

Lecture 15

Tariffs

1. Tariffs, prices and welfare in a small economy
2. Equivalence of an import tariff and export tax
3. Tariff = consumption tax + production subsidy
4. Export subsidies
5. Existing distortions, second best, “infant industry argument
6. Terms of trade and the optimal tariff
7. Tariffs and retaliation, trade wars
8. Effective protection, internal income redistribution

Trade Protection and Promotion: Tariffs

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.

$$\frac{p_x}{p_y} = \frac{p_x^* (1 + t)}{p_y^*} \quad \frac{p_x}{p_y} > \frac{p_x^*}{p_y^*}$$

What does equilibrium look like?

- (1) The production and consumption points must be connected by the world price ratio.
- (2) The slope of the production frontier and the indifference curve must equal the domestic price ratio.

Fig 1

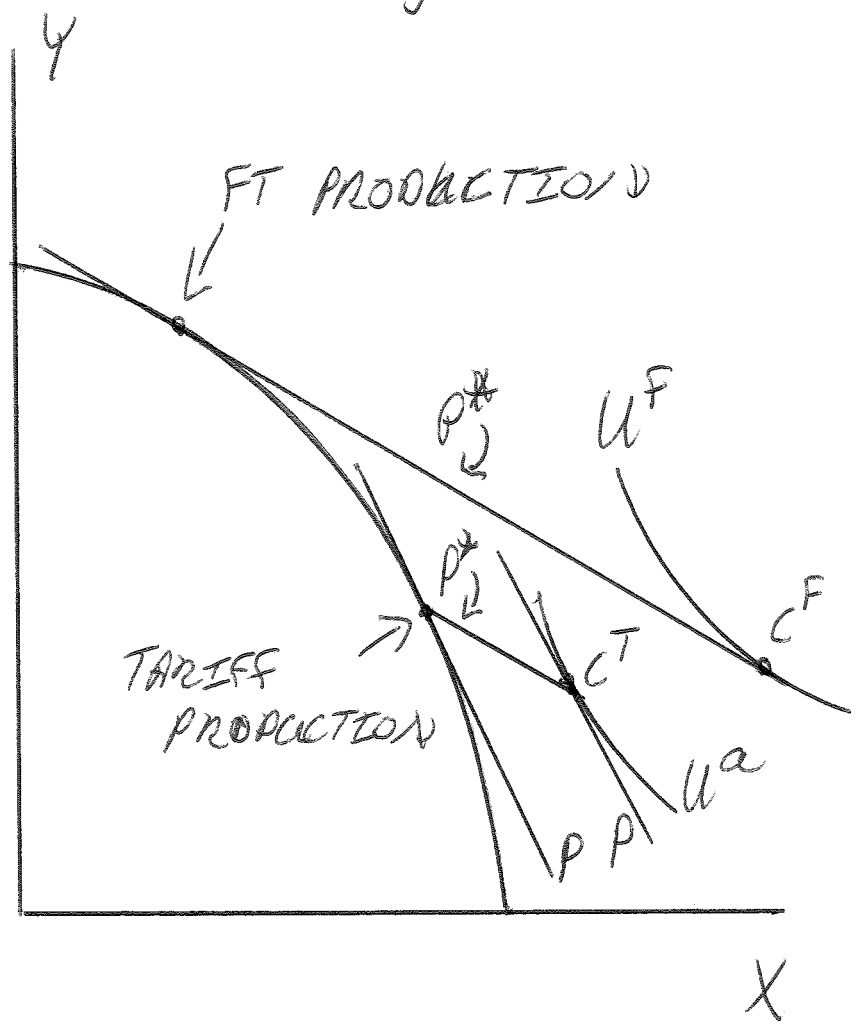
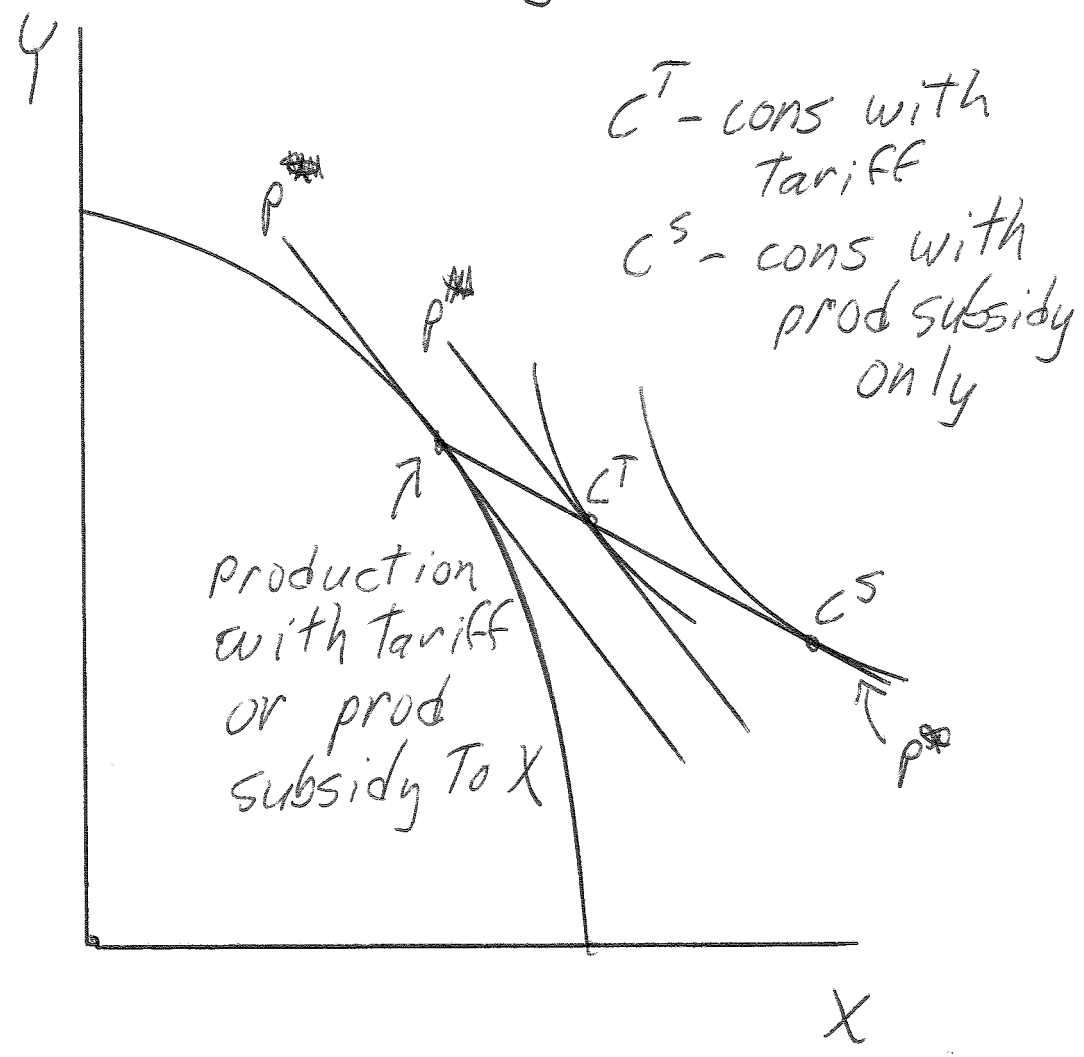


Fig 2



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.

Equivalence (1): Note that an import tariff on X has the same effect as an export tax on Y.

$$\frac{P_x}{p_y(1+t)} = \frac{P_x^*}{p_y^*} \quad \frac{P_x}{p_y} > \frac{P_x^*}{p_y^*}$$

This point is often confused in policy discussions, where we sometimes hear the view that we should restrict (tax) imports and promote (subsidize) exports. In fact, such a combination of policies cancels out!

Equivalence (2): Note that an import tariff:

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

Raises the price that domestic consumers must pay for X.

Therefore, a tariff is equivalent to a combined policy of a
production subsidy
 plus
consumption tax

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 worse than just subsidizing production, since it also taxes consumption.

Export Subsidy

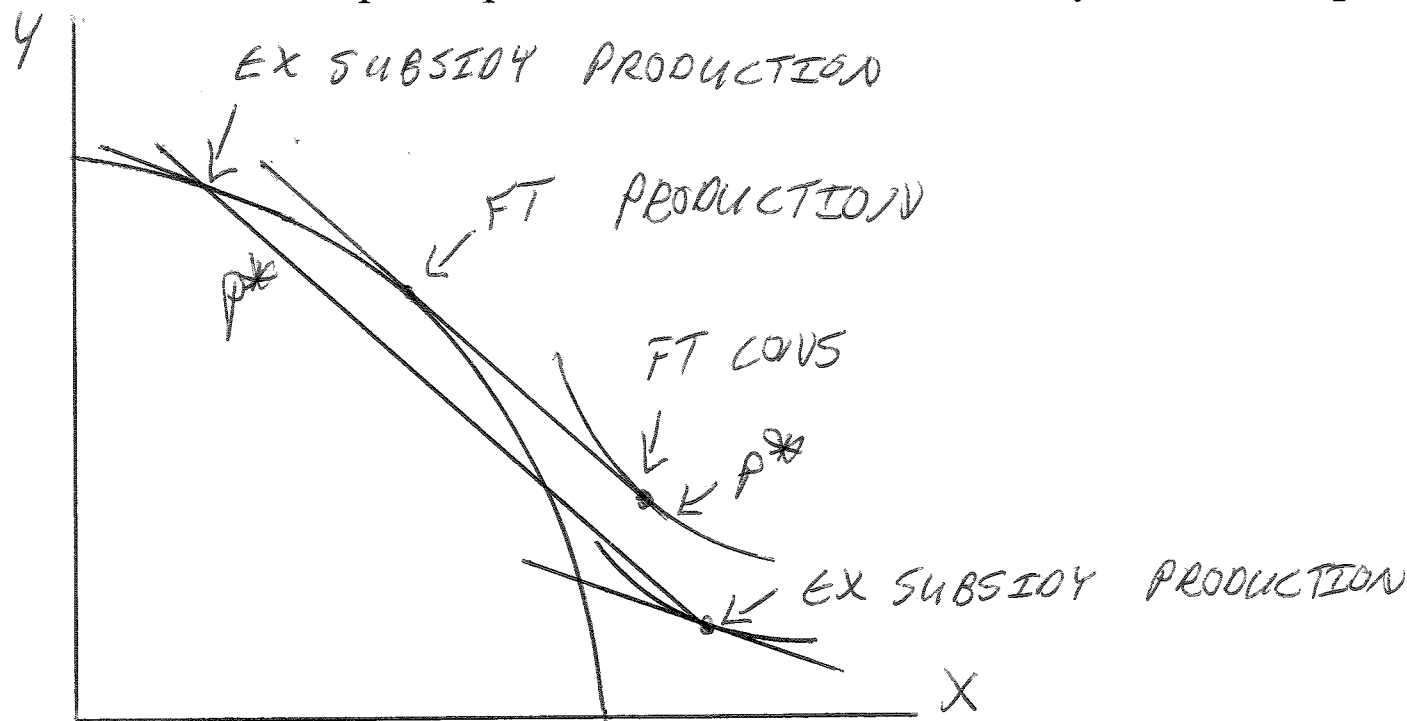
Suppose again that the country has a comparative advantage in Y and faces fixed world prices.

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 $p_y^*(1+s)$.

$$\frac{P_x}{P_y} = \frac{P_x^*}{P_y^*(1 + s)} \quad \frac{P_x}{P_y} < \frac{P_x^*}{P_y^*}$$

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.



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

Existing Distortion

Theorem of the Second Best: (1) in the presence of one distortion, adding a second distortion can improve welfare; (2) in the presence of multiple distortions, removing one distortion can reduce welfare.

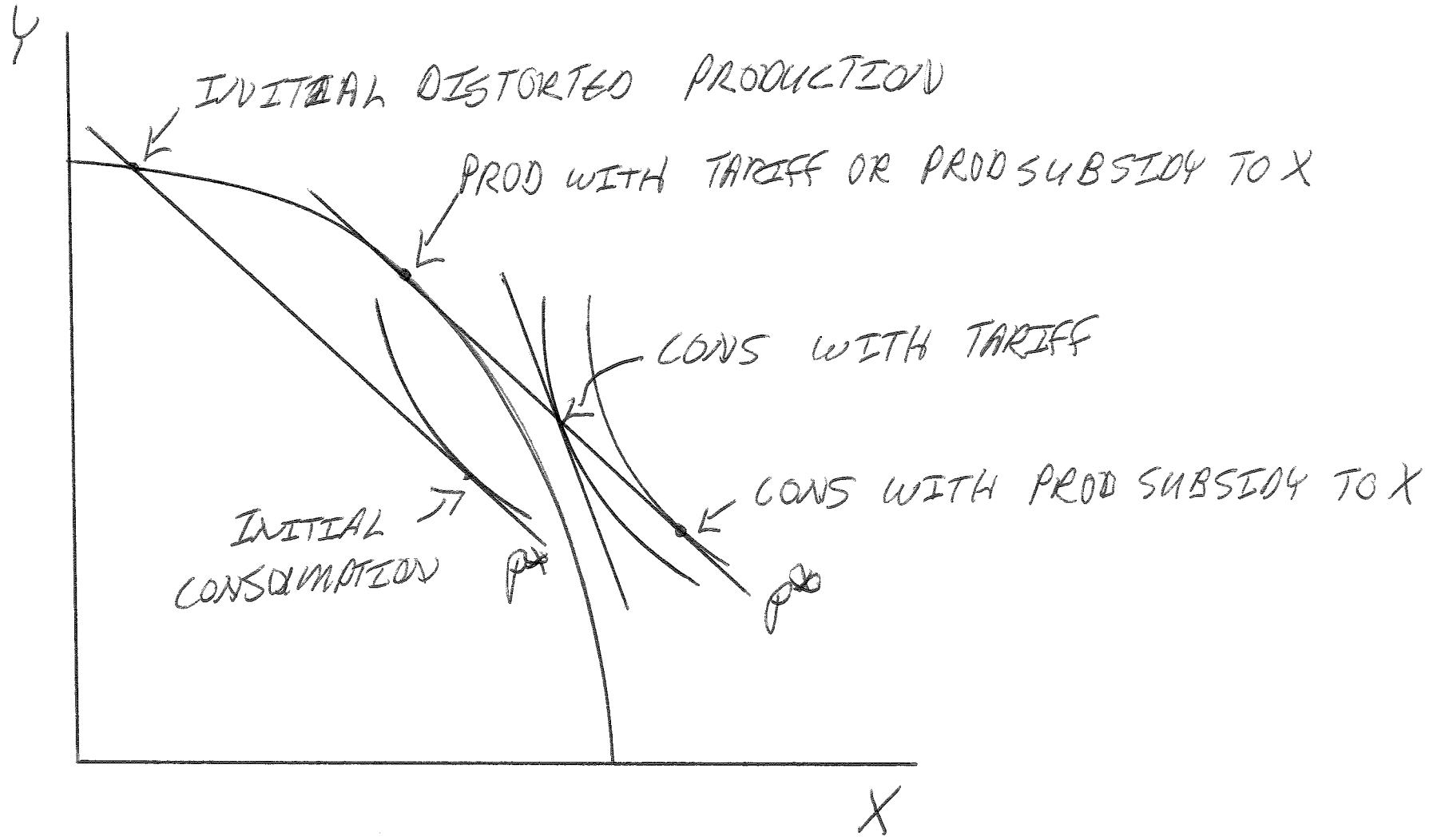
Suppose that there is a positive production externality in the X sector. Each firm confirms positive benefits on other firms, benefits that the firm cannot charge for.

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

Q_f, C_f - free trade production and consumption points

Q_t, C_t - production and consumption with a tariff on X

Q_s, C_s - production and consumption with a production subsidy on X



Infant Industry Argument

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.

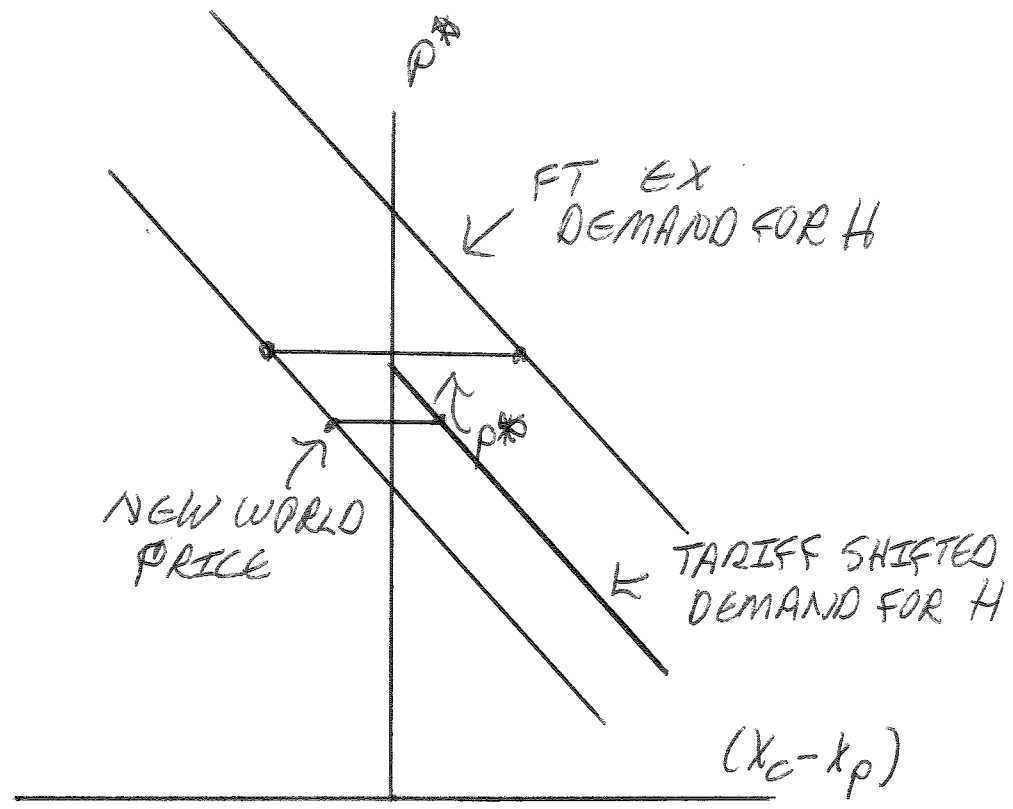
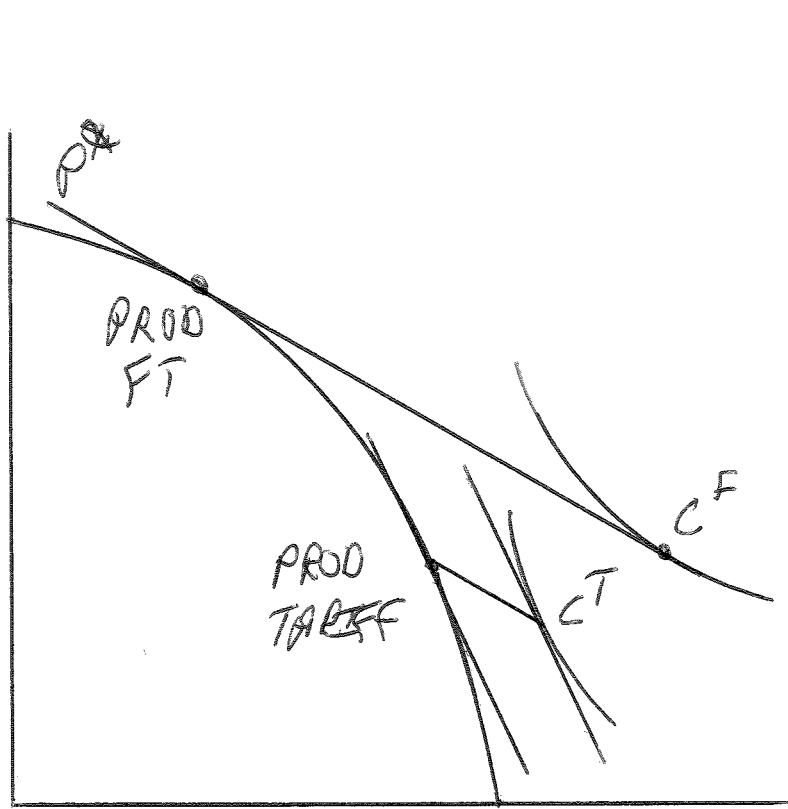
Possible Exceptions

1. positive production externalities
2. coordination failures
3. capital market imperfections

But even in these cases, a production subsidy is generally preferred to an import tariff.

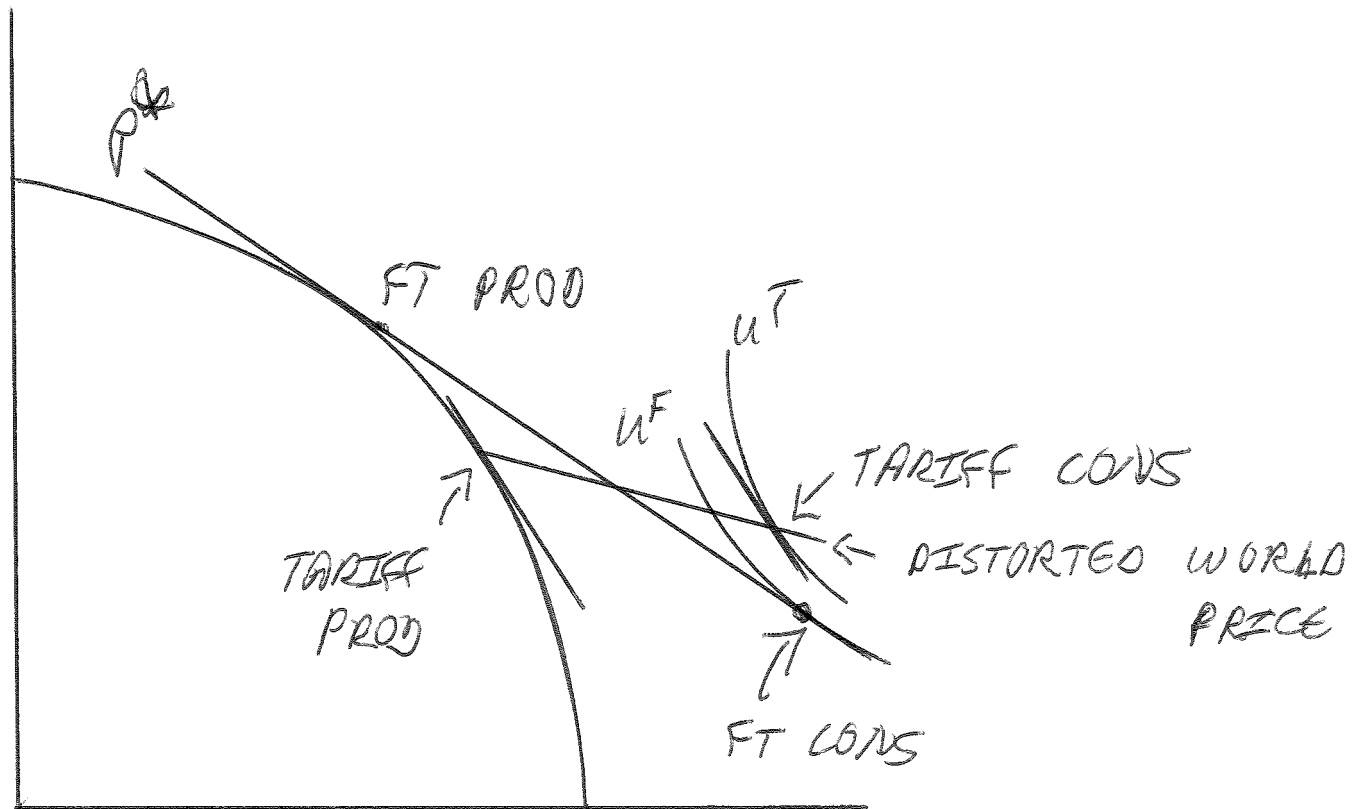
The Large Country Case:

A tariff reduces export supply and import demand at constant prices.



This shift in the country's excess demand curve, and causes equilibrium world prices to move in the country's favor (a terms-of-trade improvement).

The improvement in the terms of trade may be sufficiently strong that welfare improves.



Examples:

- (1) opec
- (2) agricultural marketing boards

The algebra of tariffs, the large country case, “optimal” tariffs

$$(1) \quad U = U(C_0, C_1)$$

$$(2) \quad F(X_0, X_1) = 0$$

$$(3) \quad E_0 + p^* E_1 = 0, \quad E_i \equiv C_i - X_i \quad E_1 > 0$$

$$(4) \quad E_1 = -E_1^* = G(p^*) \quad G' \geq 0$$

$$(5) \quad p = p^*(1 + t) \quad p = p_1/p_0$$

$$(6) \quad dU = U_0 dC_0 + U_1 dC_1$$

$$(7) \quad dW = \frac{dU_1}{dU_0} = dC_0 + \frac{U_1}{U_0} dC_1 = dC_0 + p dC_1$$

$$(8) \quad F_0 dX_0 + F_1 dX_1 = 0 = dX_0 + \frac{F_1}{F_0} dX_1 = dX_0 + p dX_1$$

$$(9) \quad dE_0 + p^* dE_1 + E_1 dp^* = 0$$

$$(10) \quad dE_i = dC_i - dX_i \quad dE_1 = G' dp^* \quad (p - p^*) = p^* T$$

Use (10) in (7)

$$(11) \quad dW = dC_0 + p dC_1 = dE_0 + dX_0 + p_1 dE_1 + p dX_1$$

Substitute for dX_0 from (8) and for dE_0 from (9)

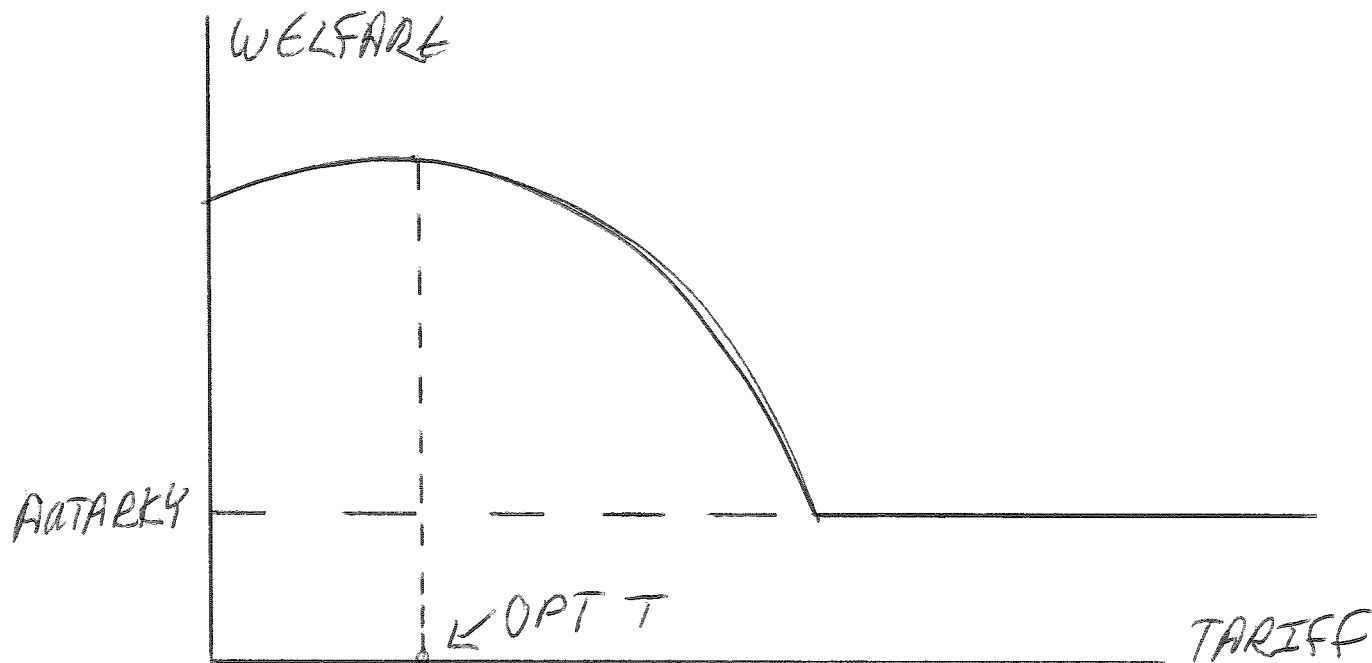
$$(12) \quad dW = -p^* dE_1 - E_1 dp^* - p dX_1 + p dE_1 + p dX_1$$

$$(13) \quad dW = (p - p^*) dE_1 - E_1 dp^* = p^* T dE_1 - E_1 dP^*$$

The change in welfare is composed of a terms-of-trade effect and a volume-of-trade effect.

Assuming that a tariff increase improves the TOT, then locally at $T = 0$, the TOT effect dominates and welfare increases with a small tariff.

But as the tariff increases and trade volume ($dE_1 < 0$) shrinks, the VOT effect dominates and further welfare change is negative.



What is the “optimal” tariff? It balances the VOT and TOT effects.
Substitute the second equation of (10) into (14)

$$(14) \quad dW = (p^* TG' - E_1) dp^*$$

Optimizing with respect to the world price ratio

$$(15) \quad T = \frac{E_1}{p^* G'} = \frac{1}{\eta_s^*} \quad \eta_s^* \equiv \frac{p^*}{-E_1^*} \frac{d(-E_1^*)}{dp^*}$$

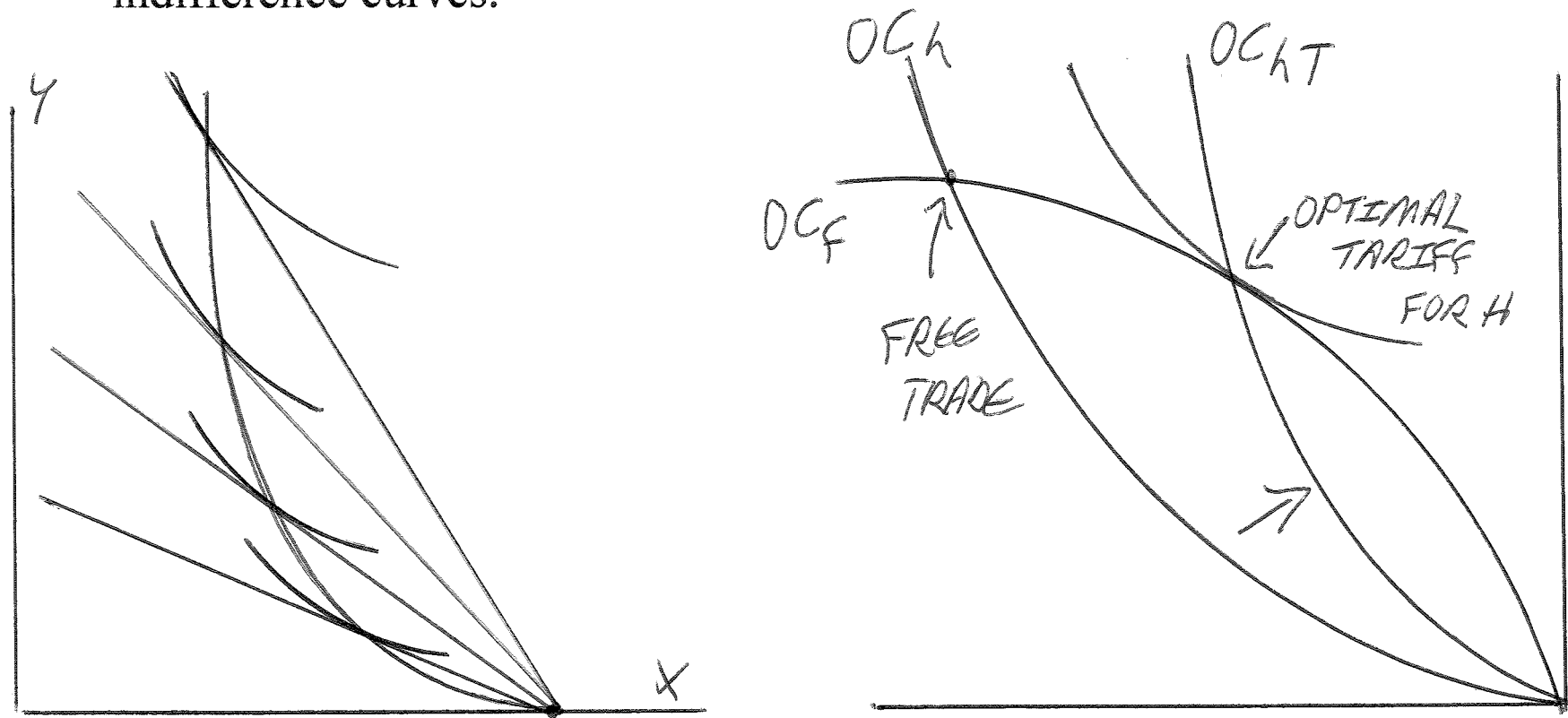
The “optimal” tariff is one over the foreign elasticity of export supply. The less elastic is foreign supply, the higher the optimal tariff.

Note:

- (a) The similarity of the formula to a markup formula for a monopolist or a monopsonist
- (b) The formula says that for a small country facing perfectly elastic foreign excess supply that the tariff should be zero (free trade is optimal)
- (c) The inverse elasticity is a *formula*, not a *numerical value*
- (d) This elasticity is a *variable*, related in very complicated ways to the whole GE structure of the economy, and the *value* of this variable depends upon where it is evaluated.

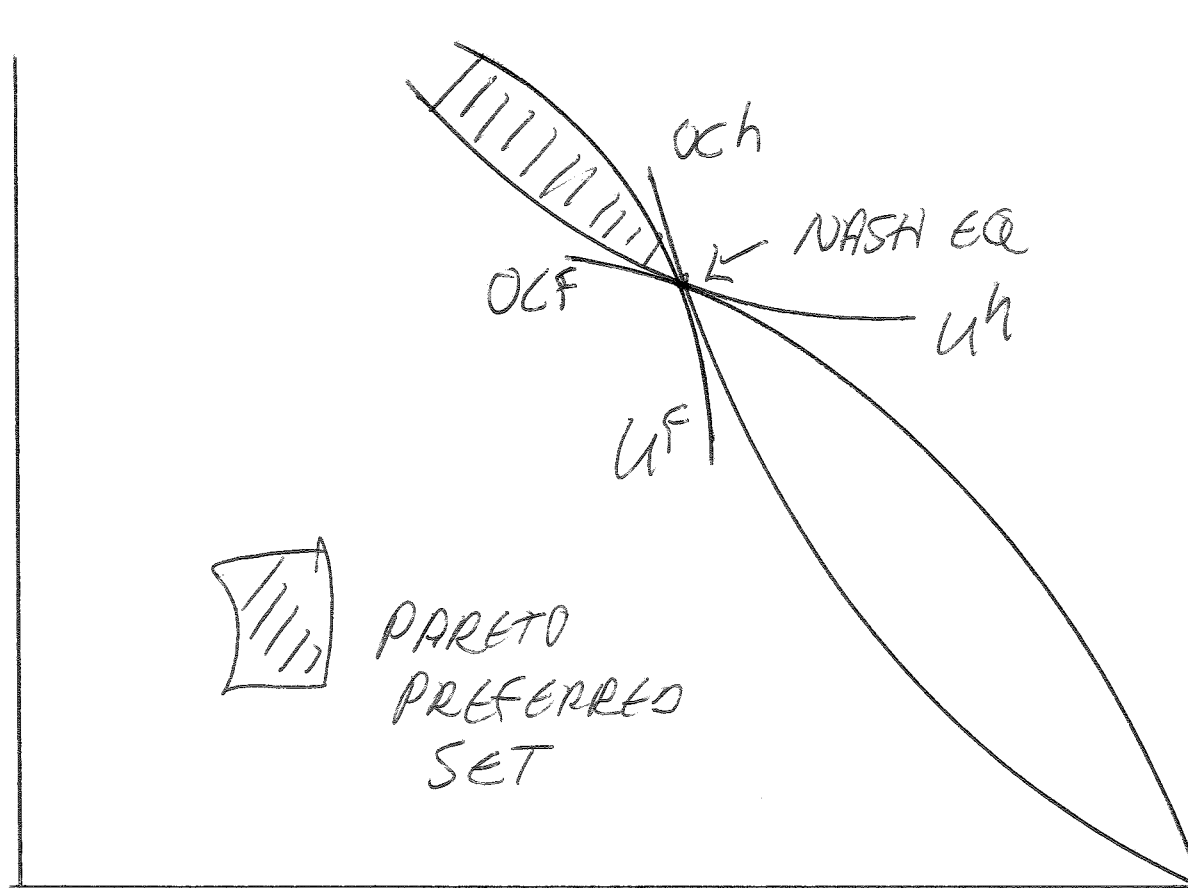
“Optimal” tariffs and retaliation, Nash equilibrium in tariff rates

Consider two pure-exchange economies, one endowed with X and one endowed with Y. Recall how offer curves are constructed and how they are related to indifference curves.



A tariff shifts in a country's offer curve; the optimal tariff shifts the equilibrium to the highest indifference curve on the rival's offer curve.

If both countries play a non-cooperative strategy, then the Nash equilibrium in tariff rates will look something like this.



Obviously, there are Pareto improvements from bilateral tariff reductions. However, the free-trade point may not be in the Pareto preferred set to the Nash equilibrium. Large country may be better off at Nash eq. than at free trade.

Effective Protection

Nominal protection: protection offered to the output price

$$p = p^*(1 + T) \quad T = \frac{p - p^*}{p^*}$$

Effective Protection: protection offered to value added

Value added per unit = output price minus the value of purchased inputs

$$p_i X_i = a_{li} w X_i + \sum_j a_{ji} p_j X_i$$

$$p_i = a_{li} w + \sum_j a_{ji} p_j$$

$$VA^* = a_{li}w = p_i^* - \sum_j a_{ji}p_j^*$$

$$VA = a_{li}w = p_i^*(1 + T_i) - \sum_j a_{ji}p_j^*(1 + T_j)$$

Effective tariff is given by:

$$\frac{VA - VA^*}{VA^*} = \frac{p_i^*(1 + T_i) - \sum_j a_{ji}p_j^*(1 + T_j) - p_i^* + \sum_j a_{ji}p_j^*}{p_i^* - \sum_j a_{ji}p_j^*}$$

Divide through by p_i^* , and use the notation

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

$$\frac{VA - VA^*}{VA^*} = \frac{(1 + T_i) - \sum_j \sigma_{ji}(1 + T_j) - 1 + \sum_j \sigma_{ji}}{1 - \sum_j \sigma_{ji}}$$

$$\frac{VA - VA^*}{VA^*} = \frac{T_i - \sum_j \sigma_{ji} T_j}{1 - \sum_j \sigma_{ji}}$$

Special cases:

$T_i > 0$, all $T_j = 0$ $VA > T$ leverage effect.

$T_i = T_j > 0$ $VA = T$

$T_i = 0$, all $T_j > 0$ $VA < 0$, $T = 0$

Limiting Assumptions

1. prices don't change
2. no factor substitution
3. meaning of VA in a competitive world when profits are zero; protection for what/whom?
4. estimating the effective tariff requires calculation of a counterfactual.

This concept has the most meaning in a situation where the value added is a sector-specific factor. So the effective tariff measures the change in the Ricardian rent to that factor from the tariff system as a whole.

Tariffs - Summary Points

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. 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.

7. 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.
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.