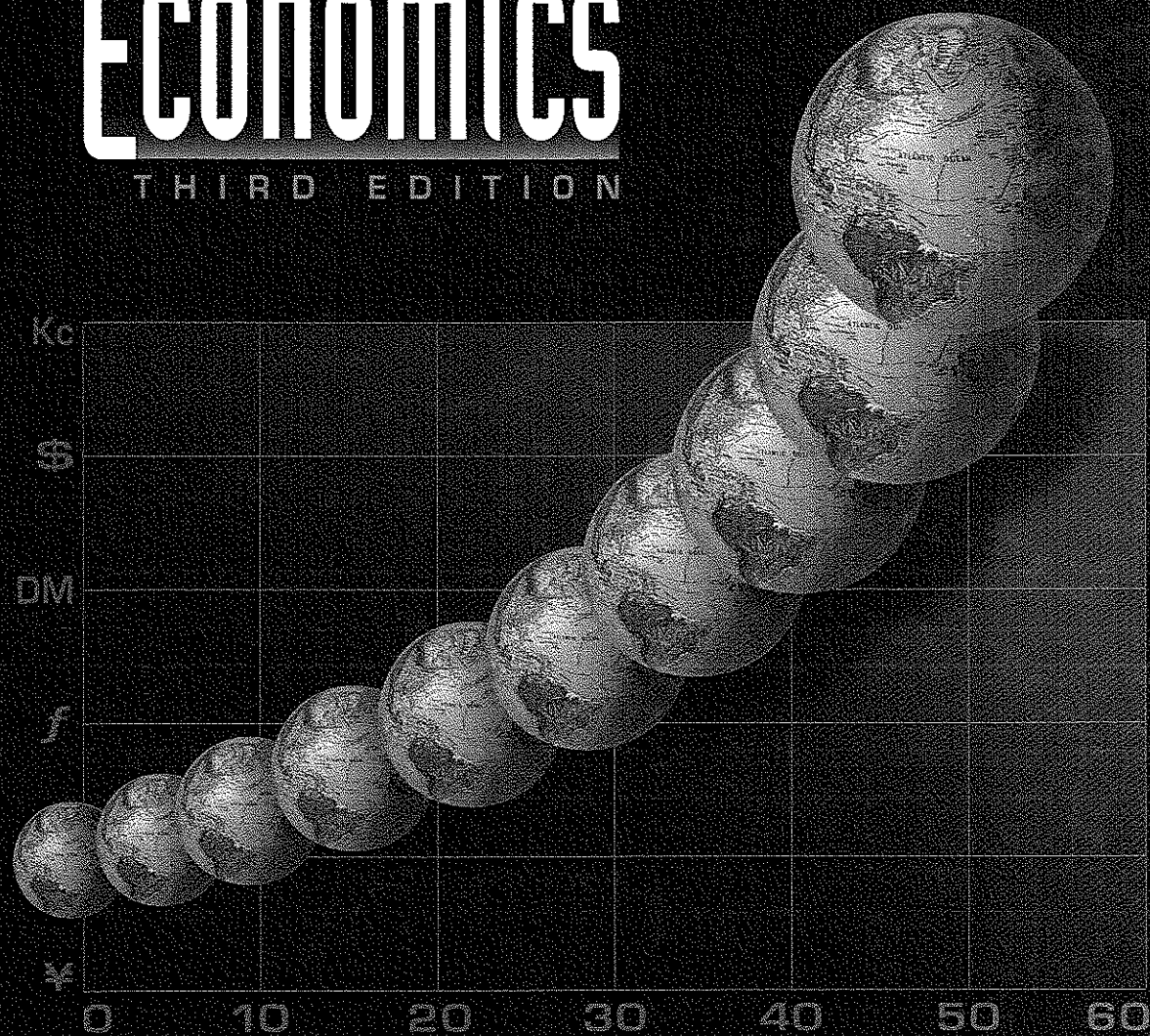


Modern International Economics

THIRD EDITION



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CHAPTER 8

Why Nations Restrict Trade

Around the splendid public buildings we are erecting in Philadelphia, there stood till very recently a stiff and angular structure of wood. Like that scaffolding is the Tariff around the edifice of our national industries. It is not aesthetic. It adds nothing to the beauty of the edifice. But we cannot do without it.

—ROBERT ELLIS THOMPSON

Chapter 7 exploited the pure theory of international trade to deduce the economic effects of tariff protection. These seem largely negative: the world is made worse off by protection, and even the tariff-levying nation suffers a production cost and a consumption cost. Yet extensive protection has been endemic throughout history. In this chapter we examine the reasons for tariffs.

Reasons for tariffs can be classified into two groups. In the first are those that address the economic relations of the tariff-levying nation with the rest of the world. These *international* objectives are discussed in section 1. Other reasons concern the tariff-levying country itself, and we discuss these *internal* objectives in sections 2 and 3. We shall examine eight reasons altogether.

We shall see that there is a basic difference between the validity of the international objectives and the validity of the internal objectives. The international objectives result in arguments for protection that can be rational from a *nationalistic* perspective: under the proper circumstances it makes sense for a country to interfere with trade, at least if *global* welfare is not a concern. But the internal objectives generally supply only *second-best* reasons for protection: although interfering with trade may sometimes help, it is better to use other policy tools instead. Thus protection is generally not a good thing.

1. MOTIVES FOR PROTECTION: INTERNATIONAL ECONOMIC OBJECTIVES

We saw in Part One that there are three independent reasons for countries to trade: comparative advantage, economies of scale, and imperfect competition. Each type of trade also generates a potential motivation to limit trade; this section discusses each in turn. A fourth international objective amounts simply to not wanting to trade for some reason.

(A) The Optimum-Tariff Argument

A tariff improves the terms of trade of the levying country if that country is large enough in world markets. It also reduces the volume of trade, generating production and consumption costs. But a moderate tariff could benefit a large country—that is, the favorable terms-of-trade effect could outweigh the unfavorable consumption and production costs.

This, then, is one possible motive for tariff protection: to increase national welfare by improving the terms of trade. It applies to comparative-advantage trade. The policy can be pushed just so far; an increase in the tariff increases the production and consumption costs as it improves the terms of trade. Eventually, the costs will predominate because, as Chapter 1 showed, free trade is better than no trade, and the result of a high-enough tariff will be no trade. The rate that squeezes out as much gain as possible is known as the *optimum tariff*.

The Optimum-Tariff Formula

We can derive a formula for the optimum tariff if we are willing to be a little more exact about the marginal savings curve MS. If imports are reduced by 1 unit, we save, first, their price p . Also, a 1-unit reduction in M is a percentage reduction of $1/M$, and each percentage reduction in M will reduce p by $1/f^*$ percent, where f^* is the elasticity of the foreign export supply curve. (Review Chapter 4 if necessary.) Thus the absolute fall in p is $p(1/f^*)(1/M)$. Multiply this by the volume of imports M to find the savings due to the price reduction: p/f^* . The total savings—what is measured by the MS curve—is thus $p + p/f^*$.

The value to the economy of one import is its domestic relative price, q . Imports should be restricted until MS is just equal to this, or until $p(1 + 1/f^*) = q$. Since $t = (q/p) - 1$, this gives the optimum-tariff formula

$$t = 1/f^*.$$

If the home country is too small to influence world prices, f^* is infinite. Thus t equals 0: the optimum policy for a small country is free trade. But if the home country is not small, the formula calls for a positive tariff. Free trade is not best.

When will all possible gains be squeezed out? The optimum tariff is illustrated in Figure 8.1. With free trade the home economy is at E , importing OA at the price AE . Suppose we were to import one less unit. How much would we save? Since we would no longer have to pay for that unit, we would save its price, AE . But the lessened demand for imports would also force down that price, so we would also save on what we still imported. Suppose that the distance BE in Figure 8.1 measures this additional savings. The marginal savings (MS) curve in the figure shows, for each level of imports, how much the economy could save by reducing imports by 1 unit. This marginal savings curve lies above the foreign export supply curve because we always save the price (which the export curve shows) and then some due to the price reduction.

At E , it pays the home country to restrict trade. By importing one less unit we save AB in exports needed to pay for it. But that unit is worth just AE , the price we are willing to pay for it. Thus importing less gives us a net saving of BE . The best we can do is to keep on restricting imports until we get to C , where the marginal savings curve crosses the free-trade import demand curve. Then we will be importing OF , and the marginal savings from a further reduction, FC , is just what 1 unit of imports is worth to us.

But point C is not on the foreign export supply curve. We will in fact import the quantity OF if we levy a tariff at the rate CD/FD so that FD would be the international price of imports and FC the domestic price.

Practical Relevance of the Optimum Tariff. The essence of the optimum tariff is the exploitation of monopoly power. If a country can influence world

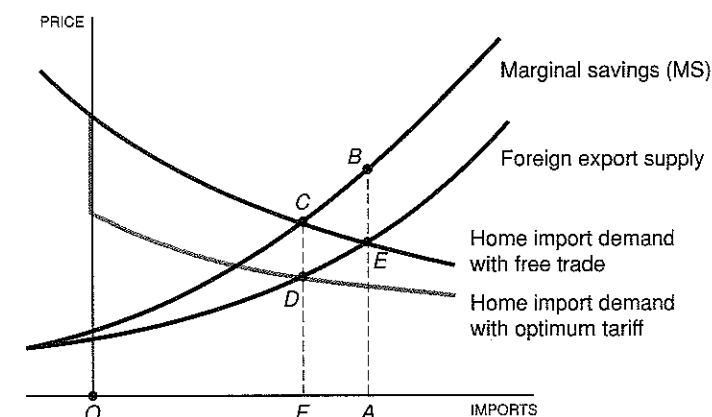


FIGURE 8.1 The Optimum Tariff A country has levied an optimum tariff when the domestic price of imports just equals the savings from reducing imports by 1 unit. This occurs when the free-trade import curve intersects the marginal savings (MS) curve.

prices, the citizens of that country collectively possess monopoly power; by withholding part of their export supply they can force the price up. Equivalently, they have monopsonistic power in the market for their imports, and by restricting demand they can hold price down. The tariff is the instrument by which the country's citizens collectively manipulate the market. It is important to realize that this argument is strictly a *nationalistic* one. From a global point of view the optimum tariff is 0. With a tariff, the home country imposes a loss on the rest of the world, a loss that exceeds the home country's gain: the country carves a larger slice for itself from a shrinking world pie.

How relevant is all this for actual tariff policy? It does not now seem very relevant for industrial countries. One examines the records of congressional tariff debates in vain for any mention of an optimum-tariff motive for protection. A major reason is that other motives are far more important. Another is the feasibility of an optimum-tariff strategy. This requires the home country to be able to influence world prices, and the degree of influence must be sizable enough for an optimum tariff to be worth bothering about. But even a large country needs to worry about the possibility of *retaliation*. Our discussion of the optimum tariff took the foreign export supply curve as fixed and, therefore, assumed a fixed tariff policy on the part of the rest of the world. But if we can use commercial policy to improve our terms of trade, other countries can presumably do the same to us. Our tariff could be countered by a foreign tariff and a resultant tariff war. The final outcome could easily leave both countries worse off than in free trade. In any case, the possibility of retaliation greatly reduces the appeal of an optimum-tariff policy.

Such a policy is, therefore, tempting only to a country that is both sizable and reasonably free of the fear of retaliation. The latter requires an asymmetric position vis-à-vis the rest of the world. For example, if a large country trades with many small countries, retaliation is unlikely. Each of the trading partners would be unable to exert significant monopoly power by itself, and, if there are many of them, they would be unlikely to collude. Asymmetry could also be due to the commodity composition of trade. For example, the home country might be the world's only exporter of a certain good that many other countries import, while importing an assortment of goods also imported by many other countries. Germany, as the predominant exporter of potash, and Chile, as virtually the only exporter of nitrates, were in this position at the turn of the century. Both countries were able to exploit their monopoly positions until the high prices of their exports induced the development of additional supply sources and of substitutes.

An asymmetry, either of size or of trade pattern, is not currently possessed by any of the industrial countries, with their roughly similar economic structures. The United States was perhaps in such a position at the close of the Second World War, when the other major industrial countries had been devastated. But American policy at the time was oriented toward reducing tariff barriers.

The optimum-tariff argument, then, seems to be largely irrelevant to tariff policy in the developed countries. But the argument is by no means irrelevant in the modern world economy, even for the industrial nations. Far from

it. OPEC pursued such a policy. OPEC's policy instruments were not tariffs, but, in effect, export taxes and quotas. (This had also been the case with Germany and Chile early in this century.) However, these have basically the same economic effects as tariffs. OPEC possessed the necessary asymmetry. The manufactured goods and foodstuffs that OPEC imports are probably as vital to them as their oil is to their trading partners. But they can obtain these imports, or close substitutes, from a large and diverse number of countries. Accordingly, OPEC was not seriously threatened with retaliation. But now there are more sources of oil.

The success of OPEC spawned attempts by other primary-product exporters. But, as noted in Chapter 4, most of these had little success. A possible exception is bauxite, which rose sharply in price.

(B) Production Shifting

The optimum-tariff argument may apply to trade due to comparative advantage. Trade due to national external economies of scale introduces another possible motive: production shifting. Recall from Chapter 2 that a country operating an industry with such scale economies will benefit from supplying as much of the world market as possible: the more it can produce, the lower will be its average cost. If the economies are *national*, these costs depend on how much the home economy produces, not on how much the world produces. If the economies are also external to the firm, individual firms will be unable to realize these economies by themselves; so there is potentially a case for government intervention to, in effect, seize the economies collectively.

Tariff protection can help in such cases. Suppose that butane is characterized by national external economies of scale and that the home economy imports butane and also operates a small, import-competing butane sector. Then, as we saw in Chapter 2, wages at home will have to be low to allow the small, inefficient butane sector to compete. Indeed, such a country will be worse off than if it refused to trade at all—that is, a prohibitive tariff will raise welfare. If the country is aggressive, it might be tempted to go further and subsidize exports of butane in the hope that a large butane industry will be so efficient that wages and national welfare can rise.

The basic idea here is to make the home industry more efficient by grabbing market share from foreigners. If this is successful, the foreign economy could be left with a smaller butane industry and so be worse off. Thus this argument, like that for the optimum tariff, is basically nationalistic. But there is a subtle difference. The optimum-tariff argument implied inefficiency for the world as whole: the home country realized a gain by inflicting even more harm on the rest of the world. This is not necessarily true now: switching butane production from the foreign economy to the home one may or may not be inefficient from a cosmopolitan point of view—that is, the home country may or may not gain less than the foreign economy loses. Indeed, it is conceivable that, if the foreign economy ceases production of butane altogether, it might even share in the gains.

How important is all this in practice? Such arguments have been important in policy debates because they furnish the most significant justification for the *infant-industry* argument for protection, an argument with a long history and one that we will return to later in this chapter. But concrete examples are another matter. They are hard to come by, so production shifting should be regarded as a theoretical possibility of questionable relevance.

(C) Profit Shifting

Imperfect competition is the third possible reason for trade. When markets are not competitive, firms in those markets may earn positive profits. If there are both domestic and foreign firms in the market, trade policy can be used to divert profits from the latter to the former, making the home economy better off at the expense of the rest of the world. This was discussed in Chapter 7. Figure 8.2 is simply Figure 7.10 adapted to present purposes, so you might review the earlier discussion now if you do not remember it.

Suppose a home firm and a foreign firm compete with each other in some foreign market. Equilibrium is initially at H . Recall that moving away from H down and to the right along the foreign best-response curve will raise the profit of the home firm. But this will be true for just so long. If we go all the way to c , the home firm's profit will be 0. Thus there is some point between H and c on the foreign firm's best-response curve where home profit is maxi-

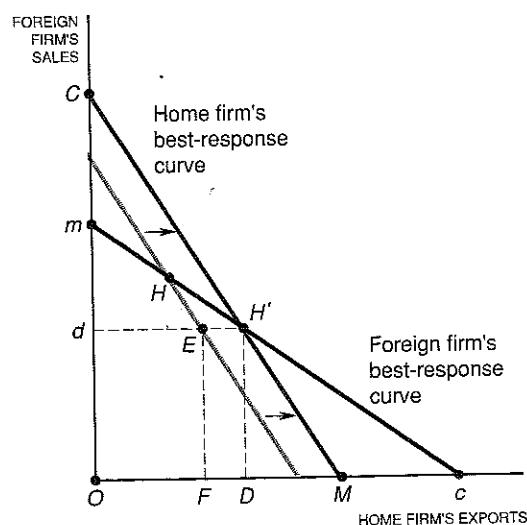


FIGURE 8.2 Optimal Export Subsidy in an Oligopolistic Market An export subsidy shifts the home firm's best-response curve to the right so that home exports of OD become a credible threat to the foreign firm.

mized. Suppose this is at point H' in the figure. A home export subsidy will shift the home firm's best-response curve to the right and move equilibrium from H to H' , maximizing home profit.

The fact that a subsidy is called for here is not significant since we saw in Chapter 7 that under many circumstances a tax would in fact be appropriate. Rather, the point is that trade policy of some sort can make the home economy better off by obtaining for it a larger share of oligopoly profit. But what exactly is the role of the government? In our previous example the government was essentially the means by which the residents of the economy could combine and exercise their aggregate market power; individual residents had no such power by themselves. But this is not the case now. The home firm is part of a duopoly, not a competitive market. Why cannot the home firm simply announce that it will sell the quantity OD no matter what the foreign firm does? If the foreign firm believes this announcement, it will realize that the best it can do is sell Od , and so we will still end up at H' . Who needs the government? The problem with this is that such a home-firm announcement will not be *credible*. The foreign firm presumably understands the world as well as its home competitor and so knows that, if it sells the quantity Od , the home firm will in fact maximize its profit by selling OF , not OD . H is the equilibrium in the sense that only here is each firm's strategy credible. By establishing an export subsidy, the home government changes the incentives facing the home firm so that it becomes optimal for the latter to sell OD if its foreign rival sells Od . But this will work only if the government can credibly commit itself actually to pay the subsidy—for example, by passing a law. Otherwise there is no reason why the foreign firm should take the government's announcement of a subsidy any more seriously than it would take the home firm's announcement of an increase in exports. But if it does, the government has a role to play.

Like the optimum tariff, trade policy here benefits the home country at the expense of a foreign country. But whereas an optimum tariff is always bad from a global point of view, the same need not be true of trade policy in the face of an oligopoly. The reason is that an oligopolistic market is not efficient to begin with, so a change in behavior might either increase or decrease efficiency. The export subsidy illustrated in Figure 8.2, for example, might very well raise world welfare because it increases competition in a market where competition was restrained by duopoly.

(D) Trade Limitation for Noneconomic Reasons

Sometimes governments wish to limit imports for reasons that are not economic at all. For example, limiting oil imports to 8.2 million barrels per day was an objective of the U.S. government, enunciated by President Carter in 1979. In Figure 8.3, if national policy is to limit imports to OC , a tariff of AB/BC does the trick. The country must pay the production and consumption costs (unless the terms of trade improve enough), but these are the inevitable costs of the national objective.

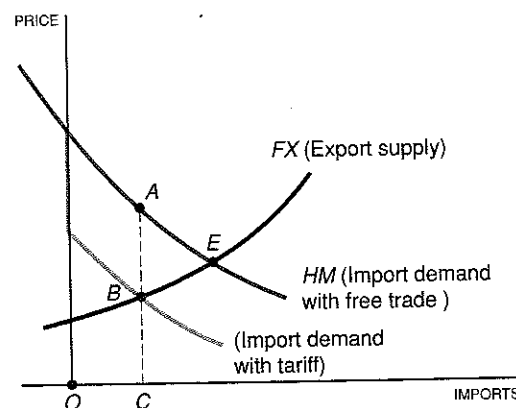


FIGURE 8.3 **Import Limitation** If national policy is to limit imports to OC , a tariff of AB/BC will accomplish this.

Problems

8.1 Some people urged that the United States use the "wheat weapon" against OPEC—that is, force up the price that OPEC must pay for our agricultural exports just as they forced up the price of their oil exports. Discuss the feasibility of such a policy.

8.2 We shall see that tariffs are often *second-best* policy tools—that is, they are inferior in some ways to alternative methods of achieving whatever goals the tariffs are being used for. Examine each of the four motives discussed in this section to see if you can think of some other, superior policy.

8.3 The optimum-tariff policy $t = 1/f^*$ would seem to indicate that when on the backward-bending part of the foreign export supply curve ($f^* < 0$), a *subsidy* to imports ($t < 0$) is best. But we concluded that tariffs should be *increased* in such a case. Reconcile.

8.4 How would our discussion of an optimal export subsidy (or tax) change if the home and foreign oligopolists competed in the *home* market rather than in a foreign one?

2. MOTIVES FOR PROTECTION: INTERNAL ECONOMIC OBJECTIVES

Although the tariff is ostensibly a device for regulating a country's international economic activity, many motives for protection center upon its internal effects. We take up three motives involving internal objectives in this section and a fourth in the next one.

(A) Revenue

The tariff is a tax, and it can yield revenue. There is a limit: a higher tariff lowers imports, and a prohibitive tariff yields no revenue at all. But most governments can raise substantial revenues in this way. In order to do so the country must bear the production and consumption costs, so (unless a significant terms-of-trade improvement can be expected) the tariff is inferior to less distortionary taxes. That is, a tariff is a *second-best* tool.

If the tariff exists to raise revenue, the needs of the government become important in determining the degree of protection. Tariff policy becomes linked politically to how heavily a country wishes to tax itself and to how large a government it wants.

How important in practice is the revenue motive? Not very, as far as the modern industrial economies are concerned. Tariff revenues account for less than 2 percent of the total tax revenue of the U.S. government and are minor sources in other DCs. Public discussions of tariff questions seldom allude to revenue aspects. One must conclude that this is not important in such countries.

But it has not always been so. At one time most nations relied heavily on tariff revenues for government finance. Revenue was the reason Britain maintained some tariffs from the abolition of the Corn Laws in 1846 until the First World War. The American tariff was the principal source of federal revenue throughout the nineteenth century and was not displaced until the income tax was instituted. Even today, tariffs are important revenue sources for the governments of most LDCs. For example, in 1986 the government of Uganda derived over 75 percent of its revenue from taxes on trade, and Lesotho had similarly raised about 76 percent of its revenues in 1985. The DCs today rely mainly on broad-based taxes (income, sales, and value-added), which are much more effective for raising the enormous revenues required by the governments of modern industrial states. But the efficient administration of such taxes requires a large and reasonably effective government bureaucracy and a reasonably literate population, conditions that were not met in the past and are still not met in large parts of the world. A tariff, by contrast, requires only customs officials stationed (palms upward) in the trading centers and a police force to control smuggling. Seventeenth-century Britain banned tobacco growing because it was easier to tax tobacco imports than to tax a domestic crop.

(B) Domestic Distortions

Because a tariff affects a country's internal price structure and allocation of resources, it can deal with distortions in the domestic economy. These have various causes: monopolies, labor unions, external economies or diseconomies (social benefits or costs not reflected in private prices, such as pollution), government activities or regulations. The basic idea is to use a tariff to cancel partially the effect of such distortions. Suppose, for example, that a

brewery, needing pure water for its product, reduces water pollution in its vicinity. The brewer is paid for his beer, but there is no one to reward him in materialistic fashion for purifying the water. Because of this the industry will not be as large as socially desirable. A tariff on beer could help deal with this problem by reallocating resources into the brewery industry.

The fly in the ointment (or in the ale) is the fact that a tariff introduces distortions of its own. These additional distortions must be weighed against those neutralized by the tariff. In the brewery example, a tariff on beer will lead to cleaner water but will also introduce a consumption cost. Although protection can be used to deal with domestic distortions, it is better to use more direct methods that do not have the undesirable side effects of tariffs. The best policy for the brewery is a subsidy for purifying water; this would ensure that brewers receive monetary rewards equal to the social benefits supplied without introducing the distortions of a tariff.

Protection, if carefully employed, can potentially reduce the damage caused by domestic distortions, but tariffs are not as good as measures that directly attack the distortions. Of course, direct measures might be ruled out by political or administrative considerations. There is a clear analogy to the use of tariffs to raise government revenue: other methods are more effective in principle, but they are not practical for some countries. Once again, they are *second-best*.

The Infant-Industry Argument. This is a good example of the domestic-distortion case for protection. Also, it is important enough in practice to deserve separate mention.

This argument does not dispute that, in the long run, countries are best off with free trade. But, so the argument goes, a country might not be able to realize its true comparative advantage under free trade if other countries are already established in the relevant sectors. For example, a certain LDC might possess all the natural advantages needed to become a successful exporter of steel. But it must compete with existing steel exporters, who possess enormous advantages simply by being in the market to begin with. Our potential entrant must be prepared to suffer huge losses while it establishes the necessary plants, trains the required labor force and managers, and gradually penetrates the international market.

The infant-industry argument is that such industries ought to be given tariff protection to help them get off the ground. Then they will gradually develop in the sheltered domestic market until they are ready to compete internationally. At that time tariffs will become unnecessary, and the country will export the products of the no-longer infant industry. The country will be trading according to its long-run comparative advantage; and if the infant industry has been wisely chosen, the gains from this trade will more than compensate for the losses the country had to suffer while the tariffs were effective.

Sometimes the argument is applied at a more general level. Industrialization requires much infrastructure and a sizable labor force with the requisite

attitudes, habits, and skills. Thus we have what might be called an "infant country" argument. In any case, protection should cease when the long-run pattern of comparative advantage is attained.

The argument has been important in practice. One frequently hears it in reference to LDCs. Alexander Hamilton argued along these lines for the young American republic, as did Friedrich List for Germany. John Stuart Mill gave the argument his approval. In the eighteenth century the development of Britain's textile industry, a key element in the industrial revolution, was aided by protection from Asian competition. The growth of American industry in the nineteenth and early twentieth centuries took place behind high tariff walls.

The essential point is that the argument depends upon market distortions. An effective free market would not be hampered by the fact that a new industry must suffer losses before it can compete. Capital markets enable entrepreneurs to borrow to tide themselves over until their projects pay off. If a country has a long-run comparative advantage in steel production, potential steel producers should be able to borrow enough to develop to compete internationally. If they cannot, that fact is an indication that steel production is not really a good bet for the country. In order to justify protection there must be some distortion to be overcome.

For example, it might be unduly difficult to borrow funds for investment because of restrictive legislation, prejudice, or incomplete information on the part of private investors. This would constitute a distorted capital market. Or the infant industry might be one that generates external economies of scale: expansion of the industry reduces costs to all participants, not simply to the firms that expand. A single firm cannot capture the full social benefit from an expansion and is, therefore, not likely to expand as much as is socially desirable. This possibility was discussed in section 1. In any case, some distortion is necessary to justify protection.

This means that the infant-industry argument is subject to the same criticism as above: a tariff causes distortions of its own, which must be weighed against any benefits, so that direct measures are always better. Distortions in capital markets ought to be attacked head on; the best-response to external economies of scale is a subsidy on output. This will expand activity and enable the external economies to be realized without the consumption cost of a tariff.

A political objection is also sometimes raised against the infant-industry argument. An essential aspect of this argument is that protection be temporary until the industry gets on its legs. Cynics argue that any industry politically powerful enough to obtain protection while it is an infant would have no trouble retaining special treatment once it had grown even more powerful.

(C) Noneconomic Objectives

Closely related to the domestic-distortion argument is the view that noneconomic objectives may justify protection. For example, a country might wish to produce its own military hardware, even if similar products are

file. The rental of capital in the butane industry rises in the short run and rises further in the medium run, only to fall in the end; the wages of labor in the butane industry initially rise, then fall, and then reverse themselves again. Only capital originally in the apple industry fares consistently over time. Thus owners of other factors could either favor or oppose protection for their industry, depending upon their time horizon. This discrepancy helps explain why individuals sometimes adopt positions on tariff issues at odds with their own interests as predicted by the Stolper-Samuelson theorem. For example, the owners of capital invested in labor-intensive industries, such as textiles in the DCs, often plea for protection even though the Stolper-Samuelson theorem indicates it is contrary to their interests. Emphasis on short-run effects is also strengthened by the fact that factory owners are frequently organized politically on the basis of industrial location. Laborers in the capital-intensive apple industry might be organized in a Federation of Apple Pickers and Worm Squashers. Because it represents only apple workers, this federation could favor a tariff on apples even though it would harm laborers in general (and its own members in the long run): apple workers who leave the industry also leave the federation.

Importance of Distributional Considerations. The distributional motive for protection seems very powerful in reality, if we are to judge by how well individuals' positions on tariff issues accord with their self-interests. But it is hard to tell just how important the motive is. Unless requested by a group generally perceived to have an inequitable income share, an appeal for protection that is not couched in terms of national well-being is unlikely to be persuasive. Thus appeals will be based on noneconomic objectives and on the infant industry and other such arguments (or else on fallacious arguments). Despite this ambiguity, distribution is certainly an important consideration. Thus the tariff, ostensibly aimed at international economic relations, is also a domestic issue: part of the struggle over the distribution of the national income.

Problem

8.7 The optimum-tariff argument supplies a motive where the tariff is a first-best tool from a *nationalistic* perspective. But from a *cosmopolitan* perspective is it a first-best method for redistributing income among countries? Why? If it is not, what methods are better and why?

4.* EXPLORING FURTHER: THE SECOND-BEST NATURE OF THE TARIFF

Previous sections have shown that tariffs are *second-best* methods of dealing with domestic objectives. This section examines the issues more thoroughly. We consider a domestic distortion in the production of importables,

but our analysis applies as well to the other motives discussed in sections 2 and 3.

In Figure 8.6 the terms of trade equal HA/GH so that with free trade and perfect competition the economy would produce at C . But the domestic distortion prevents this. The nature of that distortion is not relevant; suppose that all producers of importables are required to belong to a trade association, with a membership fee proportional to output. If that fee equals FG/HA in Figure 8.6, the economy will produce at A . The quantity HA of importables could be sold for GH exportables, but FG of that goes for the fee, leaving producers with FH . Thus producers behave as though the relative price were FH/HA rather than GH/HA . Consumers are not directly affected by the trade association, so the economy consumes at B .

If the trade association were broken down, production would shift from A to C and the economy would consume the free-trade collection of goods, D . This is a *first-best* solution. A subsidy of FG/HA per unit on the production of importables would produce the same result by neutralizing the association's fee.

But suppose a tariff is used instead. The idea would be to protect importables, thereby stimulating their production, thus countering the effect of the association in reducing production. Such a tariff cannot possibly be a first-best solution because it will impose a consumption cost. In fact, the tariff might not improve matters at all.

This is illustrated in Figure 8.7. Again, point B on the indifference curve U_F represents initial, free-trade consumption, and point D on the indifference curve U_1 represents consumption if the distortion is removed by a first-best method. With the tariff, production is at E , and consumption is at J on the in-

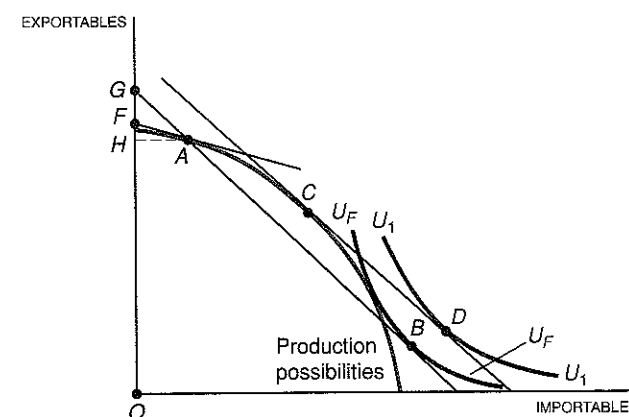
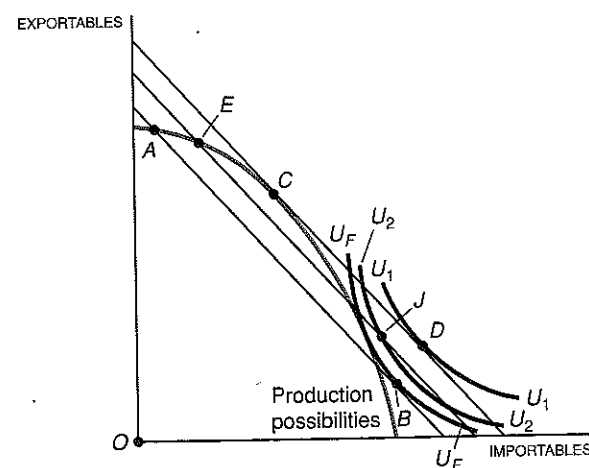
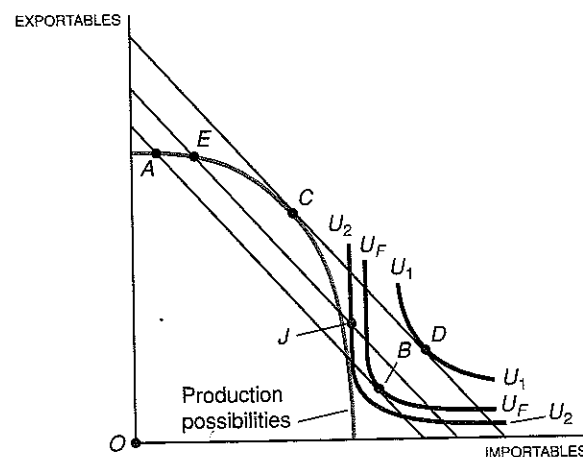


FIGURE 8.6 A Domestic Distortion A production distortion causes production to be at A rather than C so that consumption is at B rather than D . A tariff can shift production back to C , but it would add a consumption distortion so that consumption would not be as good as at D .



(a) Tariff increases welfare



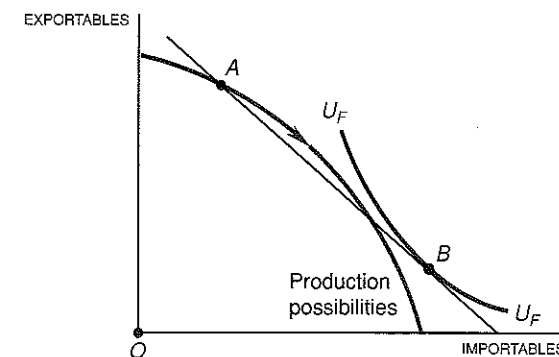
(b) Tariff reduces welfare

FIGURE 8.7 A Tariff to Counter a Domestic Distortion A tariff that neutralizes a domestic distortion may either raise or lower national welfare since the tariff introduces distortions of its own.

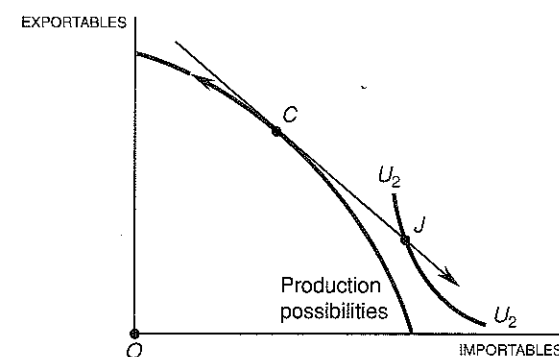
difference curve U_2 . By shifting production from A to E , the tariff has countered part of the distortion and increased national income. In panel (a) the country has been made better off since U_2 is above U_F . But the country cannot be as well off as with a first-best policy—that is, U_2 must be below U_1 —for two reasons. First, the tariff has not been large enough to counter completely the distortion: production has moved only to E and not all the way to C . Second, the tariff has introduced a new distortion of its own in the con-

sumption cost. U_2 is not tangent to the budget line between E and J ; the slope of U_2 at J reflects the domestic (tariff-ridden) relative price. In panel (b) the country is actually worse off than before as a result of the tariff, U_2 is below U_F and would have been better off doing nothing at all. In this case the harm due to the consumption cost exceeds the benefit from countering the original distortion.

Two further conclusions are demonstrated in Figure 8.8. Panel (a) shows that a *small* tariff will always cause an improvement relative to free trade. With no tariff, the country produces at A and consumes at B , on U_F . A tariff distorts consumers' choices away from importables, causing consumption to move from B along the budget line in the direction of point A . This will put the economy on a lower indifference curve, thereby imposing the consumption cost. At the same time, the tariff will protect the importables industry so that



(a) Initial free trade



(b) Initial complete neutralization of distortion

FIGURE 8.8 The Effects of a Small Change in a Tariff A small tariff that partly neutralizes a domestic distortion is always better than doing nothing, and a tariff that completely neutralizes the distortion is always overkill.

production moves away from A , as shown by the arrow. This pushes the budget line outward, illustrating the increase in income from neutralizing the distortion. Suppose now that only a small tariff is imposed. The indifference curve U_F has the same slope at B as does the budget line. Thus a small movement along the latter will not be very different from moving along the former; the movement to a lower indifference curve will be negligible, and the consumption cost will be insignificant. But the production possibility frontier at A cuts the budget line from below, so any movement along the former must push out the latter to a commensurate degree. Thus for a *small* initial tariff, the increase in income due to neutralizing the distortion dominates the consumption cost. This argument applies only to a small tariff. As the tariff is raised, the production point moves to flatter parts of the production possibility frontier, whose slope, therefore, approaches that of the budget line, and the consumption point moves to steeper parts of the indifference curves.

Panel (b) of Figure 8.8 shows a case in which the tariff is just large enough to neutralize completely the domestic distortion. The production point C , therefore, coincides with what production would be with a first-best solution. But there is a consumption cost, illustrated by the fact that the indifference curve U_2 through the consumption point J cuts the budget line. The same logic as above now shows that a small tariff *reduction* must benefit this country. Such a reduction will move production in the direction of the arrow from C and consumption in the direction of the arrow from J . Since the production possibility frontier has the same slope at C as does the budget line, the reduction in income will be negligible for a small tariff. But U_2 is steeper at J than is the budget line so that the country must move to a higher indifference curve.

In sum, four conclusions apply to the use of a tariff to neutralize domestic distortions.

1. Because it introduces a distortion of its own, a tariff is necessarily second-best—that is, inferior to a more direct method.
2. A *small* tariff is always better than free trade.
3. A tariff that completely neutralizes the distortion is too large.
4. A moderate to large tariff may be either better or worse than no tariff at all.

Problems

8.8 This section suggested two possible first-best ways of dealing with the trade-association example of a distortion. Are those two ways equivalent? What would determine which should be used?

8.9 Prove each of the four conclusions of this section *without* using community indifference curves.

8.10 Formulate analogs of this section's four conclusions that apply to the use of a tariff to improve the terms of trade.

5. EFFECTIVE PROTECTION

Thus far we have ignored the fact that countries import many different goods subject to different tariff rates. Such differences become important in some cases, such as when dealing with intermediate goods.

Intermediate goods are used to produce other products, as steel is used to produce automobiles. The price of an automobile covers the cost of the steel embodied in the vehicle as well as the value added in the automobile industry itself. Now, a tariff on automobiles affects its total price, whereas an automobile producer is interested only in the part of the price represented by value added and not in the part that is simply passed on to producers of intermediate goods.

As an illustration, suppose that a firm produces an automobile that, with free trade, sells for \$20,000. Suppose further that \$10,000 of this pays for steel and that the remaining \$10,000, the value added in the automobile industry, covers wages, rent, profit, and so forth. Suppose that a country imports both automobiles and steel. Consider the effect of a 20 percent tariff on automobiles with free trade in steel. The domestic price of a car is thus \$24,000 (the \$20,000 world price plus 20 percent), of which \$10,000 is still required to pay for the (duty-free) steel. This leaves \$14,000 (\$24,000 less \$10,000) for value added. Thus the 20 percent tariff on cars has enabled the domestic producer to increase value added from \$10,000 to \$14,000—a 40 percent rise. It is this latter figure, rather than the 20 percent *nominal* tariff on automobiles, that is of immediate interest to individuals involved in automobile production.

Suppose, next, that trade in automobiles is free but that steel has a 20 percent tariff. The producer must now sell his car at the world price of \$20,000, but the steel that he uses to produce it will cost him \$12,000 (\$10,000 plus 20 percent), leaving only \$8,000 for value added. Thus although the tariff on automobiles is 0, the overall impact of the tariff policy on the automobile producer is a 20 percent *fall* in value added (a decline from \$10,000 to \$8,000). Industries are affected not only by the tariffs on goods that they produce, but also by the tariffs on all intermediate goods that they purchase.

The Effective-Rate Formula

The *effective rate of protection* measures the overall effect of a tariff structure on an individual industry. To see how it is measured, let us continue with our automobile-steel example and let P_A and P_S denote the world prices of automobiles and steel, respectively, and suppose that the amount of steel used in the production of a single automobile is denoted by a . Then, at *world* prices, the value added v in a single car is

$$v = P_A - P_S a. \quad (8.1)$$

Suppose that automobile imports are subject to the tariff rate t_A and steel imports to the tariff rate t_S . Then, at *domestic* prices, the value added v' is

$$v' = P_A(1 + t_A) - P_S(1 + t_S)a. \quad (8.2)$$

Now, the *nominal* rate of protection (that is, the tariff) on automobiles is equal to the proportion by which the domestic price exceeds the world price:

$$t_A = \frac{Q_A - P_A}{P_A},$$

where $Q_A = P_A(1 + t_A)$ is the domestic price. The *effective* rate of protection, by analogy, is defined as the proportion by which value added at domestic prices exceeds value added at world prices:

$$e_A = \frac{v' - v}{v}, \quad (8.3)$$

where e_A denotes the effective rate of protection on automobiles. We can obtain a formula with which to measure e_A by substituting (8.2) and (8.1) into (8.3) and rearranging:

$$\begin{aligned} e_A &= \frac{v' - v}{v} = \frac{[P_A(1 + t_A) - P_S(1 + t_S)a] - [P_A - P_Sa]}{v} \\ &= \frac{[P_A - P_Sa] + [P_At_A - P_St_Sa] - [P_A - P_Sa]}{v} \\ &= \frac{P_At_A - P_St_Sa}{v} = \frac{P_At_A - P_Sat_A + P_Sat_A - P_St_Sa}{v} \\ &= \frac{[P_A - P_Sa]t_A}{v} + \frac{P_Sa[t_A - t_S]}{v}, \end{aligned}$$

or

$$e_A = t_A + [t_A - t_S] \frac{P_Sa}{v}. \quad (8.4)$$

This formula leads to a number of observations. First, if the automobile industry uses no intermediate goods ($a = 0$), then the effective rate equals the nominal rate ($e_A = t_A$). This is as expected, for in this case the full price of the car goes toward value added. Second, if all goods have the same tariff rate (so that $t_A = t_S$), then the effective rate again equals the nominal rate. Thus effective-rate calculations become interesting when tariff rates differ across commodities. In the above numerical example, if the 20 percent tariff on automobiles and the 20 percent tariff on steel *both* hold, then the domestic price of a car is \$24,000 and the cost of steel is \$12,000, leaving value added at \$12,000, which is just 20 percent above what it would be at world prices (\$10,000).

Formula (8.4) implies, third, that if the tariff rate on the final good exceeds that on the intermediate good (so that t_A exceeds t_S), then the effective rate exceeds the nominal rate (e_A is larger than t_A). Finally, the gap between the nominal and effective rates is larger the more important the intermediate goods are in the production of the final good (that is, the larger is P_Sa relative to v).

Use of Effective Rates

Why use a formula such as (8.4) to calculate effective rates of protection? There are two basic reasons. The effective rates measure the impact of the tariff structure as a whole upon individual *industries* rather than goods. Suppose one is interested in income distribution in the short run when factors are specific to the industries in which they are employed. Then the effective rates are the indicators to look at because value added is what these factors receive. Industry lobbyists care about the effective protection they receive rather than about the nominal protection. Government officials engaged in tariff bargaining with foreign countries use effective-rate calculations to discover the effects of proposed tariff changes on special interests and industry pressure groups.

The second reason has to do with resource allocation. The presumption is that the impact of any tariff structure is to cause resources to flow from industries with low effective rates of protection to industries with high rates because value added is what resources earn in an industry. Economists, therefore, look at the set of effective tariff rates of a country if they wish to obtain some idea of how that country's tariff structure has influenced its allocation of resources among the various industries.

For some purposes nominal rates are more relevant than effective rates. The relative price of a commodity indicates the opportunity cost of producing more of it as well as the value of more of it to consumers, regardless of how important intermediate goods are in the final stage of that commodity's production. Because of this, nominal tariff rates—which indicate the effects of protection on prices—are relevant to our earlier discussions of such things as the production and consumption costs of protection and the optimum tariff. Effective rates are not necessary for these important topics.

Since the mid-1960s, many economists have made calculations of the effective tariff rates of many countries. One feature that has been given prominence by these studies is the *cascading* nature of the developed countries' tariff structures. These countries typically levy higher nominal tariffs on goods at more advanced levels of processing so that raw materials have relatively low tariffs and finished goods produced from those materials have relatively high tariffs. Formula (8.4) shows that if the nominal tariff on a good exceeds that on its intermediate input, the effective tariff exceeds the nominal tariff. Thus the cascading nature of the industrial countries' tariffs results in relatively high effective protection of the later stages of production. One study revealed, for example, that although the nominal U.S. tariff on woven wool fabrics was 20.7 percent, the effective rate of protection of the activity of weaving the fabrics was 60.9 percent. Table 8.2 shows overall average nominal and effective rates of protection for the industrial countries as a group. The first column shows how nominal tariffs rise as the stages of production become more advanced, and the second column shows the resulting high effective rates for the more advanced processes. Spokesmen for the LDCs point to such calculations as indications that the DCs' tariff policies constitute a

TABLE 8.2 Average Rates in All Industrial Countries at Various Stages of Production

Stage of processing	Nominal rate (%)	Effective rate (%)
1	4.6	4.6
2	7.9	22.6
3	10.2	29.7
4	22.2	38.4

SOURCE: United Nations Conference on Trade and Development, *The Kennedy Round Estimated Effects on Tariff Barriers* (New York: United Nations, 1968).

much more serious obstacle to industrialization than the moderate nominal tariff levels would appear to suggest. Industrialization in the LDCs could involve advancing their production to later stages, thus replacing some of their exports of rudimentary goods with the export of more finished goods. But it is these stages of production that are highly protected in the developed countries. The tariff structures of the latter thereby tend to lock in the LDCs to the earlier stages.

Another prominent feature is the high degree of effective protection afforded industrial activities in many LDCs with import substitution policies. A country might wish to develop an automobile industry, for example, and attempt to do this by giving both high protection to finished automobiles and low protection to many intermediate goods such as parts. As a result, the share of total cost accounted for by value added is low relative to the share of intermediate goods (because few are produced in the local industry), and the tariff on automobiles substantially exceeds that on inputs. Then, formula (8.4) implies that the effective rate could be much higher than the nominal rate. Many studies have revealed an extensive tendency for LDCs to shelter industrial activities behind effective tariffs that greatly exceed the (frequently high) nominal tariffs. As an extreme example, Anne Krueger's study of Turkish policies revealed that superphosphate fertilizer, with a nominal tariff of 27 percent, was accorded an effective tariff rate of 925 percent.

Problems

8.11 Suppose that shoes have a 25 percent nominal tariff rate, leather a 15 percent rate, and two-thirds of the cost of a pair of shoes is due to the leather they contain and one-third to value added. What is the effective rate of protection of the activity of making shoes from leather?

8.12 Suppose that, in a refinery, a_O barrels of crude oil, a_C tons of coal, and a_M units of materials are combined with value added to yield b_G gallons of gasoline and b_A gallons of aviation fuel. If P_O , P_C , P_M , P_G , and P_A denote the world prices of oil, coal, materials, gasoline, and aviation fuel, respectively, and if t_O , t_C , t_M , t_G , and t_A de-

note the corresponding nominal tariff rates, derive a formula, analogous to (8.4), for the effective rate of protection of refining, e_R .

8.13* Consider the example of steel and autos in the text. Gross output, denoted X_A and X_S for autos and steel, respectively, refers to the total output of an industry. Net output (Y_A and Y_S) refers to gross output less that part of output used as an input in other industries (that is, that part of gross output available for consumption or export). Thus, $Y_A = X_A$ and $Y_S = X_S - aX_A$. Chapter 1 showed that relative commodity prices equal the marginal rate of transformation between any two goods that are produced. Show that this refers to the *MRT* between net outputs. Will the ratio of values added per unit equal the *MRT* between gross outputs? Why? What do you conclude about the significance of effective rates of protection?

6. SUMMARY

1. Tariffs can be imposed to influence a country's relations with the rest of the world and to influence the domestic economy. International motives include the optimum-tariff argument, production shifting, profit shifting, and limiting trade for noneconomic reasons.

2. A tariff is usually a first-best way of attaining an international objective, at least if one takes a nationalistic—as opposed to a cosmopolitan—point of view.

3. Domestic motives include raising government revenue, countering domestic distortions, the infant-industry argument, noneconomic objectives, and changing the domestic distribution of income.

4. The tariff is usually a second-best tool for these purposes because it introduces distortions of its own, which more direct methods would not do.

5. The effective rate of protection measures the excess of actual value added per unit in an industry above what it would be if calculated at international prices. Effective rates differ from nominal rates when intermediate goods and final goods are subject to different tariffs, and the effective rates measure the direct impacts of a tariff structure on factors employed in the various sectors.

SUGGESTED READING

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