

## Second Midterm Exam, Fall 2005

### HECKSCHER-OHLIN MODEL

1-4 The United States is abundant in labor to land compared to Canada. Cloth production relatively intensively uses labor to land compared to food. The countries have the same technology and relative demand.

1. Under free trade, the United States exports
  - a) food
  - b) cloth
  - c) food and cloth
  - d) food and sometimes cloth
  - e) cloth and sometimes food
  
2. Under free trade, Canada exports
  - a) food
  - b) cloth
  - c) food and cloth
  - d) food and sometimes cloth
  - e) cloth and sometimes food
  
3. The United States produces more \_\_\_\_\_ than Canada.
  - a) cloth
  - b) food
  - c) cloth relative to food
  - d) food relative to cloth
  - e) cannot tell from the information provided
  
4. Opening up to trade, the price of \_\_\_\_\_ rises in the United States.
  - a) cloth
  - b) food
  - c) cloth relative to food
  - d) food relative to cloth
  - e) cannot tell from the information provided

5-8 Mexico is abundant in labor to land compared to the United States. Cloth production relatively intensively uses labor to land compared to food. The countries have the same technology and relative demand. Each country produces both goods.

5. Under free trade, the wage paid to labor in the United States is
  - a) higher than the wage in Mexico
  - b) lower than the wage in Mexico
  - c) the same as the wage in Mexico
  - d) the same as the rent in Mexico
  - e) the same as the rent in the United States
  
6. Under free trade, the rent paid to land in the United States is
  - a) higher than the rent in Mexico
  - b) lower than the rent in Mexico
  - c) the same as the rent in Mexico
  - d) the same as the wage in Mexico
  - e) the same as the wage in the United States
  
7. In the United States, who is hurt by free trade?
  - a) workers
  - b) landowners
  - c) everyone
  - d) no one
  - e) depends on spending patterns
  
8. In Mexico, who is hurt by free trade?
  - a) workers
  - b) landowners
  - c) everyone
  - d) no one
  - e) depends on spending patterns

## STANDARD TRADE MODEL

9-12 Free trade prevails between the United States and China. China has comparative advantage in cloth and the United States in food. Suppose China experiences economic growth (while the United States has no economic growth).

9. In world markets, the relative price of cloth to food:
  - a) rises
  - b) falls
  - c) stays the same
  - d) rises, if China's growth is biased toward cloth
  - e) falls, if China's growth is biased toward cloth
  
10. The primary effect of economic growth on China is:
  - a) benefit
  - b) burden
  - c) none
  - d) benefit, if China's growth is biased toward cloth
  - e) burden, if China's growth is biased toward cloth
  
11. The secondary effect of China's growth on the United States is a terms of trade:
  - a) improvement
  - b) deterioration
  - c) unchanged
  - d) improvement, if China's growth is biased toward cloth
  - e) deterioration, if China's growth is biased toward cloth
  
12. The secondary effect on China is a terms of trade:
  - a) improvement
  - b) deterioration
  - c) unchanged
  - d) improvement, if China's growth is biased toward cloth
  - e) deterioration, if China's growth is biased toward cloth

13-16 Free trade prevails between the United States and Pakistan.  
Suppose the United States transfers one billion dollars to Pakistan.  
Pakistan spends more of every dollar on construction (and less on food) than the United States.

13. In world markets, the relative price of construction to food:
  - a) rises
  - b) falls
  - c) stays the same
  - d) rises, if Pakistan has comparative advantage in food
  - e) falls, if Pakistan has comparative advantage in food
  
14. The primary effect of the transfer on Pakistan is:
  - a) benefit
  - b) burden
  - c) none
  - d) benefit, if Pakistan has comparative advantage in food
  - e) burden, if Pakistan has comparative advantage in food
  
15. The secondary effect on the United States is a terms of trade:
  - a) improvement
  - b) deterioration
  - c) unchanged
  - d) improvement, if Pakistan has comparative advantage in food
  - e) deterioration, if Pakistan has comparative advantage in food
  
16. The secondary effect on Pakistan is a terms of trade:
  - a) improvement
  - b) deterioration
  - c) unchanged
  - d) improvement, if Pakistan has comparative advantage in food
  - e) deterioration, if Pakistan has comparative advantage in food

## FACTOR PROPORTIONS MODEL PROBLEMS

Producing one yard of cloth requires 3 workers and 1 acre of land, while producing one pound of food requires 1 worker and 2 acres of land. Both countries have 90 workers; the United States has 80 acres of land, while ROW has 130. The price of food is always \$16/pound; the price of cloth is \$18/yard in the United States in autarky and \$33/yard in both countries under free trade.

1. Determine and compare the relative abundance of factors across countries. Determine and compare the relative intensity of factor use across goods. Determine the pattern of comparative advantage and the pattern of trade.
2. Construct the labor constraint (same for both countries). Construct the U.S. land constraint. Determine the U.S. production bundle that fully employs both factors.
3. Construct the ROW land constraint. Determine the ROW production bundle that fully employs both factors. Compare the relative production of cloth to food across countries. *Draw graph of factor constraints, with food on the vertical axis. Indicate values for the endpoints and for the quantities produced in each country.*
4. Construct the pricing equation for food (same always for both countries). Construct the U.S. pricing equation for cloth in autarky. Determine U.S. factor prices in autarky that allow both goods to be priced at cost.
5. Construct the pricing equation for cloth under free trade (same for both countries). Determine the factor prices under free trade that allow both goods to be priced at cost. Compare the U.S. relative factor prices (wage relative to rent) under free trade to autarky. *Draw graph of pricing equations, with rent on the vertical axis. Indicate values for the endpoints and for the factor prices before and after trade.*
6. Calculate and compare the proportional changes in the wage, rent, price of cloth, and price of food. In the United States, owners of which factor would oppose a free trade agreement? How can this group be identified, even in autarky?

## Second Midterm Exam Solutions, Fall 2005

### MULTIPLE CHOICE

- 1b Under free trade, the United States exports cloth, its comparative advantage good.
- 2a Under free trade, Canada exports food.
- 3c The United States produces more cloth relative to food than Canada
- 4c Opening up to trade, the price of cloth relative to food rises in the United States.
- 5c Under free trade, the wage paid to labor in the United States is the same as the wage in Mexico.
- 6c Under free trade, the rent paid to land in the United States is the same as the rent in Mexico.
- 7a U.S. workers are hurt by free trade (relatively scarce factor).
- 8b Mexican landowners benefit from free trade.
- 9e In world markets, the relative price for cloth to food falls, if China's growth is biased toward cloth.
- 10a The primary effect of economic growth on China is benefit.
- 11d The secondary effect on the United States is a terms of trade improvement, if China's growth is biased toward cloth.
- 12e The secondary effect on China is a terms of trade deterioration, if China's growth is biased toward cloth.
- 13a In world markets, the relative price of construction to food rises.
- 14a The primary effect of the transfer on Pakistan is benefit.
- 15d The secondary effect on the United States is a terms of trade improvement, if Pakistan has comparative advantage in food.
- 16e The secondary effect on Pakistan is a terms of trade deterioration, if Pakistan has comparative advantage in food.

## FACTOR PROPORTIONS MODEL PROBLEMS

Producing one yard of cloth requires 3 workers and 1 acre of land, while producing one pound of food requires 1 worker and 2 acres of land. Both countries have 90 workers; the United States has 80 acres of land, while ROW has 130. The price of food is always \$16/pound; the price of cloth is \$18/yard in the United States in autarky and \$33/yard in both countries under free trade.

1. Determine and compare the relative abundance of factors across countries.

*The United States is relatively labor abundant*

$$\frac{90}{80} = \frac{L}{T} > \frac{L^*}{T^*} = \frac{90}{130}$$

Determine and compare the relative intensity of factor use across goods.

*Cloth production is relatively labor intensive*

$$3 = \frac{3}{1} = \frac{a_{LC}}{a_{TC}} > \frac{a_{LF}}{a_{TF}} = \frac{1}{2}$$

Determine the pattern of comparative advantage and the pattern of trade.

*The United States has comparative advantage in cloth and the ROW in food. The United States will export cloth (and import food), while the ROW will export food (and import cloth).*

2. Construct the labor constraint (same for both countries).

$$a_{LC} Q_C + a_{LF} Q_F = L, \quad 3Q_C + Q_F = 90, \quad Q_F = 90 - 3Q_C$$

Construct the U.S. land constraint.

$$a_{TC} Q_C + a_{TF} Q_F = T, \quad Q_C + 2Q_F = 80, \quad Q_F = 40 - \frac{1}{2}Q_C$$

Determine the U.S. production bundle that fully employs both factors.

$$90 - 3Q_C = 40 - \frac{1}{2}Q_C, \quad \frac{5}{2}Q_C = 50, \quad Q_C = \frac{100}{5} = 20$$

$$Q_F = 90 - 3Q_C = 90 - 3(20) = 90 - 60 = 30$$

3. Construct the ROW land constraint.

$$a_{TC} Q_C^* + a_{TF} Q_F^* = T^*, \quad Q_C^* + 2Q_F^* = 130, \quad Q_F^* = 65 - \frac{1}{2} Q_C^*$$

Determine the ROW production bundle that fully employs both factors.

$$90 - 3Q_C^* = 65 - \frac{1}{2} Q_C^*, \quad \frac{5}{2} Q_C^* = 25, \quad Q_C^* = \frac{50}{5} = 10$$

$$Q_F^* = 90 - 3Q_C^* = 90 - 3(10) = 90 - 30 = 60$$

Compare the relative production of cloth to food across countries.

*The United States produces more cloth relative to food than Mexico*

$$\frac{2}{3} = \frac{20}{30} = \frac{Q_C}{Q_F} > \frac{Q_C^*}{Q_F^*} = \frac{10}{60} = \frac{1}{6}$$

4. Construct the pricing equation for food (same always for both countries).

$$a_{LF} w + a_{TF} r = P_F, \quad w + 2r = 16, \quad r = 8 - \frac{1}{2} w$$

Construct the U.S. pricing equation for cloth in autarky.

$$a_{LC} w^A + a_{TC} r^A = P_C^A, \quad 3w^A + r^A = 18, \quad r^A = 18 - 3w^A$$

Determine U.S. factor prices in autarky that allow both goods to be priced at cost.

$$8 - \frac{1}{2} w^A = 18 - 3w^A, \quad \frac{5}{2} w^A = 10, \quad w^A = \frac{20}{5} = 4$$

$$r^A = 18 - 3w^A = 18 - 3(4) = 18 - 12 = 6$$

5. Construct the pricing equation for cloth under free trade (same for both countries).

$$a_{LC} w + a_{TC} r = P_C, \quad 3w + r = 33, \quad r = 33 - 3w$$

Determine the factor prices under free trade that allow both goods to be priced at cost.

$$8 - \frac{1}{2} w = 33 - 3w, \quad \frac{5}{2} w = 25, \quad w = \frac{50}{5} = 10$$

$$r = 33 - 3w = 33 - 3(10) = 33 - 30 = 3$$

Compare the U.S. relative factor prices (wage relative to rent) under free trade to autarky.

*The wage relative to the rent rises in the United States in the move from autarky to free trade.*

$$\frac{2}{3} = \frac{4}{6} = \frac{w^A}{r^A} < \frac{w}{r} = \frac{10}{3}$$

6. Calculate and compare the proportional changes in the wage, rent, price of cloth, and price of food.

*In the United States, the wage rises by more than the price of either good, while the rent falls relative to the price of either good.*

$$\hat{w} = 150\% > \hat{P}_C = 83.3\% > \hat{P}_F = 0\% > \hat{r} = -50\%$$

$$\hat{P}_C = \frac{33 - 18}{18} = \frac{15}{18} = 83.3\%$$

$$\hat{w} = \frac{10 - 4}{4} = \frac{6}{4} = 150\%$$

$$\hat{r} = \frac{3 - 6}{6} = -\frac{3}{6} = -\frac{1}{2} = -50\%$$

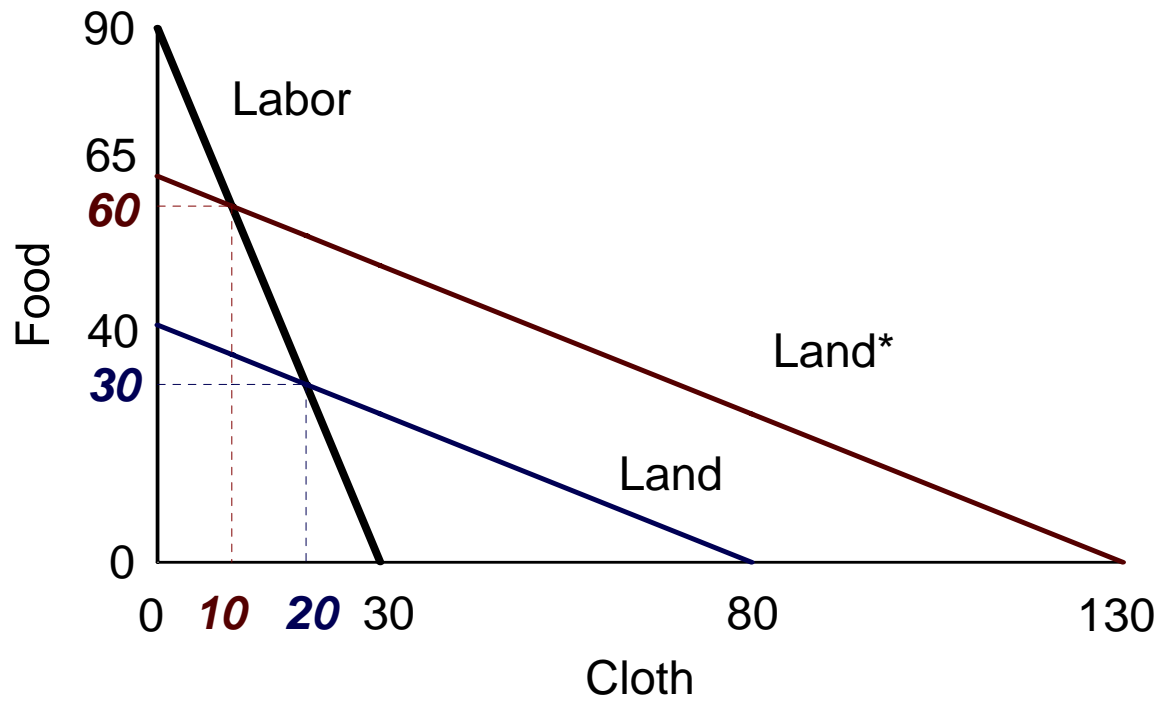
In the United States, owners of which factor would oppose a free trade agreement?

*Landlords*

How can this group be identified, even in autarky?

*They own the relatively scarce factor in the United States.*

# Production



# Pricing

