

Problem set 6 –Trade Policy

Keywords: Trade policy instruments (tariff, quota, voluntary export restraints).

Exercise 1

Consider a *small* open economy (N) with the following internal demand and supply for good X : $X^D = 100 - P$, $X^S = P$.

The international price of the good is $P = 10$.

a) Describe the free-trade equilibrium in N and represent it in a graph.

Suppose N imposes a specific tariff of 5 Euros on imports.

b) Analyze the effect of the tariff on domestic prices, production, consumption and imports. Also analyze the impact of the tariff in the welfare of the different agents involved. What would be the tariff revenue?

Suppose that instead of the tariff, N imposes a quota of 70 units.

c) Find out the expression for the residual demand and describe the equilibrium in the domestic economy, assuming that both the domestic production and the foreign production are perfectly competitive. In this case, are the quota and the tariff equivalent?

Suppose that a technological improvement abroad pushed the international price of this good to $P = 7$.

d) In which case would the domestic producers be more isolated from this development: the tariff or the quota? Explain, with the help of a graph.

Consider, in alternative, that the domestic demand increased to $X^D = 120 - P$.

e) In which case would the consumers be more penalized? Explain, with the help of a graph.

f) Returning to (c), discuss how you would change your answer if you knew that, instead of a quota, there was a voluntary export restraint, in which foreign producers are given the licenses to export up to 70 units of X .

Finally, assume that the domestic production was undertaken by a monopolist, with the marginal costs given by $MC = X$.

g) What would be the equilibrium in the domestic economy in the case of the tariff and in the case of the quota?

Exercise 2

Home's demand curve for wheat is $X^D = 100 - 20P$. Its supply curve is $X^S = 20 + 20P$.

- a) Derive and graph Home's import demand schedule. What would the price of wheat be in the absence of trade?

Now add Foreign, which has a demand curve $X^{*D} = 80 - 20P$ and a supply curve $X^{*S} = 40 + 20P$.

- b) Derive and graph Foreign's export supply curve and find the price of wheat that would prevail in Foreign in the absence of trade.

Now allow Foreign and Home to trade with each other, at zero transportation cost.

- c) Find and graph the equilibrium under free trade. What is the world price? What is the volume of trade?

Home imposes a specific tariff of 0.5 on wheat imports.

- d) Determine and graph the effects of the tariff on the following: (1) the price of wheat in each country; (2) the quantity of wheat supplied and demanded in each country; (3) the volume of trade.
- e) Determine the effect of the tariff on the welfare of each of the following groups: (1) Home import-competing producers; (2) Home consumers; (3) the Home government.
- f) Show graphically and calculate the terms of trade gain, the efficiency loss, and the total effect on welfare of the tariff.

Suppose that Foreign had been a much larger country, with domestic demand and supply given by $X^{*D} = 800 - 200P$ and $X^{*S} = 400 + 200P$, respectively [notice that this implies that the Foreign price of wheat in the absence of trade would have been the same as in problem b)].

- g) Recalculate the free trade equilibrium and the effects of a 0.5 specific tariff by Home. Relate the difference in results to the discussion of the small country case in the text.

Exercise 3

Home and Foreign have the following demand and supply functions:

$$\text{Home: } X^D = 200 - 40P, X^S = 40 + 40P.$$

$$\text{Foreign: } X^{*D} = 160 - 40P^*, X^{*S} = 80 + 40P^*.$$

- a) Find the autarky equilibrium in each country before trade, including price, quantity, consumer and producer surpluses.

Assume now that these two countries engage in free trade and that there are no transportation costs.

- b) Find the expression of the import and demand schedules as well as the international equilibrium quantities and volume of trade. Explain the gains from trade for producers and consumers.

Suppose now that Home imposes a specific tariff on imports of 0.5.

- c) What is the effect on the international price? Identify, with the help of a graph, the welfare changes for the different agents involved. Explain the terms-of-trade effect. Discuss the consequences of the tariff for world welfare.

Suppose the foreign nation retaliates imposing a tariff on imports in some other market.

- d) What would be the consequences? Build a game theory payoff matrix of the strategic interaction between nations.

Suppose instead that the world has a large country and a small country.

- e) How should the payoff-matrix look like? Identify the Nash-equilibrium. What can small countries do?

Exercise 4

In a general equilibrium framework, explain with the help of a graph, that a tariff is equivalent to a subsidy on production plus a tax on consumption. Explain the cost associated with each one of these distortions.

Exercise 5

Explain why South Africa could find it optimal to tax its gold exports.

Exercise 6

Congo is one of the world's major exporters of cobalt. Discuss, with the help of a graph, the possible effects new discoveries of cobalt could have on its economy.

Exercise 7

Suppose that the domestic demand for a given product (X) is given by $X^D = 10 - p$.

This product is only produced by a foreign monopoly, with a constant marginal cost of $MC = 2$.

- a) Assuming that the foreign firm fully explores its monopoly power, at which price will it sell X in the domestic market?

Now assume that the domestic government imposes a specific tariff of 2 euros per imported unit.

- b) What will be the optimal price policy for the foreign monopoly in this case?
- c) Compute the consumer loss.
- d) Compute the government revenue.
- e) Discuss.

Exercise 8

In Home the demand and supply schedules are equal to $Y^D = 60 - P$ and $Y^S = P$. In Foreign they are equal to $Y^{D*} = 60 - P$ and $Y^{S*} = 20 + P$.

- a) Plot Home's import demand and Foreign's export supply and identify both the autarky and free trade prices (graphically and numerically).

Now suppose that Home imposes a specific tariff of 2.

- b) Compute the equilibrium prices in both countries and the change in the volume of trade.
- c) Compute the changes in welfare of the different agents and the country as a whole, both for Home and Foreign. Discuss.

Solutions – PS 6

Exercise 1

Solved in class.

Exercise 2

- a) $MD = 80 - 40P$; Price(autarky) = 2. b) $XS = -40 + 40P$; Price(autarky) = 1.
c) Price = 1.5, volume of trade = 20. d) $P^H = 1.75$; $P^F = 1.25$, volume of trade = 10.
e) $\Delta PS = +13.125$; $\Delta CS = -16.875$; Government revenues = + 5.
f) Changes: Terms of trade = + 2.5; distortion in production = - 0.625; distortion in consumption = - 0.625; Overall welfare change = + 1.25.
g) Free trade: $P^* = 12/11 \approx 1.09$ With tariff: $P^F = 23/22$; $P^H = 34/22$

In relative terms country Home is now a *smaller* big country.

Exercise 3

Solved in class.

Exercise 4

Check "*International Trade: Theory and Evidence*" by Markusen et al. (pag. 251/252, Moodle).

Exercise 5

An export tax distorts the terms of trade in the same direction as a import tariff.

Exercise 6

This is a case of export-biased growth. It expands the PPF but it also worsens the terms of trade (if it is a big country). This may result in a reduction of overall welfare (you can try to illustrate this graphically).

Exercise 7

- a) $P = 6$. b) $P = 5$. c) $\Delta CS = -3.5$. d) $R = 6$.
e) Trade policy can be used to capture some part of the foreign monopoly rents.

Exercise 8

- a) $P^F < P^* < P^H \Rightarrow 20 < 25 < 30$.
- b) $P^F = 24, P^H = 26, \Delta\text{Volume} = -2$.
- c) Change overall welfare: (i) Home: + 7; (ii) Foreign: - 9.