Exercise Sheet 4: The Specific Factors Model

Exercise 1[1]

Suppose a country can produce two goods, food and clothing. Labor is used for both goods, while capital is the specific factor used for clothing production and land is the specific factor used for food production. Output of clothing is denoted by Q_C and output of food is denoted by Q_F. L_C and L_F denote the amount of labor used for clothing and food production respectively. The total amount of labor available in the country is L, such that $L_C + L_F = L$. K and T denote the amounts of capital and land available in the country. The production functions are Cobb-Douglas production functions given by:

$$Q_C = \sqrt{L_C}\sqrt{K} \tag{1}$$
$$Q_F = \sqrt{L_F}\sqrt{T} \tag{2}$$

Remember the assumptions made in the specific-factors model:

- Perfect competition (each production factor is paid the value of its marginal product)

- Perfect labor mobility (wages have to be the same in both sectors)

a) Show that the marginal product of labor in each sector is decreasing in the amount of labor per specific factor in that sector.

b) Show that the marginal product of each specific factor is increasing in the amount of labor per specific factor.

c) Suppose the home country is a small open economy that engages in trade. It takes the world prices of food and clothing, P_C and P_F, as given. Show that an increase in the relative world price of clothing ($\frac{P_C}{P_F}$) leads to a shift of labor away from food into clothing production (i.e. show that $\frac{L_C}{L_F}$ increases if $\frac{P_C}{P_F}$ increases).

d) Show that an increase in land leads to a shift of labor away from clothing into food production. (show that $\frac{L_C}{L_F}$ decreases if T increases)

---

[1]Not exam relevant. Economics majors should do it.

Exercise 2

Suppose a country that engages in trade produces two goods, food and clothing. Capital is specific to the production of clothing and land is specific to the production of food. Labor is needed to produce both goods.

a) Show graphically what happens to wages and production if the world price of food increases. What happens to the *real* wage in this case? (Draw a diagram as the ones on the second page of the lecture notes).

b) Show graphically what happens to wages and production if the supply of land increases. What happens to the real wage in this case?

Exercise 3

Suppose Australia produces two goods: Wool and manufactures. Labor is used as input for both goods. Sheep farms are the specific factor used for wool production while capital is the specific factor used for manufactures production.

a) Explain in the context of the specific factors model why capitalists and sheep farm owners (landlords) in Australia probably favor the same policies on labor immigration policies. Draw a graph showing the effect of labor immigration on production and wages.

b) Australia is a traditional exporter of wool. The Australian government decides to introduce a tariff on manufactures imports, leading to a price increase of domestic manufactures. Draw a graph showing the effect of the tariff on production and wages. What do you think is the reaction of Australian owners of sheep farms to this tariff?

Exercise 4

Suppose Scottland produces two things: Oil and Whiskey.[2] Labor is needed to produce both goods. Oil fields are specific to the production of oil while whiskey factories are specific to the production of whiskey.

a) Suppose the number of oil fields decreases because some oil fields are exhausted. Draw a graph showing the effect on production on wages. What happens to the real wage? What happens to the welfare of the owners of whiskey factories and oil fields respectively?

b) Suppose the world price for oil increases a lot. Show graphically that, in an extreme case, this may lead to a complete stop of whiskey production. (This phenomenon is called the *Dutch Disease* - why is it called like that?)

---

[2]Suppose Scottland is an independent country.