

**14.54 International Economics**  
**Instructor: Lorenzoni**

**Problem Set 1 (Due 9/20)**

**1. Pure Exchange Economy**

In this problem we will go through the model seen in class using an example with specific assumptions about tastes and endowments. Home and Foreign are endowed with different amounts of two goods, Apples and Bananas. The two countries are characterized by the following preferences. Home country's aggregate utility function is:

$$U = x_A^{\frac{1}{2}} x_B^{\frac{1}{2}}$$

while Foreign country's aggregate utility function is:

$$U^* = x_A^{*\frac{1}{3}} x_B^{*\frac{2}{3}}$$

The two countries' endowments are the following: Home has 100 Apples and 70 Bananas while Foreign has 50 Apples and 80 Bananas.

Let's start by looking at what happens if the two countries are in autarky and then we will analyze what happens if the two countries are allowed to trade.

As for all general equilibrium problems you have to think in terms of relative prices, therefore from now on we are interested only in the relative price of Apples relative to Bananas  $p = \frac{p_A}{p_B}$ , which is equivalent to assuming that we are taking Bananas as our numeraire,  $p_B = 1$ .

1. For the Home country draw a graph with the quantity of the two goods on the two axes and explain why at the consumption point the MRS must be equal to the autarky relative price. What is the meaning of autarky relative price since there is no exchange allowed with other countries? The autarky prices are in fact determined by two factors: what are these factors? Find the autarky price  $p$  in the Home country.
2. For the Foreign country do the same analysis and draw a graph showing what determines relative prices in autarky. Find the autarky price  $p^*$  in the Foreign country.
3. Now compare autarky prices in the two countries. In which country is the price of Apples higher relative to the price of Bananas? What factors determine the different autarky prices? In particular in this example why is  $p \gtrless p^*$ ?
4. Now imagine the two countries are allowed to trade. Similarly to what we saw in class, draw an Edgeworth box, where the indifference curves for the two countries are drawn in the same graph. Show where the endowment point is located. Show also the "lens" area that contains points which are preferred to the original endowment by both countries.
5. Derive the demand for both goods for both countries and find the equilibrium relative price at which the two countries exchange Apples for Bananas,  $p_T$ . What are  $MRS$  and  $MRS^*$  equal to in equilibrium?
6. Show the pattern of trade between the two countries. Which country exports Apples? Which country exports Bananas? Can you explain the pattern of trade by looking at the initial endowments and tastes?
7. Imagine the two countries are populated by Apple-owners and Banana-owners. Show that if no redistribution is allowed a group of owner in each country is damaged by free trade.

**2. 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.

### 3. True/False and Comment

Comment the following statements using the models and the concept we have seen in class so far.

1. Since in the US wages are higher than in China, China should produce all goods that require labor as an input.
2. Two countries produce a variety of products, among which Cars and Boats. Country A can produce Cars with 10 units of labor and Boats with 20 units of labor. Country B can produce Cars with 100 units of labor and Boats with 200 units of labor. Therefore there are no gains from trade between these two countries. (Hint: do you have enough information?)
3. In a two-country ricardian economy complete specialization depends only on the relative size of the two countries.