

PROBLEM SET #2

1. Consider a world economy that is identical to the one in question 1 on the first problem set. There are 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 $b_2^1 = 2$; in country 2, $b_1^2 = 2$ and $b_2^2 = 1$. In each country the representative consumer has the utility function

$$\log x_1^i + \log x_2^i$$

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

(a) What is the autarky equilibrium in each country? What is the free trade equilibrium for the world economy? Calculate the real income levels in each country in autarky and in free trade.

(b) Suppose now that country 1 imposes a 50 percent tariff on the imports of good 2 from country 2. The tariff revenues are redistributed in lump-sum form to the representative consumer in country 1. What is the equilibrium? Calculate the real income levels in each country. Suppose instead that country 2 imposes the tariff on the imports of good 1 from country 1 (but country 1 imposes no tariff). What is the equilibrium? Calculate the real income levels in each country.

(c) Suppose now that both countries impose 50 percent tariff on the imports. What is the equilibrium? Calculate the real income levels in each country.

(d) Explain the concepts of countervailing duties and antidumping duties. How do your answers to parts a, b, and c relate to these trade policies? Try to find an example of a countervailing duty or antidumping duty imposed by the United States and explain the logic behind it. (Textbooks on international trade have such examples, but it would be fun to find a more recent example.)

2. Consider a world economy that is identical to the one in question 2 on the first problem set. There are two countries and two produced goods.

(a) Suppose that the production functions are equal across countries,

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

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

that the representative consumers' utility functions are equal,

$$u(x_1^i, x_2^i) = \log x_1^i + \log x_2^i ;$$

but that endowments are different, $\bar{k}^1 = 40, \bar{\ell}^1 = 32$ and $\bar{k}^2 = 32, \bar{\ell}^2 = 40$. What is the autarky equilibrium in each country? What is the free trade equilibrium for the world economy? Calculate the real income levels in each country in autarky and in free trade. Suppose that capitalists and workers are different people. Calculate their real income levels in autarky and free trade.

(b) Repeat the analysis in part a for a world in which the utility functions are the same but the production functions are

$$y_1^i = k_1^{1/2} \ell_1^{1/2}$$

$$y_2^i = t_2^{1/2} \ell_2^{1/2},$$

and endowments are $\bar{k}^1 = 9, \bar{\ell}^1 = 32, \bar{t}^1 = 4$, and $\bar{k}^2 = 4, \bar{\ell}^2 = 32, \bar{t}^2 = 9$. In this case the three types of economic agents are capitalists, workers, and landowners.

(c) Suppose that the two countries are initially closed to trade, but are considering opening. Using your answers to either part a or part b, tell a story about the debate over free trade in each country.

(d) Explain what you see to be the limitations of using models like that in parts a and b to analyze gains and losses associated with changes in trade policy.

3. Consider an economy in which there are two types of goods, agriculture and manufactured goods. Agricultural goods are homogeneous and are produced using labor according to the constant returns to scale production function

$$y_0 = \ell_0.$$

Manufactured goods are differentiated by firm. The production function for firm j is

$$y_j = (1/b) \max[\ell_j - f, 0].$$

Here f is the fixed cost, in terms of labor, necessary to operate the firm and b is the unit labor requirement. Suppose that there is a representative consumer with preferences

$$\log x_0 + (1/\rho) \log \sum_{j=1}^n x_j^\rho$$

where $\rho > 0$. There is an endowment of $\bar{\ell}$ units of labor.

- (a) Define a monopolistically competitive equilibrium for this economy in which firms follow Cournot pricing rules and there is free entry and exit.
- (b) Suppose that $b = 2$, $f = 6$, $\rho = 1/2$, and $\bar{\ell} = 100$. Calculate the autarky equilibrium.
- (c) Suppose now that $\bar{\ell} = 1000$. Calculate the equilibrium.
- (d) Interpret the equilibrium in part c as a trading equilibrium among two countries, one with $\bar{\ell}^1 = 100$ and the other with $\bar{\ell}^2 = 900$, but otherwise identical. Assume that manufacturing firms are distributed proportionally across countries. What impact does trade have on the number of manufacturing firms in each country? The average output of firms? The total number of products available? Consumer utility? Illustrate the efficiency gains using an average cost curve diagram.
- (e) Explain how your answer to part d is related to the debate in Canada on the U.S.-Canada Free Trade Agreement.