Problem set 2 – The Ricardian Model

Exercise 1

Consider a world with two countries, U and V, and two goods, A and F. It is known that the amount of work available in U is 150 and in V is 84. The unit labor requirements for the production of one the two goods in country c for sector i are as follows:

a_i^c	U	V
A	0.5	0.3
F	2	3

a) Draw the PPF's of both countries and determine the pattern of trade.

b) Suppose that there is a technological improvement in V, so that now it only requires a unit of work to produce a unit of F. Is there a change in the specialization pattern? Explain with the help of a graph.

c) Determine the effects of trade openness:

    i.   On the relative price of goods;

    ii.   On the patterns of production and consumption;

    iii.   On the real wages in each country.

d) Do the real wages in both countries converge with international trade? Why?

Exercise 2

Consider a small economy (Home), where each worker can produce 1 unit of good x or, alternatively, 4 units of good y. In the large country (Foreign), each worker produces 2 units of good x or, alternatively, 4 units of good y. It is known that in the Home country there are 100 workers.

a) Comment the following statement: '*Since workers in both countries have the same productivity regarding good y, there should be no trade with this good'*.

b) Is there any advantage in free trade between both countries? If yes, describe the pattern of trade and the gains from trade.

c) Comment the following statement: '*The volume of Home's exports is the double of Foreign's exports'*. [Hint: Notice the difference between 'volume' and 'value'.]

d) Determine how real wages evolve in Home when this country engages in free trade with Foreign. [Hint: Marginal productivity in a sector only exists if the country is producing that good.]

e) Determine the ratio of wages between both countries after free trade. Comment on the result.

Exercise 3

Consider two Ricardian economies, A and B, with similar sizes, with the following technical coefficients for the production of x and y:

a_i^c	A	B
x	a_x^A	a_x^B
y	a_y^A	a_y^B

a) Find conditions for the coefficients, such that:

    i.   Country B has absolute advantages in both goods, but there are no gains from trade.

    ii.   Country B has absolute advantages in both goods, and both have the incentive to trade, with country A specializing in the production of good x.

b) Under which conditions will free trade lead to the equalization of real wages across countries?

Exercise 4

Consider Exercise 1 again (after the technological improvement), but assume further that welfare functions in both countries are identical and given by $U = A \cdot F$. Determine the following:

a) The equilibria under autarky.

b) The demands for goods A and F in both countries.

c) The equilibrium price under free trade, as well as the corresponding trade flows.

d) The changes in real wages in both countries, associated to the move from autarky to free trade.

e) The relative wage rate between the two countries.

f) Examine the effects of an increase in the number of workers in V from 84 to 100. If afterwards the number of workers in V continues to increase steadily, what would happen?

Exercise 5

Home has 1200 units of labor available. It can produce two goods, apples and bananas. The unit labor requirement in apple production is 3, while in banana production it is 2.

a) Graph Home's production possibility frontier (PPF).

b) What is the opportunity cost of apples in terms of bananas?

c) In the absence of trade, what would the price of apples in terms of bananas be? Why?

There is now also another country, Foreign, with a labor force of 800. Foreign's unit labor requirement in apple production is 5, while in banana production it is 1.

d) Graph Foreign's PPF.

e) Construct the world relative supply curve.

Now suppose world relative demand takes the following form: Demand for apples/demand for bananas = price of bananas/price of apples.

f) Graph the relative demand curve along with the relative supply curve.

g) What is the equilibrium relative price of apples? Describe the pattern of trade.

h) Show that both Home and Foreign gain from trade.

i) Compute the real wages in Home before and with free trade.

Suppose that instead of 1200 workers, Home has 2400. Find the equilibrium relative price.

j) What can you say about the efficiency of world production and the division of the gains from trade between Home and Foreign in this case?

Suppose that Home has 2400 workers, but they are only half as productive in both industries as we have been assuming.

k) Construct the world relative supply curve and determine the equilibrium relative price. How do the gains from trade compare with those in the case h) and j)?

Adapted from Krugman et al 'International Economics: Theory & Policy' (chapter 3, exercises 1 – 5).

Exercise 6

'*Korean workers receive $2.50 per hour. If we open our borders to trade with that country, our workers would have to suffer a wage decrease to that level or we would be crushed by competition.*' Comment this statement in light of the Ricardian model.

Exercise 7

In a Ricardian world there are two economies, Eastland and Westland, with labor endowments equal to 200 and 100, respectively. Both use their unique production factor to produce two goods, x and y. In Eastland, the unit labor requirements are equal to 4 in both industries, whereas in Westland they are equal to 4 and 1 for sectors x and y, respectively. With equal preferences in the world, the relative demand is equal to $(x/y)^D = P_y/P_x$.

a) Explain if there are absolute and/or comparative advantages.

b) Determine the relative prices in autarky and the equilibrium price under free trade. Represent the equilibrium with the relative demand and relative supply.

c) Compute the real wages before and after trade in Eastland. [If you didn't solve b), assume that with trade the equilibrium price is $P_x/P_y = 3$].

d) Will there be convergence of wages with free trade in this case? Is this a general result?

Solutions – PS 2

Exercise 1

Solved in class.

Exercise 2

a) Wrong.   b) Home exports y, imports x.   c) True.

d) Before trade: $\left(w/p_y\right) = 4 \cdot \left(w/p_x\right) = 4$; With trade: $\left(w/p_y\right) = 2 \cdot \left(w/p_x\right) = 4$

e) $w^H/w^F = 1$

Exercise 3

a) $a_x^B < a_x^A$, $a_y^B < a_y^A$. In addition, in (i) $a_x^A a_y^B = a_x^B a_y^A$; in (ii) $a_x^A a_y^B < a_x^B a_y^A$

b) If A has comparative advantage in x: $a_x^A < a_x^B$, $a_y^B < a_y^A$, $\left(P_x/P_y\right)* = a_x^A/a_y^B$.

Exercise 4

a) In U: $(A, F) = (150 , 37.5)$. In V: $(A, F) = (140 , 42)$.   c) $P_A/P_F = 0.28$

d) $\left(w/p_F\right)^Y = 1$ (const.); $\left(w/p_A\right)^Y$ $10/3 \rightarrow 25/7$; $\left(w/p_A\right)^U = 2$ (const.); $\left(w/p_F\right)^U$ $0.5 \rightarrow$ 0.56.

e) V will become a large country.

Exercise 5

b) 1.5 bananas.   c) Relative price of apples = 1.5

g) Relative price of apples = 2; Home exports apples, imports bananas.

i) (apples are x) Before: $\left(w/p_x\right) = 1/3$, $\left(w/p_y\right) = 0.5$; w/ trade: $\left(w/p_x\right) = 1/3$, $\left(w/p_y\right) = 2/3$.   j) Relative price of apples = 1.5. Only Foreign will experience gains from trade.   k) Gains are identical to question h).

Exercise 6

Wrong.

Exercise 7

a) Westland has absolute and comparative advantage in y.

b) $\left(P_x/P_y\right)_{aut}^{E} < \left(P_x/P_y\right)^{*} < \left(P_x/P_y\right)_{aut}^{W} \Rightarrow 1 < 2 < 4$

c) $\dfrac{w}{P_x} = \dfrac{1}{4}$ (before and after); $\dfrac{w}{P_y}$ increases from $\dfrac{1}{4}$ to $\dfrac{1}{2}$.

d) No convergence. Here, with $\left(P_x/P_y\right)^{*} = 4$ there would be convergence.