

Midterm 2 (Total Points: 90)

I)

Consider two countries (Country 1 and Country 2) and two firms (Firm 1 and Firm 2) that produce a homogeneous product. Firm 1 is from country 1 (i.e. produces in country 1 and its owners are from country 1) and Firm 2 is from country 2 (i.e. produces in country 2 and its owners are from country 2).

Both firms have zero marginal costs of production and sell in each other's markets (i.e. firm 1 exports to country 2 and firm 2 exports to country 1). There is no cost of physically transporting the goods from one country to another but each country charges a tariff  $\tau$  to the foreign good.

Both markets have identical market demands:

$$p_1 = 120 - q_1 \quad \text{and} \quad p_2 = 120 - q_2$$

(where  $p$ 's and  $q$ 's denote the price and total quantities sold in each country).

Suppose the firms behave as **Cournot competitors**.

(1) (14 pts) Calculate the Cournot equilibrium in country 1's market (you need to calculate  $q_1^H$ ,  $q_2^F$  and  $p_1$ .)

(2) (6 pts) Do you think that country 1 could accuse the foreign firm (Firm 2) of dumping? (No calculations needed, a short justification is sufficient.)

(3) (6 pts)

What is the tariff level that will drive the foreign firm (Firm 2) out of country 1's market?

II)

Consider two firms (Firm 1 and Firm 2) from two different countries (Country 1 and Country 2) that produce a homogeneous product for export to a third country.

Marginal costs are zero for both firms and the demand for their product is :

$$p = 120 - q_1 - q_2$$

Firms behave as Cournot duopolists choosing output simultaneously. Suppose that countries can give their firms an export subsidy of  $s_1$  and  $s_2$  dollars per unit respectively before both firms choose their output.

In other words, countries and firms are engaged in a sequential game. In stage 1, countries choose simultaneously their subsidy levels in order to maximize social welfare. In stage 2, after the subsidy choices are known, both firms choose their output level simultaneously.

**(1) (14 pts)**

Calculate the subsidy levels that countries will choose at the SPNE (you are calculating the Nash Equilibrium subsidy levels).

*I have calculated and in this case NE in outputs in stage 2 is as follows :*

$$q_1 = (1/3) [120 + 2 s_1 - s_2]$$

$$q_2 = (1/3) [120 + 2 s_2 - s_1]$$

$$p = (1/3) [120 - s_1 - s_2]$$

**(2) (8 pts)** Do you think that countries that engage in export subsidy competition end up worse off than when they do not subsidize at all? Relate your answer to the agreement between the US and the European Union on large civil aircraft.

**(III) Deardorff**

Consider first the Deardorff model for the case of multiple inventions in a **SINGLE** country. The attached diagram shows the amount of research investment (I) in the horizontal axes and  $s^o(I)$  (optimal consumer surplus per dollar of research obtainable from the last dollar of research investment),  $\pi^m(I)$  (monopoly profits per dollar of research obtainable from the last dollar of research investment) and  $s^m(I)$  (consumer surplus per dollar of research under monopoly obtainable from the last dollar of research investment) in the vertical axes.

- (1) (6 pts) Identify the optimal amount of research investment for country A. Justify your choice.
- (2) (6 pts) Identify the Net gain for society (or Country A's Welfare) when the optimal amount of research investment is undertaken. Justify your choice.
- (3) (6 pts) Identify the amount of research investment that a patent holder (monopolist) will undertake. Justify your choice.
- (4) (6 pts) Identify the Net Gain for Society (or Country A's Welfare) when a patent is granted to a firm (monopolist). Justify your choice.

Consider now the case of **TWO COUNTRIES**. Country A is the only country that can produce inventions but both countries (A and B) consume the invented products. Two IPR regimes are considered: the restricted regime (R) where patents are only recognized in country A and the extended regime (E) where both countries recognize patents.

(5) (8 pts) Assume the world moves from the restricted regime to the extended regime. What does the Deardorff model predict regarding the amount of innovation and countries' welfare (no need to identify areas in the diagram, a short and clear explanation is sufficient.)

**(IV) Short Questions**

- (1) (5 pts) Briefly describe the link between Pfizer and the IPR provisions in the WTO agreements.
- (2) (5 pts) What are the predicted welfare effects of TRIPS on Indian consumers according to the study by Chaudhuri, Goldberg, et al presented in class?

COUNTRY A

