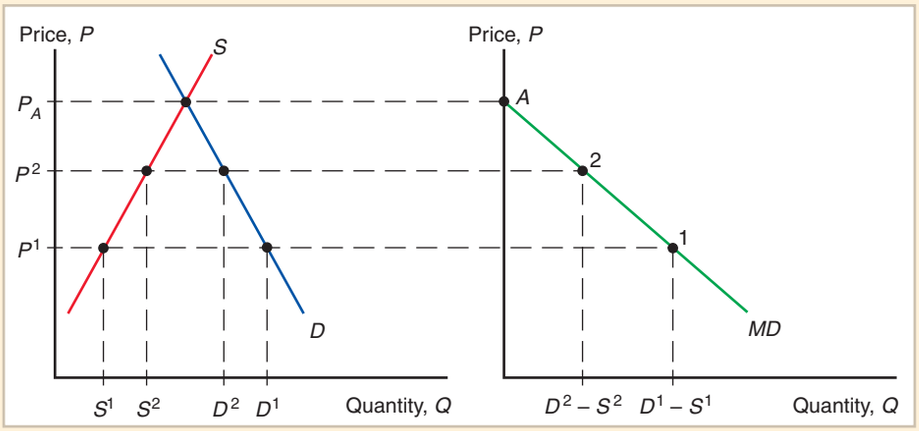


Figure 9-1

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.

the absence of trade, so the Home import demand curve intercepts the price axis at P_A (import demand = zero at P_A).

Figure 9-2 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

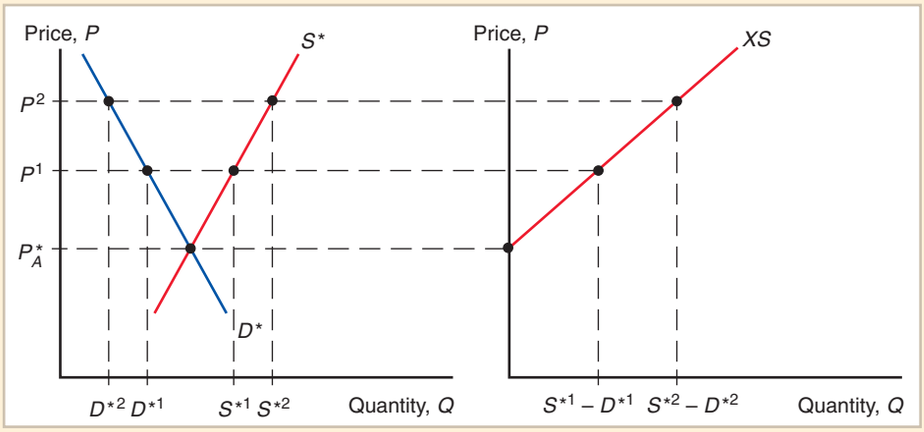


Figure 9-2

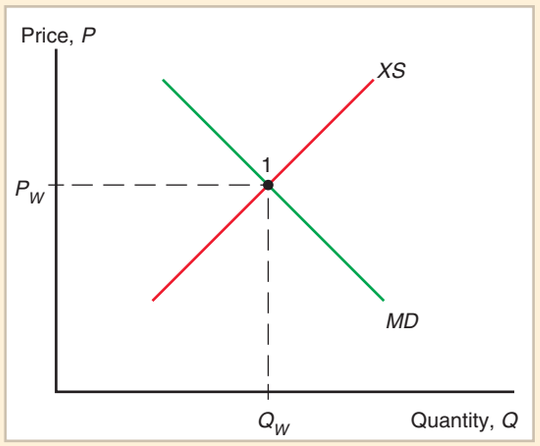
Deriving Foreign's Export Supply Curve

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 9-3

World Equilibrium

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



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^*).

World equilibrium occurs when Home import demand equals Foreign export supply (Figure 9-3). At the price P_W where the two curves cross, world supply equals world demand. At the equilibrium point 1 in Figure 9-3,

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

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 9-4 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

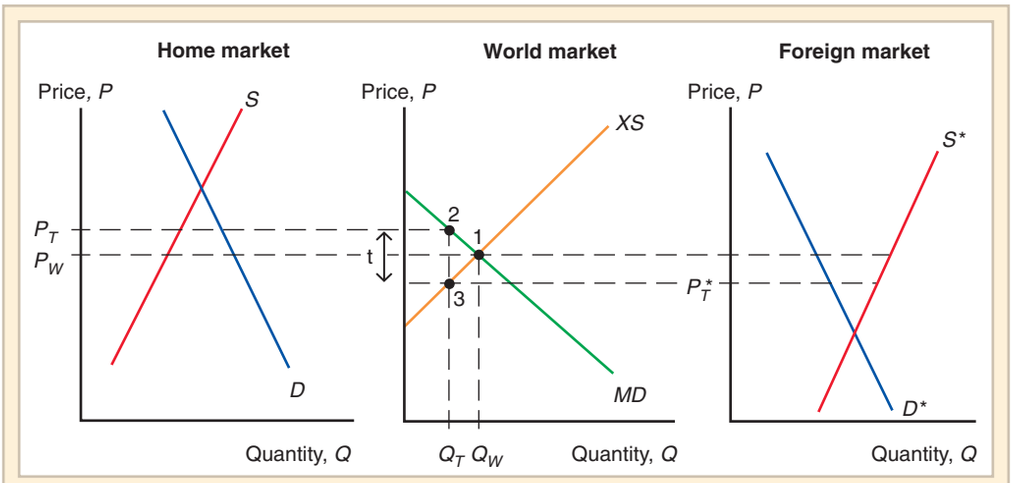


Figure 9-4

Effects of a Tariff

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

volume with a tariff. At the trade volume Q_T, Home import demand equals Foreign export supply when $P_T - P_T^* = t$.

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 thus 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 very small in practice. 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 9-5. In this case, a tariff raises the price of the imported 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 35 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.

Tariffs for the Long Haul

We just saw how a tariff can be used to increase producer surplus at the expense of a loss in consumer surplus. There are also many other indirect costs of tariffs: They can lead trading partners to retaliate with their own tariffs (thus hurting exporting producers in the country that first imposed the tariff); they can also be fiendishly hard to remove later on even after economic conditions have completely changed, because they help to politically organize the small group of producers that is protected from foreign competition. (We will discuss this further in Chapter 10.) Finally, large tariffs can induce producers to behave in creative—though ultimately wasteful—ways in order to avoid them.

In the case of the tariff known as the "Chicken Tax," the tariff lasted for so long (47 years, and counting) that it ended up hurting the same producers that had intensively lobbied to maintain the tariff in the first place![*] This tariff got its name because it was a retaliation by U.S. President Lyndon Johnson's administration against a tariff on U.S. chicken exports imposed by Western Europe in the early 1960s. The U.S. retaliation, focusing on Germany (one of the main political forces behind the original chicken tariff), imposed a 25 percent tariff on imports of light commercial truck vehicles. At the time, Volkswagen was a big producer of such vehicles and exported many of them to the United States. As time went by, many

illustrated in Figure 9-5), region *e*, which represents the terms of trade gain, disappears, and it is clear that the tariff reduces welfare. A tariff 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 at which that marginal unit yields them welfare equal to the tariff-inclusive domestic price. This means that 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 at which 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 are summarized in Figure 9-10. The negative effects consist of the two triangles *b* and *d*. The first triangle is the **production distortion loss** resulting from the fact that the tariff leads domestic producers to produce too much of this good. The second triangle is the domestic **consumption distortion loss** resulting from 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; thus 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 have understood tariffs, it is not too difficult to understand these other trade instruments.

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, in which the quota raises prices more than this; see the 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 with a tariff as government revenue is collected by whoever receives the import licenses. License holders are thus 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. The quotas restrict the imports of both raw sugar (almost exclusively, sugar cane) as well as refined sugar. We now describe the most recent forecast for the effects of the import restrictions on raw sugar cane (the effects on the sugar refining industry are more complicated, as raw sugar is a key input of production for that industry).[3]

Figure 9-13 shows those forecasted effects for 2013. The quota would restrict imports to approximately 3 million tons; as a result, the price of raw sugar in the United States would be 35 percent above the price in the outside world. The figure is drawn with the assumption that the United States is "small" in the world market for raw sugar; that is, removing the quota would not have a significant effect on the world price. According to this estimate, free trade would increase sugar imports by 66 percent.

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 $884 million. Part of this consumer loss represents a transfer to U.S. sugar producers, who gain the producer surplus a equal to $272 million. Part of the loss represents the production distortion b ($68 million) and the consumption distortion d ($91 million). The rents to the foreign governments that receive import rights are summarized by area c, equal to $453 million.

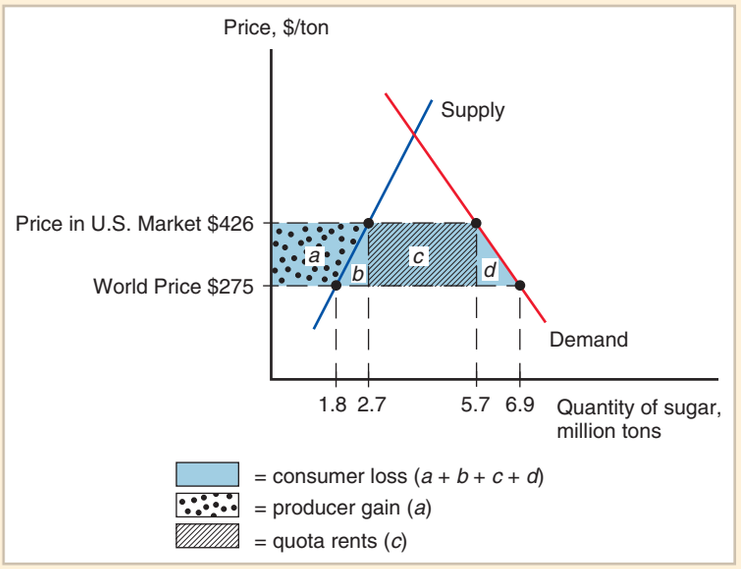
The net loss to the United States is equal to the distortions ($b + d$) plus the quota rents (c), a total of $612 million per year. Notice that much of this net loss comes from the fact that foreigners get the import rights.

[3]These estimates are based on a report by the U.S. International Trade Commission, *The Economic Effects of Significant U.S. Import Restraints.* (Washington, D.C., 2009) cited in Further Readings.

Figure 9-13

Effects of the U.S. Import Quota on Sugar

The quota limits imports of raw sugar to 3 million tons. Without the quota, imports of sugar would be 66 percent higher, or 5.1 million tons. The result of the quota is that the price of sugar is $426 per ton, versus the $275 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 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 $3 per capita, or a little more than $11 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 raw sugar producers (farmers and processors), however, the quota is a life-or-death issue. These producers employ only about 6,500 workers, so the producer gains from the quota represent an implicit subsidy of about $42,000 per employee. It should be no surprise that these 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. Clearly, the loss of the $42,000 subsidy per employee indirectly provided by the quota would force raw sugar producers to drastically reduce their employment. Without the quota, it is forecasted that 32 percent of the 6,500 jobs would be lost. This implies that the cost to the U.S. consumer is equal to $432,000 per job saved.

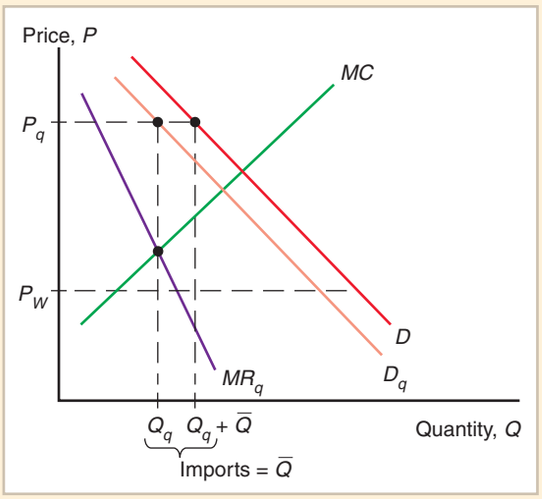
When one also considers that raw sugar is a key input of refined sugar (which is then used to produce a vast variety of confectionery consumer goods), the costs escalate even higher. In Chapter 4 we briefly mentioned these costs, which were roughly double the ones we have summarized here for raw sugar only. When one further considers that the high cost of sugar reduces employment in those sugar-using industries, the issue is no longer that the consumer cost per job saved is astronomically high; rather, it is plainly that jobs are being *lost*, not saved, by the sugar quota. The U.S. Department of Commerce has estimated that, for every farming/processing job saved by high sugar prices, three jobs are lost in the confectionery manufacturing industries.[4]

[4]See U.S Department of Commerce, International Trade Administration, *Employment Changes in U.S. Food Manufacturing: The Impact of Sugar Prices*, 2006.

Figure 9A-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 post-quota demand curve as D_q; it is parallel to the domestic demand curve D but shifted $\overline{Q}$ units to the left (Figure 9A-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 9A-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 $\overline{Q}$.

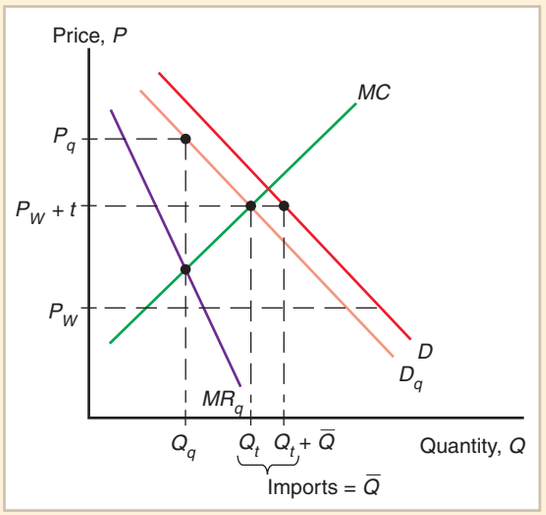
We see from the figure that the results are not the same. The tariff leads to domestic production of Q_t and a domestic price of $P_W + t$. The quota leads to a lower level of domestic production, Q_q, and a higher price, P_q. When protected by a tariff, the monopolistic domestic industry behaves as 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 9A-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.