

**Exercise set 1.** Assignment 4

**Problem:** This assignment is designed to illustrate the economic and welfare implications of a policy affecting export competition (i.e., an export subsidy) both in terms of the partial equilibrium effects and some expected general equilibrium effects. Suppose the government in the net exporting manufacturing country applies an export subsidy. Model the changes in equilibrium and analyze the economic effects of a policy change from free trade to subsidized trade.

The internal manufacturing markets in North and South are expressed exactly as in assignment 1.

| North's Manufacturing Market      | South's Manufacturing Market     |
|-----------------------------------|----------------------------------|
| $D_M: Q_M = 8571.43 - 571.43 P_M$ | $D_M: Q_M = 6000 - 400 P_M$      |
| $S_M: Q_M = 3428.57 + 571.43 P_M$ | $S_M: Q_M = 666.67 + 133.33 P_M$ |

4.1. The initial situation is the free trade partial equilibrium solution from assignment 2.

**Free trade partial equilibrium**

| North's manufacturing market |           |           |         |       | South's manufacturing market |           |           |         |       |
|------------------------------|-----------|-----------|---------|-------|------------------------------|-----------|-----------|---------|-------|
| $[P_M]_W$                    | $[Q_S]_1$ | $[Q_D]_1$ | $[Q_T]$ | $V_T$ | $[P_M]_W$                    | $[Q_S]_1$ | $[Q_D]_1$ | $[Q_T]$ | $V_T$ |
|                              |           |           |         |       |                              |           |           |         |       |

4.2. Now, the government in the exporting country applies a specific subsidy of 1.10 per unit. Ignore the possibility for retaliation. Derive the new excess supply function with a subsidy.

| Excess demand function | Excess supply function |
|------------------------|------------------------|
| $[ED_M] =$             | $[ES_M]^1 =$           |

4.3. Determine the new world price,  $[P_M]_W'$ , the domestic price,  $[P_M]_D$  in the exporting country, the new quantity traded,  $[Q_M]_T'$ , the value of trade,  $[V_M]_T'$ , and the new domestic market situations in the manufacturing sectors in each country, i.e.,  $[Q_S]'$  and  $[Q_D]'$ .

**Equilibrium under a specific export subsidy of 1.10 on the manufactured good**

| North's manufacturing sector |           |            |            |            |            | South's manufacturing sector |            |            |            |            |
|------------------------------|-----------|------------|------------|------------|------------|------------------------------|------------|------------|------------|------------|
| $[P_M]_W'$                   | $[P_M]_D$ | $[Q_S]_1'$ | $[Q_D]_1'$ | $[Q_M]_T'$ | $[V_M]_T'$ | $[P_M]_W'$                   | $[Q_S]_1'$ | $[Q_D]_1'$ | $[Q_M]_T'$ | $[V_M]_T'$ |
|                              |           |            |            |            |            |                              |            |            |            |            |

4.4. Construct a 3-panel diagram to show market changes from free trade to subsidized trade.

- 4.5. Concepts related to export subsidies for class discussion:
- 4.5.1. What is the ad valorem export subsidy equivalent to the specific export subsidy? That is, what percent rate of an export subsidy results in the same economic and welfare effects? What is the export quota equivalent of the export subsidy?
- 4.5.2. Is this an example of an optimal policy? Explain. What would it mean for an export subsidy to be considered a “strategic export policy” on the part of the exporting government?
- 4.5.3. Would you expect a retaliatory policy response by the importing country? Explain. What action could the importing country take? Would or could it result in a welfare improvement in the importing country?
- 4.6. Analyze the welfare effects of the export subsidy using free trade as the benchmark.
- 4.6.1. Identify the areas in your model that represent the welfare changes in consumer surplus,  $\Delta CS$ , producer surplus,  $\Delta PS$ , change in government revenue,  $\Delta G$ , and the change in net social welfare,  $\Delta NSW$ . What is the  $\Delta NSW$  in the world? Explain.
- 4.6.2. Compare the welfare estimates to a measurement of the consumer and producer subsidy equivalents, CSE and PSE, respectively. Explain the difference of the value of the measurements.

#### Welfare analysis of an export subsidy

| Welfare analysis |          |          |                            | Subsidy equivalent measurements |          |          |
|------------------|----------|----------|----------------------------|---------------------------------|----------|----------|
|                  | Importer | Exporter | Change in NSW in the world |                                 | Importer | Exporter |
| $\Delta CS$      |          |          |                            | CSE                             |          |          |
| $\Delta PS$      |          |          |                            | PSE                             |          |          |
| $\Delta G$       |          |          |                            |                                 |          |          |
| $\Delta NSW$     |          |          |                            |                                 |          |          |

- 4.7. Recall that each country has an agricultural sector that competes with the manufacturing sector. So, the change in the nominal price of the manufactured good,  $[P_M]_W'$ , will affect the relative price of the goods,  $[P_A]_W/[P_M]_W'$ . You have only solved a partial equilibrium problem and do not have specific information on how the export subsidy on manufacturing exports affects the agricultural sector. However, you can deduce how the trade effect on the international manufacturing market affects the relative prices of the goods (i.e.,  $P_A$  relative to  $P_M$ ) in the markets of both economies. To do this, use the offer curve analysis to show: (1) the initial equilibrium of quantity traded,  $[Q_A]_T$  for  $[Q_M]_T$ , (2) the initial terms of trade (TOT), (3) the new equilibrium quantity traded,  $[Q_A]_T'$  for  $[Q_M]_T'$ , and (4) the new terms of trade,  $TOT_1$ .

**Optional:** A more advanced general equilibrium solution would be the use of the H-O-S framework. Relying on the use of the H-O-S model, show the direction of the changes in a general equilibrium context as a result of the export subsidy's effect on relative prices, production, consumption, trade and welfare. Do this for each country separately.