of trade by lowering the price of the export in the foreign market from P_W to P_S^*. This leads to the additional terms of trade loss $e + f + g$, equal to $P_W - P_S^*$ times the quantity exported with the subsidy. So an export subsidy unambiguously leads to costs that exceed its benefits.

Case Study

Europe's Common Agricultural Policy

In 1957, six Western European nations—Germany, France, Italy, Belgium, the Netherlands, and Luxembourg—formed the European Economic Community, which has since grown to include most of Europe. Now called the European Union (EU), its two biggest effects are on trade policy. First, the members of the European Union have removed all tariffs with respect to each other, creating a customs union (discussed in the next chapter). Second, the agricultural policy of the European Union has developed into a massive export subsidy program.

The European Union's Common Agricultural Policy (CAP) began not as an export subsidy, but as an effort to guarantee high prices to European farmers by having the European Union buy agricultural products whenever the prices fell below specified support levels. To prevent this policy from drawing in large quantities of imports, it was initially backed by tariffs that offset the difference between European and world agricultural prices.

Since the 1970s, however, the support prices set by the European Union have turned out to be so high that Europe, which would under free trade be an importer of most agricultural products, was producing more than consumers were willing to buy. The result was that the European Union found itself obliged to buy and store huge quantities of food. At the end of 1985, European nations had stored 780,000 tons of beef, 1.2 million tons of butter, and

12 million tons of wheat. To avoid unlimited growth in these stockpiles, the European Union turned to a policy of subsidizing exports to dispose of surplus production.

Figure 8-12 shows how the CAP works. It is, of course, exactly like the export subsidy shown in Figure 8-11, except that Europe would actually be an importer under free trade. The support price is set not only above the world price that would prevail in its absence but also above the price that would equate demand and supply even without imports. To export the resulting surplus, an export subsidy is paid that offsets the difference between European and world prices. The subsidized exports themselves tend to depress the world price, increasing the required subsidy. Cost-benefit analysis would clearly show that the combined costs to European consumers and taxpayers exceed the benefits to producers.

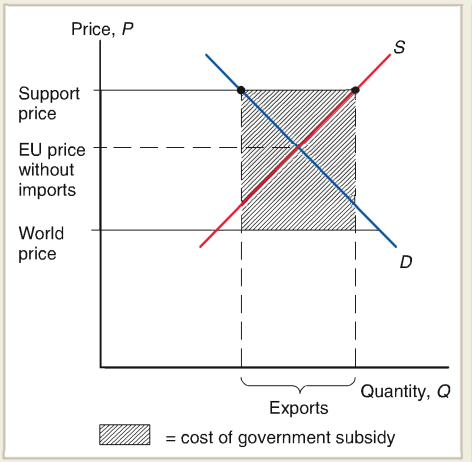
Despite the considerable net costs of the CAP to European consumers and taxpayers, the political strength of farmers in the EU has been so strong that the program has been difficult to rein in. One source of pressure has come from the United States and other food-exporting nations, which complain that Europe's export subsidies drive down the price of their own exports. The budgetary consequences of the CAP have also posed concerns: In 2005, the CAP cost European taxpayers $60 billion—and that figure doesn't include the indirect costs to food consumers. Government subsidies to European farmers are equal to about 36 percent of the value of farm output, twice the U.S. figure.

Recent reforms in Europe's agricultural policy represent an effort to reduce the distortion of incentives caused by price support, while continuing to provide aid to farmers. If politicians go through with their plans, farmers will increasingly receive direct payments that aren't tied to how much they produce; this should lower agricultural prices and reduce production.

Figure 8-12

Europe's Common Agricultural Program

Agricultural prices are fixed not only above world market levels but above the price that would clear the European market. An export subsidy is used to dispose of the resulting surplus.



Import Quotas: Theory

An import quota is a direct restriction on the quantity of some good that may be imported. The restriction is usually enforced by issuing licenses to some group of individuals or firms. For example, the United States has a quota on imports of foreign cheese. The only firms allowed to import cheese are certain trading companies, each of which is allocated the right to import a maximum number of pounds of cheese each year; the size of each firm's quota is based on the amount of cheese it imported in the past. In some important cases, notably sugar and apparel, the right to sell in the United States is given directly to the governments of exporting countries.

It is important to avoid the misconception that import quotas somehow limit imports without raising domestic prices. *An import quota always raises the domestic price of the imported good.* When imports are limited, the immediate result is that at the initial price the demand for the good exceeds domestic supply plus imports. This causes the price to be bid up until the market clears. In the end, an import quota will raise domestic prices by the same amount as a tariff that limits imports to the same level (except in the case of domestic monopoly, when the quota raises prices more than this; see the second appendix to this chapter).

The difference between a quota and a tariff is that with a quota the government receives no revenue. When a quota instead of a tariff is used to restrict imports, the sum of money that would have appeared as government revenue with a tariff is collected by whoever receives the import licenses. License holders are able to buy imports and resell them at a higher price in the domestic market. The profits received by the holders of import licenses are known as **quota rents.** In assessing the costs and benefits of an import quota, it is crucial to determine who gets the rents. When the rights to sell in the domestic market are assigned to governments of exporting countries, as is often the case, the transfer of rents abroad makes the costs of a quota substantially higher than the equivalent tariff.

Case Study

An Import Quota in Practice: U.S. Sugar

The U.S. sugar problem is similar in its origins to the European agricultural problem: A domestic price guarantee by the federal government has led to U.S. prices above world market levels. Unlike the European Union, however, the domestic supply in the United States does not exceed domestic demand. Thus the United States has been able to keep domestic prices at the target level with an import quota on sugar.

A special feature of the import quota is that the rights to sell sugar in the United States are allocated to foreign governments, which then allocate these rights to their own residents. As a result, rents generated by the sugar quota accrue to foreigners.

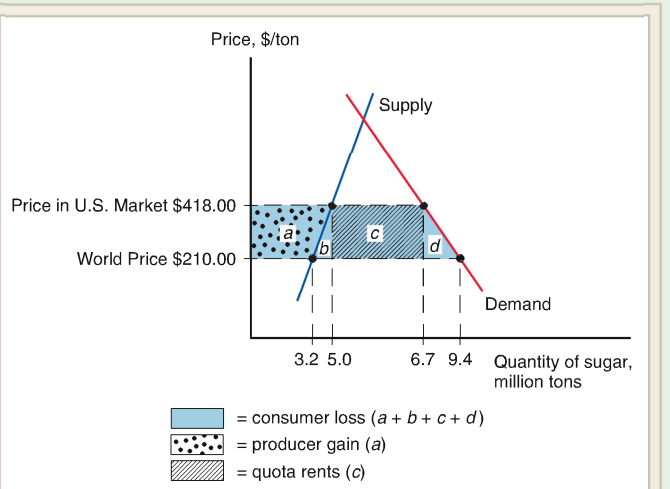
Figure 8-13 shows an estimate of the effects of the sugar quota in 2005.[3] The quota restricted imports to approximately 1.4 million tons; as a result, the price of sugar in the United States was more than twice the price in the outside world. The figure is drawn on the assumption that the United States is "small" in the world sugar market; that is, removing the quota would not have a significant effect on the world price. According to this estimate, free trade would more than double imports to 3.7 million tons.

[3] These estimates are based on a simplified version of the model in the paper by the United States International Trade Commission (2007) cited in Further Reading.

Figure 8-13

Effects of the U.S. Import Quota on Sugar

The sugar import quota holds imports to about half the level that would occur under free trade. The result is that the price of sugar is $418 per ton, versus the $210 price on world markets. This produces a gain for U.S. sugar producers, but a much larger loss for U.S. consumers. There is no offsetting gain in revenue because the quota rents are collected by foreign governments.



The welfare effects of the import quota are indicated by the areas a, b, c, and d. Consumers lose the surplus $a + b + c + d$, with a total value of $1.674 billion. Part of this consumer loss represents a transfer to U.S. sugar producers, who gain the producer surplus a $0.853 billion. Part of the loss represents the production distortion b ($0.188 billion) and the consumption distortion c ($0.281 billion). The rents to the foreign governments that receive import rights are summarized by area c, equal to $0.364 billion.

The net loss to the United States is the distortions ($a + d$) plus the quota rents (c), a total of $883 billion per year. Notice that much of this net loss comes from the fact that foreigners get the import rights.

The sugar quota illustrates in an extreme way the tendency of protection to provide benefits to a small group of producers, each of whom receives a large benefit, at the expense of a large number of consumers, each of whom bears only a small cost. In this case, the yearly consumer loss amounts to only about $6 per capita, or perhaps $20 for a typical family. Not surprisingly, the average American voter is unaware that the sugar quota exists, and so there is little effective opposition.

From the point of view of the sugar producers, however, the quota is a life-or-death issue. The U.S. sugar industry employs only about 38,000 workers, so the producer gains from the quota represent an implicit subsidy of about $20,000 per employee. It should be no surprise that sugar producers are very effectively mobilized in defense of their protection.

Opponents of protection often try to frame their criticism not in terms of consumer and producer surplus but in terms of the cost to consumers of every job "saved" by an import restriction. Economists who have studied the sugar industry believe that even with free trade, most of the U.S. industry would survive; only about 12,000 workers would be displaced. Thus the consumer cost per job saved is more than $200,000.

Voluntary Export Restraints

A variant on the import quota is the **voluntary export restraint (VER),** also known as a voluntary restraint agreement (VRA). (Welcome to the bureaucratic world of trade policy, where everything has a three-letter symbol.) A VER is a quota on trade imposed from the exporting country's side instead of the importer's. The most famous example is the limitation on auto exports to the United States enforced by Japan after 1981.

Voluntary export restraints are generally imposed at the request of the importer and are agreed to by the exporter to forestall other trade restrictions. As we will see in Chapter 9, certain political and legal advantages have made VERs preferred instruments of trade policy in some cases. From an economic point of view, however, a voluntary export restraint is exactly like an import quota where the licenses are assigned to foreign governments and is therefore very costly to the importing country.

A VER is always more costly to the importing country than a tariff that limits imports by the same amount. The difference is that what would have been revenue under a tariff becomes rents earned by foreigners under the VER, so that the VER clearly produces a loss for the importing country.

A study of the effects of the three major U.S. voluntary export restraints of the 1980s—in textiles and apparel, steel, and automobiles—found that about two-thirds of the cost to consumers of these restraints was accounted for by the rents earned by foreigners.[4] In other words, the bulk of the cost represents a transfer of income rather than a loss of efficiency. This calculation also emphasizes the point that from a national point of view, VERs are much more costly than tariffs. Given this, the widespread preference of governments for VERs over other trade policy measures requires some careful analysis.

Some voluntary export agreements cover more than one country. The most famous multilateral agreement is the Multi-Fiber Arrangement, which limited textile exports from 22 countries until the beginning of 2005. Such multilateral voluntary restraint agreements are known by yet another three-letter abbreviation as OMAs, for orderly marketing agreements.

Case Study

A Voluntary Export Restraint in Practice: Japanese Autos

For much of the 1960s and 1970s the U.S. auto industry was largely insulated from import competition by the difference in the kinds of cars bought by U.S. and foreign consumers. U.S. buyers, living in a large country with low gasoline taxes, preferred much larger cars than Europeans and Japanese, and, by and large, foreign firms had chosen not to challenge the United States in the large-car market.

In 1979, however, sharp oil price increases and temporary gasoline shortages caused the U.S. market to shift abruptly toward smaller cars. Japanese producers, whose costs had been falling relative to their U.S. competitors in any case, moved in to fill the new demand. As the Japanese market share soared and U.S. output fell, strong political forces in the United States demanded protection for the U.S. industry. Rather than act

[4] See David G. Tarr, *A General Equilibrium Analysis of the Welfare and Employment Effects of U.S. Quotas in Textiles, Autos, and Steel* (Washington, D.C.: Federal Trade Commission, 1989).

unilaterally and risk creating a trade war, the U.S. government asked the Japanese government to limit its exports. The Japanese, fearing unilateral U.S. protectionist measures if they did not do so, agreed to limit their sales. The first agreement, in 1981, limited Japanese exports to the United States to 1.68 million automobiles. A revision raised that total to 1.85 million in 1984 to 1985. In 1985, the agreement was allowed to lapse.

The effects of this voluntary export restraint were complicated by several factors. First, Japanese and U.S. cars were clearly not perfect substitutes. Second, the Japanese industry to some extent responded to the quota by upgrading its quality and selling larger autos with more features. Third, the auto industry is clearly not perfectly competitive. Nonetheless, the basic results were what the discussion of voluntary export restraints earlier would have predicted: The price of Japanese cars in the United States rose, with the rent captured by Japanese firms. The U.S. government estimates the total costs to the United States at $3.2 billion in 1984, primarily in transfers to Japan rather than efficiency losses.

Local Content Requirements

A **local content requirement** is a regulation that requires that some specified fraction of a final good be produced domestically. In some cases this fraction is specified in physical units, like the U.S. oil import quota in the 1960s. In other cases the requirement is stated in value terms, by requiring that some minimum share of the price of a good represent domestic value added. Local content laws have been widely used by developing countries trying to shift their manufacturing base from assembly back into intermediate goods. In the United States, a local content bill for automobiles was proposed in 1982 but was never acted on.

From the point of view of the domestic producers of parts, a local content regulation provides protection in the same way an import quota does. From the point of view of the firms that must buy locally, however, the effects are somewhat different. Local content does not place a strict limit on imports. It allows firms to import more, provided that they also buy more domestically. This means that the effective price of inputs to the firm is an average of the price of imported and domestically produced inputs.

Consider, for example, the earlier automobile example in which the cost of imported parts is $6,000. Suppose that to purchase the same parts domestically would cost $10,000 but that assembly firms are required to use 50 percent domestic parts. Then they will face an average cost of parts of $8,000($0.5 \times \$6{,}000 + 0.5 \times \$10{,}000$), which will be reflected in the final price of the car.

The important point is that a local content requirement does not produce either government revenue or quota rents. Instead, the difference between the prices of imports and domestic goods in effect gets averaged in the final price and is passed on to consumers.

An interesting innovation in local content regulations has been to allow firms to satisfy their local content requirement by exporting instead of using parts domestically. This is sometimes important. For example, U.S. auto firms operating in Mexico have chosen to export some components from Mexico to the United States, even though those components could be produced in the United States more cheaply, because this allowed them to use less Mexican content in producing cars in Mexico for Mexico's market.

American Buses, Made in Hungary

In 1995, sleek new buses began rolling on the streets of Miami and Baltimore. Probably very few riders were aware that these buses were made in, of all places, Hungary.

Why Hungary? Well, before the fall of communism in Eastern Europe Hungary had in fact manufactured buses for export to other Eastern bloc nations. These buses were, however, poorly designed and badly made; few people thought the industry could start exporting to Western countries any time soon.

What changed the situation was the realization by some clever Hungarian investors that there is a loophole in a little-known but important U.S. law, the Buy American Act, originally passed in 1933. This law in effect imposes local content requirements on a significant range of products.

The Buy American Act affects *procurement:* purchases by government agencies, including state and local governments. It requires that American firms be given preference in all such purchases. A bid by a foreign company can only be accepted if it is a specified percentage below the lowest bid by a domestic firm. In the case of buses and other transportation equipment, the foreign bid must be at least 25 percent below the domestic bid, effectively shutting out foreign producers in most cases. Nor can an American company simply act as a sales agent for foreigners: While "American" products can contain some foreign parts, 51 percent of the materials must be domestic.

What the Hungarians realized was that they could set up an operation that just barely met this criterion. They set up two operations: One in Hungary, producing the shells of buses (the bodies, without anything else), and an assembly operation in Georgia. American axles and tires were shipped to Hungary, where they were put onto the bus shells; these were then shipped back to the United States, where American-made engines and transmissions were installed. The whole product was slightly more than 51 percent American, and thus these were legally "American" buses which city transit authorities were allowed to buy. The advantage of the whole scheme was the opportunity to use inexpensive Hungarian labor: Although Hungarian workers take about 1,500 hours to assemble a bus compared with less than 900 hours in the United States, their $4 per hour wage rate made all the transshipment worthwhile.

Other Trade Policy Instruments

There are many other ways in which governments influence trade. We list some of them briefly.

1. *Export credit subsidies.* This is like an export subsidy except that it takes the form of a subsidized loan to the buyer. The United States, like most countries, has a government institution, the Export-Import Bank, that is devoted to providing at least slightly subsidized loans to aid exports.

2. *National procurement.* Purchases by the government or strongly regulated firms can be directed toward domestically produced goods even when these goods are more expensive than imports. The classic example is the European telecommunications industry. The nations of the European Union in principle have free trade with each other. The main purchasers of telecommunications equipment, however, are phone companies—and in Europe these companies have until recently all been government-owned. These government-owned telephone companies buy from domestic suppliers even when the suppliers charge higher prices than suppliers in other countries. The result is that there is very little trade in telecommunications equipment within Europe.

3. *Red-tape barriers.* Sometimes a government wants to restrict imports without doing so formally. Fortunately or unfortunately, it is easy to twist normal health, safety,

TABLE 8-1 Effects of Alternative Trade Policies

	Tariff	Export Subsidy	Import Quota	Voluntary Export Restraint
Producer surplus	Increases	Increases	Increases	Increases
Consumer surplus	Falls	Falls	Falls	Falls
Government revenue	Increases	Falls (government spending rises)	No change (rents to license holders)	No change (rents to foreigners)
Overall national welfare	Ambiguous (falls for small country)	Falls	Ambiguous (falls for small country)	Falls

and customs procedures so as to place substantial obstacles in the way of trade. The classic example is the French decree in 1982 that all Japanese videocassette recorders must pass through the tiny customs house at Poitiers—effectively limiting the actual imports to a handful.

The Effects of Trade Policy: A Summary

The effects of the major instruments of trade policy can be usefully summarized by Table 8-1, which compares the effect of four major kinds of trade policy on the welfare of consumers, producers, the government, and the nation as a whole.

This table does not look like an advertisement for interventionist trade policy. All four trade policies benefit producers and hurt consumers. The effects of the policies on economic welfare are at best ambiguous; two of the policies definitely hurt the nation as a whole, while tariffs and import quotas are potentially beneficial only for large countries that can drive down world prices.

Why, then, do governments so often act to limit imports or promote exports? We turn to this question in Chapter 9.

SUMMARY

1. In contrast to our earlier analysis, which stressed the general equilibrium interaction of markets, for analysis of trade policy it is usually sufficient to use a partial equilibrium approach.
2. A tariff drives a wedge between foreign and domestic prices, raising the domestic price but by less than the tariff rate. An important and relevant special case, however, is that of a "small" country that cannot have any substantial influence on foreign prices. In the small country case a tariff is fully reflected in domestic prices.
3. The costs and benefits of a tariff or other trade policy may be measured using the concepts of consumer surplus and producer surplus. Using these concepts, we can show that the domestic producers of a good gain, because a tariff raises the price they receive; the domestic consumers lose, for the same reason. There is also a gain in government revenue.

4. If we add together the gains and losses from a tariff, we find that the net effect on national welfare can be separated into two parts. There is an efficiency loss, which results from the distortion in the incentives facing domestic producers and consumers. On the other hand, there is a terms of trade gain, reflecting the tendency of a tariff to drive down foreign export prices. In the case of a small country that cannot affect foreign prices, the second effect is zero, so that there is an unambiguous loss.
5. The analysis of a tariff can be readily adapted to other trade policy measures, such as export subsidies, import quotas, and voluntary export restraints. An export subsidy causes efficiency losses similar to a tariff but compounds these losses by causing a deterioration of the terms of trade. Import quotas and voluntary export restraints differ from tariffs in that the government gets no revenue. Instead, what would have been government revenue accrues as rents to the recipients of import licenses in the case of a quota and to foreigners in the case of a voluntary export restraint.

KEY TERMS

ad valorem tariff, p. 182
consumer surplus, p. 188
consumption distortion loss, p. 191
effective rate of protection, p. 187
efficiency loss, p. 191
export restraint, p. 183
export subsidy, p. 192
export supply curve, p. 183
import demand curve, p. 183
import quota, p. 183
local content requirement, p. 198
nontariff barriers, p. 183
producer surplus, p. 188
production distortion loss, p. 191
quota rent, p. 195
specific tariff, p. 182
terms of trade gain, p. 191
voluntary export restraint (VER), p. 197

PROBLEMS

1. Home's demand curve for wheat is

$$D = 100 - 20P.$$

Its supply curve is

$$S = 20 + 20P.$$

Derive and graph Home's *import* demand schedule. What would the price of wheat be in the absence of trade?

2. Now add Foreign, which has a demand curve

$$D^* = 80 - 20P,$$

and a supply curve

$$S^* = 40 + 20P.$$

   a. Derive and graph Foreign's *export* supply curve and find the price of wheat that would prevail in Foreign in the absence of trade.
   b. Now allow Foreign and Home to trade with each other, at zero transportation cost. Find and graph the equilibrium under free trade. What is the world price? What is the volume of trade?

3. Home imposes a specific tariff of 0.5 on wheat imports.
   a. Determine and graph the effects of the tariff on the following: (1) the price of wheat in each country; (2) the quantity of wheat supplied and demanded in each country; (3) the volume of trade.
   b. Determine the effect of the tariff on the welfare of each of the following groups: (1) Home import-competing producers; (2) Home consumers; (3) the Home government.
   c. Show graphically and calculate the terms of trade gain, the efficiency loss, and the total effect on welfare of the tariff.
4. Suppose that Foreign had been a much larger country, with domestic demand

$$D^* = 800 - 200P, S^* = 400 + 200P.$$

   (Notice that this implies that the Foreign price of wheat in the absence of trade would have been the same as in problem 2.)
   Recalculate the free trade equilibrium and the effects of a 0.5 specific tariff by Home. Relate the difference in results to the discussion of the small country case in the text.
5. What would be the effective rate of protection on bicycles in China if China places a 50 percent tariff on bicycles, which have a world price of $200, and no tariff on bike components, which together have a world price of $100?
6. The United States simultaneously limits imports of ethanol for fuel purposes, and provides incentives for the use of ethanol in gasoline, which raise the price of ethanol by about 15 percent relative to what it would be otherwise. We do, however, have free trade in corn, which is fermented and distilled to make ethanol, and accounts for approximately 55 percent of the cost. What is the effective rate of protection on the process of turning corn into ethanol?
7. Return to the example of problem 2. Starting from free trade, assume that Foreign offers exporters a subsidy of 0.5 per unit. Calculate the effects on the price in each country and on welfare, both of individual groups and of the economy as a whole, in both countries.
8. Use your knowledge about trade policy to evaluate each of the following statements:
   a. "An excellent way to reduce unemployment is to enact tariffs on imported goods."
   b. "Tariffs had a more negative effect on welfare in large countries than in small countries."
   c. "Automobile manufacturing jobs are leaving to Mexico because wages are so much lower there than in the United States. As a result, we should implement tariffs on automobiles equal to the difference between U.S. and Mexican wage rates."
9. The nation of Acirema is "small," unable to affect world prices. It imports peanuts at the price of $10 per bag. The demand curve is

$$D = 400 - 10P.$$

   The supply curve is

$$S = 50 + 5P.$$

   Determine the free trade equilibrium. Then calculate and graph the following effects of an import quota that limits imports to 50 bags.
   a. The increase in the domestic price.
   b. The quota rents.
   c. The consumption distortion loss.
   d. The production distortion loss.

10. If tariffs, quotas, and subsidies each cause net welfare losses, why are they so common, especially in agriculture, among the industrialized countries such as the United States and the members of the European Union?

11. Suppose that workers involved in manufacturing are paid less than all other workers in the economy. What would be the effect on the real income *distribution* within the economy if there were a substantial tariff levied on manufactured goods?

FURTHER READING

Jagdish Bhagwati. "On the Equivalence of Tariffs and Quotas," in Robert E. Baldwin et al., eds. *Trade, Growth, and the Balance of Payments*. Chicago: Rand McNally, 1965. The classic comparison of tariffs and quotas under monopoly.

W. M. Corden. *The Theory of Protection*. Oxford: Clarendon Press, 1971. A general survey of the effects of tariffs, quotas, and other trade policies.

Robert W. Crandall. *Regulating the Automobile*. Washington, D.C.: Brookings Institution, 1986. Contains an analysis of the most famous of all voluntary export restraints.

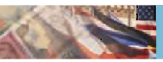
Gary Clyde Hufbauer and Kimberly Ann Elliot. *Measuring the Costs of Protection in the United States*. Washington, D.C.: Institute for International Economics, 1994. An assessment of U.S. trade policies in 21 different sectors.

Kala Krishna. "Trade Restrictions as Facilitating Practices." *Journal of International Economics* 26 (May 1989), pp. 251–270. A pioneering analysis of the effects of import quotas when both foreign and domestic producers have monopoly power, showing that the usual result is an increase in the profits of both groups—at consumers' expense.

Patrick Messerlin. *Measuring the Costs of Protection in Europe: European Commercial Policy in the 2000s*. Washington, D.C.: Institute for International Economics, 2001. A survey of European trade policies and their effects, similar to Hufbauer and Elliot's work for the United States.

D. Rousslang and A. Suomela. "Calculating the Consumer and Net Welfare Costs of Import Relief." U.S. International Trade Commission Staff Research Study 15. Washington, D.C.: International Trade Commission, 1985. An exposition of the framework used in this chapter, with a description of how the framework is applied in practice to real industries.

U.S. International Trade Commission. *The Economic Effects of Significant U.S. Import Restraints*. Washington, 2007. A regularly updated economic analysis of the effects of protection on the U.S. economy.



APPENDIX 1 TO CHAPTER 8

Tariff Analysis in General Equilibrium

The text of this chapter takes a partial equilibrium approach to the analysis of trade policy. That is, it focuses on the effects of tariffs, quotas, and other policies in a single market without explicitly considering the consequences for other markets. This partial equilibrium approach usually is adequate, and it is much simpler than a full general equilibrium treatment that takes cross-market effects into account. Nonetheless, it is sometimes important to do the general equilibrium analysis. In Chapter 5 we presented a brief discussion of the effects of tariffs in general equilibrium. This appendix presents a more detailed analysis.

The analysis proceeds in two stages. First, we analyze the effects of a tariff in a small country, one that cannot affect its terms of trade; then we analyze the case of a large country.

A Tariff in a Small Country

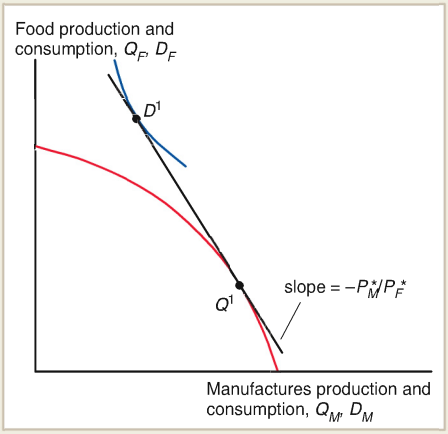
Imagine a country that produces and consumes two goods, manufactures and food. The country is small, unable to affect its terms of trade; we will assume that it exports manufactures and imports food. Thus the country sells its manufactures to the world market at a given world price P_M^* and buys food at a given world price P_F^*.

Figure 8A1-1 illustrates the position of this country in the absence of a tariff. The economy produces at the point on its production possibility frontier that is tangent to a line with slope $-P_M^*/P_F^*$, indicated by Q^1. This line also defines the economy's budget constraint, that is, all the consumption points it can afford. The economy chooses the point on the budget constraint that is tangent to the highest possible indifference curve; this point is shown as D^1.

Figure 8A1-1

Free Trade Equilibrium for a Small Country

The country produces at the point on its production frontier that is tangent to a line whose slope equals relative prices, and it consumes at the point on the budget line tangent to the highest possible indifference curve.



Now suppose the government imposes an ad valorem tariff at a rate t. Then the price of food facing both consumers and domestic producers rises to $P_F^*(1 + t)$, and the relative price line therefore gets flatter, with a slope $-P_M^*/P_F^*(1 + t)$.

The effect of this fall in the relative price of manufactures on production is straightforward: Output of manufactures falls, while output of food rises. In Figure 8A1-2, this shift in production is shown by the movement of the production point from Q^1, shown in Figure 8A1-1, to Q^2.

The effect on consumption is more complicated; the tariff generates revenue, which must be spent somehow. In general, the precise effect of a tariff depends on exactly how the government spends the tariff revenue. Consider the case in which the government returns any tariff revenue to consumers. In this case the budget constraint of consumers is *not* the line with slope $-P_M^*/P_F^*(1 + t)$ that passes through the production point Q^2; consumers can spend more than this, because in addition to the income they generate by producing goods they receive the tariff revenue collected by the government.

How do we find the true budget constraint? Notice that trade must still be balanced at world prices. That is,

$$P_M^* \times (Q_M - D_M) = P_F^* \times (D_F - Q_F)$$

where Q refers to output and D to consumption of manufactures and food, respectively. The left-hand side of this expression therefore represents the value of exports at world prices, while the right-hand side represents the value of imports. This expression may be rearranged to show that the value of consumption equals the value of production at world prices:

$$P_M^* \times Q_M + P_F^* \times Q_F = P_M^* \times D_M + P_F^* \times D_F$$

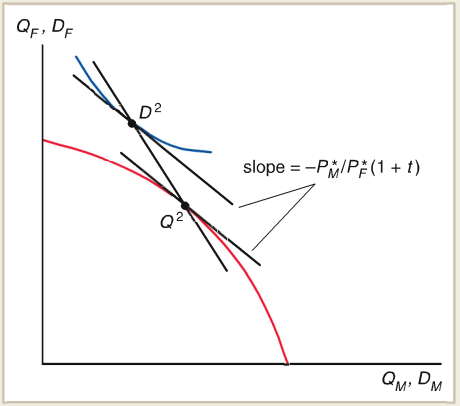
This defines a budget constraint that passes through the production point Q^2, with a slope of $-P_M^*/P_F^*$. The consumption point must lie on this new budget constraint.

Consumers will not, however, choose the point on the new budget constraint at which this constraint is tangent to an indifference curve. Instead, the tariff causes them to consume less food and more manufactures. In Figure 8A1-2 the consumption point after the tariff is

Figure 8A1-2

A Tariff in a Small Country

The country produces less of its export good and more of its imported good. Consumption is also distorted. The result is a reduction in both welfare and the volume of the country's trade.



shown as D^2: It lies on the new budget constraint, but on an indifference curve that is tangent to a line with slope $-P_M^*/P_F^*(1 + t)$. This line lies above the line with the same slope that passes through the production point Q^2; the difference is the tariff revenue redistributed to consumers.

By examining Figure 8A1-2 and comparing it with Figure 8A1-1, we can see three important points:

1. Welfare is less with a tariff than under free trade. That is, D^2 lies on a lower indifference curve than D^1.

2. The reduction in welfare comes from two effects. (a) The economy no longer produces at a point that maximizes the value of income at world prices. The budget constraint that passes through Q^2 lies inside the constraint passing through Q^1. (b) Consumers do not choose the welfare-maximizing point on the budget constraint; they do not move up to an indifference curve that is tangent to the economy's true budget constraint. Both (a) and (b) result from the fact that domestic consumers and producers face prices that are different from world prices. The loss in welfare due to inefficient production (a) is the general equilibrium counterpart of the production distortion loss we described in the partial equilibrium approach in this chapter, and the loss in welfare due to inefficient consumption (b) is the counterpart of the consumption distortion loss.

3. Trade is reduced by the tariff. Exports and imports are both less after the tariff is imposed than before.

These are the effects of a tariff imposed by a small country. We next turn to the effects of a tariff imposed by a large country.

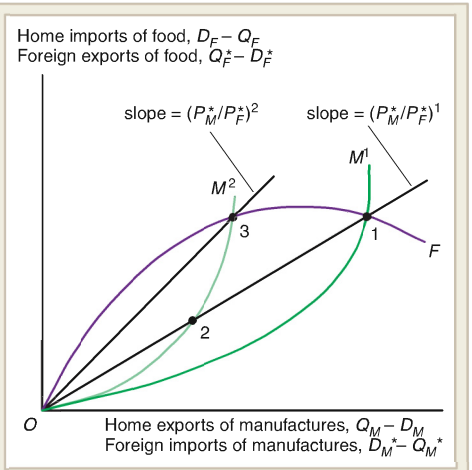
A Tariff in a Large Country

To address the large country case, we use the offer curve technique developed in the appendix to Chapter 5. We consider two countries: Home, which exports manufactures and imports food, and its trading partner Foreign. In Figure 8A1-3, Foreign's offer curve is represented

Figure 8A1-3

Effect of a Tariff on the Terms of Trade

The tariff causes the country to trade less at any *given* terms of trade; thus its offer curve shifts in. This implies, however, that the terms of trade must improve. The gain from improved terms of trade may offset the losses from the distortion of production and consumption, which reduces welfare at any given terms of trade.



by OF. Home's offer curve in the absence of a tariff is represented by OM^1. The free trade equilibrium is determined by the intersection of OF and OM^1, at point 1, with a relative price of manufactures on the world market $(P_M^*/P_F^*)^1$.

Now suppose that Home imposes a tariff. We first ask, how would its trade change if there were no change in its terms of trade? We already know the answer from the small country analysis: For a given world price, a tariff reduces both exports and imports. Thus if the world relative price of manufactures remained at $(P_M^*/P_F^*)^1$, Home's offer would shift in from point 1 to point 2. More generally, if Home imposes a tariff its overall offer curve will shrink in to a curve like OM^2, passing through point 2.

But this shift in Home's offer curve will change the equilibrium terms of trade. In Figure 8A1-3, the new equilibrium is at point 3, with a relative price of manufactures $(P_M^*/P_F^*)^2 > (P_M^*/P_F^*)^1$. That is, the tariff improves Home's terms of trade.

The effects of the tariff on Home's welfare are ambiguous. On one side, if the terms of trade did not improve, we have just seen from the small country analysis that the tariff would reduce welfare. On the other side, the improvement in Home's terms of trade tends to increase welfare. So the welfare effect can go either way, just as in the partial equilibrium analysis.

APPENDIX 2 TO CHAPTER 8

Tariffs and Import Quotas in the Presence of Monopoly

The trade policy analysis in this chapter assumed that markets are perfectly competitive, so that all firms take prices as given. As we argued in Chapter 6, however, many markets for internationally traded goods are imperfectly competitive. The effects of international trade policies can be affected by the nature of the competition in a market.

When we analyze the effects of trade policy in imperfectly competitive markets, a new consideration appears: International trade limits monopoly power, and policies that limit trade may therefore increase monopoly power. Even if a firm is the only producer of a good in a country, it will have little ability to raise prices if there are many foreign suppliers and free trade. If imports are limited by a quota, however, the same firm will be free to raise prices without fear of competition.

The link between trade policy and monopoly power may be understood by examining a model in which a country imports a good and its import-competing production is controlled by only *one* firm. The country is small on world markets, so that the price of the import is unaffected by its trade policy. For this model, we examine and compare the effects of free trade, a tariff, and an import quota.

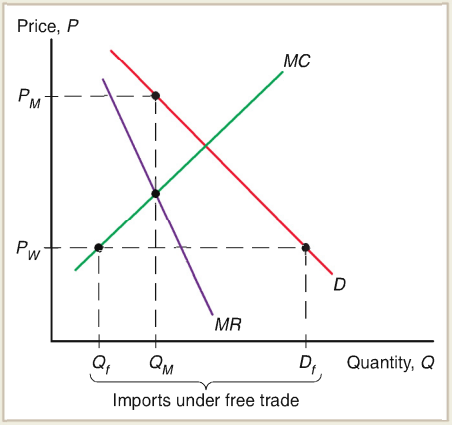
The Model with Free Trade

Figure 8A2-1 shows free trade in a market where a domestic monopolist faces competition from imports. D is the domestic demand curve: demand for the product by domestic residents. P_W is the world price of the good; imports are available in unlimited quantities at that price. The domestic industry is assumed to consist of only a single firm, whose marginal cost curve is MC.

Figure 8A2-1

A Monopolist Under Free Trade

The threat of import competition forces the monopolist to behave like a perfectly competitive industry.



If there were no trade in this market, the domestic firm would behave as an ordinary profit-maximizing monopolist. Corresponding to D is a marginal revenue curve MR, and the firm would choose the monopoly profit-maximizing level of output Q_M and price P_M.

With free trade, however, this monopoly behavior is not possible. If the firm tried to charge P_M, or indeed any price above P_W, nobody would buy its product, because cheaper imports would be available. Thus international trade puts a lid on the monopolist's price at P_W.

Given this limit on its price, the best the monopolist can do is produce up to the point where marginal cost is equal to the world price, at Q_f. At the price P_W, domestic consumers will demand D_f units of the good, so imports will be $D_f - Q_f$. This outcome, however, is exactly what would have happened if the domestic industry had been perfectly competitive. With free trade, then, the fact that the domestic industry is a monopoly does not make any difference to the outcome.

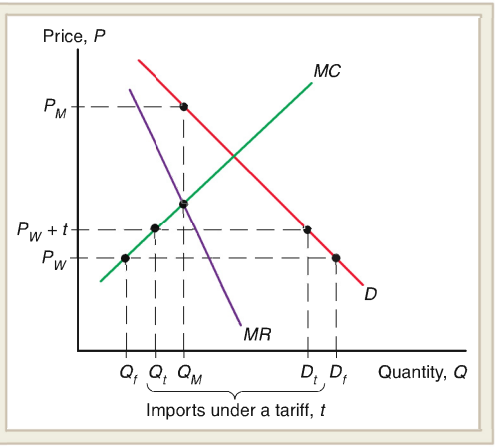
The Model with a Tariff

The effect of a tariff is to raise the maximum price the domestic industry can charge. If a specific tariff t is charged on imports, the domestic industry can now charge $P_W + t$ (Figure 8A2-2). The industry still is not free to raise its price all the way to the monopoly price, however, because consumers will still turn to imports if the price rises above the world price plus the tariff. Thus the best the monopolist can do is to set price equal to marginal cost, at Q_t. The tariff raises the domestic price as well as the output of the domestic industry, while demand falls to D_t and thus imports fall. However, the domestic industry still produces the same quantity as if it were perfectly competitive.[1]

Figure 8A2-2

A Monopolist Protected by a Tariff

The tariff allows the monopolist to raise its price, but the price is still limited by the threat of imports.

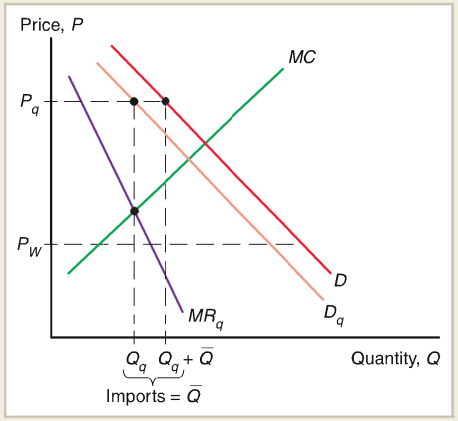


[1] There is one case in which a tariff will have different effects on a monopolistic industry than on a perfectly competitive one. This is the case where a tariff is so high that imports are completely eliminated (a prohibitive tariff). For a competitive industry, once imports have been eliminated, any further increase in the tariff has no effect. A monopolist, however, will be forced to limit its price by the *threat* of imports even if actual imports are zero. Thus an increase in a prohibitive tariff will allow a monopolist to raise its price closer to the profit-maximizing price P_M.

Figure 8A2-3

A Monopolist Protected by an Import Quota

The monopolist is now free to raise prices, knowing that the domestic price of imports will rise too.



The Model with an Import Quota

Suppose the government imposes a limit on imports, restricting their quantity to a fixed level $\overline{Q}$. Then the monopolist knows that when it charges a price above P_W, it will not lose all its sales. Instead, it will sell whatever domestic demand is at that price, minus the allowed imports $\overline{Q}$. Thus the demand facing the monopolist will be domestic demand less allowed imports. We define the postquota demand curve as D_q; it is parallel to the domestic demand curve D but shifted $\overline{Q}$ units to the left (Figure 8A2-3).

Corresponding to D_q is a new marginal revenue curve MR_q. The firm protected by an import quota maximizes profit by setting marginal cost equal to this new marginal revenue, producing Q_q and charging the price P_q. (The license to import one unit of the good will therefore yield a rent of $P_q - P_W$.)

Comparing a Tariff and a Quota

We now ask how the effects of a tariff and a quota compare. To do this, we compare a tariff and a quota that lead to *the same level of imports* (Figure 8A2-4). The tariff level t leads to a level of imports $\overline{Q}$; we therefore ask what would happen if instead of a tariff the government simply limited imports to $\overline{Q}$.

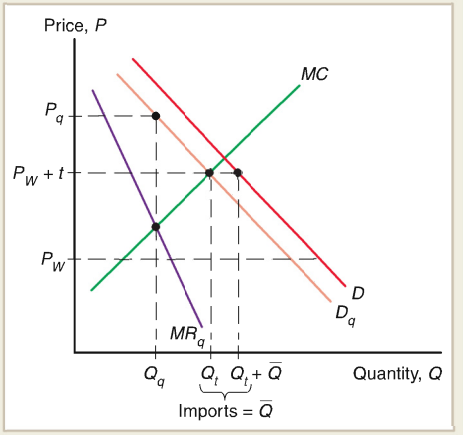
We see from the figure that the results are not the same. The tariff leads to domestic production of Q_t and a domestic price of $P_W + t$. The quota leads to a lower level of domestic production, Q_q, and a higher price, P_q. When protected by a tariff the monopolistic domestic industry behaves as if it were perfectly competitive; when protected by a quota it clearly does not.

The reason for this difference is that an import quota creates more monopoly power than a tariff. When monopolistic industries are protected by tariffs, domestic firms know that if they raise their prices too high they will still be undercut by imports. An import quota, on the other hand, provides absolute protection: No matter how high the domestic price, imports cannot exceed the quota level.

Figure 8A2-4

Comparing a Tariff and a Quota

A quota leads to lower domestic output and a higher price than a tariff that yields the same level of imports.



This comparison seems to say that if governments are concerned about domestic monopoly power, they should prefer tariffs to quotas as instruments of trade policy. In fact, however, protection has increasingly drifted away from tariffs toward nontariff barriers, including import quotas. To explain this, we need to look at considerations other than economic efficiency that motivate governments.