

14.54 International Economics
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Problem Set 2
(Due 10/3)

1. Comparative Advantage

Two countries, Home and Foreign, use one factor, labor, to produce two goods, Shoes and Computers. The Home country can produce Shoes with one unit of labor and Computers with two units of labor. The Foreign country can produce Shoes with 3 units of labor and Computers with 4 units of labor. Home country is endowed with a labor force of 200 units, while Foreign country is endowed with a labor force of 100 units. Preferences are the same in the two countries and are described by the following utility function:

$$U(S, C) = \ln S + \ln C$$

1. Which country has an absolute advantage in producing Shoes? Which country has an absolute advantage in producing Computers?
2. Which country has a comparative advantage in producing Shoes? Explain in words why this is the relevant information to determine the pattern of production in an economy where the two countries are allowed to trade.
3. What is the pattern of production and consumption in the Home country when in autarky?
4. What is the pattern of production and consumption in the Foreign country when in autarky?
5. Draw for both countries a graph with the production possibility frontier and the graphical solution to the maximization problem.
6. Now imagine the two countries are allowed to trade. Draw the world relative supply curve. For which range of prices will both countries specialize? What happens if the price is not in this range?
7. Now draw the world relative demand curve and find the world equilibrium price. Do both countries specialize? What is the pattern of trade? Does your answer correspond to your explanation for question 2.?
8. Explain what is the source of gains from trade in this problem.

2. Specific factor model

In this economy two countries, Home and Foreign, produce two goods, Computers and Desks, using three factors of production, skilled labor (H), unskilled labor (L) and capital (K).

Skilled workers are self-employed. They rent capital at the rental rate r and produce computers according to the production function:

$$Q_C = H^{\frac{1}{2}} K_C^{\frac{1}{2}},$$

their income is given by the profits $R_C = P_C Q_C - r K_C$.

Unskilled workers are also self-employed. They rent capital and use it to produce desks according to the production function:

$$Q_D = L^{\frac{1}{2}} K_D^{\frac{1}{2}}$$

their income is given by the profits $R_D = P_D Q_D - r K_D$.

The Home country is endowed with the following factor amounts: $H = 9$, $K = 20$, $L = 4$. The Foreign country is endowed with the following factors: $H^* = 1$, $K^* = 20$, $L^* = 4$.

1. Preferences are identical in the two countries and are described by the following utility function:

$$U(C_C, C_D) = C_C^{\frac{1}{3}} C_D^{\frac{2}{3}}$$

Remember that in the economy all the factors are always fully employed. Assume for now that the two countries are in autarky.

1. Derive the production possibility frontier for both countries using the 4-quadrant graph seen in class.

2. Given prices of Computers and Desks, p_C and p_D , consider the Home country and find the autarky equilibrium return to capital r_K using the graph showing the Value Marginal Product of Capital ($p \times MPK$) for both goods. What is the allocation of Capital to the production of the two goods?

3. Now consider the Foreign country and, for given prices p_C^* and p_D^* find the return to capital r_K^* using the same method as in part 2. What is the allocation of Capital to the production of the two goods?

4. Take the Home country and consider an increase in the relative price $\frac{p_C}{p_D}$. What is the effect of this price change on the income of the skilled (R_S) and unskilled workers (R_U).

5. From parts 2 and 3 you are able to derive the relative supply of the two goods in both countries. Knowing preferences you can also derive the relative demand for each country. Using relative demand and relative supply find for each country the equilibrium autarky relative price: $(\frac{p_C}{p_D})_A$ and $(\frac{p_C}{p_D})_A^*$. You should use Desk as the numeraire good by setting its price to one.

6. Now imagine the two countries can trade. Derive the world relative supply curve and find the equilibrium world relative price. Now using your answer to part 4 show which factors gain and which lose from allowing free trade between the two countries.

3. From Autarky to Trade with Transfers (in Specific Factors Model)

1. Calculate the indirect utility (function of prices and income) for each agent and for the entire country in the home country under the autarky equilibrium considered above. You should still consider desks as the numeraire good, such that $p_D = 1$.

2. Now calculate the indirect utility (function of prices and income) for the Home country under the trade equilibrium considered above. To simplify the calculations, assume that the price of desks, the numeraire good, is $p_D = 2^{-1/6}$.

3. Calculate the total gains from trade in the Home country.

4. Assume that, in the home country, a social planner can enforce a transfer scheme such that all the gains from trade go to the unskilled worker. The planner can either impose only lump sum taxes or subsidies in order to implement such scheme. Find how much the skilled workers, the capital owners, and the unskilled workers would have to pay/receive in this world (Hint: remember that the sum of all taxes and subsidies must be zero).

5. Now assume that same social planner decides to divide the gains from trade equally among each type of individual in this country. Find how much the skilled workers, the capital owners, and the unskilled workers would have to pay/receive in this world.

4. Trade Policy Issues

Comment the following excerpts from articles in the New York Times and The Economist in light of the models we have seen in class so far.

Please, do not write more than 2 sentences.

1. "The rich worlds agricultural policies deserve to be put to the sword. America, for example, spends almost \$4 billion each year on cotton subsidies alone. This government largesse has turned America, an expensive cotton producer, into a leading cotton exporter. The subsidies are not just a burden on American taxpayers; they also helped to halve world cotton prices between 1997 and 2002, according to the Financial Times. One of the distinguishing features of being poor is being dependent on one or two exports. Burkina Faso and Mali count on cotton for about one-third of their

export earnings, and Chad about one-quarter. The collapse in cotton prices has hit their farmers particularly hard." [The Economist, September 12th, 2003]

2. "This American emphasis on exports has not only increased the size of the farms, but has also limited what is grown on them.[...]Now the commercial crops are down to four" and Gaylord Moeller complains "The subsidies let the big farms get bigger..." [New York Times, September 9th, 2003]