

Second Midterm Exam, Spring 2005

FACTOR PROPORTIONS MODEL

1-4 Cloth production relatively intensively uses labor to land compared to food production. Mexico is abundant in labor to land compared to the United States. The countries have the same 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, Mexico exports
 - a) food
 - b) cloth
 - c) food and cloth
 - d) food and sometimes cloth
 - e) cloth and sometimes food

3. An increase in labor in the United States causes U.S. production of
 - a) cloth to rise
 - b) food to rise
 - c) cloth to fall
 - d) food to rise and production of cloth to fall
 - e) cloth to rise and production of food to fall

4. A decrease on labor in Mexico causes Mexican production of
 - a) cloth to rise
 - b) food to rise
 - c) cloth to fall
 - d) food to rise and production of cloth to fall
 - e) cloth to rise and production of food to fall

5-8 The United States is abundant in labor to land compared to Canada. The countries have the same technology and the same 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 Canada
 - b) lower than the wage in Canada
 - c) the same as the wage in Canada
 - d) the same as the rent in Canada
 - 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 Canada
 - b) lower than the rent in Canada
 - c) the same as the rent in Canada
 - d) the same as the wage in Canada
 - e) the same as the wage in the United States

7. In the United States, who benefits from free trade?
 - a) workers
 - b) landowners
 - c) everyone
 - d) no one
 - e) depends on spending patterns

8. In Canada, who benefits from 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 (both countries are large). Suppose China experiences economic growth biased toward cloth (and 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 has comparative advantage in cloth
 - e) falls, if China has comparative advantage in cloth

10. The primary effect of economic growth on China is:
 - a) benefit
 - b) burden
 - c) none
 - d) benefit, if China has comparative advantage in cloth
 - e) burden, if China has comparative advantage in cloth

11. The secondary effect on China is a terms of trade:
 - a) improvement
 - b) deterioration
 - c) unchanged
 - d) improvement, if China has comparative advantage in cloth
 - e) deterioration, if China has comparative advantage in cloth

12. The secondary effect on the United States is a terms of trade:
 - a) improvement
 - b) deterioration
 - c) unchanged
 - d) improvement, if China has comparative advantage in cloth
 - e) deterioration, if China has comparative advantage in cloth

13-16 Free trade prevails between the United States and Indonesia (both countries are large). Suppose the United States transfers one billion dollars to Indonesia. Indonesia 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 Indonesia has comparative advantage in food
 - e) falls, if Indonesia has comparative advantage in food
14. The primary effect of the transfer on Indonesia is:
- a) benefit
 - b) burden
 - c) none
 - d) benefit, if Indonesia has comparative advantage in food
 - e) burden, if Indonesia has comparative advantage in food
15. The secondary effect on Indonesia is a terms of trade:
- a) improvement
 - b) deterioration
 - c) unchanged
 - d) improvement, if Indonesia has comparative advantage in food
 - e) deterioration, if Indonesia has comparative advantage in food
16. The secondary effect on the United States is a terms of trade:
- a) improvement
 - b) deterioration
 - c) unchanged
 - d) improvement, if Indonesia has comparative advantage in food
 - e) deterioration, if Indonesia has comparative advantage in food

FACTOR PROPORTIONS MODEL PROBLEMS

Producing one yard of cloth requires 4 workers and 1 acre of land, while producing one pound of food requires 1 worker and 1 acre of land. Both countries have 40 workers; the United States has 16 acres of land, while Mexico has 25. The price of food is always \$18/pound; the price of cloth is \$24/yard in the United States in autarky and \$36/yard 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 Mexican land constraint. Determine the Mexican production bundle that fully employs both factors. Compare the relative production of cloth to food across countries. *Draw graph of factor constraints here, 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 here, 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, Spring 2005

MULTIPLE CHOICE

- 1a Under free trade, the United States exports food, its comparative advantage good.
- 2b Under free trade, Mexico exports cloth.
- 3e An increase in labor in the United States causes U.S. production of cloth to rise and production of food to fall.
- 4d An decrease in labor in Mexico causes Mexican production of food to rise and production of cloth to fall.
- 5c Under free trade, the wage paid to labor in the United States is the same as the wage in Canada.
- 6c Under free trade, the rent paid to land in the United States is the same as the rent in Canada.
- 7a U.S. workers benefit from free trade (relatively abundant factor).
- 8b Canadian landowners benefit from free trade.
- 9b In world markets, the relative price for cloth to food falls.
- 10a The primary effect of economic growth on China is benefit.
- 11e The secondary effect on China is a terms of trade deterioration, if China has comparative advantage in cloth.
- 12d The secondary effect on the United States is a terms of trade improvement, if China has comparative advantage in cloth.
- 13a In world markets, the relative price of construction to food rises.
- 14a The primary effect of the transfer on Indonesia is benefit.
- 15e The secondary effect on Indonesia is a terms of trade deterioration, if Indonesia has comparative advantage in food.
- 16d The secondary effect on the United States is a terms of trade improvement, if Indonesia has comparative advantage in food.

PROBLEMS

1. The United States is relatively labor abundant

$$2.5 = \frac{40}{16} = \frac{L}{T} > \frac{L^*}{T^*} = \frac{40}{25} = 1.6$$

Cloth production is relatively labor intensive

$$4 = \frac{4}{1} = \frac{a_{LC}}{a_{TC}} > \frac{a_{LF}}{a_{TF}} = \frac{1}{1} = 1$$

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

2. The labor constraint is

$$a_{LC} Q_C + a_{LF} Q_F = L, \quad 4Q_C + Q_F = 40, \quad Q_F = 40 - 4Q_C$$

The U.S. land constraint is

$$a_{TC} Q_C + a_{TF} Q_F = T, \quad Q_C + Q_F = 16, \quad Q_F = 16 - Q_C$$

The United States's production of cloth and food that fully employs both labor and land is (show math)

$$Q_C = 8, \quad Q_F = 8$$

3. Mexico's land constraint is

$$a_{TC} Q_C^* + a_{TF} Q_F^* = T^*, \quad Q_C^* + Q_F^* = 25, \quad Q_F^* = 25 - Q_C^*$$

Mexico's production of cloth and food that fully employs both labor and land is (show math)

$$Q_C^* = 5, \quad Q_F^* = 20$$

The United States produces more cloth relative to food than Mexico

$$1 = \frac{8}{8} = \frac{Q_C}{Q_F} > \frac{Q_C^*}{Q_F^*} = \frac{5}{20} = 0.2$$

4. The food pricing equation is

$$a_{LF}w + a_{TF}r = P_F, w + r = 18, r = 18 - w$$

The U.S. cloth pricing equation under autarky is

$$a_{LC}w^A + a_{TC}r^A = P_C^A, 4w^A + r^A = 24, r^A = 24 - 4w^A$$

The U.S. factor prices that permit both goods to sell at cost under autarky is (show math)

$$w^A = 2, r^A = 16$$

5. The cloth pricing equation under free trade is

$$a_{LC}w + a_{TC}r = P_C, 4w + r = 36, r = 36 - 4w$$

The factor prices that permit both goods to sell at cost under free trade is (show math)

$$w = 6, r = 12$$

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

$$0.125 = \frac{2}{16} = \frac{w^A}{r^A} < \frac{w}{r} = \frac{6}{12} = 0.5$$

6. 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.

$$\hat{w} = 200\% > \hat{P}_C = 50\% > \hat{P}_F = 0\% > \hat{r} = -25\%$$

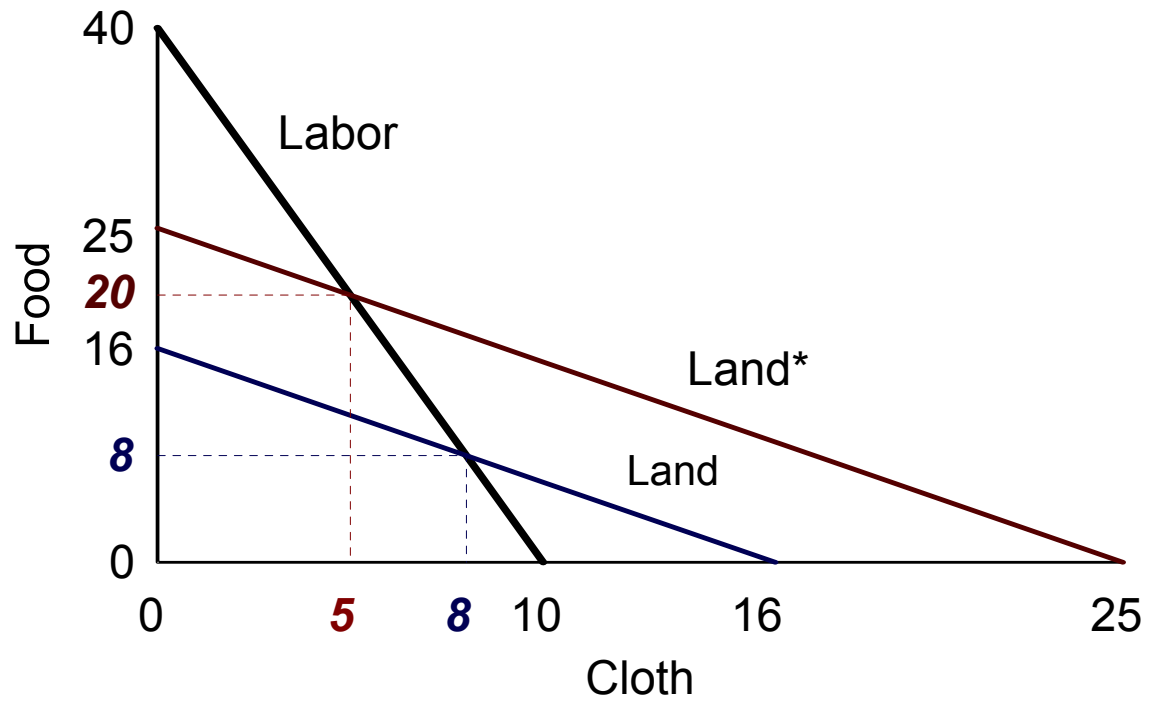
$$\hat{P}_C = \frac{36 - 24}{24} = \frac{12}{24} = \frac{1}{2} = 50\%$$

$$\hat{w} = \frac{6 - 2}{2} = \frac{4}{2} = 200\%$$

$$\hat{r} = \frac{12 - 16}{16} = -\frac{4}{16} = -\frac{1}{4} = -25\%$$

Landlords would oppose because they own the relatively scarce factor in the United States.

Production



Pricing

