Problem Set 1 Solutions

ECON 355 International Trade, 2015-2016 Winter Term 2

By LAM, Wing Tung

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1. True/False

(1) False. Take year 2012 as an example. Trade between developed countries only made up 34% of total trade volume in the world. 28% of the world trade was between developing countries and 37% was between developed and developing countries.

(2) True. Globally, the ratio of Imports to GDP is about 25% on average while the fraction of immigrants in population is just over 3% on average. In most countries, less than 20% of population are immigrants. In contrast, many countries have Imports to GDP ratios well above 20%.

(3) True. Let MPL_W and MPL_C denote the marginal productivity of Labor in Wheat and Cloth in Home respectively. MPL_W^* and MPL_C^* denote those in Foreign. If Home has an absolute advantage in Wheat and Foreign has an absolute advantage in Cloth, then

$$\begin{aligned} MPL_W &> MPL_W^* \\ MPL_C &< MPL_C^* \end{aligned}$$

Combining these two inequalities, we have

$$\frac{MPL_W}{MPL_C} > \frac{MPL_W^*}{MPL_C^*}$$

so that Home has a comparative advantage in Wheat and Foreign has comparative advantage in Cloth.

2. Ricardian Model - Home Autarky

(1) If employing all labor in Oranges,

$$Q_O = 90 \times 3 = 270$$

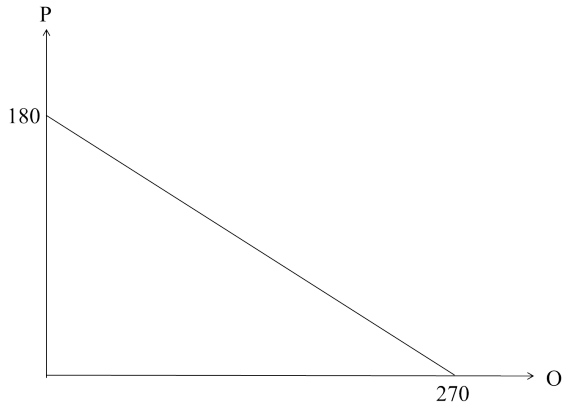
(2) If employing all labor in Potatoes,

$$Q_P = 90 \times 2 = 180$$

(3) The opportunity cost of an Orange OC_O and that of a Potatoes OC_P are given by

$$\begin{aligned} OC_O &= \frac{MPL_P}{MPL_O} = \frac{2}{3} \\ OC_P &= \frac{MPL_O}{MPL_P} = \frac{3}{2} \end{aligned}$$

(4) PPF for Home:



(5) Under perfect competition, the wage rates for the workers producing Oranges and Potatoes are given by the value of worker's marginal product

$$\begin{aligned} W_O &= P_O \times MPL_O \\ W_P &= P_P \times MPL_P \end{aligned}$$

Since Home will produce both goods, the wage rates in the two sectors must be equal, $W_O = W_P = W$.

The real wage in terms of Oranges $(w_O)_A$ and that in terms of Potatoes $(w_P)_A$ in Home under Autarky are given by

$$\begin{aligned} (w_O)_A &= \frac{W_O}{P_O} = MPL_O = 3 \\ (w_P)_A &= \frac{W_P}{P_P} = MPL_P = 2 \end{aligned}$$

(6) In autarky, the relative price of Oranges is given by

$$\left(\frac{P_O}{P_P}\right)_A = \frac{MPL_P}{MPL_O} = \frac{2}{3}$$

Hence, an orange producer may exchange 3 Oranges for $3 \times \frac{2}{3} = 2$ Potatoes.

3. Ricardian Model - Foreign Autarky

Let X^* denote the quantity X in the Foreign country

(1) If employing all labor in Oranges,

$$Q_O^* = 60 \times 1.5 = 90$$

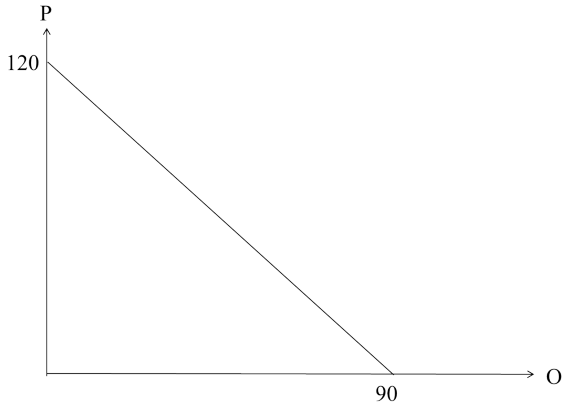
(2) If employing all labor in Potatoes,

$$Q_P^* = 60 \times 2 = 120$$

(3) The opportunity costs are given by

$$\begin{aligned} OC_O^* &= \frac{2}{1.5} = \frac{4}{3} \\ OC_P^* &= \frac{1.5}{2} = \frac{3}{4} \end{aligned}$$

(4) PPF for Foreign:



(5) Under perfect competition, with both goods produced we have

$$1.5P_O^* = W_O^* = W_P^* = 2P_P^*$$

The real wages in Foreign under Autarky are given by

$$\begin{aligned} (w_O^*)_A &= \frac{W_O^*}{P_O^*} = MPL_O^* = 1.5 \\ (w_P^*)_A &= \frac{W_P^*}{P_P^*} = MPL_P^* = 2 \end{aligned}$$

(6) The autarky relative price of Oranges in the Foreign country is

$$\left(\frac{p_O^*}{p_P^*}\right)_A = \frac{4}{3}$$

Hence, an orange producer may exchange 3 Oranges for $3 \times \frac{4}{3} = 4$ Potatoes.

4. Ricardian Model - International Trade

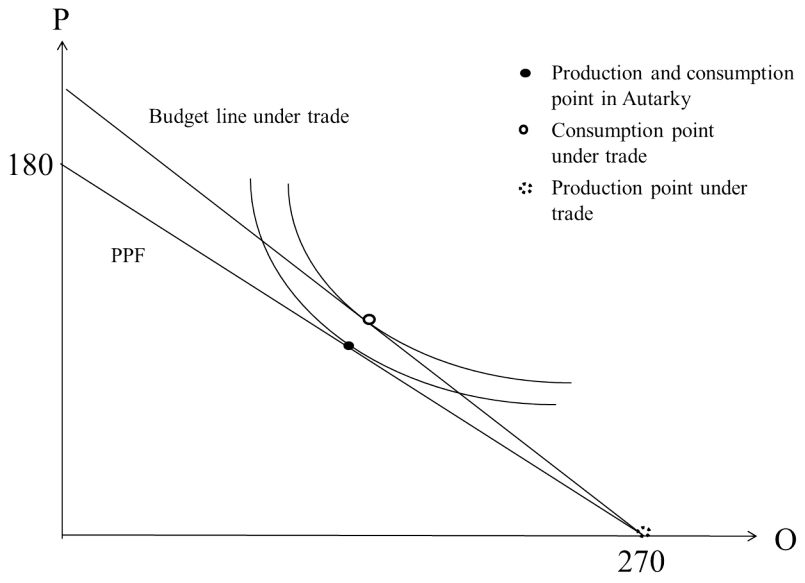
(1) Home country has an absolute advantage in producing Oranges as its MPL is higher. Neither country has an absolute advantage in producing Potatoes as their MPL are the same for that good.

(2) The opportunity cost of an Orange is $\frac{2}{3}$ unit of Potatoes in the Home country, which is lower than $\frac{4}{3}$ in the Foreign country. The Home country has a comparative advantage in the production of Oranges. Similarly, the opportunity cost of a Potato is $\frac{3}{2}$ unit of Oranges for the Home country, which exceeds that for the Foreign country. The Foreign country must have a comparative advantage in the production of Potatoes.

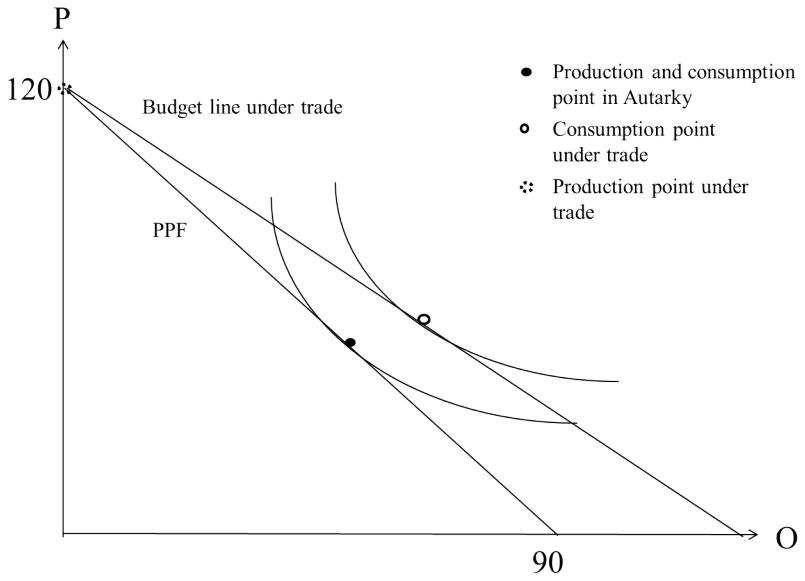
(3) The relative price of Oranges under trade $\left(\frac{P_O}{P_p}\right)_T$ are bounded between the autarky prices in the two countries, so that $\frac{2}{3} \leq \left(\frac{P_O}{P_p}\right)_T \leq \frac{4}{3}$.

(4) If $\left(\frac{P_O}{P_p}\right)_T = 0.9$, the Home country completely specializes in the production of Oranges while the Foreign country specializes in the production of Potatoes. The Home country produces 270 unit of Oranges but no Potatoes. The Foreign country produces 120 unit of Potatoes but no Oranges.

For Home:



For Foreign:



Yes, both countries have their consumption points on higher indifference curves.

(5) At $\left(\frac{P_O}{P_p}\right)_T = 0.9$, the Home country produces Oranges only while Foreign specializes in producing Potatoes. In Home country, the wage rate for the Oranges industry is given by

$$W_O = 3P_O$$

The real wage in terms of Oranges in Home under Trade is

$$(w_O)_T = \frac{W_O}{P_O} = 3 = (w_O)_A$$

The real wage in terms of Potatoes in Home under Trade is

$$(w_P)_T = \frac{W_O}{P_O} \times \left(\frac{P_O}{P_p}\right)_T = 3 \times 0.9 = 2.7 > (w_P)_A$$

Similarly, the real wage in terms of Potatoes in Foreign under Trade is given by

$$(w_P^*)_T = \frac{W_P^*}{P_P} = 2 = (w_P^*)_A$$

The real wage in terms of Oranges in Foreign under Trade is

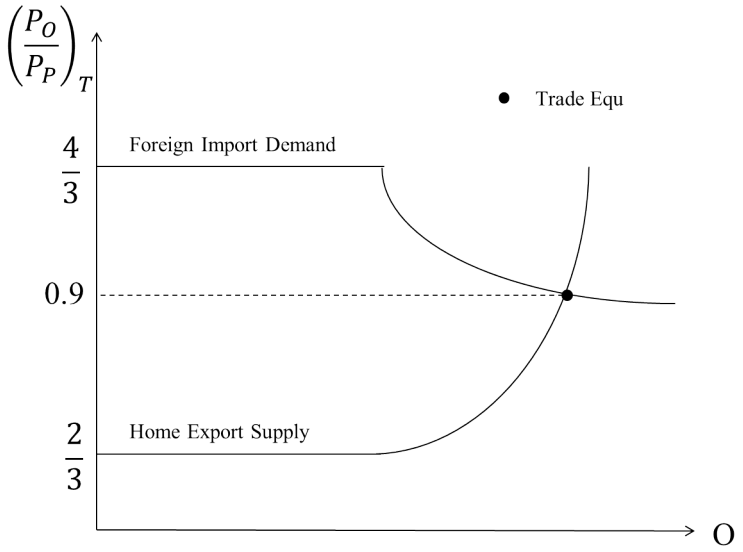
$$(w_O^*)_T = \frac{W_P^*}{P_P} \div \left(\frac{P_O}{P_p}\right)_T = 2 \div 0.9 \approx 2.22 > (w_O^*)_A$$

For Home, the real wage in terms of Potatoes increases under trade while the real wage in terms of Oranges remains unchanged. For Foreign, the real wage in terms of Oranges

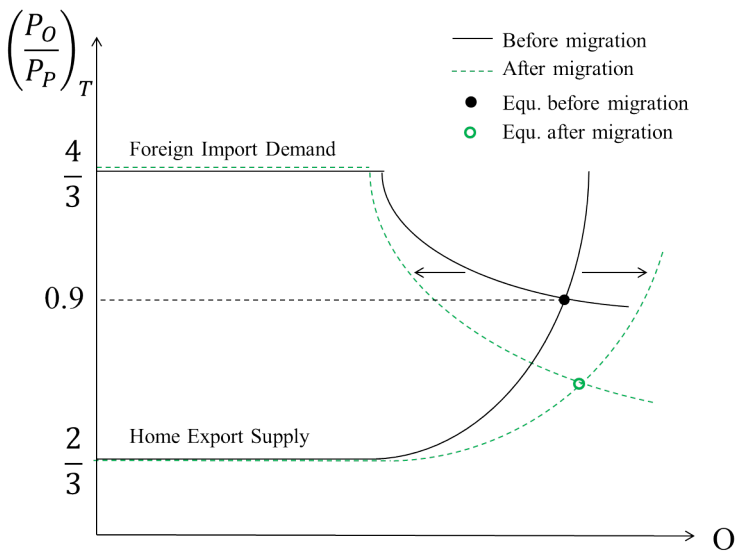
increases under trade while the real wage in terms of Potatoes stays unchanged. As the real wages in terms of both goods weakly increase under free trade, both countries are better off when opening up to trade.

The real wages in terms of both goods are higher in Home than in Foreign. This is because Foreign has no absolute advantages in producing both goods.

(6) Trade Equilibrium:



(7) Since workers' marginal productivity in the two countries are not affected by the migration, the comparative advantage and hence the pattern of trade between the two countries will remain the same. For any relative price $\left(\frac{P_O}{P_p}\right)_T$ in the range $[\frac{2}{3}, \frac{4}{3}]$, Foreign's quantity demanded for Oranges will decrease because there are fewer workers consuming Oranges. Since Home is specializing in producing Oranges, the migration increases the quantity it produces more than the quantity it consumes. Therefore, Home will export a greater quantity of Oranges at any relative price $\left(\frac{P_O}{P_p}\right)_T$.



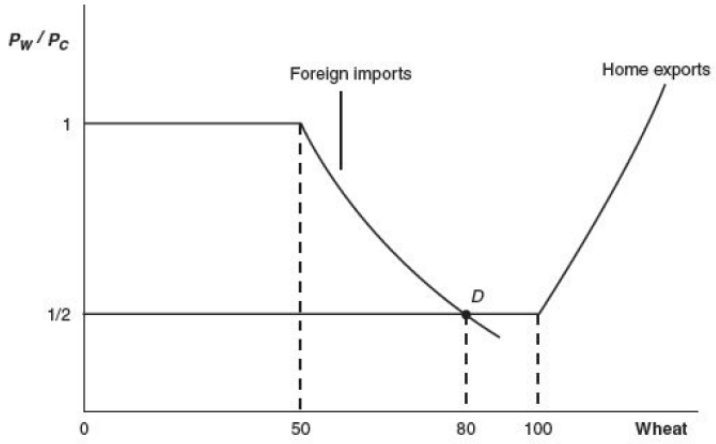
In summary, the Home's export supply of Oranges will shift to right while the Foreign import demand will shift to the left following the migration. As a result, the relative price of Oranges will fall.

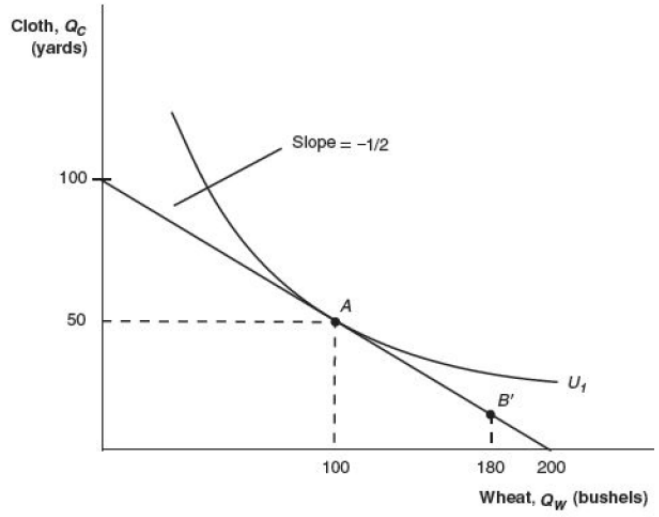
The decline in the relative price of Oranges constitutes a deterioration of the Terms of Trade for Home. This means native Home workers are worse off after the migration. Observe that the real wage for the native workers in Home stays unchanged in terms of Oranges but declines in term of Potatoes.

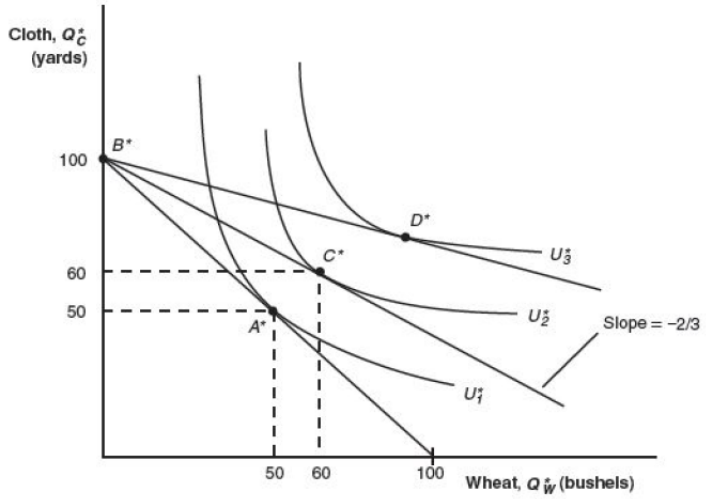
Home has an absolute advantage in producing Oranges and the two countries have the same productivity in Potatoes. As the migrants gain access to the superior Home technology, they will enjoy a higher real wage in terms of both goods than the workers staying in Foreign.

5. Problems from the Textbook Ch2-Q11

(1) The intersection of the foreign imports and home exports gives the new international equilibrium relative price of wheat, which is 1/2.


P_W / P_C
Foreign imports
Home exports
1
1/2
D
0
50
80
100
Wheat


Cloth, Q_C (yards)
Slope = −1/2
100
50
A
U_1
B′
100
180
200
Wheat, Q_W (bushels)


Cloth, Q_C^* (yards)
B*
100
D*
U_3^*
C*
60
50
A*
U_2^*
Slope = −2/3
U_1^*
50
60
100
Wheat, Q_W^* (bushels)

(2) The international price of 1/2 is the same as Home's no-trade relative price of wheat. Home would consume at point A and produce at point 80. The difference between these two points gives Home exports of wheat of 80 units. (Notice that workers earn equal wages in the two industries, so production can occur anywhere along the PPF.) Because the international price of 1/2 is lower than Foreign's no-trade relative price of wheat, Foreign is able to consume at point D*, which gives higher gains from trade than at point C*.

(3) The foreign country gains a lot from trade, but the home country neither gains nor loses: its consumption point A is exactly the same as what it would be in the absence of trade. This shows that in the Ricardian model, a small country can gain the most from trade, whereas a large country may not gain (although it will not lose) because the world relative price might equal its own no-trade relative price. This special result will not arise in other models that we study, but illustrates how being small can help a country on world markets!