

Problem Set 2 Solutions: Heckscher-Ohlin Model

1. Consider the table below

Factor Endowments	Countries	
	C	D
Labor Force (in millions of workers)	12	30
Capital Stock (in thousands of machines)	48	60

Table 1:

Answers: Calculate the $\frac{K}{L}$ ratio for each country. This yields 4 for C and 2 for D.

- (a) Which country is relatively capital abundant? – **C**
- (b) Which country is relatively labor abundant? – **D**
- (c) Suppose that good S is capital intensive relative to good T. Which country will have a comparative advantage in the production of good S? Explain.

According to HO, a country has a comparative advantage in the product which is relatively intensive in the factor which the country is abundant in. Hence, since good S is capital intensive, country C which is capital abundant will have a comparative advantage in good S.

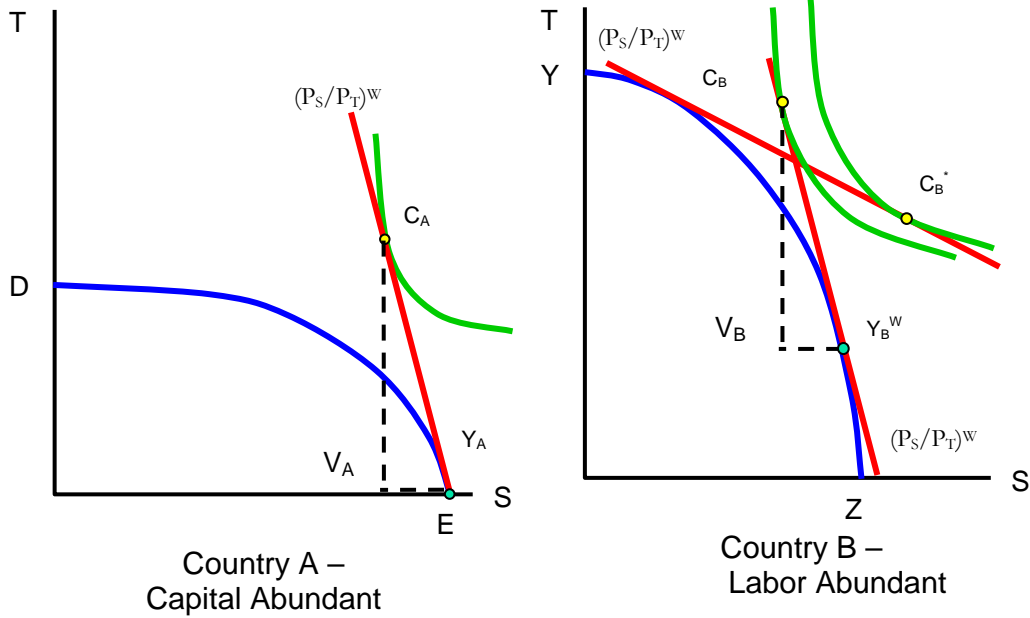
2. Use a general equilibrium (GE) depiction of trade equilibrium in the Heckscher-Ohlin (HO) model to prove that complete specialization in the production of exports, will in general lower the standard of living of an economy relative to incomplete specialization.

Answer:

Suppose that country A is capital abundant and country B is labor abundant. Moreover, suppose that good S is capital intensive whilst good T is labor intensive. One way to prove the proposition above could be as follows. In the diagrams below, suppose that country A specializes in the production of good S. Given the terms of trade (TOT), it would end up consuming at C_A , which is the highest indifference curve that can be achieved.

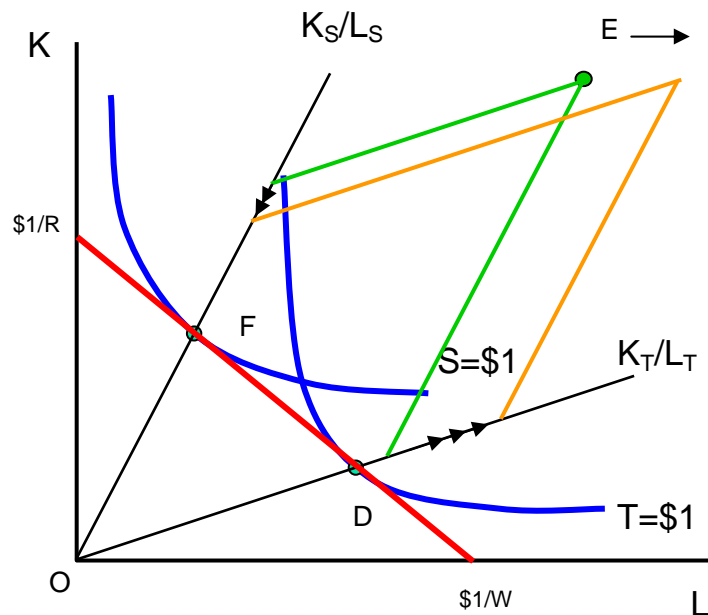
However, now consider country B which is labor abundant. Given the terms of trade determined through trade between these two countries, residents in country B would end up consuming at C_B , whereas with incomplete specialization in country A, they could have consumed at C_B^ , and reached*

a higher indifference curve. So, although trade has led to improved consumption possibilities, they are not as well off as they could have been if country A had not specialized incompletely.



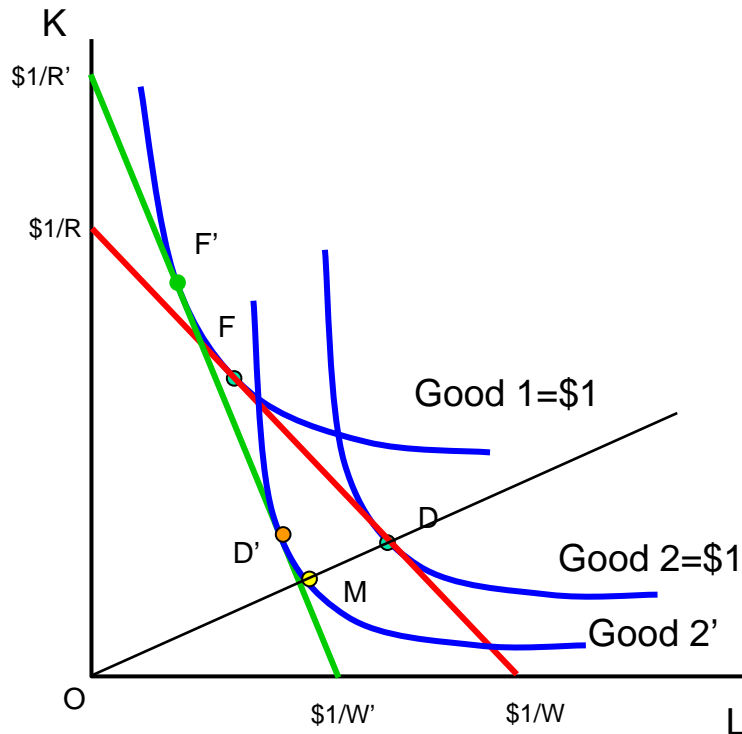
- Consider the economic environment of the HO model from the lectures. Use a Lerner diagram to show the effects of an increase in the endowment of labor for a country.

Answers: This is what the Rybczynski Theorem tells us about. It will lead to an increase in the production of the good which is intensive in that factor, and a decline in the production of the other good.



4. Using the HO framework with two goods (good 1 and good 2), use a Lerner diagram to show the effects of an increase in the price of good 2 on factor prices and on output.

Answer: *WLOG, assume that good 1 is good S in our lecture notes, and that good 2 is good T from the lecture notes. Then the effects of an increase in the price of good 2 can be shown via the Stolpher-Samuelson Theorem. An increase in the price of good 2 will increase the return to that factor in which that good is intensive in (wages in this case) and a decline in the return of the other factor (rental rates in this example).*



5. What goes wrong in the Lerner diagram if we have:

- (a) more goods than factors?

Answer: *When we have more goods than factors, we run into a dimensionality problem. The problem lies in that we are no longer able to draw an isocost line that is tangential to any three production isoquants for the different goods (- try it yourself to see!). It is only in the very special case that they three isoquants happen to line up that you can draw an isocost line tangential to all, but not in the general case for any three production sets.*

- (b) more factors than goods?

Answer: *As above, we run into a dimensionality issue. Now however, we need to utilize three (or more) dimensions, and find a tangent hyperplane that touches all production sets. With three factors, it is possible to draw this, but with four or more, you cannot.*

6. Describe a situation in the Heckscher-Ohlin model by which a country would end up fully specializing in a product. What would have to happen for this to be an optimal outcome (in terms of gains from trade) for the country?

Answer: *The answer here is related to what you did in question 2. There are a number of reasons that a country may optimally specialize in the HO model. Here are some of them:*

- (i) The special case that the trade triangles are such that full specialization is optimal*
- (ii) The terms of trade rise so much for a country that specialization is optimal*
- (iii) Production of both goods was similar in their use of factor inputs. Note, if this was the case, then the more similar the techniques used in producing the two goods, the less additional output of one good is lost as factors are increasingly attracted towards the other industry. In other words, as goods become similar in production, the less bowed out are the PPFs, and the PPFs begin to look more like the straight-line, constant opportunity cost PPFs found in the classical model – where complete specialization always tends to occur.*