Alan Deardorff Problem Set #2 - Answers Page 1 of 6

Problem Set #2 - Answers Trade Policy

- 1. Use the small-economy, partial equilibrium model of a tariff to answer the following questions:
 - a. How does a rise in the world price of a good that is imported subject to a constant specific tariff affect the well being of various groups in the importing economy?

The domestic price rises from P_W+t to $P_W'+t$, increasing producer surplus and reducing consumer surplus. Tariff revenue falls due to the reduction in imports:



Suppliers gain	+a
Demanders lose	-(a+b+c+d)
Government loses	-(e+h+g+j)
Country loses	-(b+c+d+e+h+g+j)

b. In your answer to part (a), would the effects on any of these groups be different if the tariff were *ad valorem* instead of specific?

Yes. The price increase would be somewhat larger. The effects on suppliers and demanders would therefore be slightly larger, but in the same direction. The government could actually gain tariff revenue now, however, if the drop in quantity of imports were small enough, since it would be collecting more revenue on each unit of imports.

c. For a given world price and a given quantity of imports with free trade, determine how the various welfare effects of a given tariff, compared to free trade, depend on the elasticities of domestic supply and domestic demand for the good.

To increase the elasticity of supply and demand without changing the quantity of imports with free trade, the supply and demand curves must become flatter while still passing through their original intersections with P_W , as shown. We can then read off the effects on welfare:



- Producers gain +a from the tariff, which is larger the more elastic is domestic supply. Elasticity of domestic demand does not matter for them.
- Demanders lose -(a+b+c+d) from the tariff, which is smaller (in absolute value) the more elastic is domestic demand. Elasticity of supply does not matter for them.
- Government gains tariff revenue +c from the tariff, which is smaller the more elastic are either supply or demand.
- The country as a whole loses -(b+d) from the tariff, which is larger(in absolute value) the more elastic are either supply or demand.
- d. Suppose that domestic supply is perfectly elastic at a price higher than the world price. Determine the welfare effects of a tariff starting from free trade.

If domestic supply is perfectly elastic at price P_A , which is higher than the world price plus tariff as shown, then domestic supply is zero, even with the tariff. The tariff hurts demanders, as usual, and generates tariff revenue, but there is no benefit to suppliers and no portion of deadweight loss due to production distortion.



e. Under the assumption of part (d), suppose that a tariff is more than large enough for domestic production to take place. What are the effects of increasing the size of that tariff even further?

None. In this case, $P=P_A$, imports are zero, and increasing the tariff has no effect.

2. Describe how you would find the optimal tariff of a large country whose elasticity of demand for imports is zero.

A tariff in this case raises the domestic price by the full amount of the tariff and does not lower the foreign price at all, regardless of the elasticity of the foreign excess supply curve. Since there is no terms-of-trade improvement due to a tariff here, the country cannot make itself better off than under free trade. One could say, therefore, that the optimal tariff is zero in this situation. However, it also does not lose anything by using a tariff, since it causes no distortions. So really, the optimal tariff here is any tariff at all, including zero.



3. Starting from an equilibrium in which imports of a good into a small country are reduced from their free trade level to some level, M_0 , by either a specific tariff, t_0 , or by an auctioned import quota, q_0 , compare the effects under the tariff and under the quota on i) domestic price, ii) producer welfare, iii) consumer welfare, and iv) government revenue of the following changes:

In each case, I will use the following notation to give the answers, which can be read from the diagrams:

Change in domestic price	due to quota due to tariff	$\frac{\Delta P^{q}}{\Delta P^{t}}$
Change in producer welfare	due to quota due to tariff	$\frac{\Delta P W^q}{\Delta P W^t}$
Change in consumer welfare	due to quota due to tariff	$\frac{\Delta C W^{q}}{\Delta C W^{t}}$
Change in government revenue	due to quota due to tariff	ΔR^q ΔR^t

a. An increase (shift to the right) of domestic demand;



b. An increase (shift to the right) of domestic supply;



c. A fall in the world price.



4. Suppose that a domestic monopoly in a small country, protected by a tariff, is initially charging a profit-maximizing price in its domestic market that is above the world price, and that it is selling on both the domestic market and for export. Suppose that foreign countries now identify this behavior as dumping and that they levy an anti-dumping duty equal to the "dumping margin," defined as the difference between the price it charges at home and the price it charges for exports.



a. What will the firm now do if the anti-dumping duty cannot be removed by changing its behavior?

The anti-dumping duty lowers the price the firm can get on the world market to $P_W - (P_d - P_W)$, same as a fall in the world price. If this leaves P_W above the intersection of MR and MC, then it will continue to export. But as drawn, it will not, and it will move to the MR/MC intersection and charge the autarkic monopoly price

b. Suppose instead that by ceasing to dump the firm could cause the anti-dumping duty to be removed. Show how you would determine what it would do in that case.

In order not to dump, it must charge P_W at home, since it cannot charge more abroad. The question then is whether it earns more from doing that than by selling only at home as a monopolist. The answer is yes if area b is larger than area a, which it could be, but as drawn apparently is not.

5. Analyze the effects of a tariff on a good imported into a small country under the assumption that it not produced inside the country at all, but that another good for which the import is a complement, is produced in the country and is not traded. A slightly contrived example might be a tariff on imports of movies into a country that has no movie industry together with the market for popcorn to be eaten at the movie theater. A rise in the price of movies will reduce the demand for popcorn.

Ans: This is very much like the case of a tariff on a differentiated product that we saw in class and in the paper on multi-market analysis, except that now the domestic good is a complement for the import rather than a substitute. The graphical analysis is as follows:



Note that while the effect of price in one market on demand in the other is now negative, rather than positive, and this causes the demand curve for popcorn to shift left instead of right, the shift of the movie demand curve is still to the right. This is because two things have reverse, the price change in popcorn and its effect on movie demand.

It is also the case that the net loss in the domestic market for popcorn, area b, is exactly duplicated by the extra loss to net demanders in the movie market when we shift the curve, thus the area (d+e). Substituting this for area e in the bottom line of welfare effects, the loss to the country as a whole is -(d+e+f-d) = -(e+f). Thus, one can find the net effect on the welfare of the country as a whole using just the import demand curve, so long as it is one that takes account of the effect of the movie price on the equilibrium price of popcorn.