EC3355 International Trade
Problem Set 6: Trade policy

Consider Vietnam which has the following supply and demand for rice:

$$Supply = 7P_r^f; Demand = 3000 - 3P_r^c$$

P_r^f is the price that the farmers receive and P_r^c is the price that the consumers pay. In the absence of any tariffs we assume $P_r^f = P_r^c$ and under free trade Vietnam can export rice at the world price of $P_r^w = 500$. Vietnam decides to impose a tariff of t per unit on rice exports.

1. Show how the domestic price, consumption, and production change as t increases.

   Answer: Based on the world price the net-revenue for a domestic firm is $500 - t$ if trade occurs. Under autarky the domestic price is: $7P_r^f = 3000 - 3P_r^c$ with $P_r^f = P_r^c$ so $P_r^f = 300$. This means that for $t \geq 200$ there will be no exports and the domestic price will be the autarky price of 300.

   For $t \leq 200$ we have:
   $P_r^c = P_r^f = 500 - t$
   $D = 3000 - 3P_r^c = 1500 + 3t$
   $S = 7P_r^f = 3500 - 7t$
   $X = S - D = 2000 - 10t$

   So if t increases the domestic price will decrease, consumption increases, production decreases and exports decrease.

2. Calculate how consumer surplus, producer surplus, and government tariff revenue changes as t increases. When t increases what happens to general welfare?

   Answer: Producer surplus will change by:
   $\Delta PS = -(\frac{1}{2}) * t * (3500 + 3500 - 7t) = -(3500t - \frac{7}{2}t^2)$

   Consumer surplus will change by:

$\Delta CS = \frac{1}{2} * t * (1500 + 1500 + 3t) = 1500t + \frac{3}{2}t^2$

Government revenue will be:
$TR = tX = t * (2000 - 10t) = 2000t - 10t^2$

Note that government revenue will only increase for $t < 100$ and decreases thereafter.
The overall change in welfare is:

$\Delta Welfare = \Delta PS + \Delta CS + TR = -(3500t - \frac{7}{2}t^2) + (1500t + \frac{3}{2}t^2) + (2000t - 10t^2) = -5t^2$
There is a decrease in general welfare.

3. With trade and tariff, is the country worse off than in autarky?

   Answer: The tariff will hurt Vietnam compared to free trade but the country is still better of compared to no trade.

4. Consider the case where there is an export quota of 1,000 units, but no tariffs, and compare this with a domestic equilibrium when $t = 100$. Calculate how exports, domestic price, production and consumption compare under these two plans and explain which policy is better for the country.

   Answer: With $t = 100$ exports will be $2000 - 10t = 1000$. So a quota of 1,000 or a tariff of 100 will have identical effects. They only differ in government revenue.

5. Instead of an export tariff, the government decides to subsidise exports at a rate of s per unit of export. So not only does the exporter receive the world price, but also a subsidy of s from the government. How does this subsidy affect domestic price, consumer surplus, producer surplus, government expenditures on the subsidy, and overall welfare?

   Answer: As a result of the subsidy, the domestic price for both consumers and producers increases to $500 + s$, since exporters receive 500 from the foreign buyers and additionally s from the government. So if the domestic price is less than $500 + s$ it will not be profitable to sell domestically, and as a result prices will increase. If domestic prices are larger than $500 + s$, exporters will have no incentive to export which would lower the domestic price.

   Note that the government will have to ban rice imports as exporters could make money by importing rice and re-exporting it.

Consumer surplus will decrease due to the higher domestic prices.
$\Delta CS = \frac{-s}{2}(1500 + 1500 - 3s) = -1500s + \frac{3}{2}s^2$.

Producer surplus will increase due to higher prices.
$\Delta PS = \frac{s}{2}(3500 + 3500 + 7s) = 3500s + \frac{7}{2}s^2$

Government expenditures are the costs of the subsidy. Exported goods are $S - D = 2000 + 10s$ so costs to the government are $s(2000 + 10s) = 2000s + 10s^2$

The overall impact on welfare is consumer surplus plus producer surplus minus government expenditures is $-5s^2$.

6. Does there exist an export quota that would have a similar effect as the export subsidy?

   Answer: No export quota can force exports to increase over the free trade level so there is no quantitative policy that has the same impact as an export subsidy.

7. Could the country be worse off without trade or with an export subsidy?

   Answer: If the subsidy is too high it will encourage too much trade which could make the country worse off.

8. Suppose that the government wants to the help the domestic rice consumers living in the urban areas. The government can implement either an export tariff or a consumption subsidy. Which would be the better policy? For the answer compare the welfare implication of a tariff and subsidy both of 100.

   Answer: If the government wants to help the urban consumers it should try to lower the domestic price of rice. This could be accomplished by imposing an export tariff. However, this tariff will also lead to a decrease in production. With a consumption subsidy of 100 there is no change in the producer surplus compared to free trade whereas the effect on consumer surplus is the same as with an export tariff. Welfare effects of a consumption subsidy of 100 are:

   $\Delta PS = 0$
   $\Delta CS = 1500s + \frac{3}{2}s^2 = 165,000$
   The costs of the subsidy are: 100*1,800=180,000.
   Welfare loss is 165,000-180,000=-15,000.

   For an export tariff of 100 the welfare loss is $-5t^2 = -50,000$.

The consumption subsidy has lower welfare costs.

9. We know that a tariff will increase producer surplus and decrease consumer surplus in the importing country. Explain why one cannot separate producer and consumer surplus in the general equilibrium models of trade discussed in the course.

   Answer: Because in these models there is no clear distinction between consumers and producers.

10. Is it correct to assume that consumer surplus is worth the same amount as producer surplus or government revenue?

    Answer: The short answer is no not really. The gains of trade for produces could boost the economy and government revenues could be used to compensate the losers from trade. These are things to be taken into consideration when analysing the effects of trade on national welfare. Therefore consumer surplus shouldn't be regarded as sacrosanct.