Lapan Econ 455
Fall 2009

Midterm Exam 1

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

1. Consider the specific-factor model with two goods (food, F, and computers, C). Let land (T) be the specific factor in the food sector, and let capital (K) be the specific factor in the computer sector, while labor is used in both sectors and is mobile between the two sectors. In terms of equations:

$$Q_c = C\left(K, L_c\right); \quad Q_f = F\left(T, L_f\right); \quad L_c + L_f \le L$$

Assume each production function exhibits constant returns to scale, which means if you double both inputs used to produce a good, you double output of that good.

(a) Briefly explain how the production possibility frontier (*ppf*) can be derived, then sketch the *ppf* and explain its curvature (how the slope change as you move along the *ppf*). **(6 points)**

i. Explain how the (general equilibrium) supply curve for food can be obtained from the production possibility frontier. **(4 points)**

ii. What does the area under the supply curve, between any two output levels, measure? Be precise, and relate your answer to the *ppf*. **(4 points)**

(b) Discuss how the demand for labor in each sector (food and computers) is determined, and then use a diagram to show how the **equilibrium wage rate** is determined. **(6 points)**

i. Briefly discuss how the output supply curves (for food and computers) can be determined from the labor market equilibrium (e.g., show how an increase in the price of food affects the equilibrium wage rate and the amount of labor used in each sector, and hence how it affects the quantity supplied of each good). **(4 points)**

ii. Given output prices, show how an increase in the amount of **capital** (the specific factor used in computer production) affects: (1)the output of food, (2)the output of computers; (3)the wage rate; (4)the return on capital (per machine); and (5)the return on land (per acre). {Note that the technology implies inputs are complements – that is, an increase in the amount of capital **increases** the marginal product of labor in producing computers}. **(8 points)**

(c) Suppose there are two countries (the US, Europe) that are alike in all respects (same technology, same tastes, etc.) except that Europe has more capital than the US (the two countries have the same amounts of land and labor). Using your result in (bii), compare autarky output prices and factor prices between the two countries. Be as specific as possible. **(8 points)**

(d) If trade is allowed between Europe and the US, what will the pattern of trade be (what good will each region export)? In each country, who gains and who loses from trade? **(10 points)**

2. Assume the domestic supply and demand curves for rice in Korea are:

$$S = 6P^f; \quad D = 600 - 4P^c$$

where P^c is the price domestic consumers pay for rice, and P^f is the price domestic firms (producers) receive for their rice output (think of the units for price as **cents/pound**, if that helps)

(a) Assuming Korea 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). **(8 points)**

(b) Assume that a change in economic policy allows free trade in rice between Korea and the rest of the world. Further, assume the world price is 20 $\left(P^w = 20\right)$, and that Korea 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 Korea).

i. How does trade affect price, production and consumption in Korea? 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 Korea wants to provide some help to those who lose from free trade, and thus considers two different policies:

Policy 1: Allow free trade but provide a subsidy to domestic rice producers of **20/pound** (thus the producer price is $P^f = \left(P^w + 20\right) = 40$ and the consumer price is $P^c = P^w = 20$).

Policy 2: Place a tax (tariff) on rice imports of **20/pound** (so $P^c = P^f = \left(P^w + 20\right) = 40$).

i. Compared to free trade, show how **policy 1** affects Korea's rice production, consumption and trade volume. 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. **(7 points)**

ii. For policy 1, calculate the extra cost due to increased Korean rice production, and compare this increased production cost to the cost of buying the rice from foreign producers. How does this difference in cost compare to the change in welfare? **Be specific.** **(5 points)**

iii. Compared to free trade, show how **policy 2** affects Korea's rice output, consumption and trade volume. 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. **(7 points)**

iv. What is the economic difference between these policies? If your goal were to help producers at the least possible cost to other groups, which policy would you recommend? **(5 points)**

3. Consider a Ricardian model, where each country's labor producitivies (output per day**)** are given in the following Table:

Laobr productivity

	Bikes (B)	Food (F)	Clothes (C)	Glass (G)	Shoes (S)
United States	12	24	8	8	12
China	3	4	8	4	4

(a) Find the autarky relative price of each good (in terms of food) in each country. Which country has the higher real wage and standard of living? Why? **(8 points)**

(b) Suppose that the US and China sign a trade agreement that permits trade **only** in **bikes and food,** while banning trade in all other goods. What will the pattern of trade be and what is the range of post-trade relative prices (of bikes to food) that can prevail? How does this trade affect the real wage in each country? Be as specific as possible. **(6 points)**

i. Let W^{us} represent the post-trade wage in the US and $\bar{W}^{c}$ represent the post-trade wage in China when only these two goods (food and bikes) are traded. What is the possible range of the post-trade relative wage $\left(W^{us}/\bar{W}^{c}\right)$? Be as specific as possible **(4 points)**

(c) Suppose a new trade agreement allows free trade in all five goods. Will each country necessarily continue to export the good that they exported under restricted trade (in part b)? Which good will the US definitely export? Which good will China definitely export? Explain carefully. **(8 points)**

i. Let ω^{*} be the equilibrium relative wage found in part (bi), when only food and bikes were traded. At $\left(\omega^{*}\right)$, how does this new trade agreement, which allows free trade in all five goods, affect the demand for US labor and Chinese labor (compared to when only the two goods were traded)? Explain carefully. **(6 points)**

(d) Let W denote the wage in the US, $\bar{W}$ the wage in China and $\omega=\left(W/\bar{W}\right)$ denote the relative wage (US wage divided by Chinese wage). Draw the (relative) labor demand curve, showing which goods the US will produce, and export, at each relative wage. Explain carefully the shape of this relative labor demand curve. **(7 points)**

i. Let L represent the labor supply in the US, and $\bar{L}$ the labor supply in China. Show how the equilibrium relative wage is determined (when all five goods are traded). **(5 points)**

ii. Using your results from parts (bi) and (ci), compare the equilibrium relative wage (US wage/Chinese wage) when all five goods are traded to the equilibrium relative wage when only food and bikes were traded. Which relative wage is larger? Be specific, and explain your answer. **(6 points)**