



Economic Development Institute

Trade Policy and the Real Exchange Rate

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March 1988

The World Bank

Issues of tariff policy

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In this chapter, we are mainly concerned with the effects of tariff policy on the particular activities on which the tariff impinges directly—namely, the consumption of the tariffed product, the production and consumption of its domestic substitutes, the processing of imported raw materials and semifinished goods in the domestic manufacture of protected products, and so forth. The larger, more macroeconomic issues—of how policies of protectionism affect the real exchange rate, of the interconnections between import taxes and quantitative controls on the one hand and export taxes and controls on the other, and of the principles to follow in designing a strategy on general trade liberalization—were dealt with in Chapter 1.

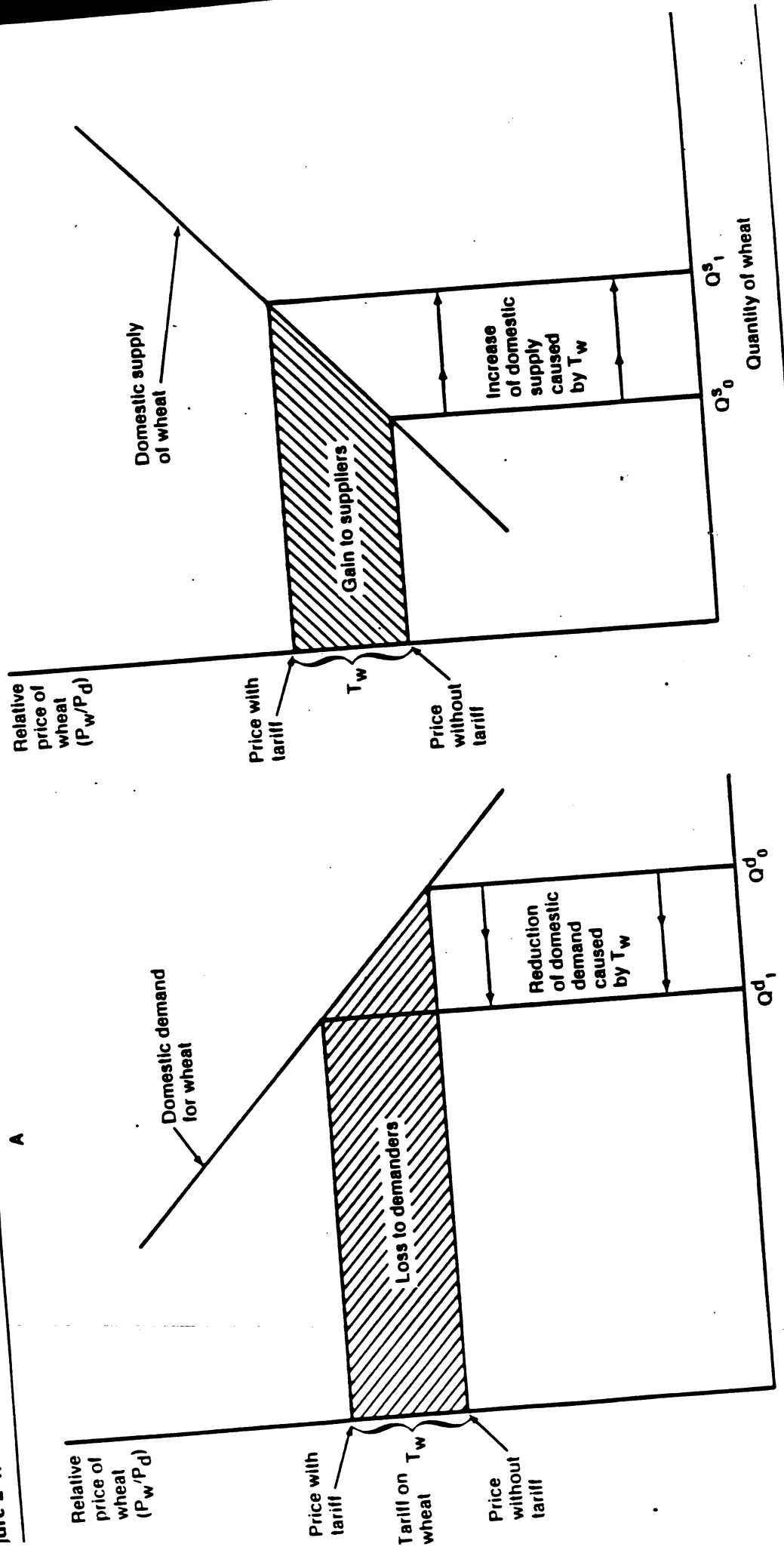
Elementary analysis of tariffs

We begin with a straightforward application of simple supply and demand analysis to a tariff situation. Figure 2.1 shows how the tariff works to reduce the domestic demand and to increase the domestic supply of the protected product (wheat in this case). It also presents measures of what the demanders of the product lose and what its domestic suppliers gain as a result of the tariff.

Demanders lose the amount of the rise in price caused by the tariff *times* the quantity of the protected good (Q_1^d) which they continue to consume after the tariff is in effect. They lose something by way of reduction (Q_0^d minus Q_1^d) that takes place in their demand because of tariff-induced price increases. This loss is measured by how much demanders would be *willing* to pay for each unit between Q_0^d and Q_1^d , minus the price that they actually would have to pay in the absence of the tariff.

Domestic suppliers of wheat gain the full increase in the domestic price of the commodity that comes as a result of the tariff on the amount Q_1^d that they would be producing anyway—even without

Figure 2-1. Effects of tariff on demanders and suppliers of protected product (wheat)



Quantity of wheat

the tariff. With the increase in supply (Q_1 minus Q_0) induced by the tariff, suppliers gain the excess of the price with tariff over their respective supply price (that is, the price that would just barely elicit that unit of supply) for each unit.

For visual reference, the losses of the demanders are shaded with lines drawn parallel to the domestic demand curve, while the gains of suppliers are shaded with lines drawn parallel to the domestic supply curve. It should be obvious from Figure 2.1 that the tariff on imports of wheat affects demanders in the same way as would a tax on the domestic consumption of wheat, while it affects the suppliers of wheat in the same way as would a subsidy on the domestic production of wheat.

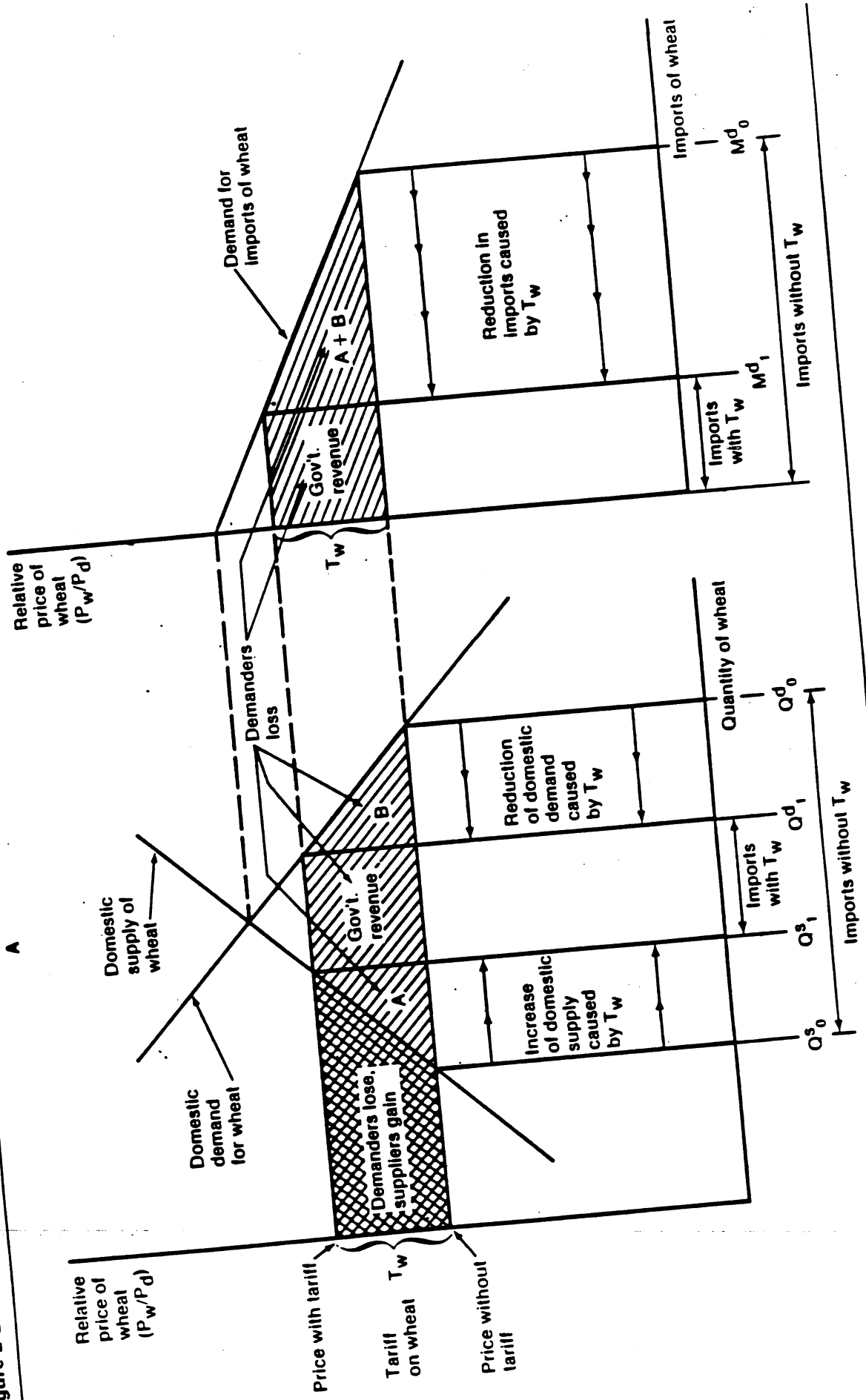
Thus, a tariff on a commodity is equivalent to a tax on the domestic consumption (or purchase or use) of that commodity combined with a subsidy to the domestic production (or sale or delivery) of the same commodity. This is a very fundamental proposition in the economics of tariffs and it deserves to be underscored and remembered. In it we may find important clues to why the most convinced opponents of tariffs as an instrument of policy tend to be those who have studied them most thoroughly.

Consider, for example, the case where the policy objective is to stimulate the domestic production of the commodity in question. This might argue in favor of a subsidy to production, but it does not argue that all the subsidy should be financed by the domestic consumers of the favored commodity.¹ Why would we want to stimulate production and at the same time curtail domestic use of a product? Why would we want to cause the very users of that product to bear costs that in total exceed the benefits that its producers perceive? In general, when a case exists that would, perhaps, justify the subsidization of a productive activity, it does not come side-by-side with a parallel case for taxing those who con-

A tariff on a commodity is equivalent to a tax on domestic consumption, combined with a subsidy to the domestic production of the same commodity.

The most convinced opponents of tariffs as an instrument of policy tend to be those who have studied them most thoroughly.

Figure 2-2. Effects of tariff on demand for imports of protected product (wheat)



sume that activity's output.

Now consider a situation where the policy objective is to raise revenue. This may provide a basis for taxing a particular set of commodities, but it is highly implausible that there would simultaneously exist reasons to use a good share of that revenue to subsidize by a like percentage (or amount) the local production of the very commodities being taxed. This is even more true in the case where one motive for taxing the commodities is the desire to limit or deter their use (as in the cases of alcoholic beverages and tobacco products). Creating incentives to expand local production seems totally out of focus under such circumstances.

In Figure 2.2, the effects on domestic demand and on domestic supply of the tariffed commodity are shown together (see Graph A). We can see how a part (but not all) of the cost borne by the demanders is translated into a gain for the suppliers. Another part—the area labeled “government revenue”—ends up as tariff receipts in the public treasury.

Special attention should be paid to the two remaining parts—the triangles labeled A and B—of the total loss experienced by demanders. Together, they measure the economic inefficiency (sometimes called “efficiency cost” or “welfare cost”) brought about by the tariff. Special terms have been used in the literature of international economics to distinguish between these two triangles. Triangle A is called the “production cost” (sometimes “producer cost”) of the tariff; triangle B is labeled the “consumption cost” (sometimes “consumer cost”) of the tariff. The reasoning behind the use of these labels is easy to see. If there were only a subsidy to production, equal to T_v per unit, the quantity produced would rise from Q^s to Q^s_1 , but the quantity demanded would remain at Q^d . The government's outlays on the subsidy would equal T_v times Q^s_1 , and the trapezoid now labeled “demanders lose, suppliers

gain" would have to be relabeled "cost to government, gain to suppliers." But the total outlays on the subsidy would include triangle A in addition to the trapezoid. This triangle would thus be a cost to the government not counterbalanced by a gain to suppliers. It would measure the loss of economic efficiency entailed in "artificially" stimulating the expansion of production from Q^s_0 to Q^s_1 .

Just as triangle A is the efficiency cost that would be generated by a subsidy of T_w per unit to the domestic production of the good in question, so triangle B is the efficiency cost that would be generated by a tax of T_w in its domestic consumption. The tax would drive up the price faced by consumers, but would leave the price received by producers at the level determined by the world market (in this case, the world market for wheat). Domestic production would stay at Q^s_0 , but domestic demand would fall to Q^d_1 . Consumers would lose the full "loss of demanders" that is shaded in Figure 2.1, but government receipts from the tax would only be T_w times Q^d_1 . Thus, the loss perceived by demanders would exceed the tax revenue of the government by an amount equal to triangle B (in Graph A).

The efficiency cost of a tariff (T_w) can be broken down into a production cost (which is what would result from a subsidy of T_w per unit to domestic production) and a consumption cost (which is what would result from a tax of T_w per unit on domestic consumption or demand). The equivalence of the tariff to a consumption tax plus a production subsidy, thus, carries through to the measurement of its economic costs. The efficiency cost of a tariff is the sum of the *separately identifiable* costs of a production subsidy and a consumption tax of like amount on the product in question.

The efficiency cost of a tariff is the sum of the costs of a production subsidy and a consumption tax of like amount on the product in question.

Figure 2.2 shows how the analysis of the effects of a tariff can be done using the demand curve for imports rather than distinguishing separable effects of movements along the domestic supply and the

domestic demand curves for the product. The demand curve for imports of a product that is also produced within the importing country is the "excess demand curve" obtained by subtracting, at each price, the quantity of domestic supply from the quantity of domestic demand. Thus, we have a zero demand for imports (in Graph B) at the price at which the domestic supply is fully sufficient to meet domestic demand (in Graph A). Similarly, at what is labeled the "price with tariff," the difference, Q_1^d minus Q_1^s , is reflected (in Graph B) as the amount M_1^d , while at the "price without tariff" the difference, Q_0^d minus Q_0^s , is reflected as M_0^d . The rectangle representing government revenue from the tariff has the same base and the same altitude in Graph A as in Graph B in Figure 2.2. Triangles A and B in Graph A likewise have their counterpart in a single larger triangle (A+B) whose base is equal to M_0^d minus M_1^d , and is necessarily the same as the sum of the bases of the separate triangles A and B. It is, therefore, possible to carry out analyses of the effects of tariffs by working with demand functions for imports, even in cases where there is domestic production of the tariffed good, and where movements in that production are an important part of the total effect of the tariff.

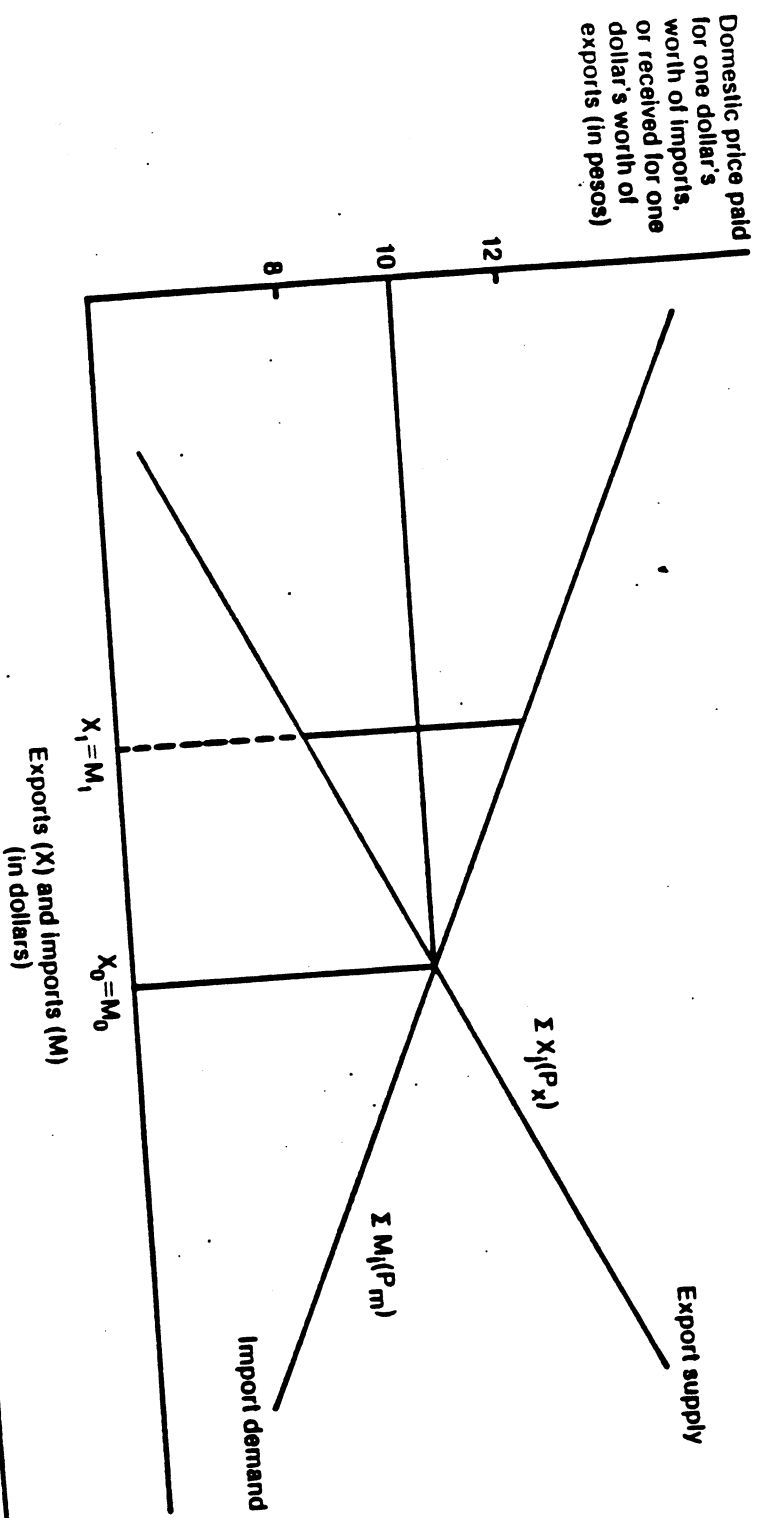
Tariffs in macroeconomic setting

In this section we take a brief look at the way tariffs fit into the macroeconomic setting of a country. The main conclusion drawn from this exercise is the insight that any policy of restricting imports, whether by tariffs or by other devices, will end up by also constraining exports below what would otherwise be their normal level. Restrictions on imports do indeed merit the label of "trade restrictions," for their end result is a reduction of the overall volume of trade, imports and exports alike. This proposition is demonstrated in the pages that follow.

Figure 2.3 depicts the demand for imports and the supply of exports as a function of the domestic prices of each of them—that is, rela-

Any policy that restricts imports will end up constraining exports as well. The end result of a trade restriction is a reduction in the overall volume of trade, imports and exports alike.

Figure 2-3. Demand for imports and supply of exports as function of domestic prices



tive to the general level of domestic prices. Exports are a rising function of the relative price that suppliers receive; imports are a declining function of the relative price that importers pay.

We assume that all tradable goods are counted in units whose international market price is equal to one dollar. That is, if a bushel of wheat costs \$4 in the international market, the units in which we measure wheat are units of 1/4 bushel. If the price of copper in the international market is 50 cents per pound, the units in which we measure copper would each be equal to two pounds. We also assume that the international prices prevailing for imports and exports are set in a marketplace that is fundamentally beyond the control of the developing country whose policies we are examining.

In this way, we can add up (horizontally) the demand curves for different imports and the supply curves for different exports. The way Figure 2.3 is drawn, all the demand curves for different imports add up to the line labeled $\sum M_i(P_m)$. All the supply curves for different exports add up to the line labeled $\sum X_j(P_x)$; where P_m and P_x are the internal (domestic, national) prices of one dollar's worth of imports and exports, respectively. If there are no trade restrictions these two prices will have to be the same. So, in Figure 2.3, without trade restrictions and with no capital movements or reserve losses or gains, the exchange rate would have to equal 10 pesos per dollar; that is, the supply of exports, valued at international prices, would be equal to the demand for imports, also valued at international prices, at this exchange rate. The quantities of imports and exports, measured at these prices, would also be equal at $M_o = X_o$.

Suppose now that a 50-percent across-the-board tariff is imposed. Things will change. Demand for imports will be reduced first. Incentives will be created for the production of import substitutes at home. If the exchange rate is flexible, the reduced demand for imports will cause the peso price of the dollar to fall. In Figure 2.3,

it falls to 8 pesos as a consequence of the imposition of a uniform 50-percent tariff on all imports. Hence, the tariff causes the market exchange rate to fall from 10 to 8 pesos per dollar. The price paid by domestic residents for imports and import substitutes rises to 12 pesos per dollar. A wedge, or a gap, is created between the amount that exporters get (8 pesos) for *producing* a dollar and the amount that import-substituters get (12 pesos) for *saving* a dollar of import. This wedge reflects the percentage rate of tariff (here 50 percent).

The consequence of all of this is a reduction in the volume of trade to $M_1 = X_1$. Exports fall because the price received for them (per dollar's worth) has fallen from 10 to 8 pesos. Imports fall because demand declines as a consequence of a rise in import price from 10 to 12 pesos per dollar's worth.

The above argument is built on the assumption that the country's monetary and fiscal policy is so regulated as to keep the general price level approximately constant. (In technical terms, the numeraire in Figure 2.3 is the general price level of the country.)

When, however, the exchange rate of the peso is fixed to the dollar, a different mechanism comes into play. Now, it is the prices of exportables that stay fixed, while those of importables again rise by 50 percent *relative* to those of exportables (this is virtually preordained by a 50-percent tariff). The monetary consequences of a tariff under a fixed exchange-rate policy cause a rise in the price level of nontradables (see Section 1.04, and in particular Graph A in Figure 1.7). In the end, the same real equilibrium is achieved under fixed exchange rates as under flexible rates. Import restrictions reduce trade, and curtail the incentive to export in the same way under either type of nominal exchange-rate policy.³

The most important practical point is that the imposition of a tariff will result in a reduction in both imports and exports, and by the same amount, regardless of whether the country pursues a flexible or a fixed exchange-rate policy.

Domestic resource cost of foreign exchange

I introduce the concept of domestic resource cost working on the assumption that there are no imported inputs into the productive processes being discussed. This is clearly a simple assumption, which permits us to treat the problem of measuring the domestic resource cost of foreign exchange in a straightforward manner. Later, when the concept of effective protection is discussed, this assumption will be withdrawn.

Refer again to Figure 2.3. You will see that the real exchange rate facing exporters falls by 20 percent. In the new equilibrium (that is, after the imposition of a 50-percent across-the-board tariff), exporters will receive 8 pesos for every dollar's worth of exports sold. Thus, they will be willing to incur costs of up to 8 pesos per dollar of exports.

On the side of imports, however, the local-currency price rises to 12 pesos per dollar's worth. Producers of import substitutes will be willing to incur costs of up to 12 pesos per unit. Therefore, the domestic resource cost of *saving* a dollar via import substitution can rise as high as 12 pesos, while the domestic resource cost of *producing* a dollar via additional exports will be at or below 8 pesos.

You need to be aware that the precise way in which the result worked out in Figure 2.3, with the local price of importables rising from 10 to 12 pesos (per dollar's worth), and that of exportables falling from 10 to 8 pesos, is not part of the necessary outcome. Depending on the elasticities of the two curves, it might work out that export prices fall only from 10 to 9 pesos per dollar's worth, while those of imports and import substitutes rise from 10 to $13\frac{1}{2}$. Alternatively, at another extreme, prices of exportables might fall from 10 to 7, while those of importables might rise only from 10 to $10\frac{1}{2}$ pesos per dollar's worth. These cases are illustrated in the two graphs in Figure 2.4 (see page 111).

Both these cases are characterized by relative prices of exportables and importables (per dollar's worth) being the same in the initial equilibrium ($X_0 = M_0$), and by prices of importables being 50 percent higher (per dollar's worth) in the new equilibrium ($X_1 = M_1$) after the 50-percent tariff is imposed. (Thus, $1.5 \times 9 = 13.5$; $1.5 \times 7 = 10.5$, just as, in Figure 2.3, $1.5 \times 8 = 12$.) Relative elasticities determine the precise effect of a 50-percent uniform tariff on the real exchange rate, but it always ends up that the domestic price level of a dollar's worth of imports is 50 percent higher than that of a dollar's worth of exports.

When there are different tariffs on different imports, and subsidies or taxes on particular exports, the domestic resource cost will differ among these groups. Table 2.1 presents a case of this type.

Here we have three separate categories for both imports and exports. The example is calibrated to be similar to Figure 2.1. If M_1 , M_2 , and M_3 are of equal importance in the presence of newly introduced distortions, the average tariff on imports will be 50 percent (which was assumed as the *uniform* tariff in Figure 2.3). Likewise, if the three export categories end up having equal weight, the average subsidy on exports will be zero. Thus, it is plausible to assume that the net effect on the real exchange rate will also be similar. All of this is built into Column 3 of Table 2.1. The average domestic price per dollar's worth of imports is 12 pesos; that of a dollar's worth of exports is 8 pesos. However, we have domestic prices as high as 16 pesos per dollar's worth on the import side (M_2), and as low as 6 pesos per dollar's worth on the export side. This means that in the process of generating import substitutes for M_3 , producers will be willing to incur domestic resource costs of up to 16 pesos to save a dollar, while in the process of generating exports of X_1 , producers will be using only up to 6 pesos of domestic resources to produce a dollar. The contrasts among the domestic resource costs of producing dollars (via exports) and of saving dollars (via import substitution) can become vastly more acute under differentiated treatment

Tat
doll
imp
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—
Foods:

Cloth:

Durabl

Meat (X

Palm oil

Manufac

—
a. Negau
≡

Table 2.1. Domestic resource costs of producing and saving a dollar with differential tax or subsidy treatment of different imports and exports

	Domestic price per dollar's worth		
	Tariff rate	Initially no tariff	With tariff and other distortions
	1	2	3
Foodstuffs (M_1)	0	10	8
Clothing (M_2)	50	10	12
Durable goods (M_3)	100	10	16

	Domestic price per dollar's worth		
	Subsidy rate ^a	Initially no tax or subsidy	With tariff and other distortions
Meat (X_1)	-25	10	6
Palm oil (X_2)	0	10	8
Manufactures (X_3)	25	10	10

a. Negative subsidy is a tax.

than it is when the treatment applying within each of the two broad groups (imports and exports) is kept the same.

2.04

Concept of effective protection

The stage is now set to introduce the concept of effective protection. This entails withdrawing the assumption, made in the previous section, that there are no imported inputs into the productive processes. When such inputs are present, the picture becomes more complicated.

Consider the example of a country with a tariff of 60 percent on steel, but where iron ore is imported free of duty. Suppose the iron ore accounts for 40 percent of the world price (say \$300 per ton) of steel. Hence, by producing a ton of steel at home, a country saves \$300 in steel-import costs, but incurs \$120 (equal to 40 percent of \$300) in iron-ore costs. The net saving of foreign exchange is \$180. Assuming that domestic resources are indeed used up to the point where, at the margin, domestic steel is just barely competitive with imported steel, and assuming also that the exchange rate is 10 pesos per dollar, we have the picture as shown in Table 2.2.

The 60-percent tariff raises the domestic price of steel to 4,800 pesos (the counterpart of \$480). The importation of iron uses up \$120 or (at the official exchange rate of 10 pesos to the dollar) 1,200 pesos. Thus, the net saving of foreign exchange is \$180 ($\$300 - \120), while the domestic resources used at the margin to save these dollars amount to 3,600 pesos ($4800 - 1200$). Hence, the domestic resource cost per dollar is equal to 20 pesos ($3600/\$180$). The 60-percent tariff on imported steel has become an effective rate of protection of 100 percent on the conversion of imported iron ore into steel.

Table 2.2. Effective protection rate for converting iron ore into steel

Assumptions:	
Tariff on steel 60%;	
Tariff on iron ore 0%;	
Market exchange rate 10 pesos/ dollar	
	<i>Dollars</i>
a. Dollars saved by reduced steel imports	300
b. Dollars newly spent on ore imports	120
c. Net dollars saved	180
	<i>Pesos</i>
d. Domestic value of steel with 60% tariff (\$300 x 10 x 1.6)	4800
e. Peso cost of iron ore imports at 0% tariff (\$120 x 10 x 1.0)	1200
f. Maximum profitable domestic resource cost of converting iron ore into steel (d - e)	3600
g. Domestic resource cost per dollar of net import substitution (f/c)	20
	<i>Percent</i>
h. Effective rate of protection $[(g/E_m) - 1] \times 100^a$	100

a. The market exchange rate (E_m) at which the protection rate is calculated is assumed to be 10 pesos per dollar.

Consider now an alternative possibility under the same tariff on steel—namely that instead of importing iron ore, the local producers import pig iron. Assume that this pig iron costs $66\frac{2}{3}$ percent of the world market price of steel, or \$200 per ton of steel to be produced. In this case, the net saving of foreign exchange is only \$100 (\$300 - \$200) per ton of steel produced, and (again with a 60-percent tariff) the domestic resource cost of effectuating this foreign-exchange saving can reach as high as 2,800 pesos. (This works out to a protected product price of 4,800 pesos minus 2,000 pesos of outlays for imported pig iron, which is assumed to have a zero tariff.) In this case, the country is in fact incurring up to 28 pesos of domestic resource costs to save one dollar of foreign exchange. The effective rate of protection thus becomes 180 percent.

The effective rate of protection changes not just with the proportion of the world price of the product (here steel) accounted for by imported inputs (here iron ore in the first case and pig iron in the second). The effective rate of protection also varies with the rate of tariff to which these inputs are subject. Table 2.3 deals with a case where the rate of nominal tariff protection is 60 percent for steel and 30 percent for iron ore.

The case presented in Table 2.3 is comparable to Table 2.1 in every respect, except that imported iron ore is subject to a 30-percent tariff. Row e amounts to 1,560 pesos instead of 1,200, and, as a result, the maximum profitable domestic resource cost of converting iron ore into steel falls from 3,600 to 3,240 pesos. As a consequence, the effective rate of protection of this steel-making operation falls from 100 percent to 80 percent.

If we do the same thing for the case where pig iron rather than iron ore is imported with a 30-percent duty, we find that \$200 of pig-iron imports now have an internal cost of 2,600 pesos; hence, the maximum profitable domestic resource cost for converting iron

Table 2.3. Effective protection rate for converting iron ore into steel

Assumptions:
 Tariff on steel 60%;
 Tariff on iron ore 30%;
 Market exchange rate 10 pesos/dollar

	<i>Dollars</i>
a. Dollars saved by reduced steel imports	300
b. Dollars newly spent on ore imports	120
c. Net dollars saved (a - b)	180
	<i>Pesos</i>
d. Domestic value of steel with 60% tariff (\$300 x 10 x 1.6)	4800
e. Peso cost of iron ore imports at 30% tariff (\$120 x 10 x 1.3)	1560
f. Maximum profitable domestic resource cost of converting iron ore into steel (d - e)	3240
g. Domestic resource cost per dollar of net import substitution (f/c)	18
	<i>Percent</i>
h. Effective rate of protection $[(g/E_M) - 1] \times 100^a$	80
a. The market exchange rate (E_M) at which the protection rate is calculated is assumed to be 10 pesos per dollar	

ore into steel is 2,200 pesos (4800 - 2600). Because the net foreign-exchange saving in this case is \$100, the maximum domestic resource cost is 22 pesos per dollar (instead of 28 when the duty on pig iron was zero). This corresponds to an effective protection rate of 120 per-cent versus 180 percent in the earlier case.

The general formula for the rate of effective protection on product j with imported input i is:

$$(1) \quad t_{ej} = \frac{t_{aj} - a_{ij}t_{mi}}{1 - a_{ij}}$$

where t_{ej} is the effective rate of protection in the operation of converting imported input i into final product j ,
 t_{aj} is the nominal rate of tariff on imports of final product j ,
 t_{mi} is the nominal rate of tariff on imported input i , and
 a_{ij} is the cost (at world prices) of the amount of input i used to make a dollar's worth (again at world prices) of final product j .

Formula (1) can be used to check the previous results. When steel has a tariff of 60 percent, and iron ore costs amount to 40 percent of the value of the steel, we have:

$$t_{ej} = \frac{.60 - (.4)(0)}{1 - .4} = \frac{.60}{.60} = 100\%$$

When the tariff on iron ore is set at 30 percent, we have:

$$t_{ej} = \frac{.60 - (.4)(.30)}{1 - .4} = \frac{.48}{.60} = 80\%$$

Turning to the case where pig iron is imported, at a cost amounting

to two-thirds of the world price of the steel it will be used to make, the formula reads, with a zero tariff on pig iron:

$$t_{ej} = \frac{.60 - (2/3)(0)}{1 - 2/3} = \frac{.60}{(1/3)} = 180\%$$

When the tariff on pig iron is 30 percent, we have:

$$t_{ej} = \frac{.60 - (2/3)(30)}{1 - 2/3} = \frac{.40}{(1/3)} = 120\%$$

Uniform nominal tariff implies equal effective protection to all domestic operations

From the preceding exercise we can see that when the nominal tariff t_{ni} on imported inputs is equal to the nominal tariff t_{nj} on the final product, this leads to an effective rate of protection t_{ej} that is equal to the nominal rate. Setting $t_{ni} = t_{nj} = t^*$, we have, from the formula:

$$t_{ej} = \frac{t^* - a_{ij}t^*}{1 - a_{ij}} = \frac{t^*(1 - a_{ij})}{(1 - a_{ij})} = t^*$$

Similarly, in the numerical example with iron ore imports, if we place a 60-percent tariff on them we get:

$$t_{ej} = \frac{.60 - .4(.60)}{1 - .4} = \frac{.60(1 - .4)}{(1 - .4)} = 60\%$$

Doing the same thing in the case with pig iron inputs, we get:

$$t_{ej} = \frac{.60 - (2/3)(.60)}{1 - (2/3)} = \frac{.60[1 - (2/3)]}{1 - (2/3)} = 60\%$$

Whenever the average nominal tariff rate on imported inputs is equal to the actual nominal tariff rate of the final product, the effective rate of protection for the final product will be equal to the nominal rate of tariff.

The proposition is a general one. When there are many imported inputs, the formula for the rate of effective protection becomes:

$$(2) \quad t_{ej} = \frac{t_{nj} - \sum_i a_{ij} t_{ni}}{1 - \sum_i a_{ij}}$$

where a_{ij} represents the different fractions that the different imported inputs account for (at world prices) in the cost of producing a dollar's worth of product j . A good numerical example is Table 2.4 which assumes to have a 60-percent tariff on steel, a 30-percent tariff on iron ore, together with a 10-percent tariff on coal. (Iron ore accounts for 40 percent and coal accounts for 20 percent of the cost of steel at world prices.) The results of Table 2.4 show that a dollar of net import substitution by way of producing more steel has a maximum profitable domestic resource cost of 21.5 pesos. The effective rate of protection (assuming a market rate of exchange of 10 pesos per dollar) is, therefore, 115 percent.

In Table 2.5 we perform the same exercise, but we use a 60-percent tariff rate on both iron ore and coal imports. We can see that as soon as we set the tariff rate at the same level (60 percent) for the final product *and* for the relevant imported inputs, the effective protection rate also turns out to be 60 percent. In a more formal way, if we call t_{ij} the average nominal tariff rate on the imported inputs i that are used in making final product j (or, $t_{ij} = (\sum_i a_{ij} t_{ni}) / \sum_i a_{ij}$) we can then say that whenever the average nominal tariff rate on imported inputs is equal to the actual nominal tariff rate of the final product, then the effective rate of protection for the final product will be equal to the nominal rate of tariff.

There are two ways to examine the above proposition. One way is to go final commodity by final commodity. There will be one nominal rate of protection (say, 60 percent) for steel, another (say, 30 percent) for women's cotton dresses, yet another (say, 100

Table 2.4. Effective protection rate for converting iron ore into steel

Assumptions:
 Tariff on steel 60%;
 Tariff on iron ore 30%;
 Tariff on coal 10%;
 Market exchange rate 10 pesos/ dollar

	<i>Dollars</i>
a. Dollars saved by reduced steel imports	300
b. Dollars newly spent on ore	120
c. Dollars newly spent on coal	60
d. Net dollars saved (a - b - c)	120
	<i>Pesos</i>
e. Domestic value of steel with 60% tariff ($\$300 \times 10 \times 1.6$)	4800
f. Peso cost of iron ore imports at 30% tariff ($\$120 \times 10 \times 1.3$)	1560
g. Peso cost of coal imports with 10% tariff ($\$60 \times 10 \times 1.10$)	660
h. Maximum profitable domestic resource cost of converting iron ore and coal into steel (e - f - g)	2580
i. Domestic resource cost per dollar of net import substitution (h/d)	21.5
	<i>Percent</i>
j. Effective rate of protection $[(i/E_M) - 1] \times 100^a$	115

a. The market exchange rate (E_M) at which the protection rate is calculated is assumed to be 10 pesos per dollar.

percent) for radios. Let us assume that imported inputs are used in the domestic production of each of these. The proposition that we have just set forth says that when the relevant weighted average tariff on inputs into steel *averages* 60 percent, *then and only then*, will there be a 60-percent rate of effective protection on the operation of transforming these inputs into finished steel. If the weighted average tariff t_{ij} is less than 60 percent, then the effective rate of protection on the steel-making operation will be higher than 60 percent, and vice versa. Similarly, only when the relevant weighted average tariff t_{ij} on inputs into women's cotton dresses is equal to 30 percent will the effective rate of protection of this operation be equal to the nominal rate. Finally, so, too, for radios, where the weighted average tariff rate on inputs into the radio-making process would have to equal or exceed 100 percent to keep the rate of effective protection equal to or below the 100-percent level.

All of the above statements deal with a particular final product and its inputs. None says anything about the overall tariff structure. Thus, it would be possible to have an effective rate of protection on steel that was equal to the nominal rate of 60 percent, while at the same time, say, the rate of effective protection on women's cotton dresses would also equal that particular nominal rate (in this case of 30 percent). To make this true, we would need the inputs into steelmaking to have a weighted average tariff t_i of 60 percent, while those entering into the making of women's cotton dresses would need to have a weighted-average tariff of 30 percent.

But if this type of equality (of effective and nominal rates) were to occur in a typical tariff structure with many different rates and many different classifications, it would surely be a matter of pure accident. It is not something that could be planned in advance and it is not something that could apply to more than a few categories at a time. A rise in the price of coal that is larger (percentagewise)

Table 2.5. Effective protection rate for converting iron ore and coal into steel

Assumptions:
 Tariff on steel 60%;
 Tariff on iron ore 60%;
 Tariff on coal 60%;
 Market exchange rate 10 pesos/dollar

	<i>Dollars</i>
a. Dollars saved by reduced steel imports	300
b. Dollars newly spent on iron ore	120
c. Dollars newly spent on coal	60
d. Net dollars saved (a - b - c)	120
	<i>Pesos</i>
e. Domestic value of steel with 60% tariff ($\$300 \times 10 \times 1.6$)	4800
f. Peso cost of iron ore imports at 60% tariff ($\$120 \times 10 \times 1.6$)	1920
g. Peso cost of coal imports with 60% tariff ($\$60 \times 10 \times 1.6$)	960
h. Maximum profitable domestic resource cost of converting iron ore and coal into steel (e - f - g)	1920
i. Domestic resource cost per dollar of net import substitution (h/d)	16
	<i>Percent</i>
j. Effective rate of protection $[(i/E_M) - 1] \times 100^a$	60
a. The market exchange rate (E_M) at which the protection rate is calculated is assumed to be 10 pesos per dollar.	

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than the contemporaneous rise in the price of steel will reduce the effective protection of steelmaking below 60 percent. A rise in world cotton prices that is lower than the contemporaneous rise in world market prices of women's cotton dresses would cause the rate of effective protection on the latter to rise.

We need to be aware that a great many key inputs—petroleum, iron, coal, lead, copper, tin, aluminum, wool, cotton, and so forth—go into a great many *different* products. If perchance an input's price would change by just the same percentage as one of the principal products it is used for, there is virtually no likelihood that this would (or even could) simultaneously be true for the other major outputs into whose production it enters. In practice, there is only one way to guarantee what will be the effective rate of protection that applies to any significant number of productive processes. And that is to impose an across-the-board tariff at a uniform rate.

If, using equation (2), we make $t_{nj} = t^*$ for every final product, and $t_{ij} = t^*$ for every imported input, then we will have:

$$(2) \quad t_{ej} = \frac{t^* - \sum a_{ij} t^*}{1 - \sum a_{ij}} = \frac{t^* (1 - \sum a_{ij})}{(1 - \sum a_{ij})} = t^*$$

and this will be true for every product j —in our case, for steel, for women's cotton dresses, and for radios, along with all the rest. There will be no confusion, no error.⁴

Reasons for adopting uniform tariff

The most profound and persuasive argument for a uniform tariff is the capriciousness of the alternative tariff structures that we observe in the real world. By capriciousness I mean two things:

- a. The effective protection that emerges as a result of given tariff legislation is far from what was intended.
- b. As relative prices change (which they must and always will in the complex world economy), rates of effective protection will also vary—sometimes quite dramatically.

These variations in effective protection rates are not intended by legislators and administrators, but they are additional to tariff legislation. For example, if we assume that the initial degree of effective protection was exactly what legislators wanted, then variations of relative world-market prices that end up changing the rate of effective protection obviously create a new situation that is different from what was intended.

Why effective protection turns out different from what was intended

The main reason why effective protection so often turns out to be different from what was intended is that legislators and government administrators do not really think in these terms. Perhaps, in ten or twenty years they will, in which case we will observe much more uniform world tariff structures than those we see today.

To get a feeling for the sort of motivation that lies behind tariff-setting decisions, consider the classic question of how to deal with imported inputs. The standard answer—directly embodied in legislation in some countries, and characterizing the actual tariff structure in many more—is that one should allow to enter duty-free all inputs of a type that cannot (or are unlikely to) be produced in the country in question.

The standard (but incorrect) answer to the classic question of how to deal with imported inputs is that we should allow duty-free the import of all inputs that cannot (or are unlikely to) be produced in the country. The typical result of such a rule is packaging and assembly operations.

What is the typical outcome of such a rule in most developing countries? Answer: packaging and assembly operations. The classic case of packaging is pharmaceuticals. When these are imported in the same packages or bottles that are finally sold to consumers, they are usually considered final products and are typically subject to a tariff. But when they are imported in bulk form (barrels, drums, cases, 20-liter cans, etcetera), they are typically considered inputs into productive process and are allowed to enter with a low or zero tariff.

Consider a situation in which the world-market price of aspirin packaged for consumers is one dollar per hundred tablets. Suppose the packaged aspirin carries a tariff of 20 percent, while the tariff on aspirin imported in bulk is zero. Suppose, too, that the final act of packaging accounts for 10 percent of the total world price of one dollar, so aspirin in bulk can be imported for 90 cents per hundred tablets. What is the rate of effective protection on the operation of putting bulk-imported aspirin into packages? In this case it is 200 percent. The imported input is bought for \$.90, the packaged output can be sold for up to \$1.20; thus, up to 30 cents worth of domestic resources can be used to save the ten cents that foreign packaging costs. In terms of formula (1) we have:

$$t_{ej} = \frac{t_{aj} - a_{ij}t_{ai}}{1 - a_{ij}} = \frac{.20 - .90(0)}{1 - .90} = \frac{.20}{.10} = 200\%$$

If the tariff on pharmaceuticals were instead embedded in a system with a uniform 20-percent tariff, the formula would give us an effective rate of protection of just 20 percent:

$$t_{ej} = \frac{t_{aj} - a_{ij}t_{ai}}{1 - a_{ij}} = \frac{.20 - .90(.20)}{1 - .90} = \frac{.20 - .18}{.10} = 20\%$$

The classic case of assembly operations is that of automobiles. In

a number of developing countries (such as Uruguay), attempts were made to produce automobiles or small trucks locally. High tariffs were placed on the final product, while the component parts were allowed to be imported at zero duty or at a very low rate. Extremely high rates of effective protection (300, 400, and even 500 percent) have been calculated for the auto industry in several developing countries.

Yet, most dramatic instances are those where infinite effective protection is involved. "Infinite protection" occurs when a country consumes domestic resources in an "import-substituting" process that doesn't save any foreign exchange. Typically, in these cases, the process actually is a net user (rather than saver) of foreign exchange. This occurs when the "kit" of unassembled pieces (that, when put together, will produce, say, a car) actually costs more than the import price of the final product (in this example, a car) that will be ultimately made from the kit of parts.

It is quite normal in the parts market that it will cost more to buy a full set of replacement parts, say, for an automobile, a refrigerator, or a television set than it would cost to buy the new, assembled product itself. And there are good economic reasons for this—the low turnover and consequent high inventory cost of storing parts, the handling costs of dealing with many different parts in small quantities, and so forth. It is thus practically certain that buying all the necessary parts for an automobile at the manufacturer's standard wholesale price for parts would cost a country more than to buy the same car, fully assembled, also at the manufacturer's standard wholesale price. Only by negotiating special prices for the parts or kits that will be used in repetitive assembly operations can a country even expect to get a price for the kit that is lower than the price for the assembled car itself. The evidence suggests that in a number of cases, countries did not take the precaution of zealously pursuing such negotiations; these

In a number of cases, countries end up with "infinite" effective protection. Infinite protection occurs when a country consumes domestic resources in an "import-substituting" process that doesn't save any foreign exchange. Actually, the process becomes a net user of foreign exchange.

Table 2.6. Effective protection rates on men's sport shirts

	Type of shirt			
	Cotton	Wool	Silk	Cashmere
Assumptions: Tariff on men's sport shirts 30%; Tariffs on wool, silk, cashmere cloth 0%; Market exchange rate 10 pesos/dollar				
a. Dollars saved by reduced shirt imports	9	12	18	24
b. Dollars newly spent on cloth imports	—	9	15	21
c. Net dollars saved	9	3	3	3
d. Domestic value of shirt in pesos (a x 10 x 1.3)	117	156	232	312
e. Peso cost of cloth imports at 0% tariff (b x 10 x 1.0)	—	90	150	210
f. Maximum profitable domestic resource cost of converting imported material (if any) into shirts (d - e)	117	66	84	102
g. Domestic resource cost per dollar of net import substitution (f/c)	13	22	28	34
h. Effective rate of protection [(g/E _M) - 1] x 100 ^a	30	120	180	240
a. The market exchange rate (E _M) at which the protection rate is calculated is assumed to be 10 pesos per dollar.				

were the ones, I suspect, that ended up with infinite effective protection.

Yet another way in which a country can end up with rates of effective protection that are unintended is through the capriciousness of tariff nomenclature. Tariff systems actually exist with a thousand, two thousand and even more separate categories. We can all see the difficulty, perhaps even the folly, of trying to administer a system with a lot more categories than that. But it is hard to imagine that a system of one or two thousand categories will be able to devote more than one or two of them to men's shirts—say men's dress shirts and men's sport shirts. To divide these into shirts made of cotton, nylon, orlon, mixtures of these, plus wool, silk, cashmere, and others, would probably require a system with more than ten thousand categories—which would be an administrative nightmare.

But let us for a moment pursue the implications of having just two categories. Consider the category "men's sport shirts." Let us assume that the country in question has a tariff of 30 percent on men's sport shirts, that it produces cotton locally, but that it is an importer (at zero tariff) of wool, silk, and cashmere cloth. Let the world price of a cotton shirt be \$9, that of a wool shirt \$12, that of a silk shirt \$18, and that of a cashmere shirt \$24. Let us also assume that the world price of the cloth for a wool shirt is \$9, that of the cloth for a silk shirt is \$15, and that of the cloth for a cashmere shirt is \$21. These prices imply that at world-market prices, the cost of making any kind of shirt (that is, of transforming the cloth into the finished shirt) is \$3.

Table 2.6 summarizes the calculation of effective rates of protection for the case just described. The innocent-looking tariff of 30 percent on men's sport shirts masks a protectionist chamber of horrors, with the 30-percent rate applying only to cotton shirts

Table 2.7. Effective protection rates on men's sport shirts

Assumptions: Tariff on men's shirts 30%; Market exchange rate 10 pesos/dollar.				
	Type of shirt			
	Cotton	Wool	Silk	Cashmere
a. Dollars saved by reduced shirt imports	9	12	18	24
b. Dollars newly spent on cloth imports	—	9	15	21
c. Net dollars saved	9	3	3	4
d. Domestic value of shirt in pesos (a x 10 x 1.3)	117	156	234	312
e. Peso cost of cloth imports at 30% tariff (b x 10 x 1.3)	—	117	195	273
f. Maximum profitable domestic resource cost of converting imported material (if any) into shirts (d - e)	117	39	39	39
g. Domestic resource cost per dollar of net import substitution (f/c)	13	13	13	13
h. Effective rate of protection (g/E _M - 1) x 100 ^a	30	30	30	30

a. The market exchange rate (E_M) at which the protection rate is calculated is assumed to be 10 pesos per dollar.

(which use no imported inputs). For the rest, the rates of protection range from 120 percent to 240 percent. It is easy to construct similar examples with even wider ranges of variations among the effective rates of protection for different subgroups within the same tariff category. These horrors will always be present, I feel, when the number of tariff categories is plausibly manageable. And I do not feel that the solution to this type of problem is to create a tariff structure with, say, twenty thousand categories. That would only create more problems than it solved.

The obvious solution is to go in the other direction—to a uniform tariff (which can also be thought of as a tariff structure with only one category). Though we have already shown that a uniform structure will result in uniform rates of effective protection, Table 2.7 is added simply to show how dramatically the move to a uniform rate solves the problems posed in Table 2.6.

How effective protection varies with world price changes

Consider a situation in which a final product is produced with imported inputs accounting for half of its world-market price. In numerical terms, think of a world price of the product equal to 100, while the world-market cost of tradable inputs is 50. Suppose, too, that we have a tariff of 60 percent on the final product, with a zero tariff on the inputs. Thus, initially, the effective rate of protection is 120 percent.

Suppose now the cost of tradable inputs falls to 25, and that the final product's world price reflects this fall and drops to 75. Now the 60-percent tariff on the final product results in a rate of effective protection equal to 90 percent. Following equation (1) we have:

$$\frac{t_j - a_{ij}t_i}{1 - a_{ij}} = \frac{.6 - (1/3)(0)}{1 - (1/3)} = \frac{.6}{(2/3)} = 90\%$$

And if the cost of tradable inputs increases from 50 to 75, with product price in this case rising to 125, we have an effective rate of protection equal to 150 percent $[(.6 - (.6)(0))/(1-.6)]$.

These examples are not exaggerated. Between 1971 and 1975 the annual average price of bauxite doubled, while the U.S. GNP deflator increased by 31 percent. From 1975 to 1980 it doubled again, with the U.S. deflator rising by 42 percent. The dollar price of lead, in contrast, was cut in half between 1979 and 1982. The dollar price of logs (per cubic meter) doubled between 1978 and 1980, then fell by about a third from 1980 to 1982. Zinc prices quadrupled (in dollar terms) between 1971 and 1974, then fell by more than half from 1974 to 1977. Wool more than tripled between 1971 and 1973, having fallen by a third from 1966 to 1968. The price of sugar, after averaging about 5-7 cents from 1968 to 1973, reached 50 cents in 1974 and again in 1980.

Trends as well as brusque movements can occur. The dollar price of iron ore was lower in 1979 than in 1953, yet the U.S. GNP deflator had almost tripled. Cotton did not fare quite so badly, but its dollar price only increased by 50 percent over the same period. The story of petroleum is perhaps too well known, but it is worth noting that petroleum prices rose less than the general price level between, say, 1953 and 1970, only to increase almost twentyfold in the subsequent decade. The commodities mentioned above are relatively homogeneous, so that price comparisons can be easily made across time. Yet, we are all aware of the tremendous fall in the relative prices (and the simultaneous massive rise in quality) of a host of products in the electronics and communications field.

Thus, the hypothetical example with which this section began is representative of many real-world situations. It is easy to find cases where changes in the world market caused the rate of effective protection to vary by much more than that example suggests.

The conclusion from all of this is that a uniform tariff rate is the simplest and most natural way for a country to avoid exposing its industries to capricious changes in the rate of effective protection brought about by changes in the pattern of world prices of different inputs and outputs.

Other arguments for uniform tariffs

The preceding arguments for uniform tariffs—those connected with customs classifications as well as with variations in world prices—were fundamentally of a pragmatic nature. They showed how capricious can be the differences among commodities in effective protection rates, and their changes over time for given commodities, when we do not have a uniform tariff. Moreover, these examples are easy to understand; they do not rely on subtleties of economic reasoning. The examples make clear what is the nature of the risks that we run and the costs that we incur in resorting to what might be called traditional, differentiated tariff structures.

In this section I present three arguments that are more closely linked to economic theory. I do so even though I find them less persuasive, certainly to a general audience of policymakers, administrators, and interested citizens, than the pragmatic arguments presented earlier. Nevertheless, they can both be considered as part of the corpus of economic theory that deals with policy matters.

The first argument deals with the case in which a country wants to limit the extent of its economic links to the rest of the world. If its objective is genuinely to limit the volume of trade as such, then it can be demonstrated that the most efficient policy instrument to use is a uniform import tax (or, a uniform export tax, since both are in effect a tax on trade).

Taxing the act of trade involves having lower domestic resource

A uniform tariff rate is the simplest and most natural way for a country to avoid exposing its industries to capricious changes in the rate of effective protection brought about by changes in the world prices of different inputs and outputs.

cost per dollar produced or generated (by exports) than the domestic resource cost per dollar saved (by import substitution). But it is easy to see that if we pay 8 pesos to substitute for imports of one type, 12 pesos for another, and 16 pesos for a third, we can have the same total amount of import substitution more cheaply by doing less in the area where it costs 16 pesos to save a dollar and more in the area where it costs only 8 pesos. To do this, we should lower the tariff for the former, and raise it for the latter group of imports. The opportunity to make this type of trade-off will continue to exist, so long as there are differences in tariff rates among categories. Only when they have all been equalized will it be impossible to find cheaper ways to save a given amount of dollars via import substitution.

The argument just presented presumes that the country in question is not capable of influencing the world price of any of its imports or of any of its exports. Since this book is being written with developing countries in mind, I believe it is quite correct to rule out this type of market power for imports. Even a physically large country like Brazil is small relative to the size of the world market for the things it imports. However, we cannot say the same thing about export products. There are some cases (coffee in Brazil, copper in Chile, tin in Bolivia, and so forth) where even a small country can account for a large proportion of the world's supply of a good that it can influence the world price by altering its exports.

This situation gives rise to the classical "optimal export tax," which in effect is conceived of as that tax which exploits the "monopoly" position of a country on a given product. The thought of a tax can arise when the export-producing industry (best exemplified by coffee in Brazil) is composed of many individual producers (in contrast, say, to International Nickel in Canada). In such a case, the multitude of local producers will not be able to collude to take advantage of their combined monopoly

power, but an export tax imposed by the state could produce (for the nation as a whole) the same monopoly benefit.

The second argument deals with cases in which a country produces a differentiated product. (Spanish, Italian, and French grapes—as well as corresponding wines—are really different and vary in price relative to one another.) Here, even without accounting for a very important share of the world market, a country could find itself in a situation where changes in its commercial policy could alter the world price of *its* (differentiated) exports, even if they could not significantly affect the world-price level of a product group as a whole.

The third argument deals with cases in which a country exports products with high transport cost. Here, that country faces a situation in which demand increases when price is reduced, for the simple fact that a lower f.o.b. price in the country of exportation enables it better to compete with alternative sources of supply over a wider geographical radius.

These three arguments all create an “optimum export tax” situation. Following what economists call a “first best policy” (which in this context means that the individual exporting country will try to maximize its own interests), the country in question could gain by levying a variegated set of export taxes, each attuned to the degree of influence the country has over the price it receives for exports of each different type.

Economists would agree with the analysis leading to the above conclusion, but may not yet want to endorse a series of export taxes in different goods, each designed to exploit the market power that the country has in each of a whole set of specific export commodity markets. There are many reasons for this reluc-

tance. In the first place, economists are on the whole free-traders, in the sense that they are not pleased at subscribing to a set of policies by which one (exporting) country gains by artificial export restrictions that are aimed to exploit its monopoly power (a "quasi-monopoly power") in the markets for its various exports. Such restrictions will produce benefits for the country, but not for the world as a whole. In the second place, countries are *not* prone to place export taxes on the types of exports listed here. With rare exceptions, the mind-set of policymakers in most developing countries is more mercantilistic, leading them to want, if anything, to subsidize exports while taxing imports.

From the point of view of a developing country, so long as it has a modicum of monopoly or quasi-monopoly power on the export side, it would perhaps stand to gain most from a set of differentiated export taxes, each trying to exploit the degree of monopoly (or "quasi-monopoly") power that the country possesses in the given export market. This is an unlikely outcome, given the mercantilist mind-set of both politicians and the public in most countries. But it must be admitted that, up to a point, a (potentially but not necessarily) uniform tariff helps a country to exploit the monopoly and quasi-monopoly advantage referred to.

Under this line of reasoning, a moderate uniform tariff could be defended as enhancing the economic interest of the country that imposes it so long as its major trading partners did not take retaliatory actions. On the whole, industrial countries, which *are* the major trading partners of developing countries, have not tended to retaliate in such circumstances. Hence, the country's economic interest may be enhanced by a moderate uniform tariff. However, the policy cannot be favored from the point of view of the world economy as a whole, and it is not a first-best policy even from the point of view of the country in question. But given the mercantilist mind-set, and given the fact that the degrees of monopoly and

Developing countries generally are not prone to place taxes on exports. With rare exceptions, the mind-set of policymakers is more mercantilist, leading them to want, if anything, to subsidize exports while taxing imports.

quasi-monopoly power in different export markets are constantly changing, a moderate uniform tariff can be defended as being in the economic interest of a developing country that imposes it. Succinctly put, if the uniform tariff is low enough, we can be quite sure that benefits exceed costs (for the country in question) while, almost as surely, costs exceed benefits for the world as a whole.

Lessons for policymakers

Just because a convincing case has been made for a country to adopt an across-the-board uniform tariff on imports (if it is going to have any tariff at all), it would be naive to believe that administrators and legislators around the world will rush to implement such a policy. The pace of progress in policy matters is slow and tentative at best. I will, therefore, enumerate and explain what I believe are the important practical lessons to be drawn from this analysis.

1. *The traditional way of thinking about tariffs must be changed.* The strongest *idée fixe* that one finds in what the general public thinks about tariffs is the notion that no particular national interest is served (except for the revenue raised) by tariffs on products that cannot be or are unlikely to be produced at home. How, they ask, can tariffs on such items have anything to do with protection, when there's nothing here (or likely to be here in the future) to protect?

What we have shown is that there are very good reasons for imposing tariffs even on goods in this category. Taxing imported inputs at rates similar to the tariffs on the protected outputs is the only way of even being sure what is the effective rate that applies to the

protected domestic activity. Taxing all imported inputs and protected products equally is the only way of having, for any wide range of protected activities, the same knowledge of what is the effective rate of protection. Add to this the fact that there are very good economic arguments (presented in the preceding section) for having a single general rate, and you have the reasons why the traditional way of thinking about tariffs must be changed.

2. A country can gain from "squeezing" its tariff structure, even when it does not reduce tariff revenue.

This does not deny that most countries would be better off with a general reduction in tariffs. It only says that even without a general reduction, countries can typically gain by moving toward equalization of tariff rates, raising the lowest rates while reducing the highest. This is definitely true when there are already tariffs (however small) on imported inputs. Moreover, in the process of "squeezing" a tariff structure, the biggest gains come from the first steps, the smallest from the last. Thus, even though countries are not prepared (for political or other reasons) to move to complete equalization, they should be encouraged to move toward it.

3. A country can gain from imposing tariffs on imported inputs, even when these have up to now entered free of duty.

This is a very clear message—the only caveat is not to overdo it. It would be absurd to move an input from duty-free status into the 100-percent tariff category. But for a country with an average tariff rate of, say, 30 percent, it is virtually certain to be beneficial to move an input from zero percent to the 10-percent category. Once it is in the category of tariffed goods, the preceding lesson on "squeezing" applies.

4. The lessons mentioned above apply equally to imported capital goods.

There has been a consistent bias in the tariff and tax legislation of

many developing countries in favor of imported capital goods over other types of imports. But truly, in the terms in which we have been speaking, the only difference between imported capital inputs and imported current inputs is that the imported capital goods render their productive services over a span of years, while the imported current inputs render their services relatively quickly.

Standard economic theory tells us that the price paid for a capital asset should reflect the present value of the services that it will render in the future—services that on the accounts of the firm are partly reflected in depreciation, partly in interest (if the asset was bought with borrowed money), and partly in profits (to the extent that the asset was bought with equity capital, and also, in addition, to the extent that the asset yielded more or less than the normal rate of return).

Thus, in effect, if we tax imports of capital equipment at the same rate as other imports, we will not be discriminating in any way against them, but rather fulfilling the objective of uniform effective protection for all domestic value added. Partial fulfillment of this objective—reflected in the idea of “squeezing”—thus includes imports of capital goods in a fashion equivalent to imports of raw materials, intermediate products, and other “current” inputs. There is no sound reason to exempt capital goods, or to treat them at a preferential rate, in a tariff structure built upon the analysis presented in this paper.

5. High tariffs on luxury items can (and probably should) be replaced by high excise taxes on the same items.

One of the policy “traps” into which many countries have fallen is that of precluding “luxury” imports via high tariff rates (or quotas, or indeed in some cases outright prohibitions). This type of policy was tried in many developing countries in the 1950s and 1960s. Tariffs (sometimes 100, 200, or even 400 percent) were thrown

up, which encouraged domestic production of, say, autos, refrigerators, or television sets at very high cost to the nation. These same goods could have been bought in the international market at a cheaper price.

Effective protection of such items has been in many cases extreme, and has led to a deplorable waste of domestic resources to produce inferior products at double (or more than double) the world price. This lesson has been recognized by some countries, notably China, which in 1982 began importing Toyotas from Japan as substitutes for its "own" car. The Chinese car was an expensive, fuel-inefficient, and fundamentally obsolete replica of a 1946 Pontiac from the United States. But the problem still remains in many countries.

What is the solution? We must first ask ourselves whether the motive for putting high tariffs on luxury items was to stimulate extremely high-cost domestic production of them. The answer is invariably "no." The motive was "not to waste scarce foreign exchange" by spending it on such items. But the consequence was often the establishment of an extremely high-cost, inefficient "hothouse" industry producing the same general type of product at home.

The question to ask the people, the administrators, and the legislators in such a case is whether the outcome is something they anticipated and wanted. Certainly the mass of people would say that they would prefer to buy better cars, refrigerators, and television sets at half the price, rather than accept inferior substitutes at what it costs to produce them domestically. There is a direct way of producing these products—by using domestic resources—but also an indirect way. The indirect way is to produce wheat, beef, iron, cotton textiles, shoes, and other items and with the proceeds buy in the international marketplace Toyotas, Frigidaires, and Sonys. The choice is made particularly easy by the fact that when the inferior

domestic substitutes are produced at very high cost, they usually contain substantial amounts of imported components, so the amount of foreign exchange saved is much less than it might at first appear.

The answer is too simple for words. If we wish to deter the use of foreign exchange for the purchase of luxury items, and if we do not, as a consequence, want to stimulate their domestic production at high cost, one can simply place luxury taxes on those goods. Thus, automobiles with list prices of \$7,000 might be taxed at 25 percent, those with list prices of \$12,000 might be taxed at 50 percent, and those with prices of \$20,000 and over might be taxed at 100 percent. The taxes in question would apply both to imported and to domestically produced items. Such a tax scheme would deter the use of imported cars, but it would also deter the domestic production of them. This solution avoids the tragedy that so many developing countries had to face in the era of extreme protectionism of this type—that of becoming ever more self-sufficient in the production of (usually inferior) luxury items while, at the same time, becoming ever more dependent on the rest of the world for imports of basic necessities and component parts.

Should there be exceptions?

To this question, an economist in principle would answer “no.” But there are some possibilities for exceptions. The basic case for a uniform tariff rests on the relationship between imported inputs and imported final products. A uniform tariff rate can be applied to the following:

- a. All final products using significant amounts of imported inputs.
- b. All products that serve as imported inputs into the above.
- c. All imported goods that serve a dual purpose—both as final products and as inputs.
- d. All products for which domestic production is feasible or conceivable within a reasonable time (say 10 to 15 years).

If we wish to deter the use of foreign exchange for the purchase of luxury items, we should place “luxury taxes” on both imported and domestically produced goods. This solution avoids the tragedy that so many developing countries have had to face—that of becoming more self-sufficient in the production of (usually inferior) luxury items, while at the same time, becoming more dependent on the rest of the world for imports of basic necessities and component parts.

The above rules exclude two types of goods:

- i. Final products (like coffee and tea) that in many countries cannot be produced at home and which do not serve as inputs in the production of import substitutes.
- ii. Inputs that serve only to produce domestic final products (that is final products with no close imported substitutes).

In any country there would be a number of items fitting in category i. They would be, in a certain sense, eligible for differential treatment. The question is why? If they are luxuries, we can add a domestic tax to the uniform treatment. If they are "merit goods," they can still be subject to the uniform tariff at the border, with their subsequent uses being subject to subsidies calibrated to their degree of "merit." Frankly, I do not think of coffee and tea as merit goods, and I find no others that fall under category i, which I would so classify.

Following similar procedures to seek goods that fall under category ii, I fail to come up with even a single example. I first thought of imported electric generators in a small and poor country for which the production of such generators is inconceivable for decades. These generators are inputs into the production of electricity, which is one of the classic nontradable goods for most countries. But the problem is that electricity is an input into the production of many tradable items. Thus, ultimately, electric generators fall under category b: they are indirect inputs into nearly every process that produces tradable goods. So, too, are railroad locomotives and cars. What imported inputs serve only to produce nontradable outputs? Maybe machines that make espresso coffee—but even here we seem to run afoul of rule d, because the technology for producing such machines is relatively simple.

The answer to the initial question thus is: yes, there may be exceptions (like coffee and tea) on the final-product side, but they do not seem to present any compelling case for special treatment. It would

not hurt, in a country that could produce neither, to have a 50-percent tariff on coffee and tea, in the presence of a general tariff of, say 20 percent. But the same objective could be reached by subjecting coffee and tea to the general tariff of 20-percent, plus an additional excise tax (in principle applicable to domestic as well as imported output) of 25 percent.

The final message is, then, that while we can make a case for a few exceptions, they pale into insignificance in comparison with the persuasiveness of the arguments for a uniform rate. We know in advance that most countries will not end up with uniform tariffs. We know, too, that the reasons for most of the deviations from uniformity will have to do with political power and pressures, with specific national traditions and goals, and so forth. We cannot deny either the reality of the pressures or the validity of the traditions and goals. But both of them end up trading off a potential economic advantage for some other value. Economists, thus, would answer that the economic goal should be a uniform tariff; that "squeezing" the tariff structure combined with introducing new (small) tariffs on previously nontaxed inputs is the operational guideline; and that there is little if any gold at the end of the rainbow that we can trace as we begin to think about exceptions.

Notes

1. Whether a subsidy is in fact justified depends on the particulars of the case. A generalized objective of increasing national production, for example, does not lead to the selection of specific commodities for special subsidy treatment. A specific purpose, such as the desire to promote the planting of forests to help control floods or to prevent soil erosion, is more likely to generate a presumption that a subsidy might be an appropriate policy instrument.

2. Since $M^d_0 = Q^d_0 - Q^s_0$ and $M^d_1 = Q^d_1 - Q^s_1$, we have $(M^d_0 - M^d_1) = (Q^d_0 - Q^s_0) - (Q^d_1 - Q^s_1) = (Q^d_0 - Q^d_1) + (Q^s_1 - Q^s_0) = \text{base of triangle}$

B plus base of triangle A.

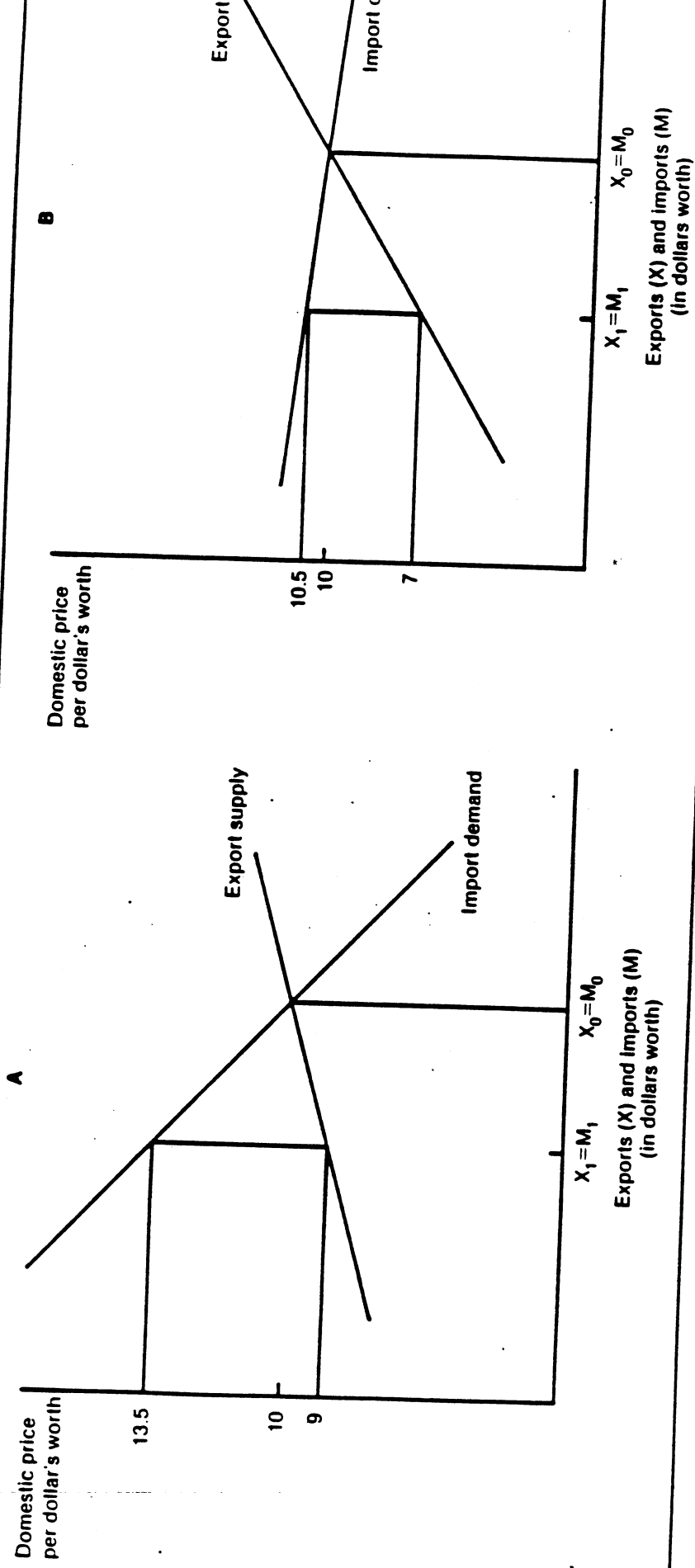
3. All of this can be succinctly put by defining the metric of the vertical axis of Figure 2.3 as P_i/P_d , where P_d is the internal price level, and P_i is the general price level of importables (on the demand curve) or exportables (on the supply curve). In the case of exportables not subject to any trade restrictions, and defining units of quantity to be a dollar's worth at world prices, P_i equals E_M , the market exchange rate. This falls when P_d is constant, but stays the same when E_M is fixed.

(An acceptable definition of a country's real exchange rate, based only on data from that country, is the ratio of the market-price level of nondistorted tradables to the general price index. Nondistorted tradables are, for example, exports that are neither taxed nor subsidized simply for the fact that they are exported. Similarly, imports that enter free of duty qualify as nondistorted tradables. This definition is arbitrary, but clear. Any restriction that reduces imports has the effect of lowering the real exchange rate—of reducing the incentives to export and to produce substitutes for nondistorted imports).

If there is a uniform 50-percent tariff, of course, the domestic price of importables will be $1.5 E_M$. With a nonuniform tariff of t_j on product j , the relevant domestic price of a dollar's worth of that product would be $E_M(1+t_j)$.

4. For a discussion of how a uniform tariff should be complemented by other policies in certain cases to guarantee uniform effective protection, see the Appendix on page 113.

Figure 2-4. Relative prices of exportables and importables



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Appendix

1. Effective protection rate when export goods serve as inputs

A footnote has to be added to the analysis presented in the text to cover the case where one or more export goods serve as inputs into activities competing with imports. The underlying principle is that an increased demand for an export good for use as an input will not cause the domestic production of that good to change. Greater use of the export good, of course, leaves less of it available for export at the prevailing world price. Using an export product as a productive input entails a loss to the nation of the foreign exchange it would have earned if it were exported.

The observations made in the preceding paragraph have implications for the calculation of the rate of effective protection. The calculation aims at measuring the ratio of "maximum profitable domestic resource cost" of the protected activity to "net dollars (of foreign exchange) saved" as a result. When an export good, say coal, is used as an input into the protected activity, the "net dollars saved" must be reduced by the dollar value of the exports diverted. It is as if coal were an import good and were used as an input.

As the calculation in Table 2.8 shows, the dollar value of coal used as an input in the process of producing steel enters as a negative item in the calculation of "net dollars saved" (row d). The calculation of the "maximum profitable domestic resource cost" (row h) of converting iron ore and coal into steel is also the same as it would have been if coal were an import good carrying zero duty. This leads us to a simple rule: in the computation of effective protection, treat the use of export goods as productive inputs in the same fashion as we would treat the use of import goods for that purpose.

This rule carries over to the case where the domestic use of an

Table 2.8. Effective protection rates when an export good (coal) serves an input to convert iron ore into steel

Assumptions:	
Tariff on steel 60%;	
Tariff on iron ore 60%;	
Tax on coal 0%;	
Market exchange rate 10 pesos/dollar.	
	<i>Dollars</i>
a. Dollars saved by reduced steel imports	300
b. Dollars newly spent on iron ore (an import good)	120
c. Dollar value of coal (an export good) used in process	60
d. Net dollars saved (a - b - c)	120
	<i>Pesos</i>
e. Domestic value of steel with 60% tariff (\$300 x 10 x 1.6)	4800
f. Peso cost of iron ore imports with 60% tariff (\$120 x 10 x 1.6)	1920
g. Peso cost of coal (no special tax treatment) (\$60 x 10)	600
h. Maximum profitable domestic resource cost of converting iron ore and coal into steel (e - f - g)	2280
i. Domestic resource cost per dollar of foreign exchange savings (h/d)	19
	<i>Percent</i>
j. Effective rate of protection [(i/E _m) - 1] x 100 ^a	90
a. The market exchange rate (E _m) at which the protection rate is calculated is assumed to be 10 pesos per dollar.	

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export good is subject to tax. If there is a tax on the domestic use of an export good, it should be treated in the calculation of effective protection in the same way as we would treat a tariff if the good in question were an import. The logic is clear; a tax on the domestic use of coal is part of the peso cost of coal which has to be deducted (as in row g) in the course of calculating the maximum profitable domestic resource cost of making steel. A higher tax on the use of coal as an input into steelmaking works in exactly the same way regardless of whether coal is an import good and the tax takes the form of a tariff or whether coal is an export good and the tax applies to its domestic use.¹

The preceding analysis has a corollary: in the presence of export goods used as inputs into the production of protected products, uniform effective protection of all activities is obtained by a uniform import tariff combined with domestic taxes of an equal percentage on the use of export goods as inputs into productive processes. Table 2.9 shows how the simple addition of such a tax can eliminate the disparity (revealed in Table 2.8) between the nominal and the effective rates of protection in making steel. Uniformity of effective protection can thus be ensured by parity of nominal rates, supplemented (where needed) by taxing the use of export goods as inputs into domestic productive processes.

You may wonder whether, by adding this footnote to our earlier analysis, we seriously weaken the case for uniform protection as a reasonable objective in the real world. The answer is "no." First, there is no need for a general tax on the domestic use of all export goods; many export items are direct-consumption goods that do not enter as inputs into the production of import substitutes. Second, while other export goods may become inputs into production, they may not be so important that a failure to tax their domestic use would have a significant quantitative effect on the rate of effective

Table 2.9. Effective protection rate when an export good (coal) serves as an input to convert iron ore into steel.

Assumptions:	
Tariff on steel 60%;	
Tariff on iron ore 60%;	
Tax on domestic use of coal 60%;	
Market exchange rate 10 pesos/dollar	
	<i>Dollars</i>
a. Dollars saved by reduced steel imports	300
b. Dollars newly spent on iron ore (an import good)	120
c. Dollar value of coal (an export good) used in process	60
d. Net dollars saved (a - b - c)	120
	<i>Pesos</i>
e. Domestic value of steel with 60% tariff (\$300 x 10 x 1.6)	4800
f. Peso cost of iron ore imports with 60% tariff (\$120 x 10 x 1.6)	1920
g. Peso cost of coal with 60% tax on domestic use (\$60 x 10 x 1.6)	960
h. Maximum profitable domestic resource cost converting iron ore and coal into steel (e - f - g)	1920
i. Domestic resource cost per dollar of foreign exchange savings (h/d)	16
j. Effective rate of protection $[(i/E_m) - 1] \times 100^a$	60
a. The market exchange rate (E_m) at which the protection rate is calculated is assumed to be 10 pesos per dollar. Effective protection is expressed in percentage.	

protection of the import-substitution activities that use them. Third, cases that are not covered under the preceding two points would be rare, and in such cases the possibility is always present of introducing a domestic tax on the use of the export as an input into productive processes, if that seems critical to avoid a grossly distorted pattern of effective protection.

A review of the list of important export products for the major developing countries confirms the preceding judgments. Wheat, meat, hides, and wool are not important inputs into import-competing productive processes in Argentina; nor is tin in Bolivia; coffee and soybeans in Brazil; copper in Chile; coffee in Colombia and Central America; cacao in Ghana and Côte d'Ivoire; rubber, palm oil, and tin in Malaysia; rice and rubber in Thailand; and so forth. Petroleum is the main case of a major export good from the developing world that is widely used as an input; but petroleum enters into nearly every import-substituting activity without being a truly major input into any of them. Moreover, petroleum is frequently subject to special taxation; rarely could there be major obstacles in the way of its being taxed at the same (presumably moderate) rate as the uniform tariff to ensure parity among the rates of effective protection across product and sectors.

2. Exports with significant inputs of imported or import-substitute goods

The formula for effective protection holds not only for cases where a nominal tariff is present, protecting a given activity j , but also when there is no such protection. There are at least two important cases here: the case of an imported good which carries no tariff or similar restriction of trade, and the case of a good produced for export. In both these instances, effective protection is negative so long as tariffs are levied on any of the inputs. The formula for the rate of effective protection is then:

$$t_{ej} = (-\sum_i a_{ij} t_i) / (1 - \sum_i a_{ij})$$

Table 2.10. Effective protection rate for converting imported iron ore and exportable coal into steel for export

Assumptions:		
Tariff on iron ore 60%;		
Domestic excise or export tax on steel or coal 0%;		
Market exchange rate 10 pesos/dollar		
	<i>Dollars</i>	
a. Dollars saved by increased steel imports	300	
b. Dollars newly spent on iron ore (an import)	120	
c. Dollar value of coal (an export good) used in process	60	
d. Net dollars saved (a - b - c)	120	
<i>Tariff on iron ore rebated with export of steel?</i>		
	<i>in pesos</i>	
	A. No	B. Yes
e. Domestic value of steel exported (\$300 x 10)	3000	3000
f. Peso cost of iron ore imports with 60% tariff (\$120 x 10 x 1.6)	1920	1920
f. Rebate of tariff on iron ore	0	720
g. Peso cost of coal (an export good) used in process (60 x 10)	600	600
h. Maximum profitable domestic resource cost of converting iron ore and coal into steel (e - f + f' - g)	480	1200
i. Domestic resource cost per dollar of foreign exchange generated (n) [h/d]	4	10
j. Effective rate of protection $[(i/E_m) - 1] \times 100^a$	-60	0
a. The market exchange rate (E_m) at which the protection rate is calculated is		

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Table 2.10 explores this case for exports of steel, where the iron ore to make the steel is imported with a 60-percent tariff. Peso costs are calculated both under the alternative assumption A, that no rebate is given when the steel is exported, and B, that the contribution of the iron-ore tariff to the peso cost of the steel is rebated whenever the steel is exported. The expected results hold: when there is no rebate, the rate of effective protection is negative (in this case a negative 60 percent), which reflects the import duty on iron ore. When the duty on iron ore is rebated, the rate of effective protection becomes zero.

In Table 2.10, there is an entry for coal (an export commodity). No special treatment is assumed, but we can see that if there were a 60-percent domestic excise tax or a tax on coal, the peso cost in row *g* would be 960 rather than 600. This would cause the effective rate of protection in Column A to be negative 90 percent rather than the negative 60 percent shown. However, if the domestic excise tax on coal were rebated whenever steel (made by using the coal) was exported, there would be an entry in Column B (in a hypothetical row *g'*, similar in concept to row *f'*) to that effect, in the amount of 360 pesos. Effective protection would again be equal to zero percent in the case covered by Column B, which would now entail the rebating both of the tariff on iron ore and of the domestic excise tax on coal.

With appropriate use of border-tax adjustments, rebating both tariffs on inputs of importable goods and taxes on inputs subject to domestic excise taxes, a zero rate of effective protection of exports can be assured.

3. Effective protection and prohibitive tariffs

In studying problems of public finance, special issues arise when taxes, tariffs, or other types of restrictions cause a particular activity to cease entirely. A prohibitive tax on the production of a

commodity is one that results in the cessation of its production; a prohibitive import duty is one that reduces imports to zero.

A problem that emerges in such cases is that several different tax or tariff rates have equivalent effects. Thus, moving a particular tariff from zero to 120 percent might steadily reduce the level of imports of the good in question. Yet, if imports reach zero with a tariff of 120 percent, they remain at zero when the tariff is raised to 130 or 150 percent and beyond. The functional dependency of the level of imports on the rate of the tariff stops, so to speak, once the tariff reaches 120 percent. This fact creates problems for writers who would want to say something like "whenever a tariff is raised, the effect is to lower the level of imports of the affected good."

To leave such statements intact, a convenient convention has evolved. This convention suggests that we should use the "just barely prohibitive tax rate" as a surrogate for any given prohibitive tax rate in interpreting statements about it. Thus, if faced with analyzing a rate of 130 or 150 percent in the case just cited, we could substitute 120 percent for the given rate, and use it instead. The effect would be the same, as all the rates in question are prohibitive.

Another aspect of prohibitive tariffs is that they can effectively eliminate certain processes in the measurement of effective protection. Suppose, for example, that a 40-percent duty would eliminate all imports of coal. If we assume that coal and iron ore both initially serve as imported inputs into making steel (as shown in Tables 2.4 and 2.5), we can state unambiguously that a uniform 30-percent tariff (with such associated domestic tax treatment of the domestic use of exportable inputs that may be required) would entail a 30-percent uniform protection. The same goes for a 35-percent and even, in the limit, a 40-percent uniform tariff. At the latter tariff rate (at which coal imports barely cease) we can deal with the case as if marginal coal imports still exist. (If it makes

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things easier, we can assume a 39.9 percent uniform tariff rather than one of 40 percent.)

But what if we move to a 60-percent uniform tariff? Inputs of iron ore now bear a peso cost that is 60 percent above the world price. So, too, do any other imported inputs. But coal will not cost 60 percent more than the world market price. Without further information about the nature of costs and of competition in coal production, we cannot say any more than that. At tariff rates of 40 percent or above, coal is a domestic resource cost, not an imported input in making steel.

This gives us a clue which clarifies an otherwise puzzling situation. The fact is that just as a uniform 30-percent nominal tariff provides 30-percent effective protection to all relevant activities, and a 40-percent uniform rate gives 40-percent effective protection, so too a 50- or 60-percent uniform rate would provide 50- or 60-percent effective protection to all relevant activities. The general proposition that a uniform tariff provides uniform, effective protection remains intact. However, as we move the uniform tariff rate upward, we observe changes in the set of "relevant activities" for which effective protection is being calculated.

At tariff rates below 40 percent, in our example, imported coal is actually used as an input into making steel. For a marginal increase in domestic output of steel, all the coal will come from imports. (This follows because the price will not rise to stimulate additional domestic production.) The "domestic resource cost per dollar of net import substitution" will be measured by calculating in the numerator the domestic costs of the nonimported resources used, and in the denominator the net dollars saved (see Tables 2.4 and 2.5). Imports of coal will appear (along with iron ore) as negative items in the denominator of this ratio.

When we pass uniform tariff rates above 40 percent, coal ceases

to be an imported input in the making of steel. Instead, it becomes a domestic resource cost. It appears now in the numerator of the (domestic resource cost/net dollars saved) ratio. The protected operation, which previously was the conversion of imported coal and iron ore into steel (as in Tables 2.4 and 2.5), now becomes one of converting just imported iron ore into steel. On this operation, a uniform tariff of 50 or 60 percent represents an effective tariff of 50 or 60 percent.

All this is "as it should be." When we raise a uniform tariff rate, we expect to get more and more domestic production and have less and less imports. Part of this process entails the passage of certain activities from the "import category" to the "domestic resource use" category. This is what happens to coal in the present case. At uniform rates of protection below 40 percent, coal is in fact an imported input and should be treated as such. At rates above 40 percent, it has become (as a result of the very protection we are analyzing) a domestic resource cost.

4. The concept of a "true tariff"

In its essence, effective protection is a microeconomic concept. The formula $t_{ej} = (t_{nj} - \sum_i a_{ij} t_{ni}) / (1 - \sum_i a_{ij})$ refers to any particular protected item or activity j , however tiny it may be. Likewise, the proposition that uniform protection renders the nominal rate equal to the effective rate is true item-by-item. If the various material inputs that go into the production of pencils are similarly tariffed at 20 percent, then the operation of converting those material inputs into pencils will have an effective rate of protection of 20 percent, regardless of what tariff rates apply to other things. Once we recognize the truth of the observation in the preceding statement, we can appreciate that the general theorem is also in a sense microeconomic in nature. The theorem states that a general uniform duty will give equal effective protection to all import-substituting activities. When we know that all actual and potential outputs of import-substituting operations will be subject to a given rate of tariff, and that all tradable inputs into those activities will be taxed at the same rate, the statement of the previous paragraph

will necessarily apply (in the same microeconomic sense as in the case of pencils) to any and every actual and potential import-substituting activity.

But although every uniform tariff of 50 percent always ends up giving 50 percent effective protection to all affected activities, it does not follow that the consequences of imposing such a tariff will everywhere and always be the same in other respects. Most relevant here are what I call the "macroeconomic consequences of a tariff structure."

Figure 2.4 (on page 111) illustrates the point. Both Graphs A and B show the effects of a uniform 50-percent tariff. But in Graph A, the price level of importables (relative to P_d) rises by 35 percent, while that of exportables (also relative to P_d) falls by 10 percent. In Graph B, by contrast, the price level of importables rises by 5 percent, while that of exportables falls by 30 percent. In each case, the end result is a 50-percent rise in the price level of importables relative to exportables [$(135/90) = (105/70) = 1.50$]. Yet, one can easily see that the results of the two cases differ. Those who produce importables and those who produce exportables would surely perceive the difference.

Examination of Graphs A and B shows that it is not within the capacity of policymakers to *choose* which situation they would like to be in. Rather, the difference depends on the elasticities of the supply curve of exports and of the demand curve for imports—attributes of the economic structure rather than of policy choice. This raises the question of whether there exists some convenient way of summarizing in capsule form the differences such as those revealed by the comparison of Graphs A and B. Fortunately, there does. We could obviously duplicate the situations of those graphs by a uniform export tax, or a whole set of combinations of general import duties together with general export taxes. One way of summarizing the differences between Graphs A and B is to choose, from this whole set of combinations of tariffs plus

export taxes, *one* particular combination which characterizes each case.

This is done by the concept of "true tariffs."² Under this concept, the case of Graph A would be represented by a combination of a 35-percent general tariff plus a 10-percent across-the-board export tax. The case of Graph B would be reflected in the combination of a 5-percent uniform tariff plus a 30-percent general export tax. The rule is that a uniform tariff, or a uniform export tax, or any combination thereof, will be represented by its "true" equivalent, where the "true" equivalent is defined as a tariff t_m such that $(p_m/p_d) = (1+t_m)(p_m^o/p_d^o)$ and an export tax t_x such that $(p_x/p_d) = (1-t_x)(p_x^o/p_d^o)$. Here (p_m^o/p_d^o) and (p_x^o/p_d^o) are the ratios that the import prices and export prices, respectively, would bear to the general price level in the absence of any trade restrictions.

The extreme cases under a 50-percent import duty are that with a completely elastic demand for imports (when the true tariff t_m would be zero and the true export tax t_x would be 33.33 percent), and that with a completely elastic supply curve of exports (when t_m would be 50 percent and t_x would be zero).

It is easy to see how the above concept generalizes to systems of tariffs and export taxes (as well as other trade distortions). We can simply define the "true tariff" on import good j to be t_{mj} , where $(p_{mj}/p_d) = (1+t_{mj})(p_{mj}^o/p_d^o)$. Similarly, the "true export tax" on export good k is t_{xk} , where $(p_{xk}/p_d) = (1-t_{xk})(p_{xk}^o/p_d^o)$.

Thus a system "like" that of Graph A in Figure 2.4, but with non-uniform tariffs might actually have tariffs equal to 30 percent, 50 percent, and 70 percent. If this combination of tariffs drove the nominal exchange rate down by 10 percent, relative to P_d , we would have $t_x = 10$ percent, $t_{m1} = 17$ percent, $t_{m2} = 35$ percent, and $t_{m3} = 53$ percent. (Note that $90 \times 1.30 = 117$; $90 \times 1.50 = 135$; $90 \times 1.70 = 153$.) If some import good m_4 were left free of duty,

its "true tariff" rate would be $t_{m4} = -10$ percent; this would be a rate equal to the negative of the "true export tax" of 10 percent (so long as there is no nominal tax or subsidy on exports).

A more complicated picture could emerge if, together with the above tariff rates, including $t_{m4} = 0$, we had a tax of 10 percent on x_1 , and a subsidy of 10 percent on x_3 , with $t_{x2} = 0$. This could result in $t_{x2} = 10$ percent (like t_x in the previous case), with $t_{x1} = 19$ percent and $t_{x3} = 1$ percent. (Note that if the untaxed export has its price relative to p_d , reduced to 90, the export taxed at 10 percent will have its price reduced to 81, while the one subsidized by 10 percent will see its price fall only to 99.)

The concept of the true tariffs is of great interest, particularly because knowledge of the structure of "true tariffs" and "true export taxes" enables us to see readily how the entire system of trade restrictions has affected particular groups in their roles as producers and/or consumers of different products. Unfortunately, the concept is *in its essence* macroeconomic, dealing with the entire structure of trade restrictions as a whole. Each single tariff on imports of commodity j will cause its internal price to rise relative to the domestic price level. At the same time, through its effect on the real exchange rate, it will produce a fall in the internal prices of all exports and in the internal prices of all imports. In a similar way, each single tax striking the exports of good k will cause its internal price to fall, relative to p_d . But simultaneously it will cause a rise in the real exchange rate E/p_d , and through this will tend to accord positive protection to all other tradable goods (that is, exportables other than good k , plus all importables). Thus, any existing structure of true tariffs can be viewed as the end product of a series of moves in which all the existing tariffs and all the existing export taxes or subsidies (together with other existing trade distortions) are sequentially imposed. For each importable item subject to tariff, this total effect will consist of the tariff t_j , together with the movement of the real exchange rate E/p_d caused by all tariffs, export taxes, restrictions, and similar trade distortions in the system.

Only when we know how the system of distortions has influenced the real exchange rate can we calculate the "true tariffs" t_{mj} and the "true export taxes" t_{xk} generated by a particular system. This is why "true tariffs" must be considered a macroeconomic concept. In the same vein, it is possible to know the rate of effective protection associated with any activity simply by knowing the rate of tariff on the final product of that activity, plus the tariff rates (or rates of domestic taxes) striking the various tradable inputs that enter into that particular activity. We need not know how the total structure of tariffs and other restrictions has influenced the real exchange rate E/p_d on any other variables. This gives us the sense that effective protection is a microeconomic concept.

Notes

1. An ordinary excise tax meets the full qualifications of a tax on domestic use, as that term is meant here, so long as the country applies the standard tax adjustments approved under the General Agreement on Tariffs and Trade (GATT). Such adjustments would involve rebating the tax when the product is exported, causing (just as in the case of a tariff) the internal price of the good to exceed the world price by the amount of the tax.

2. Economists have long recognized the fact that the costs of tariffs are in part borne by the producers of exports and that consumers of export-type goods (as well as of nonprotected imports) actually benefit when tariffs are placed on imports of protected goods. Nonetheless, the formalization of the main relationships involved, and the empirical measurement of "true" export taxes awaited the work of Larry A. Sjaastad and his collaborators. See:

Larry A. Sjaastad. 1980. "Commercial Policy, True Tariffs and Relative Tariffs." In Brian Hindley and John Black, eds. *Current Issues in Commercial Policy and Diplomacy*. London: Macmillan.

Kenneth Clements and Larry A. Sjaastad. 1984. *How Protection Taxes Exporters*. Thames Essay No. 39. London: Trade Policy Research Centre.

Larry A. Sjaastad. 1987. "Commercial Policy for Panama in the 1980s." In Michael J. Boskin, ed. *Modern Developments in Public Finance. Essays in Honor of Arnold C. Harberger*. Oxford and New York: Basil Blackwell.