

ECON 3224 International Economics

Problem Set 1, Part 2- 11th February 2009

Instructions: You need to solve the PS and turn it in by the **17th Feb (Tuesday)**. You can hand it in during class or put it in my mailbox (ECON office, Professional Building) **before 1pm**.

Questions 1-3 are interconnected and use the following information. Define K^P and L^P as the capital and labor endowments in the Philippines and K^U and L^U as the capital and labor endowments in the US. The following table gives us numbers for these.

Country	Capital Endowment (Billion 1996 \$)	Labor Endowment (1,000 persons)	Capital / Labor (Billion 1996 \$ per 1,000 persons)
Philippines	6,597	12,470	0.53
United States	785,933	76,595	10.26

QUESTION 1 We would know if the USA was is labor abundant if:

- a) $(K^U / L^U) > (L^U / K^U)$.
- b) $(K^U / L^U) < (L^U / K^U)$.
- c) $(K^U / L^U) > (K^P / L^P)$.
- d) $(K^U / L^U) < (K^P / L^P)$.
- e) $(K^U / L^U) < (L^P / K^P)$.

QUESTION 2 Assume that aircraft production is capital intensive and that apparel production is labor intensive. In the context of the Heckscher-Ohlin model, which country has a comparative advantage in which good?

- a) The Philippines has a comparative advantage in aircraft and the US in apparel.
- b) The Philippines has a comparative advantage in apparel and the US in aircraft.
- c) The US has a comparative advantage in both goods and the Philippines in aircraft.
- d) Both the US and the Philippines have a comparative advantage in apparel.
- e) (blank option – don't choose)

QUESTION 3 In the shift from autarky to free trade, incomes in both countries will change in the following ways.

- a) Workers in the Philippines will lose and capitalists in the US will gain.
- b) Workers in the Philippines will lose and capitalists in the US will lose.
- c) Workers in the Philippines will gain and capitalists in the US will lose.
- d) Workers and capitalists in the US will lose because of the cheap labor in the Philippines, while workers in the Philippines will gain.
- e) Workers in the Philippines will gain and capitalists in the US will gain.

QUESTION 4 You are an advisor to Gandalf of Middle Earth, which is now in autarky. Middle Earth uses Metal (owned by Men) and Magic (owned by Elves) to produce Wands and Rings. Production of Wands is Metal-intensive, and Middle Earth is relatively abundant in Magic when compared with the Outer Worlds. As advisor to Gandalf, you would recommend:

- a) Opening up to trade, though Men will lose.
- b) Opening up to trade, though Elves will lose.
- c) Opening up to trade, because nobody will lose.
- d) Not opening up to trade, because both Men and Elves will lose.
- e) What's the point of opening to trade when Sauron is going to get you eventually?

QUESTION 5 In the neo-classical model, when international trade is in equilibrium.....

- a) The world relative price of each good will be the same as the autarky relative price.
- b) Each country will use the same amount of labor and capital in production.
- c) Each country will necessarily specialize completely in the production of only one good.
- d) Each country will be able to consume a combination of goods that is beyond its production possibilities frontier
- e) Don't know, don't care.

Problem 1. In this question we will try to relate the Heckscher-Ohlin model and the Ricardian model of international trade and learn something new as well. In the Ricardian model, a_{LX} = number of units of L needed to produce 1 unit of X. (Each part is worth 1 point)

In the HO model, **in equilibrium a firm chooses L^*_X units of labor and K^*_X units of capital to produce X^* units of the good.**

Hence, X^* units are produced using L^*_X units of labor,

and so 1 unit of X will be produced using L^*_X / X^* **units of labor = a_{LX} !!!!**

Similarly for capital we define **a_{KX} = number of units of K needed to produce 1 unit of X = K^*_X / X^***

Now consider the **total cost function** for a producer of X: $TC_X = w \cdot L_X + r \cdot K_X$

Under perfect competition we know that: **$P_X = \text{Marginal Cost of X} = \text{Cost of producing 1 unit of X.}$**

How do we get total cost? Well, TC_X is the cost of producing X^* units of the good. So the cost of producing 1 unit of the good is (TC_X / X^*) .

That is, **$P_X = MC_X = TC_X / X = w \cdot (L_X / X) + r \cdot (K_X / X)$**

But we know that **$(L_X / X) = a_{LX}$ and $(K_X / X) = a_{KX}$**

Hence, the equilibrium condition in the market for goods (price = marginal cost) can be written as

$$P_X = MC_X = w \cdot (L_X / X) + r \cdot (K_X / X) = w \cdot a_{LX} + r \cdot a_{KX} \quad (1)$$

and

$$P_Y = MC_Y = w \cdot (L_Y / Y) + r \cdot (K_Y / Y) = w \cdot a_{LY} + r \cdot a_{KY} \quad (2)$$

Suppose that $a_{LX} = 60$, $a_{KX} = 30$, $a_{LY} = 90$ and $a_{KY} = 30$.

- a) In equations (1) and (2) above, which assumption allows us use the same wage rate (w) and rental rate (r) in both industries (X and Y)?
- b) Suppose that the market prices are $P_X = \$420$ & $P_Y = \$600$. What are the equilibrium values for wages and rentals?
- c) Suppose P_Y rises to \$610 (no change in anything else). What are the new equilibrium values of w and r?
- d) Suppose that initially, this country was in autarky with $P_Y = \$600$. Then, P_Y went up to \$610. That is, country A began exporting Y and hence, its price went up. Is country A capital-abundant or labor-abundant, relative to the world?

- e) Suppose that each worker and each machine works 1000 hours a month. So if the per hour wage that you have calculated is say, \$3 then the worker has total income of \$3000 per month. Similarly for capital. After the rise in the price of Y (part c), what are the real incomes of workers in terms of Y and X? That is, what are the physical units of X and Y that workers can buy once P_Y and their on wages have changed?
- f) After the rise in the price of Y (part c), what are the real incomes of capitalists in terms of Y and X? That is, what are the physical units of X and Y that capitalists can buy once P_Y and their on wages have changed? Remember to multiply the hourly rental rates that you have calculated by the number of hours worked by machines per month (1000).
- g) Which theorem of international trade can answer both parts (f) and (g) without even knowing the numbers?

Problem 2. Short answers (1 points each)

- a. In 3 sentences explain why iso-quants are downward sloping and convex to the origin?
- b. Suppose industry X has the production function $X=0.5K^2L$. Draw the iso-quants for $x=20$ and $x=40$ (show at least 2 points on each curve). Will the iso-quants intersect each other?
- c. Assume $w=\$1$, $r=\$2$ and the firm has \$100 to spend in production costs. Draw the iso-cost line associated with these figures. Be careful in labeling the axes as well as the intercepts.
- d. Using the iso-cost line from part (b), explain in 2 sentences how the firm will choose capital, labor and output to maximize profits.
- e. Now suppose that wages rise to $w=\$2$ ($r=\$2$, total cost=\$100). What happens to output, labor usage, capital usage and the optimal capital-labor ratio in the new profit-maximizing equilibrium?

Problem 3. Consider the country Ubetcha. Ubetcha produces two goods- autos and hats – using capital and labor. Autos are relatively capital intensive relative to hats. The country has long enjoyed its isolation from the world but is now considering free trade. Ubetcha economists notice that the relative price of autos is lower in the world markets than it is in Ubetcha. All Heckscher-Ohlin assumptions hold. (1 point each)

- a. Is there a basis for trade between Ubetcha and the world?
- b. From the information above, can you infer if Ubetcha is relatively capital-abundant or labor-abundant, relative to the world? If so, which one?
- c. What is the pattern of trade going to be if Ubetcha opens up to trade?
- d. Suppose Ubetcha engages in free trade with the world. What happens to the ratio of K/L used by Ubetcha's producers in the production of autos?
- e. Suppose Ubetcha engages in free trade with the world. How will the marginal product of capital change in the hat industry?
- f. Suppose the union of capitalists in Ubetcha (which represents the interests of capital owners in the country) hears about the free trade proposal. Would this organization support the proposal or oppose it?

Problem 4. Chapter 4, Problem 6

Problem 5. Chapter 4, Problem 1