

## Midterm Exam 1

Answer Any **Two Questions**. Answer all parts to each question.

1. Suppose the domestic supply and demand curves for maize (corn) in Belgium are given by:

$$S = 6P^f; \quad D = 100 - 4P^c$$

where  $P^c$  is the price domestic consumers pay for corn, and  $P^f$  is the price domestic firms (producers) receive for their corn output (you may think of the units for price as \$/bushel, if that helps)

- (a) Assuming Belgium does not trade with the rest of the world, find the equilibrium (autarky) price and the quantity transacted. (Note that, if there are no domestic taxes or subsidies, then  $P^f = P^c = P^d$ , where  $P^d$  represents the domestic price). **(10 points)**
- (b) Assume that a change in economic policy allows free trade in corn between Belgium and the rest of the world. Further, assume the world price is 5 ( $P^w = 5$ ), and that the imports (or exports) of Belgium have no impact on this world price. (Further, continue to assume there are no taxes or subsidies to producers or consumers in Belgium).
- i. How does trade affect price, production and consumption in Belgium? Find the country's trade volume (exports or imports) under free trade. **(8 points)**
  - ii. Briefly discuss who gains and who loses from this policy change, then show graphically, and **calculate**, the changes in consumer and producer surplus from the policy change. **(10 points)**
- (c) Suppose the government of Belgium wants to protect those who lose from free trade, and thus institutes a policy that fixes the producer price ( $P^f$ ) at the autarky price level (this is equivalent to a production subsidy equal to the difference between the autarky and world price). The consumer price is allowed to adjust to the world price.
- i. Starting from free trade, show graphically and numerically how this production subsidy affects Belgium corn production and imports or exports. **(6 points)**
  - ii. Assuming this production subsidy increases Belgian corn production, **calculate** the welfare consequences of the change in corn production due to the subsidy. **(10 points)**
  - iii. **Food for thought:** Europeans often argue that agricultural production provides an external benefit to the general population since it beautifies the countryside and provides enjoyment (utility) to those who drive through the countryside. If this argument is true for Belgium, would it be better for Belgium to limit imports of corn or to subsidize corn production? If this argument is true, how would production subsidies affect welfare? (I expect a brief discussion, not a rigorous or a numerical answer). Explain. **(6 points)**

**2. Answer both parts (a) and (b) and all subparts.**

- a) Consider a Ricardian model with two goods (food, clothing) and three countries (US, Canada, Mexico). Suppose labor productivities are as given in the following table:

Output per unit time (day)			
	US	Canada	Mexico
Clothing	6	4	4
Food	12	12	2

- (i) Find the autarky price of clothing (in terms of food) in each country. Also, find the autarky real wages in each country. **(8 points)**
- (ii) Assume the US and Canada sign a free trade agreement (but Mexico is excluded from this agreement). State the pattern of trade (US exports, imports), and specify the bounds on the post-trade relative price of clothing in the US and Canada. State how the real wages change in the US and Canada due to this trade agreement. **(10 points)**
- (iii) Suppose the trade agreement is amended to include Mexico, so free trade is allowed among all three countries. How will the entry of Mexico in to the agreement affect the relative price of clothing in Canada and the US, and which good will each country now export? Must Canada gain by Mexico's entry? Must the US gain? Explain your answer and discuss whether we can conclude that, in the real world, a country gains by continual expansion of free trade. **(10 points)**

- b) Consider a Ricardian model with five goods and two countries (US, Japan). Suppose labor productivities in each country are as given in the following table:

Output per day					
	Bikes (B)	Food (F)	Clothes (C)	Glass (G)	Shoes (S)
United States	9	12	4	10	3
Japan	6	4	6	5	6

- (i) Let  $W$  denote the US wage and  $W^*$  denote the Japanese wage. Assuming free trade between the two countries, discuss how the post-trade relative wage ( $W/W^*$ ) is determined. What are the upper and lower bounds on this relative wage? Also, what can you conclude about US exports and US imports, and how trade affects US real wages (as compared to autarky)? **(11 points)**
- (ii) How would an increase in the size of the US labor force affect the relative price of goods (say, as compared to food), the relative US wage ( $W/W^*$ ), the real wage in each country, and the set of goods the US exports? Explain. **(11 points)**

**3. Answer all parts to the question.**

- a) The Heckscher-Ohlin model of chapter 4 investigates what happens when there is more than one input. The model assumes that all goods are produced under constant returns to scale (doubling all inputs leads to a doubling of output), and that there are two inputs (labor,  $L$  and land,  $T$ ) and two goods (food,  $F$ , and clothing,  $C$ ). Overall, there are four prices in this economy:  $W$  (the wage rate),  $R$  (the rental rate on land),  $P_c$  (the price of clothing) and  $P_f$  (the price of food). As usual, only relative prices matter so there are three relative prices (for example, you can choose  $P_f = 1$ , so that the prices of the inputs and other good are all measured in food units). Assume that, in production of either good, land can substitute for labor, so the same quantity of output can be produced with less labor if more land is used. Finally, assume food is the *land-intensive* good, so that – given input prices – more land per worker is used in food production than in clothing production.
- (i) Show graphically how increases in the wage rate affect how food is produced (i.e., the proportion of land to labor used to produce food). If US food production uses more land per worker than does Mexican production, does this imply the two countries have different technologies? **(8 points)**
- (ii) Suppose the wage rate increases. What happens to the **relative** cost of producing clothing (as compared to food)? Draw a graph showing the relationship between relative input prices ( $W/R$ ) and relative output prices ( $P_c/P_f$ ). **(10 points)**
- (iii) Suppose the economy under study would import clothing if free trade were allowed. Use your result from part (ii) to conjecture how clothing imports (food exports) that lower the relative price of clothing would affect the (real) wage rate and the rental rate on land in the country. Will both workers and landowners be likely to gain from trade? Explain. **(10 points)**
- b) **Evaluate the following statements. Justify your answers (points are awarded based on the justification, not on identifying the statement as true or false). Be sure to answer both parts.**
- (i) Due to international trade, economic events in one country affect all countries that trade with that country. Thus, in the real world - which has many countries (rather than two, as in some models) - economic growth in Japan, a major trading partner of the United States, must benefit the U.S.". Answer true or false, indicating under what conditions the statement is true (or false). Be sure to **explain your answer.** **(11 points)**
- (ii) If, in the autarky (no trade) situation, countries produce on their production possibility frontier, then it is not possible that free trade will lead to increased output of all goods. **(11 points)**