

## Midterm Exam 1

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

1. Suppose the domestic supply and demand curves for soybeans in Argentina are given by:

$$S = 8P^f; \quad D = 50 - 2P^c$$

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

- (a) Assuming Argentina does not trade with the rest of the world, find the equilibrium (autarky) price and the quantity transacted. (There are no domestic taxes or subsidies, so  $P^f = P^c = P^d$ , where  $P^d$  represents the domestic price). **(10 points)**
- (b) Assume that a change in economic policy allows free trade in soybeans between Argentina and the rest of the world. Further, assume the world price is 10 ( $P^w = 10$ ), and that Argentina is “small”, so that its exports or imports have no impact on this world price. (Further, continue to assume there are no taxes or subsidies to producers or consumers in Argentina).
- i. How does trade affect price, production and consumption in Argentina? Find the country’s trade volume (exports or imports) under free trade. **(6 points)**
  - ii. Briefly discuss who gains and who loses as a result of opening up the economy to free trade, then show graphically, and **calculate**, the changes in consumer and producer surplus from this policy change. **(12 points)**
- (c) Suppose the government of Argentina wants to help those who lose from free trade, and thus considers two different policies: **Policy 1:** Allow free trade but provide a subsidy to domestic consumers of soybeans of \$2/bushel (thus the consumer price is  $P^c = (P^w - 2) = 8$  and the producer price is  $P^f = P^w = 10$ ). **Policy 2:** Place a \$2 tax on soybean exports (so  $P^c = P^f = (P^w - 2) = 8$ ).
- i. Show how **policy 1** affects Argentina’s soybean production, consumption and exports. Calculate the change in consumer and producer surpluses, and the tax cost to the government of this policy. Does this policy increase or decrease overall welfare? Explain. **(8 points)**
  - ii. Show how **policy 2** affects Argentina’s soybean production, consumption and exports. Calculate the change in consumer and producer surpluses, and the tax revenue to the government from this policy. Does this policy increase or decrease overall welfare? Explain. **(8 points)**
  - iii. What is the economic difference between these policies? If your goal were to help consumers at the least possible cost to other groups, which policy would you recommend? **(6 points)**

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

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

Output per day		
	US	China
Clothing	8	2
Food	24	1

- (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 China sign a free trade agreement. State the pattern of trade (US exports and imports), and specify the bounds on the post-trade relative world price of clothing. How do the real wages in the US and China change due to this trade agreement? **(9 points)**
- (iii) **Suppose labor productivity in China doubles**, so that a Chinese worker can produce **4** units of clothing per day or **2** units of food per day. Assuming free trade between China and the US, how will this increase in Chinese productivity affect (1)China's pattern of trade?; (2)the world relative price of clothing?; and (3)welfare (the real wage) in the U.S.? Explain. **(8 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	6	12	3	8	2
Japan	6	3	6	4	8

- (i) Let  $W$  denote the US wage and  $W^*$  denote the Japanese wage. Assuming free trade between the two countries, draw the relative demand curve for (US/Japanese) labor as a function of the relative wage ( $W/W^*$ ) and use this relative demand curve to show how the equilibrium relative wage is determined. **(9 points)**
- (ii) Under free trade, what can you conclude about which goods the US will export and which it will import? How does trade affect US real wages (as compared to autarky)? Be specific. **(7 points)**
- (iii) How would an increase in the size of the Japanese labor force affect the relative price of goods (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. **(9 points)**

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

- a) The Ricardian model assumes labor is the only input, whereas in “reality” more than one input is used to produce goods. The *Heckscher-Ohlin* model (from Chapter 4) makes the more realistic assumption that there is more than one input. Specifically, assume a good (food, for example) is produced using two inputs – land (T) and labor (L). The production function for this good, written as  $Q_f = F(T_f, L_f)$ , exhibits constant returns to scale. This means that if we double both  $T_f$  (the land used to produce food) and  $L_f$  (the labor used to produce food), then food output will also double. However, the technology also exhibits *diminishing* marginal productivity – meaning that as you increase the use of *only one input*, the marginal productivity for that input falls (and the marginal productivity increases for the input whose use has not changed).
- (i) Given input prices ( $R$  for land and  $W$  for labor), graphically show how the firm determines the minimum cost way of producing a given level of output. **(7 points)**
- (ii) Suppose, at some input combination, the marginal product of labor is 10 (units food/worker) and the marginal product of land is 5 (units food/acre). If  $W=3R$  (the wage is 3 times the rental rate on land), how can you change input use to reduce production costs while holding output constant? Be specific, and use your graph in (i) to illustrate your answer. **(8 points)**
- (iii) Assuming the firm minimizes costs, how do long run average and marginal costs change as the firm increases its output? (By the long run, I mean both inputs can be varied. Also, assume factor prices do not change). Be as specific as possible. **(7 points)**
- (iv) Suppose Mexico and the United States have the same technology for producing food. However, suppose that wages are higher in the US and that the rental rate on land is higher in Mexico. What would you predict concerning the way in which food is produced in each country (the amount of land per worker)? In which country will the average product of labor be higher (again, assuming the countries have the same technology)? Explain. **(7 points)**
- b) Suppose there are two goods, food and clothing. As in part (a), each good is produced using land and labor, and production of each good exhibits constant returns to scale. However, at *every* factor price ratio ( $W/R$ ), food uses more land per worker than does clothing (that is, food is relatively land intensive compared to clothing).
- (i) How will an increase in the wage rate change marginal cost for each good? **(5 points)**
- (ii) Will this increase in the wage rate increase production costs proportionately more in food production or in clothing production (that is, how does the wage increase affect the ratio of the marginal cost of producing clothing to the marginal cost of producing food)? Why? **(8 points)**
- (iii) Suppose you knew that technology and preferences (demands) were identical in the US and Mexico, and that prior to trade relative wages ( $W/R$ ) were higher in the US than in Mexico. If trade were allowed between the two countries, what would you predict concerning the pattern of trade (i.e., what good would the US export and what good what it import)? Explain. **(8 points)**