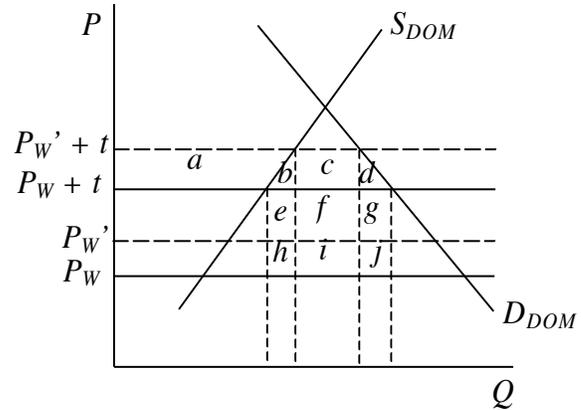


**Problem Set #2 - Answers**  
**Tariffs and Quotas**

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:*



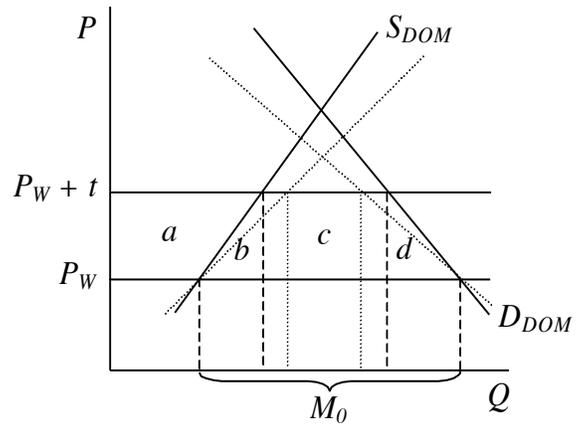
<i>Suppliers gain</i>	$+a$
<i>Demanders lose</i>	$-(a+b+c+d)$
<i>Government loses</i>	$-(e+h+g+j)$
<i>Country loses</i>	$-(b+c+d+e+h+g+j)$

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.

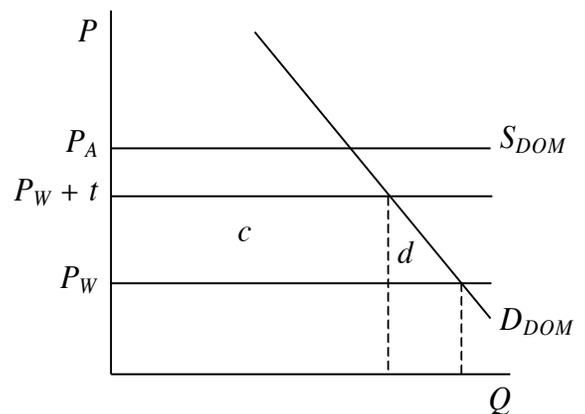
*To increase the elasticity of supply and demand without changing the quantity of imports with free trade, the supply and demand curves must become flatter while still passing through their original intersections with  $P_w$ , as shown. We can then read off the effects on welfare:*



- 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.*

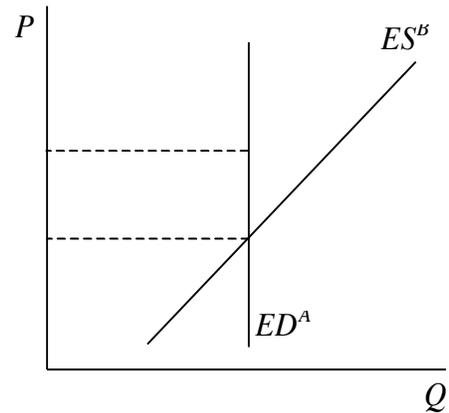


- e. Under the assumption of part (d), suppose that a tariff is more than large enough for domestic production to take place. What are the effects of increasing the size of that tariff even further?

*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	$\Delta P^q$
	due to tariff	$\Delta P^t$
Change in producer welfare...	due to quota	$\Delta PW^q$
	due to tariff	$\Delta PW^t$
Change in consumer welfare...	due to quota	$\Delta CW^q$
	due to tariff	$\Delta CW^t$
Change in government revenue...	due to quota	$\Delta R^q$
	due to tariff	$\Delta R^t$

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

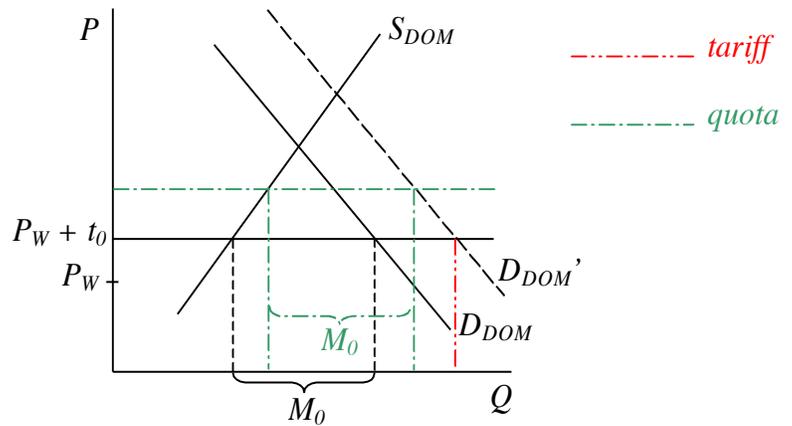
$$\Delta P^q > \Delta P^t = 0$$

$$\Delta PW^q > \Delta PW^t = 0$$

$$\Delta CW^q < \Delta CW^t = 0$$

$$\Delta R^q > 0, \Delta R^t > 0$$

$$\Delta R^q \geq \Delta R^t$$



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

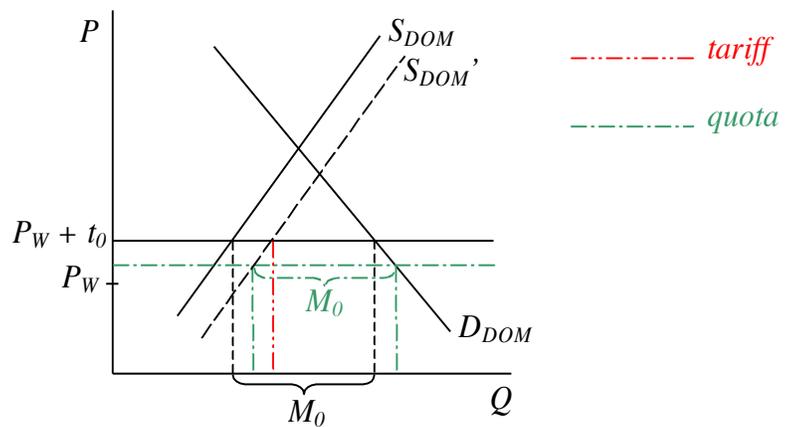
$$\Delta P^q < \Delta P^t = 0$$

$$\Delta PW^q < \Delta PW^t = 0$$

$$\Delta CW^q > \Delta CW^t = 0$$

$$\Delta R^q < 0, \Delta R^t < 0$$

$$\Delta R^q \geq \Delta R^t$$



c. A fall in the world price.

$$0 = \Delta P^q > \Delta P^t$$

$$0 = \Delta PW^q > \Delta PW^t$$

$$0 = \Delta CW^q < \Delta CW^t$$

$$\Delta R^q > 0, \Delta R^t > 0$$

$$\Delta R^q \geq \Delta R^t$$

