

**PROBLEM SET #1**

1. Consider a world with two countries and two produced goods. The production technologies in the two countries are different:

$$y_1^i = \ell_1^i / b_1^i, \quad i = 1, 2$$

$$y_2^i = \ell_2^i / b_2^i, \quad i = 1, 2.$$

In country 1  $b_1^1 = 1$  and  $b_2^1 = 2$ , while in country 2  $b_1^2 = 2$  and  $b_2^2 = 1$ . In each country the representative consumer has the utility function

$$u(c_1^i, c_2^i) = \log c_1^i + \log c_2^i$$

and the endowment  $\bar{\ell}^1 = \bar{\ell}^2 = 10$ .

a) Define an autarky equilibrium. Calculate the autarky equilibrium in each country. (Hint: the numbers for country 2 should be the same as those for country 1 with the roles of goods 1 and 2 reversed.)

b) Define a free trade equilibrium for the world economy. Calculate this equilibrium. (Hint: because of the symmetry in this problem, the equilibrium terms of trade are  $p_1/p_2 = 1$ .)

2. Consider a world with two economies and two produced goods. Suppose that the production technologies are the same across countries,

$$y_1^i = \min[k_1^i / 3, \ell_1^i]$$

$$y_2^i = \min[k_2^i, \ell_2^i / 3],$$

that the representative consumers' utility functions are the same across countries,

$$u(c_1^i, c_2^i) = \log c_1^i + \log c_2^i,$$

but that the endowments of factors are different across countries,  $\bar{k}^1 = 32$ ,  $\bar{\ell}^1 = 40$ ,  $\bar{k}^2 = 40$ ,  $\bar{\ell}^2 = 32$ .

a) Define an autarky equilibrium. Calculate the autarky equilibrium in each country. (Hint: The numbers for country 2 should be the same as those for country 1 with the roles of goods 1 and 2

reversed and the roles of capital and labor reversed. Be careful, however, with the normalization  $\hat{w}^j = 1$ .)

b) Define a free trade equilibrium for the world economy. Calculate this equilibrium. (Hint: Because of the symmetry in this problem, the equilibrium terms of trade are  $p_1/p_2 = 1$ .)

3. Consider a world with two economies and two produced goods. Suppose that the production technologies are the same across countries,

$$\begin{aligned} y_1^i &= k_1^{i/2} \ell_1^{1/2} \\ y_2^i &= t_2^{i/2} \ell_2^{1/2}, \end{aligned}$$

that the representative consumers' utility functions are the same across countries,

$$u(c_1^i, c_2^i) = \log c_1^i + \log c_2^i,$$

but that the endowments of factors are different across countries,  $\bar{k}^1 = 4$ ,  $\bar{\ell}^1 = 32$ ,  $\bar{t}^1 = 9$  and  $\bar{k}^2 = 9$ ,  $\bar{\ell}^2 = 32$ ,  $\bar{t}^2 = 4$ .

a) Define an autarky equilibrium. Calculate the autarky equilibrium in each country. (Hint: The numbers for country 2 should be the same as those for country 1 with the roles of goods 1 and 2 reversed and the roles of capital and land reversed.)

b) Define a free trade equilibrium for the world economy. Calculate this equilibrium. (Hint: Because of the symmetry in this problem, the equilibrium terms of trade are  $p_1/p_2 = 1$ .)

4. Using the answers to questions 1 and 2, explain why you would expect to see certain interest groups arguing for and against free trade. Does the theory help you predict what groups these would be in each country? Explain.