Tariffs are just taxes on trade.

Suppose that good X is imported. Let p denote domestic prices (producer and consumer prices), and let p* denote world prices.

$$\frac{p_1}{p_2} = \frac{p_1^*(1+t)}{p_2^*} \qquad \frac{p_1}{p_2} > \frac{p_1^*}{p_2^*} \tag{18.1}$$

Bear in mind, however, that trade must balance at world prices. The balance-of-trade constraint, first introduced in Chapter 4, is given by

$$p_1^*(D_1 - X_1) + p_2^*(D_2 - X_2) = 0 \qquad p^* = \frac{(X_2 - D_2)}{(D_1 - X_1)} \qquad p^* = \frac{p_1^*}{p_2^*}$$

(18.2)

Graphically, the production and consumption points must be connect by the world price ratio.

What does equilibrium look like? Figure 18.1

(1) The production and consumption points connected by the world price ratio.

(2) The slope of the production frontier and the indifference curve must equal the domestic price ratio.

Figure 18.1

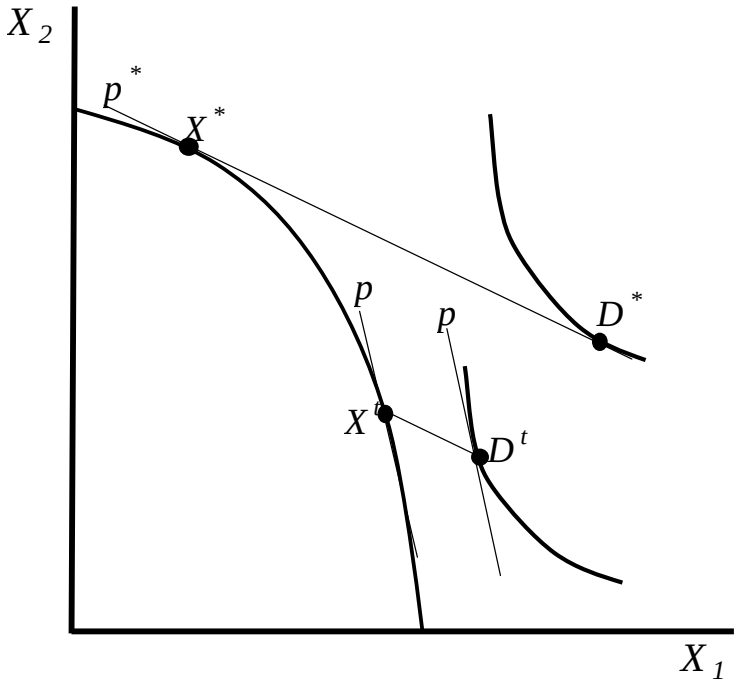
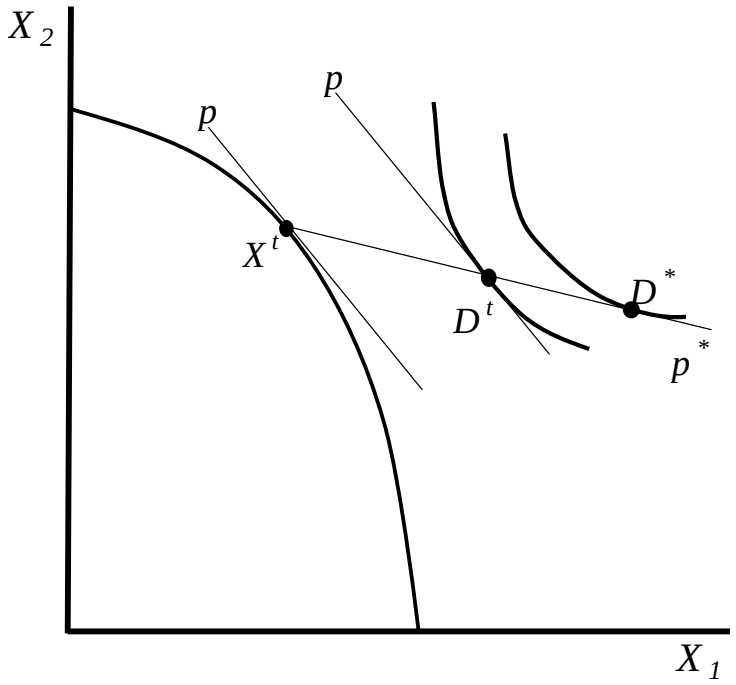


Figure 18.2



What are the effects of a tariff in a “small” economy that faces fixed world prices?

Suppose it’s a Heckscher-Ohlin economy.

1. Overall welfare is reduced

2. Production shifts toward the import-competing good.

   By the Stolper-Samuelson theorem, this raises the real return to the factor used intensively in the importing sector, and lowers the real return to the factor used intensively in the export sector.

   Thus the tariff raises the real income of the scarce factor and lowers the real income of the abundant factor.

Two important equivalences

(A) an import tariff on X_1 has the same effect as an export tax on X_2.

$$\frac{p_1}{p_2} = \frac{p_1^*}{p_2^*(1-t)} \qquad \frac{p_1}{p_2} > \frac{p_1^*}{p_2^*} \tag{18.3}$$

This point is often confused in policy discussions, where we sometimes hear the view that we should restrict imports and promote exports.

In fact, such a combination of policies cancels out!

(B) $p_1 = q_1 = p_1^*(1+t)$ $\qquad p_1 = q_1 > p_1^*$

Note that an import tariff:

Raises the price that domestic producers of X_1 can charge consumers. (producers are happy)

Raises the price that domestic consumers must pay for X_1 (consumers are unhappy)

Therefore, a tariff is equivalent to a <u>combined policy</u> of a <u>production subsidy</u> plus <u>consumption tax</u>

Figure 18.2

This is imported insofar as some anti-trade critics see tariffs as only hurting foreigners.

The same critics probably would not like the thought of a production subsidy. But in fact an import tariff is <u>worse</u> than just subsidizing production, since it also taxes consumption.

Suppose again that the country has a comparative advantage in Y and faces fixed world prices.

Well, under the view that exports are a “good thing”, maybe the country should subsidize exports?

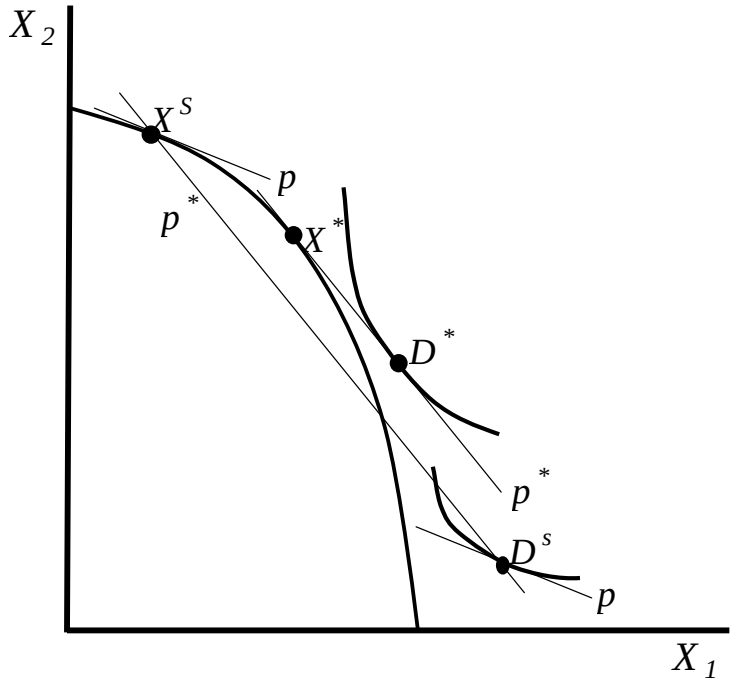
Let s be the subsidy rate, so that exporters of Y receive $p_y^*(1+s)$.

$$\frac{p_1}{p_2} = \frac{p_1^*}{p_2^*(1+s)} \qquad \frac{p_1}{p_2} < \frac{p_1^*}{p_2^*} \tag{18.4}$$

The domestic price ratio is flatter than the world price ratio. The domestic production and consumption points must be connected by the world price ratio.

Figure 18.3

Figure 18.3



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The subsidy is welfare reducing. It amounts to selling to foreigners below the cost of production.

Exports should not be confused with welfare.

Point of exporting is to allow us to import: buy things that are difficult and costly to produce at home.

18.4 Gains-from-trade with many goods, trade taxes, and subsidies

Let domestic prices be $p^d = p^*(1+t)$, where p refers to any good, an import or export or even non-traded.

But whether or not a positive t is a tax or subsidy, depends on whether the good is an export or an import.

(A) If X_i is imported, $t_i > 0$ is an import tariff, $t_i < 0$ is an import subsidy. This is the case we consider in the first section above.

(B) If X_i is exported, $t_i < 0$ is an export tax, $t_i > 0$ is an export subsidy.

Remember that an export tax lowers the domestic price below the world price, and thus $t_i < 0$ on an export good is a tax as in (18.3).

Stars * denote world prices and superscript '*a*' denotes autarky. Producers respond to domestic prices, not world prices, so the value of output with trade is maximized at domestic producer prices.

$$\sum_i p_i^*(1+t_i)X_i^* \quad \geq \quad \sum_i p_i^*(1+t_i)X_i^a \qquad (18.5)$$

Autarky market clearing and trade balance conditions are the usual

$$X_i^a = D_i^a \qquad \sum_i p_i^* X_i^* = \sum_i p_i^* D_i^* \tag{18.6}$$

First, use the first equation in (18.6) to substitute autarky consumption for production on the right-hand side of (18.5).

Second, move the left-hand side of (18.5) over to the right, entering it with a minus sign. Third, add the following to both sides of (1)

$$\sum_i p_i^* (1 + t_i) D_i^*$$

Inequality (18.5) then becomes

$$\sum_i p_i^*(1+t_i)D_i^* \quad \geq \quad \sum_i p_i^*(1+t_i)D_i^a \; + \; \sum_i p_i^*(1+t_i)(D_i^* - X_i^*) \tag{18.7}$$

Apply the balance-of-trade constraint in (18.6) to the right-hand term in (18.7) which allows this to be simplified.

Then use the definition of domestic prices to replace the $p^*(1+t)$ terms with p^d.

$$\sum_i p_i^d D_i^f \quad \geq \quad \sum_i p_i^d D_i^a \; + \; \sum_i p_i^* t_i (D_i^* - X_i^*) \tag{18.8}$$

The term on the far right of (18.8) is just total trade tax revenue: taxes minus subsidies. If a good is imported $(D - X) > 0$, then a $t > 0$ is a tax. If $t < 0$ then it is an import subsidy. Similarly, if the good is exported $(D - X) < 0$, then a $t < 0$ is a tax and so forth.

If a country is large in the market for a good, changes in its imports or exports will change world prices.

This puts the country as a *whole* (as opposed to individual small firms) in the position of having market power.

This in turn means that the country can improve its welfare by *restricting trade* which moves prices in its favor

Country large	implies
Market power	implies
Trade restrictions	improve its terms of trade

Figure 18.1 (refer back) Figure 18.4 Figure 18.5

OPEC, marketing boards

Figure 18.4

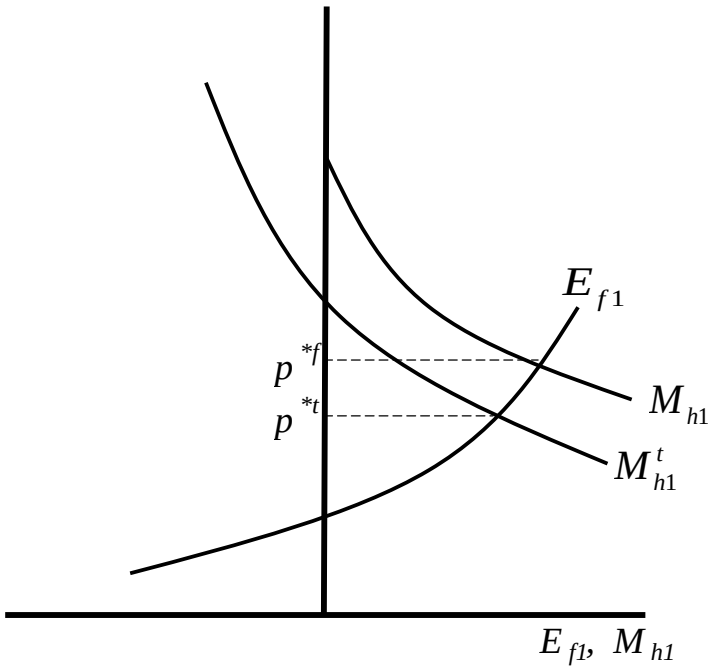
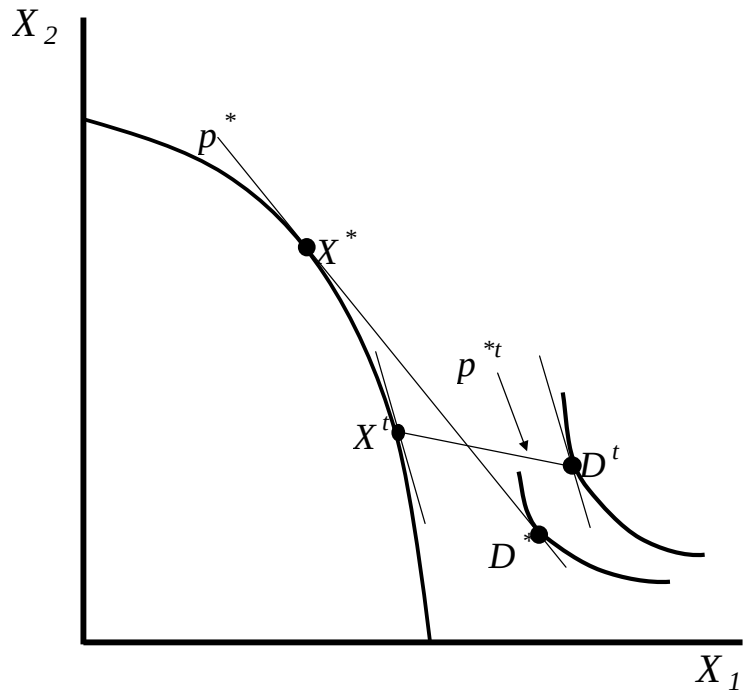


Figure 18.5



M_i is the excess demand for good i: $M_i > 0$ for an import and we assume that this country imports good 1.

The domestic imports of good 1 are foreign exports, denoted E_1^*. We assume that E_1^* is an increasing function of the world price ratio p^*.

Let $G(p^*)$ be referred to as the foreign excess supply function (foreign exports of X_1 are our imports).

$$M_1 = E_1^* = G(p^*) \qquad G' \geq 0 \tag{18.17}$$

Algebra will show that welfare change is given by:

$$dW = (p^* t G' - E_1^*)dp^* \tag{18.27}$$

A tariff forces down the price of the import good, so $dp^* < 0$. Recall also that $E_1^* > 0$ and $G' > 0$.

The first term in (18.27) is called the volume-of-trade effect and contributes negatively to welfare following a tariff increase.

The second term in (18.27) is called the terms-of-trade effect and contributes positively to welfare following a tariff increase.

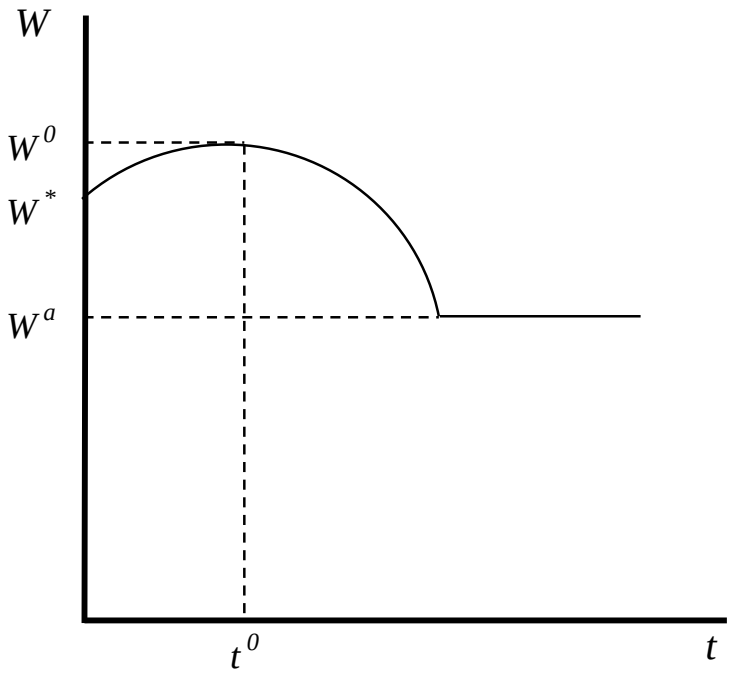
Figure 18.6

Optimizing with respect to the world price ratio by setting this to zero gives the optimal tariff.

(18.28)

$$t^o = \frac{E_1^*}{p^* G'} = \frac{1}{\eta_s^*} \qquad \eta_s^* \equiv \frac{p^*}{E_1^*}\frac{dE_1^*}{dp^*} \qquad since \qquad G' = \frac{dE_1^*}{dp^*}$$

Figure 18.6



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Existing Distortion and the theory of the second best

Suppose that there is a positive production externality in the X_1 sector. Each firm confirms positive benefits on other firms, benefits than the firm cannot charge for.

The theory of the second-best:

Second best 1: in the present of one (or more) distortions, adding a further distortion that acts to offset the first one can improve welfare.

Second best 2: in the present of more than one distortion, removing one of the distortions can make the country worse off.

The free trade equilibrium is not optimal, and too little X_1 is produced. Let p* denote the (fixed) world price ratio.

X*, D* - free trade production and consumption points

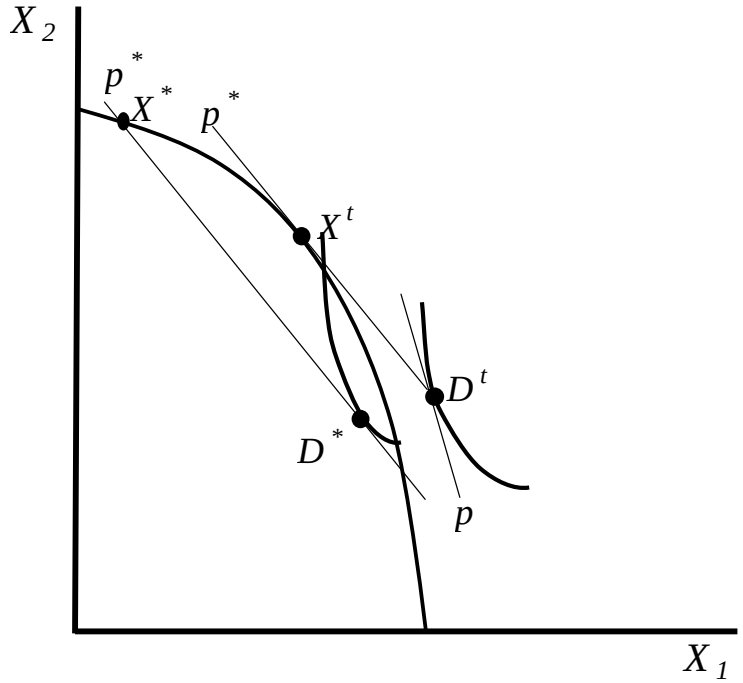
X^t, D^t - production and consumption with a tariff on X_1

Figure 18.7

But note that a tariff is not the best instrument to use because it introduces a consumption distortion.

A tariff is “third best”; a production subsidy to X_1 would be better.

Figure 18.7



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Help out an industry initially, and it will be profitable in the long run.

This is generally wrong. The "social cost" of capital is the same as the private cost in well-functioning markets.

Thus if an investment is privately unprofitable, then it is socially unprofitable as well.

Possible Exceptions

1. positive production externalities

2. coordination failures

3. capital market imperfections

But a production subsidy is generally preferred to an import tariff.

The "standard" tariffs we have been dealing with are now referred to as *nominal protection*: t^n is the protection offered to the output price.

$$p = p^*(1 + t^n) \qquad t^n = \frac{p - p^*}{p^*} \tag{18.29}$$

Effective protection and specifically the effective tariff t^e is defined as the protection offered to value added. Consider industry i and assume that value added is just payments to labor.

Value added is then output price minus the value of purchased inputs of other goods X_j. a_{il} is the amount of labor needed to produce one unit of X_i and w is the wage rate, and p*'s give world goods prices.

$$v_i^* = a_{il}w = p_i^* - \sum_j a_{ij}p_j^* \tag{18.30}$$

Now consider all tariffs on all good, and replace the world prices in (18.30) with tariff-distorted domestic prices.

$$v_i = a_{il}w = p_i^*(1 + t_i^n) - \sum_j a_{ij}p_j^*(1 + t_j^n) \qquad (18.31)$$

The effective tariff is defined as:

$$t_i^e = \frac{v_i - v_i^*}{v_i^*} = \frac{p_i^*(1 + t_i^n) - \sum_j a_{ij}p_j^*(1 + t_j^n) - p_i^* + \sum_j a_{ij}p_j^*}{p_i^* - \sum_j a_{ij}p_j^*} \qquad (18.32)$$

Divide through the numerator and denominator on the right by p_i*, and use the notation

$$\frac{a_{ij}p_j^*}{p_i^*} \equiv \sigma_{ij} = \text{share of input j in the value of i} \qquad 19$$

The effective tariff rate is then given by

$$t_i^e = \frac{v_i - v_i^*}{v_i^*} = \frac{(1 + t_i^n) - \sum_j \sigma_{ij}(1 + t_j^n) - 1 + \sum_j \sigma_{ij}}{1 - \sum_j \sigma_{ij}} \qquad (18.33)$$

which simplifies to

$$t_i^e = \frac{v_i - v_i^*}{v_i^*} = \frac{t_i^n - \sum_j \sigma_{ij} t_j^n}{1 - \sum_j \sigma_{ij}} \qquad (18.34)$$

First suppose that there is a tariff protecting industry i and all other tariffs are zero. Then the effective tariff exceeds the nominal tariff: $t_i^e > t_i^n$. The protection to value added exceeds the nominal tariff.

Second, assume that all tariffs on all goods are the same $t_i^n = t_j^n \ \forall j$. In this case, the common tariff rate factors out of (18.34) and the remaining terms in the numerator cancel with the denominator: the effective and nominal rates are equal: $t_i^e = t_i^n$.

Finally, assume that there is no tariff protecting the X_i industry, but that at least one input tariff is positive. In this case, the effective tariff for industry i is *negative*.

Export industries, for example, are (correctly) classified as losing from the tariff system as a whole.

Balance of trade

$$\sum_i p_i^* X_i = \sum_i p_i^* D_i \qquad (18.35)$$

Adding and subtracting terms for tariff revenue, this can be written as

$$\sum_i p_i^* (1 + t_i) D_i = \sum_i p_i^* (1 + t_i) X_i + \sum_i p_i^* t_i (D_i - X_i) \qquad (18.36)$$

The tariff-distorted prices $p^*(1+t)$ are domestic prices, which we can denote by p^t, and the last term on the right-hand side of (18.36) is tariff revenue: price times the tax rate times the net import volume.

$$\sum_i p_i^t D_i = \sum_i p_i^t X_i + [\textit{tariff revenue}] \qquad (18.37)$$

Suppose instead that there are trade costs. Alternatively, customs' officials have to be withdrawn from the labor force, and their salaries just exactly exhaust tariff revenues. Tariff revenues = forgone production.

Now let the t's be transport costs so that consumers must pay the world price plus t for imports (assume exporters earn the world price).

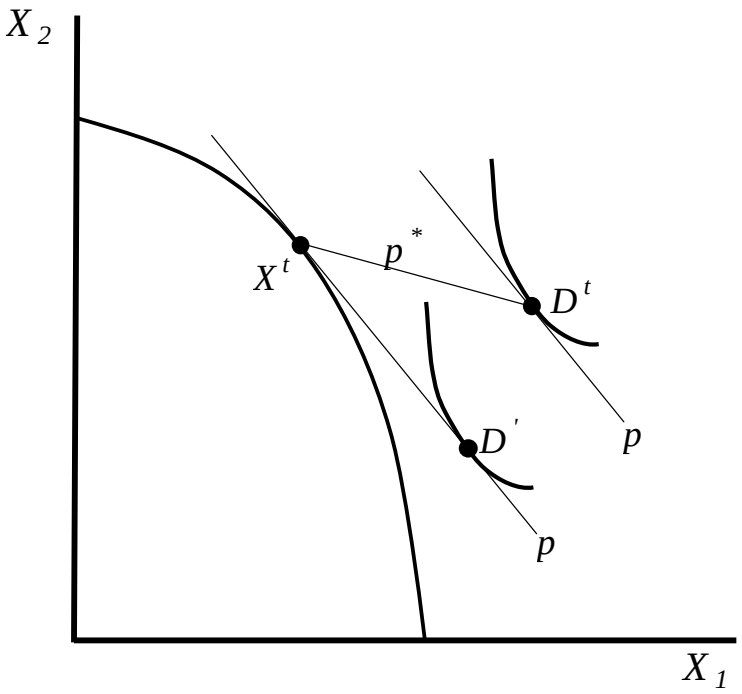
$$\sum_i p_i^*(1+t_i)(D_i - X_i) = 0 \qquad t_i > 0 \iff (D_i - X_i) > 0 \qquad (18.35')$$

$$\sum_i p_i^*(1+t_i)D_i = \sum_i p_i^*(1+t_i)X_i \qquad (18.36')$$

$$\sum_i p_i^t D_i = \sum_i p_i^t X_i \qquad (18.37')$$

Figure 18.8

Figure 18.8



1. A trade barrier necessarily reduces national income for a small economy.

2. But some groups generally gain; e.g., owners of factors used intensively in the import-competing sector. This helps explain the politics of protection.

3. An import tariff is equivalent to an export tax, not to an export subsidy.

4. A tariff is equal to a combined policy of a production subsidy and a consumption tax.

5. An export subsidy increases exports, but it is always welfare worsening (in the absence of other distortions).

   An export subsidy involves selling to foreigners for less than the cost of production.

6. Monopoly power in trade by big countries is another possible case for trade restrictions: getting many small producers to act like a single monopoly seller or buyer.

   But this argument is weakened by the likelihood of retaliation by other countries.

7. A tariff may be justified as an additional distortion introduced to counteract an existing distortion. The infant-industry argument may be conceivably be valid in some cases.

   But even then, subsidies are preferred to tariffs, and efforts might be better directed at export industries.

8. The "effective protection" argument is a type of leverage effect on the incomes of specific factor owners, and illustrates why some groups are willing to fight so hard over trade policy.

9. The standard analysis of tariffs assumes that they are costless to collect and that the revenue is costless to redistribute.

   If instead the trade cost is a transport cost, or all revenues are needed to pay the wages of tax collectors (who forego productive activity), then the welfare loss is much worse.

TABLE 15.1
Nominal and effective rates of protection in selected industries, United States, Japan, and Republic of Korea

	United States[a]		Japan[a]		Republic of Korea[b]	
Industry	**NRP (%)**	**ERP (%)**	**NRP (%)**	**ERP (%)**	**NRP (%)**	**ERP (%)**
Agriculture	1.80	1.91	18.40	21.40	72.3	85.7
Food products	4.70	10.16	25.40	50.31	11.7	−27.6
Wearing apparel	22.70	43.30	13.80	42.20	29.0	93.8
Wood products	1.70	1.72	0.30	−30.59	8.6	6.5
Chemicals	2.40	3.66	4.80	6.39	28.5	50.9
Iron and steel	3.60	6.18	2.80	4.34	12.9	31.5
Electrical machinery	4.40	6.34	4.30	6.73	26.2	44.8
Transport equipment	2.50	1.94	1.50	0.03	31.9	12.4

Source: A. V. Deardorff and R. M. Stern (1984) and J. Yoo, (1993, 22).

[a] Nominal tariff rates and effective rates of protection to be phased in by 1986 following the Tokyo Round of tariff negotiations.

[b] Nominal tariff rates and effective rates of protection in 1982.

A second observation is that many developing countries have arranged