Lapan Econ 455
Spring 2004

Midterm Exam 1

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

1. Suppose the domestic supply and demand curves for toys in Canada are given by:
$S = 6P^d$; $D = 200 - 4P^d$ where P^d is the domestic price of toys.

(a) Assuming Canada does not trade with the rest of the world, find the equilibrium (autarky) price and the quantity transacted. **(7 points)**

(b) Assume a free trade agreement allows Canada to trade with the rest of the world. Assume the *world price is 10* and that, because Canada is small, the world price is not affected by Canada's imports or exports.

i. How does trade affect price, production and consumption in Canada? Find the country's trade volume (exports or imports) under free trade. **(5 points)**

ii. Show graphically, and **calculate**, the changes in consumer and producer surplus due to the movement to free trade. **(7 points)**

iii. Assume Canada produces only two goods, toys and wheat. How does the movement to free trade affect Canada's wheat output? By **how much** does wheat output change (a numerical answer is required)? **(5 points)**

(c) Suppose the government of Canada wants to help its toy producers. To do so it is considering giving them a subsidy of **5 (per toy)** for each toy produced in Canada. Canadian consumers would be free to buy either Canadian or imported toys with no tax on either product.

i. Show (graphically or numerically) how this production subsidy affects Canadian toy production, toy consumption and imports or exports of toys. Within Canada who gains and who loses from this policy (you do **not** need to calculate these effects)? **(5 points)**

ii. Instead of a production subsidy, what trade policy would have the same effect on Canadian producers? How would the effects of this policy differ from the production subsidy and which policy do you think is better? Explain. **(4 points)**

2. Consider a Ricardian model, where each country's **labor productivities** are given in the following Table:

Output per unit (hour) labor input

	Clothing	DVD Players	Food	Glass	TVs
United States	6	9	18	6	12
Mexico	4	2	6	3	3

a) Find the autarky relative price of each good (**in terms of food**) in each country. Also, find the wage in each country. In which country is the real wage higher? Explain. (**6 points)**

(question 2, continued)

b) Suppose initially a limited trade agreement is signed between Mexico and the United States that **permits trade** only in food and glass (under the agreement, trade in the other goods is banned). What will the pattern of trade be and what is the range of post-trade relative prices (of glass to food) that can prevail? How does this trade affect the real wage (in terms of each good) in each country? Be as specific as possible. **(8 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 are you sure the US will export? Which good will Mexico definitely export? Explain carefully. **(5 points)**

d) Let *W* denote the wage in the US, and *W** the wage in Mexico. Show how U.S. exports vary with the ratio (*W/W*)* (that is, use a *graph* to show which products the US will export at each (*W/W*)*). **(6 points)**

e) Finally, assume that over time Mexican labor productivity increases by the same proportion in all sectors (while US productivity is unchanged). Discuss how this productivity increase will affect the pattern of trade (which goods Mexico exports and imports), relative prices (in terms of food), and the real wage in each country. In answering, for simplicity assume that initially Mexico exported only 1 good (and imported the other 4). **(8 points)**

3. Consider the factor-specific model with two goods (food, F, and clothing, C). Let *land* (*T*) be the specific factor in the food sector, and let *capital* (*K*) be the specific factor in the *clothing* sector, whereas labor is used in both sectors and is mobile between the two sectors. Thus, 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) Let output prices be $\left(P_c, P_f\right)$. Using the firms' profit-maximization conditions and the labor market equilibrium condition, show how the supply curve for each good is derived and indicate the variables that enter each supply curve. **Finally, explain how the production possibility frontier could be recovered (derived) from the supply curves**. **(8 points)**

b) *Given* output prices $\left(P_c, P_f\right)$, show how an increase in capital (*K*) affects output levels (shift the supply curves) and the real return to each factor. Be as specific as possible. **(6 points)**

c) Suppose there are two countries (the US, Mexico) and assume: $K^{us} = 3 \cdot K^{mex}$, $L^{us} = 2 \cdot L^{mex}$, and $T^{us} = 2 \cdot T^{mex}$ (i.e., the US has twice as much land and labor as Mexico, but 3 times as much capital as Mexico). Assuming technology and tastes are identical (and that relative demands are independent of income), compare autarky goods and factor prices in Mexico to those in the US. **(6 points)**

(question 3, continued)

d) Assuming free trade is allowed, use the result of part (c) to predict which good the US will export and which it will import. How will this trade affect the real returns to labor, land and capital in each country? Will free trade equalize factor prices between the two countries? Explain your answer. **(7 points)**

e) Suppose Mexico, to help producers of its import good, subsidizes domestic production of that good. Explain how that policy will affect the equilibrium (world) relative prices of goods. How does this policy affect overall **US welfare?** How does it affect overall **Mexican welfare? Could Mexico gain from this policy? Explain.** **(6 points)**

4. Consider the basic Heckscher-Ohlin model with two goods (*textiles (T) and computers (C)*) and two factors (inputs) of production (capital *(K)* and labor *(L)*). Each good is produced, using both inputs, under constant returns to scale; in the production of each good, capital can be substituted for labor (so that the input coefficients are NOT fixed). Assume that good *C* is the capital-intensive good. Further, assume there are two countries (the US and Mexico) that have identical technology and tastes, but that the US is endowed with more capital per worker than is Mexico.

a) Explain how the production possibility frontier is derived. Does full employment of resources (capital and labor) guarantee production is on the production possibility frontier? If not, what additional condition is needed? Explain your answer. **(5 points)**

i. Assume that, at the current input allocation, the MPL (marginal product of labor) in sector *T* is 4 and the MPK (marginal product of capital) in sector *T* is 2, while the MPL in sector *C* is 6 and the MPK in sector *C* is 4. How should you reallocate resources between the two sectors to increase output of **both** goods? Be specific. **(4 points)**

b) **Given output prices**, show how an increase in the amount of capital will alter the output levels (shift supply curves) and the factor prices in each country. **(6 points)**

c) Use the result from part (b) to compare *autarky* **output prices and factor prices (the wage rate and the return on capital)** between the US and Mexico. Since the US and Mexico are assumed to have the same technology, does this imply that *equilibrium* labor productivity will be the same in the two countries (in this *autarky* equilibrium)? Explain. **(6 points)**

d) Suppose trade is allowed between the two countries. What will the pattern of trade be, and how will this trade affect output and factor prices in each country? Who gains and who loses from trade in each country? Does trade reduce, or eliminate, the gap in factor prices between countries? Explain. **(6 points)**

e) Suppose trade between the two countries is **banned**, but labor may move between the countries. In what direction would labor flow (if at all), and how would this labor flow affect factor prices, output prices and production in each country? How would this equilibrium compare to the free trade equilibrium of part (d)? **(6 points)**

5. 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 all parts.

a) "Compared to the autarky (no trade) situation, free trade always benefits a country." Answer true or false and **justify your answer.** **(6 points)**

b) "Free trade is not only good for a country, but it benefits everybody within that country". Answer true or false and **justify your answer.** **(6 points)**

c) **"**Due to international trade, economic events in one country affect all countries that trade with that country. Thus, economic growth in Japan – a major trading partner of the United States, must benefit the U.S.". Answer true or false and **justify your answer.** **(7 points)**

d) "Since the U.S. has superior technology to Mexico, the Heckscher-Ohlin model predicts that, under free trade, the returns to both labor and capital will be higher in the U.S. than in Mexico". Answer true or false and **justify your answer.** **(7 points)**

e) "In the Ricardian model, because countries have different efficiencies, it is possible to increase world output of both goods by having each country produce more of the good in which it has a comparative advantage. However, in a model where countries have the same technology (such as the Heckscher-Ohlin model), then as long as each country produces on its own production possibility frontier, it is not possible to increase world output of both goods by changing production patterns in each country." Answer true or false and **justify your answer.** **(7 points)**