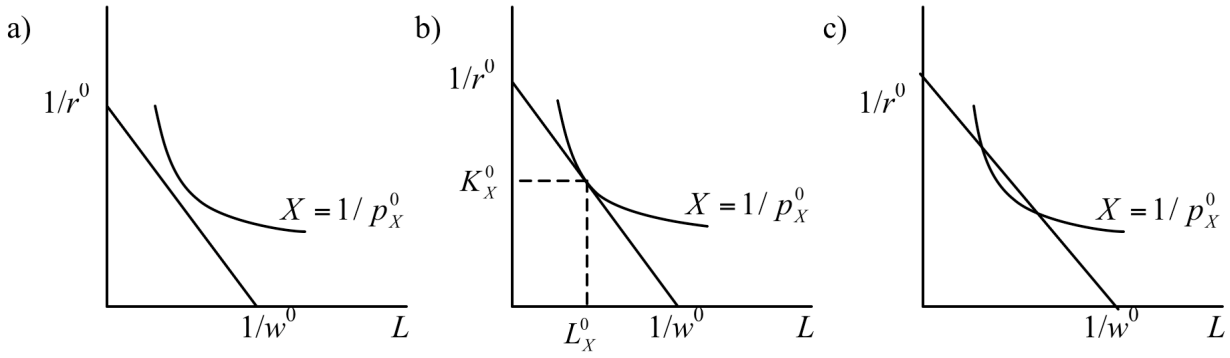
Problem Set 3

Heckscher-Ohlin and Two-Cone Model

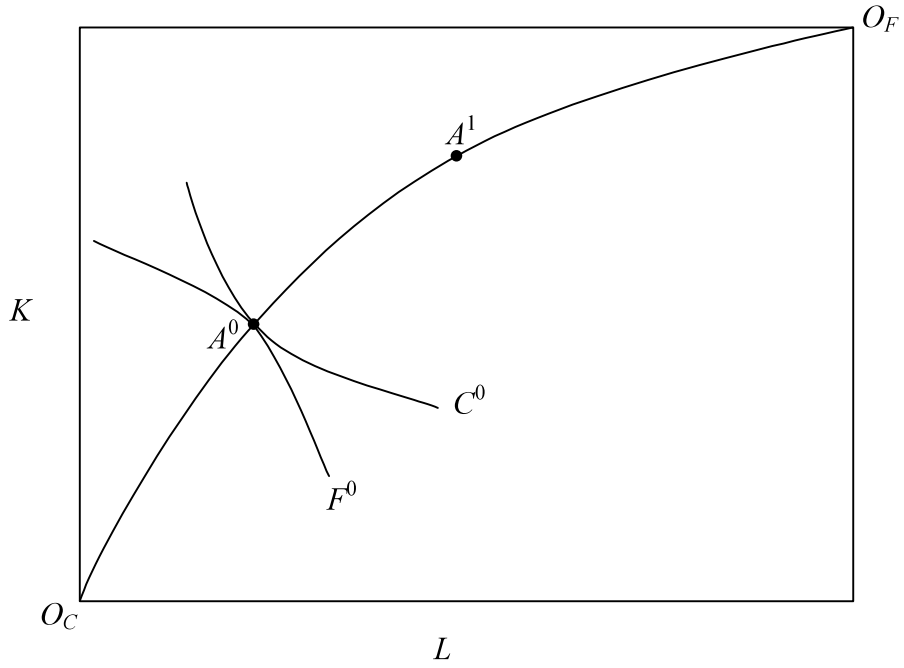
1. Which of the following characterize the Heckscher-Ohlin Model?
   a. Perfect mobility of factors across industries
   b. Perfect mobility of factors across countries
   c. Constant returns to scale
   d. The law of diminishing returns
   e. Identical technologies across industries
   f. Identical technologies across countries
   g. Monopolistic competition
   h. Perfect competition
   i. Full employment
   j. Balanced trade
   k. Factor intensity reversals
   l. Identical homothetic preferences

2. Suppose that the price of a good, X, is p_X^0 and that potential producers of that good in a country face factor prices w^0 and r^0. The three figures below show three ways that these prices might appear in an isoquant-isocost diagram. What can you say, in each case, about what will happen in the X industry in this country? That is, will the good be produced, can these prices constitute an equilibrium, and if so, what technique of production will be used to produce X?



3. The Edgeworth Box below shows the contract curve 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. Its outputs at A^0 are C^0 and F^0.

a. What is the wage-rental ratio, w^0/r^0, in this initial equilibrium? Are you able to determine the factor prices, w^0 and r^0, individually?



b. 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 $k_F^0 = K_F^0 / L_F^0$.

c. Now consider the different allocation, also along the contract curve, shown as A^1. In order for the country to produce there, how would prices have to differ from p_C^0 and p_F^0?

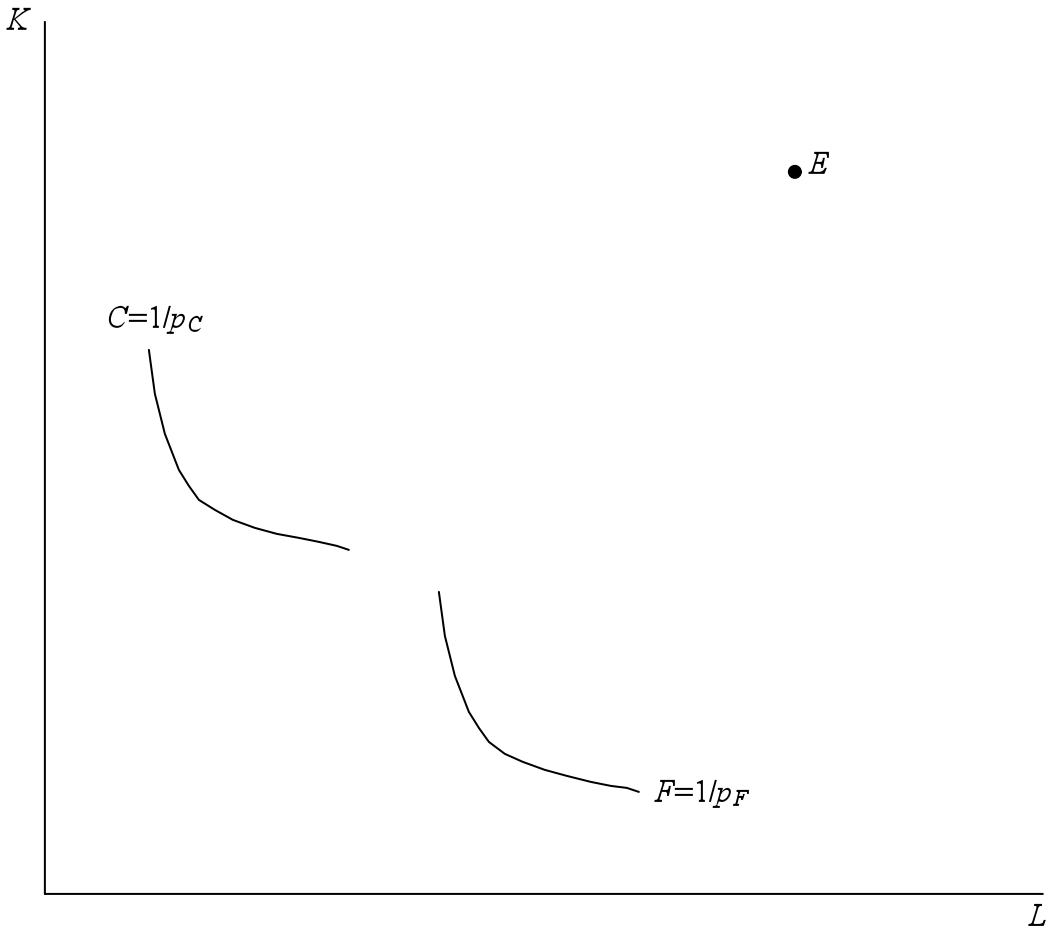
d. How do the factor allocations you looked at in part (b), and their ratios, differ at A^1 from what they were at A^0?

e. Using the full employment conditions for the two factors, show that the capital-labor ratio of the country as a whole, $k=K/L$, is a weighted average of the ratios in the two sectors, k_C and k_F.

f. In part (d), you should have found that both ratios, k_C and k_F, fell in going from A^0 to A^1. Does this mean, in view of the result in part (e), that k has fallen also? Why or why not?

g. 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?

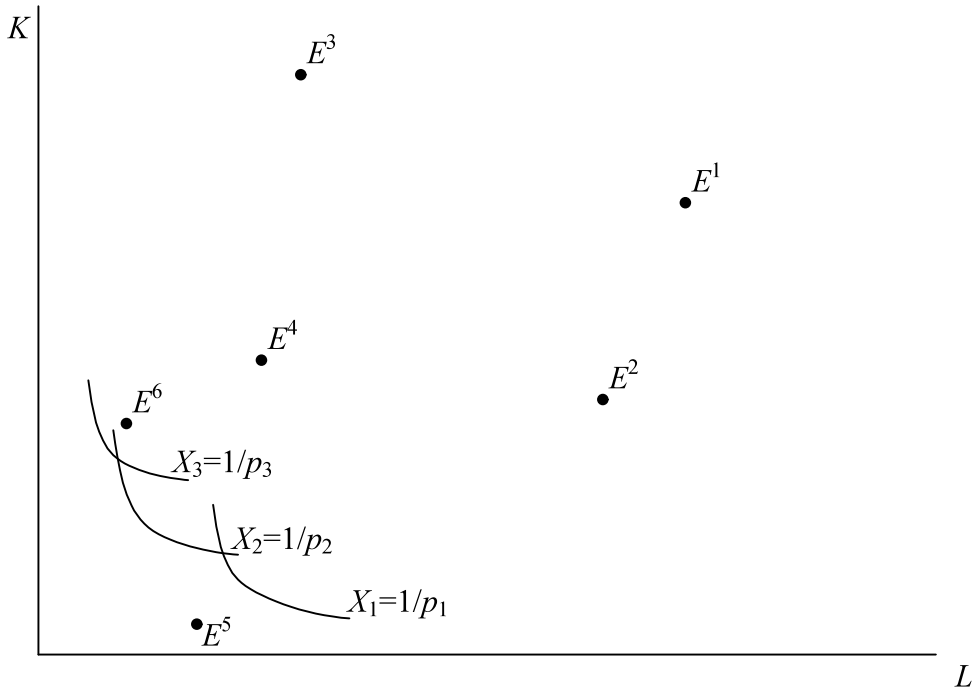
4. Starting from the unit-value isoquants shown below and using the factor endowments at point *E*, carefully construct the rest of the pieces of the Lerner diagram for this economy. Suppose that this country spends half of its income on Cloth, *C*, and half on Food, *F*. What does it export and what does it import?



5. Use the HO Model with capital-intensive cloth and labor-intensive food to answer, for a small-open economy that is (and remains) diversified:

   a. If the labor force increases, what happens to the wage of labor and to labor's share of national income?
   b. If the world price of cloth falls, what happens to the real rental on capital and to the output of food?
   c. Suppose that technology improves in this country only, permitting it to produce more cloth with the same amounts of factors. What happens to its output of cloth and its real wage of labor?

6. The graph below shows unit value isoquants for three goods, X_1, X_2 , and X_3, based on prices that are assumed to prevail throughout a world of many countries with free trade. Also shown are points representing the factor endowments of several countries, E^1, E^2, etc. Complete the two-cone Lerner diagram to identify the factor prices, factor ratios, and vectors of factors that will be employed in each sector by each country, and use these to answer the following questions:



a. In which country or countries will the wage in units of good X_1, be highest, and in which will it be lowest? Would the answer be any different for the wage in units of goods X_2 or X_3?

b. Which country will produce the largest quantity of each good?

c. Which country will produce the largest *ratio* of good X_3 to good X_2?

d. Suppose that consumer preferences in the world were to shift towards good 2 so as to cause a small increase in the price of good 2, the relative price of goods 1 and 3 remaining constant. Which country or countries would increase their output of good 2?

7. Suppose that population grows in an open economy, in a world characterized by a two-cone equilibrium, and that the country is too small to affect world prices, even after this population growth. If the country's capital stock fails to grow as rapidly as its labor force, what will happen to the real wage of labor, and how will this depend on its pattern of specialization? Would your answer be any different if the country were able, instead, to expand its capital stock in proportion to its population?

8. Suppose the world consists of just two countries and three goods, initially in a two-cone equilibrium with country 1 producing the most labor intensive good, X_1, country 2 producing the most capital-intensive good, X_3, and both producing the good of intermediate capital intensity, X_2. Suppose now that a small part of the labor force in country 1 moves to country 2.

   a. At initial prices, what happens to the real wage of the labor that moves? Does it rise, fall, remain unchanged, or is the effect ambiguous?

   b. Also at initial prices, how, if at all, will this movement of labor affect the world's outputs of goods 1, 2, and 3?

   c. Based on your answer to part (b), how would you expect world prices to change as a result, and how would this in turn affect real wages in the two countries? (Without details about preferences, you can't be sure of the answers to this, but you should be able to give answers that are plausible.)