

Second Problem Set
Economics 433: Advanced International Trade

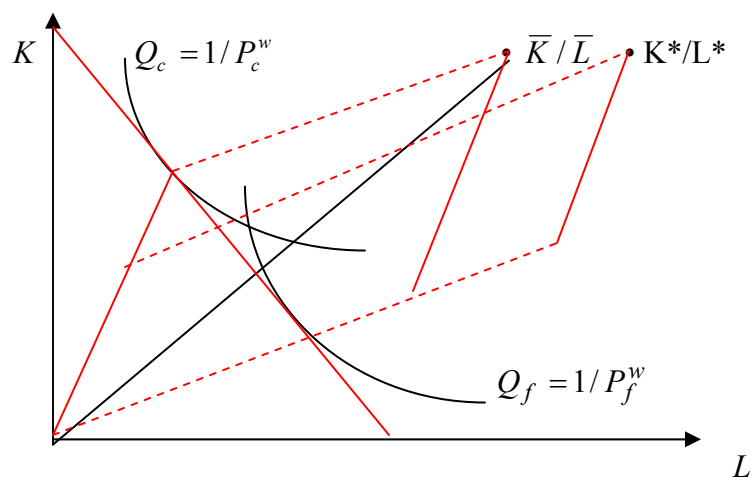
Due October 24, 2006
Prof. Tybout

Please print this problem set out and work directly on it. Show your calculations. If necessary, you may attach extra sheets. All work on this problem set must be done on an individual basis.

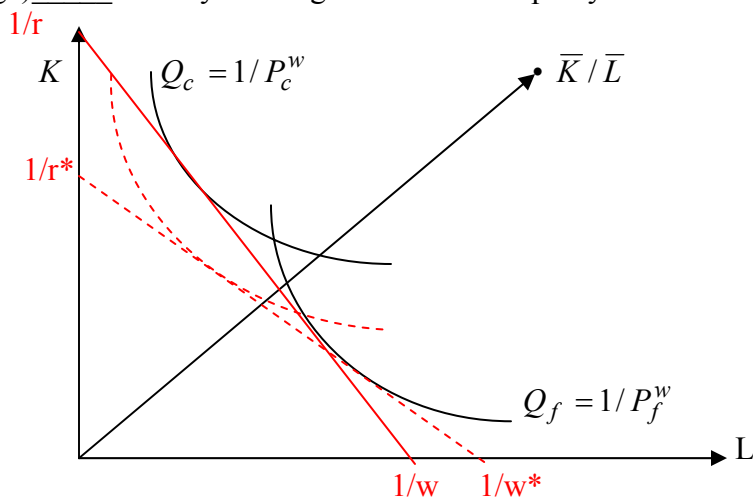
Name _____ **Answer Key** _____

Student ID _____

1. The Lerner diagram below characterizes a *small* open economy that produces capital-intensive cloth (C) and labor-intensive food (F). This economy faces world prices for cloth and food given by P_c^w and P_f^w , and it is endowed with \bar{K} units of capital and \bar{L} units of labor:

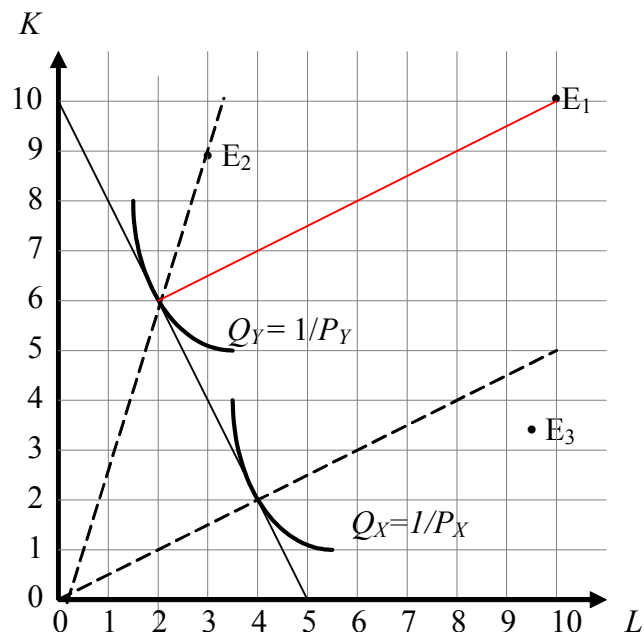


- a. If the labor force increases, what happens to the wage rate (increases, decreases, **doesn't change**) ____ To the return on capital? (increases, decreases, **doesn't change**) ____ To domestic food production? (**increases**, decreases, doesn't change) ____ Modify the diagram above to depict your answer.



- b. If the world price of cloth rises while the price of food remains unchanged, what happens to the ratio of wages to rental costs for capital? (increases, **decreases**, doesn't change) ____ What happens to the capital-intensity of food production? (increases, **decreases**, doesn't change) ____ . Modify the diagram above to depict your answer.

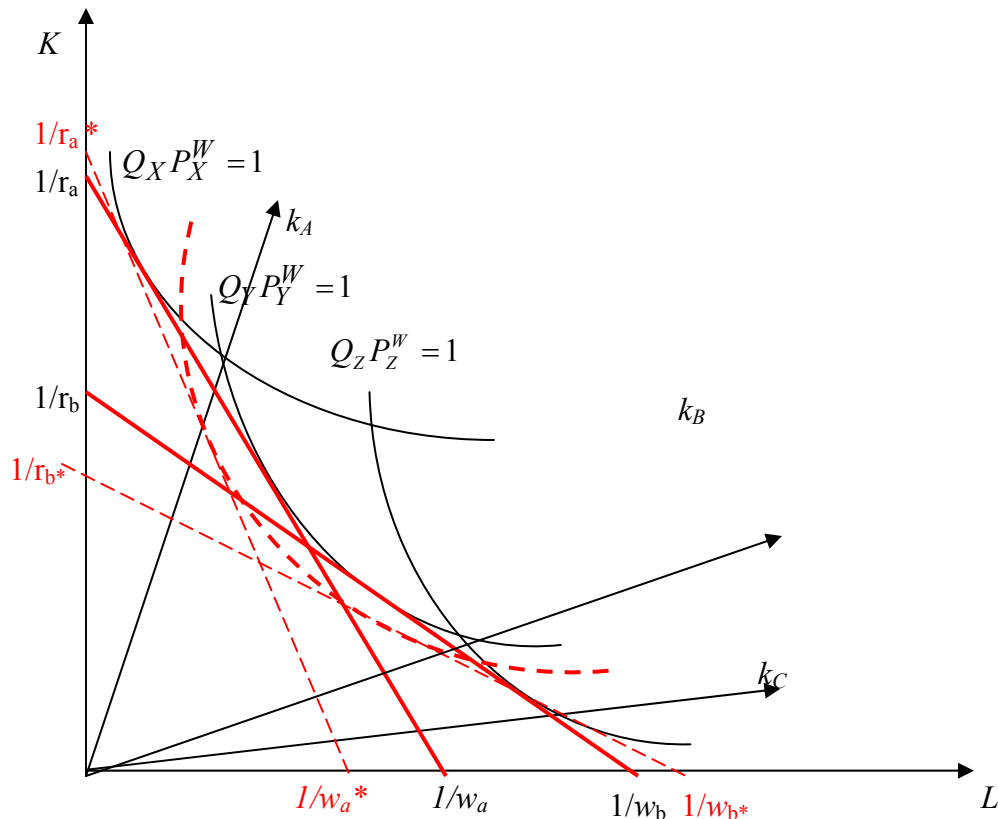
2. Consider the Lerner diagram below, which depicts unit revenue isoquants for two traded goods—shirts (X) and steel (Y). Each good is produced with capital (K) and labor (L) using a constant returns production technology, but shirts are less capital-intensive than steel. The line that is tangent to these unit revenue isoquants is a unit isocost line: it represents all bundles of capital and labor that can be purchased for \$1 at the prevailing factor prices.



- a. If both goods are being produced, what are the prices of capital and labor?
 $r = \underline{1/10}$, $w = \underline{1/5}$
- b. Continue to assume that both goods are produced, and suppose the price of a shirt is $P_X = \$0.25$ and the price of a unit of steel is $P_Y = \$0.50$. If the steel sector were to employ 3 units of capital and 1 unit of labor, how many units of steel would it produce? $Q_Y = \underline{1}$ If the shirt sector were to employ 4 units of capital and 8 units of labor, how many shirts would it produce? $Q_X = \underline{8}$.
- c. Suppose the economy's overall endowment of capital and labor is at the point E_1 . What total amount of each good will the economy produce? $Q_X = \underline{8}$, $Q_Y = \underline{2}$. Briefly explain why the economy will produce this particular combination.
 This production bundle represents the equilibrium production point because factor markets clear and producers are maximizing profits at the associated factor intensities (k_x and k_y).
- d. If the economy's endowment point had been E_2 , what would your answer to part c have been? $Q_X = \underline{0}$, $Q_Y = \underline{3}$. If it had been point E_3 , which good or goods would be produced? (shirts, steel, both) . If the endowment were to move from E_1 to E_3 , then w/r would (rise, fall, remain the same) . Briefly explain why.

The economy must specialize in X. Therefore, wages must decrease for factor markets to clear.

3. The graph below shows unit value isoquants for three goods, X , Y and Z , based on prices that are assumed to prevail throughout a world of many countries with free trade. Also shown are rays representing the capital intensities of three countries, A , B , and C . Answer the following questions:



- a. In equilibrium, will all three countries produce all three goods? Explain. For any country that you predict will *not* produce all three goods, identify the goods it will produce.

None of the countries will produce all three goods. A will produce goods X and Y , B will produce goods Y and Z , and C will produce good Z .

- b. In which country or countries will the wage rental ratio, w/r , be highest? Why?

The wage rental ratio will be highest in Country A, because it produces goods X and Y which are the most capital-intensive and lie on the steepest unit isocost line.

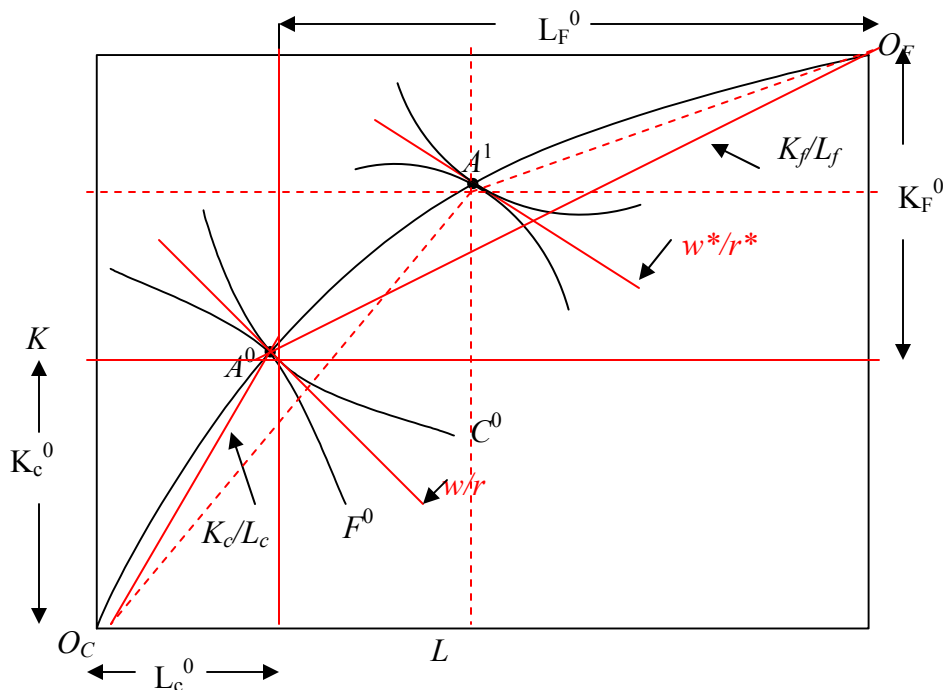
- c. Suppose a new technology is developed for the production of good Y . It allows all three countries to produce the same amount of output with less of each input. How will this affect the wage rental ratio, w/r , in each country? How will it affect the capital intensity of production, good by good, in each country? (For this question you may assume that the global price of good Y remains constant, perhaps because the technology has not diffused to other countries.)

Country A: w/r increases – X and Y become more capital intensive

Country B: w/r decreases - Y and Z become more labor intensive

Country C: no change, unless the technological advance is sufficiently large that it induces country C to start producing good Y . If this occurs, w/r will decrease and production will become more labor intensive, just as in country B . (As drawn above, country C continues to specialize in the production of Z .)

4. The Edgeworth Box below shows the efficiency locus of a country as well as a particular allocation, A^0 , along that contract curve at which the country would produce, given certain



prices, p_C^0 and p_F^0 , for clothing and food. Its outputs at A^0 are C^0 and F^0 .

- Identify the wage-rental ratio, w^0/r^0 , on the graph in this initial equilibrium. Are you able to determine the factor prices, w^0 and r^0 , individually from this diagram?
No, because factor prices are determined by output prices which are determined by the PPF.
- Identify in the figure the allocations of labor and capital to each of the industries, K_C^0 , L_C^0 , K_F^0 , and L_F^0 , as well as their ratios, $k_C^0 = K_C^0 / L_C^0$ and $k_F^0 = K_F^0 / L_F^0$. (see graph above)
- Now consider a different allocation on the efficiency locus, A^1 . In order for the country to produce there, how would relative prices have to differ from p_C^0 / p_F^0 ?

P_c / P_f must have increased if producers are producing more cloth

- How do the factor allocations you looked at in part (b), and their ratios, differ at A^1 from what they were at A^0 ?

More capital and labor are put into good C, and the capital intensity of production is lower for in each good

- Draw isoquants for both industries through point A^1 . Now identify the wage-rental ratio, w^1/r^1 , as you did in part (a). How does it compare to w^0/r^0 ?

$w^*/r^* < w/r$ or the slope is less steep at A^1 than at A .