First Midterm Exam, Fall 2003

RICARDIAN MODEL

1-4. The United States and Italy engage in free trade in cheese and wine, which are produced with labor. Suppose that the opportunity cost of cheese in terms of wine is lower in the United States than in Italy.

1. Italy must have comparative advantage in
   a. Only cheese
   b. Only wine
   c. Both cheese and wine
   d. Neither cheese nor wine
   e. Would need information about unit labor requirements to know

2. The United States must have comparative advantage in
   a. Only cheese
   b. Only wine
   c. Both cheese and wine
   d. Neither cheese nor wine
   e. Would need information about unit labor requirements to know

3. Italy exports
   a. Only cheese
   b. Only wine
   c. Both cheese and wine
   d. Neither cheese nor wine
   e. Would need information about unit labor requirements to know

4. The United States exports
   a. Only cheese
   b. Only wine
   c. Both cheese and wine
   d. Neither cheese nor wine
   e. Would need information about unit labor requirements to know

5-8 The United States and Italy engage in free trade in cheese and wine, which are produced with labor. The relative price of cheese to wine under free trade is less than the opportunity cost of cheese in terms of wine in Italy but higher than the opportunity cost of cheese in terms of wine in the United States.

5. The United States produces
   a. Only wine
   b. Only cheese
   c. Wine and maybe cheese
   d. Cheese and maybe wine
   e. Neither wine nor cheese

6. Italy produces
   a. Only wine
   b. Only cheese
   c. Wine and maybe cheese
   d. Cheese and maybe wine
   e. Neither wine nor cheese

7. Does the United States gain from trade?
   a. Yes, definitely
   b. No, definitely
   c. Yes, but only if produce just cheese
   d. Yes, but only if produce just wine
   e. Yes, but only if produce both goods

8. Does Italy gain from trade?
   a. Yes, definitely
   b. No, definitely
   c. Yes, but only if produce just cheese
   d. Yes, but only if produce just wine
   e. Yes, but only if produce both goods

SPECIFIC FACTORS MODEL

9-12 Manufacturing uses labor and capital, while agriculture uses labor and land.

9. The curvature of the production possibilities frontier is best attributed to what feature of the specific factors model?
   a. Increasing opportunity costs
   b. Decreasing opportunity costs
   c. Constant opportunity costs
   d. Both a and b
   e. Both b and c

10. An increase in the price of manufactures causes workers to change jobs how?
   a. Seek jobs in manufacturing
   b. Quit jobs in manufacturing
   c. Seek jobs in agriculture
   d. Quit jobs in agriculture
   e. Both a and d

11. If workers move to manufacturing from agriculture, what happens to the marginal product of labor?
   a. Rises in manufacturing
   b. Falls in manufacturing
   c. Rises in agriculture
   d. Falls in agriculture
   e. Both b and c

12. If the value of the marginal product of labor in manufacturing exceeds the wage, what should a manufacturing firm do?
   a. Hire more workers
   b. Fire some workers
   c. Hire more capital
   d. Hire more land
   e. Both b and c

13-16 Agriculture uses labor and land, while manufacturing uses labor and capital. Suppose that when opening up to free trade, the relative price of manufacturing to agriculture rises in the United States and falls in Italy.

13. In the United States, owners of which specific factor or factors are hurt relative to autarky?
    a. Capital
    b. Land
    c. Labor
    d. Both capital and land
    e. Both labor and land

14. In the United States, owners of which specific factor or factors benefit relative to autarky?
    a. Capital
    b. Land
    c. Labor
    d. Both capital and land
    e. Both labor and land

15. In Italy, owners of which specific factor or factors are hurt relative to autarky?
    a. Capital
    b. Land
    c. Labor
    d. Both capital and land
    e. Both labor and land

16. U.S. workers may benefit from or be hurt by an increase in the price of manufacturing because
    a. U.S. capital owners gain more than U.S. land owners lose
    b. U.S. land owners lose more than U.S. capital owners gain
    c. U.S. capital owners lose more than U.S. land owners gain
    d. U.S. land owners gain more than U.S. capital owners lose
    e. The real wage rises in terms of the price of agriculture but falls in terms of the price of manufacturing

PROBLEMS (Ricardian Model)

In the United States, producing one pound of cheese requires two units of labor, while producing one gallon of wine requires one unit of labor. In Italy, producing one pound of cheese requires ten units of labor, while producing one gallon of wine requires two units of labor. The United States has 120 units of labor and Italy has 360 units of labor. World relative demand for cheese to wine is

$$RD \equiv \frac{D_C}{D_W} = \frac{P_W}{P_C}.$$

1. Construct the production possibilities frontier for the United States. Determine the maximum production of cheese and wine. What is the U.S.'s opportunity cost of cheese in terms of wine and where does it appear in the equation describing production possibilities? *Draw graph of U.S. production possibilities frontier.*

2. Construct the production possibilities frontier for Italy. Determine the maximum production of cheese and wine. What is Italy's opportunity cost of cheese in terms of wine? Compare the slopes of the two production possibilities frontiers – which is flatter and why? *Draw graph of Italy's production possibilities frontier .*

3. What is the world relative supply of cheese to wine if each country produces only its comparative advantage good? Construct the world relative supply and world relative demand functions. Find the world equilibrium relative price of cheese in terms of wine under free trade. *Draw graph of world relative supply and world relative demand.*

4. Determine the optimal production bundle for the United States and the optimal production bundle for Italy under free trade. Determine whether the United States and/or Italy gains from trade and explain the source of any gains from trade.

5. Construct the trade possibilities frontier for the United States. Determine the maximum consumption of cheese and wine for the United States under free trade. Where does the free trade relative price of cheese in terms of wine appear in the equation describing trade possibilities? *Draw graph of U.S. trade possibilities frontier on the PPF graph.*

6. Construct the trade possibilities frontier for Italy. Determine the maximum consumption of cheese and wine for Italy under free trade. Compare the slopes of the two trade possibilities frontiers. *Draw graph of Italy's trade possibilities frontier on the PPF graph.*

First Midterm Exam Solutions, Fall 2003

MULTIPLE CHOICE

1b Italy must have comparative advantage in only wine.
2a The United States must have comparative advantage in only cheese.
3b Italy exports only wine, its comparative advantage good.
4a The United States exports only cheese, its comparative advantage good.

5b The United States produces only cheese.
6a Italy produces only wine.
7a Yes, the United States definitely gains from trade.
8a Yes, Italy definitely gains from trade.

9a The curvature of the production possibilities frontier is best attributed to increasing opportunity costs.
10e Workers quit jobs in agriculture and seek jobs in manufacturing.
11e The marginal product of labor rises in agriculture and falls in manufacturing.
12a A firm should hire more workers.

13b In the United States, owners of land suffer relative to autarky.
14a In the United States, owners of capital benefit relative to autarky.
15a In Italy, owners of capital suffer relative to autarky.
16e U.S. workers may benefit or suffer because the real wage rises in terms of the price of agriculture but falls in terms of the price of manufacturing.

PROBLEMS (Ricardian Model)

In the United States, producing one pound of cheese requires two units of labor, while producing one gallon of wine requires one unit of labor. In Italy, producing one pound of cheese requires ten units of labor, while producing one gallon of wine requires two units of labor. The United States has 120 units of labor and Italy has 360 units of labor. World relative demand for cheese to wine is

$$RD \equiv \frac{D_C}{D_W} = \frac{P_W}{P_C}.$$

1. Construct the production possibilities frontier for the United States

$$a_{LC}Q_C + a_{LW}Q_W = L,\ 2Q_C + Q_W = 120,\ Q_W = 120 - 2Q_C$$

Determine the maximum production of cheese and wine.

$$\bar{Q}_C = 60,\ \bar{Q}_W = 120$$

What is the U.S.'s opportunity cost of cheese in terms of wine and where does it appear in the equation describing production possibilities?

$$\frac{a_{LC}}{a_{LW}} = \frac{2}{1} = 2$$

Absolute value of slope of production possibilities frontier

GRAPH OF PRODUCTION POSSIBILITIES FRONTIER: horizontal axis labeled cheese, vertical axis labeled wine; cheese endpoint 60, wine endpoint 120; PPF label

2. Construct the production possibilities frontier for Italy.

$$a_{LC}^{*}Q_C^{*} + a_{LW}^{*}Q_W^{*} = L^{*},\ 10Q_C^{*} + 2Q_W^{*} = 360,\ Q_W^{*} = 180 - 5Q_C^{*}$$

Determine the maximum production of cheese and wine.

$$\bar{Q}_C^{*} = 36,\ \bar{Q}_W^{*} = 180$$

What is Italy's opportunity cost of cheese in terms of wine? Compare the slopes of the two production possibilities frontiers – which is flatter and why?

$$\frac{a_{LC}^{*}}{a_{LW}^{*}} = \frac{10}{2} = 5$$

U.S. production possibilities frontier flatter due to lower opportunity cost of cheese in terms of wine.

$$2 = \frac{a_{LC}}{a_{LW}} < \frac{a_{LC}^{*}}{a_{LW}^{*}} = 5$$

GRAPH OF PRODUCTION POSSIBILITIES FRONTIER*: horizontal axis labeled cheese, vertical axis labeled wine; cheese endpoint 36; wine endpoint 180; PPF* label

3. What is the world relative supply of cheese to wine if each country produces only its comparative advantage good?

$$\tilde{RS} = \frac{\bar{Q}_C}{\bar{Q}_W^{*}} = \frac{60}{180} = \frac{1}{3}$$

Construct the world relative supply and world relative demand functions.

P_C/P_W	RD = P_W/P_C	RS
2	1/2	0 .. 1/3
3	1/3	1/3
5	1/5	1/3 .. ∞

Find the world equilibrium relative price of cheese in terms of wine under free trade.

$$\frac{P_C}{P_W} = 3$$

GRAPH OF RELATIVE DEMAND AND RELATIVE SUPPLY: horizontal axis labeled relative quantity of cheese (to wine), vertical axis labeled relative price of cheese (to wine); first step at 2, second step at 5; jump at 1/3 and free trade relative price 3; other two points on RD; RD label, RS label

4. Determine the optimal production bundle for the United States and the optimal production bundle for Italy under free trade.

$$Q_C = \bar{Q}_C = 60, \; Q_W = 0$$

$$Q_C^* = 0, \; Q_W^* = \bar{Q}_W^* = 180$$

Determine whether the United States and/or Italy gains from trade and explain the source of any gains from trade.

Both countries gain from trade as the free trade relative price differs from both opportunity costs.

5. Construct the trade possibilities frontier for the United States.

$$\frac{P_C}{P_W} D_C + D_W = \frac{P_C}{P_W} \bar{Q}_C, \; 3D_C + D_W = 3(60) = 180, \; D_W = 180 - 3D_C$$

Determine the maximum consumption of cheese and wine for the United States under free trade.

$$\bar{D}_C = 60, \quad \bar{D}_W = 180$$

Where does the free trade relative price of cheese in terms of wine appear in the equation describing trade possibilities?

Absolute value of slope of trade possibilities frontier

GRAPH OF TRADE POSSIBILITIES FRONTIER: cheese endpoint 60; wine endpoint 180; TPF label; position of TPF outside PPF

6. Construct the trade possibilities frontier for Italy.

$$\frac{P_C}{P_W} D_C^* + D_W^* = \bar{Q}_W^*, \; 3D_C^* + D_W^* = 180, \; D_W^* = 180 - 3D_C^*$$

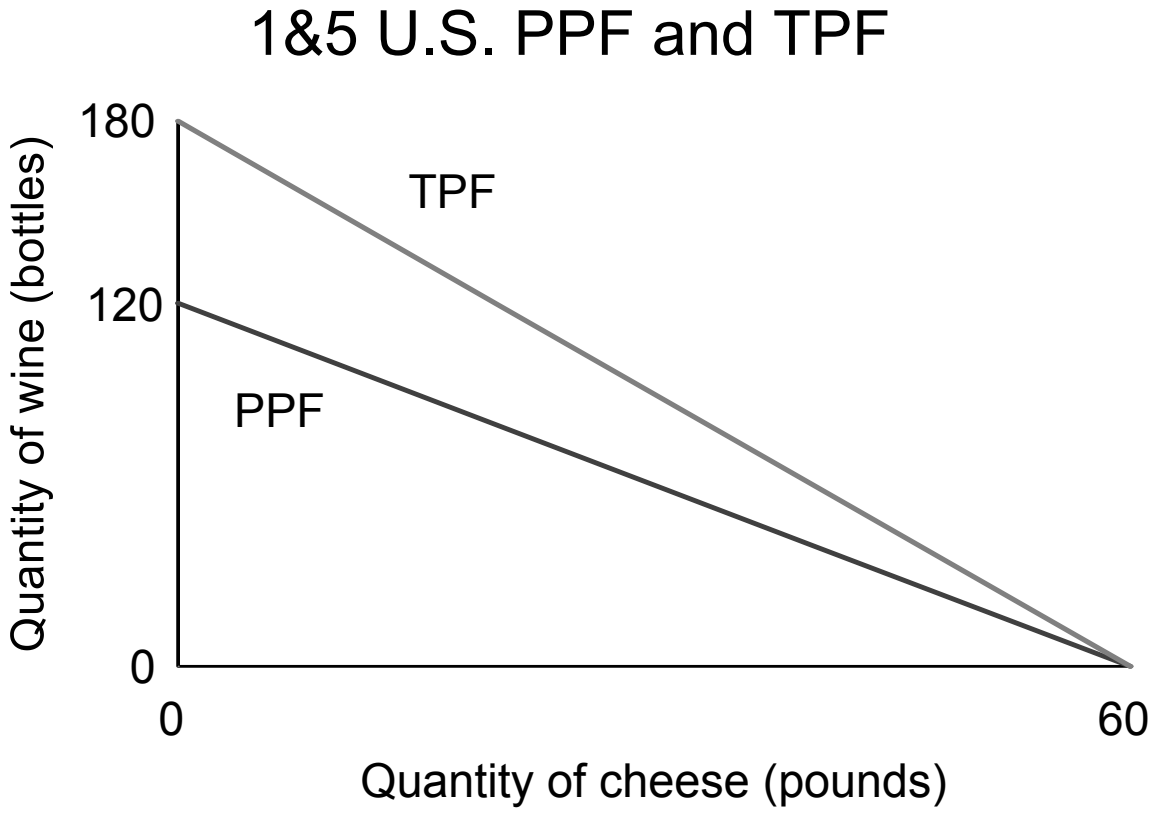
Determine the maximum consumption of cheese and wine for Italy under free trade.

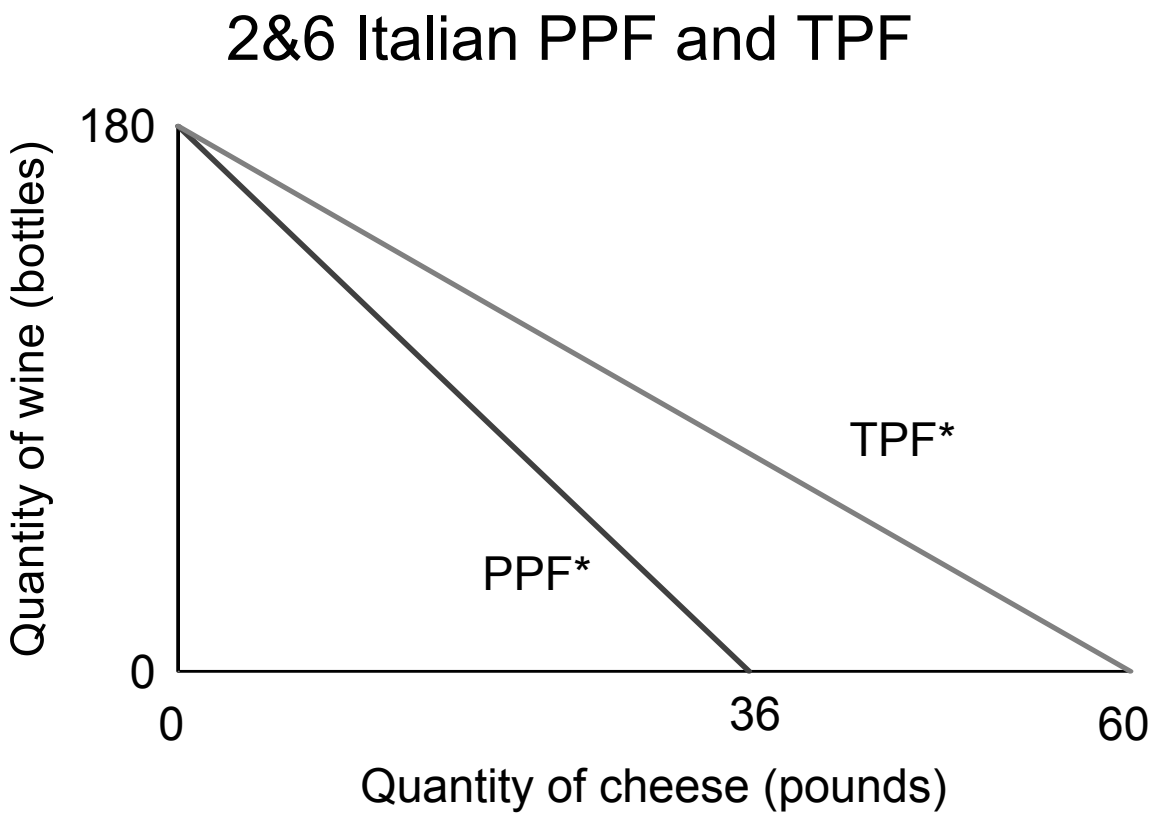
$$\bar{D}_C^* = 60, \quad \bar{D}_W^* = 180$$

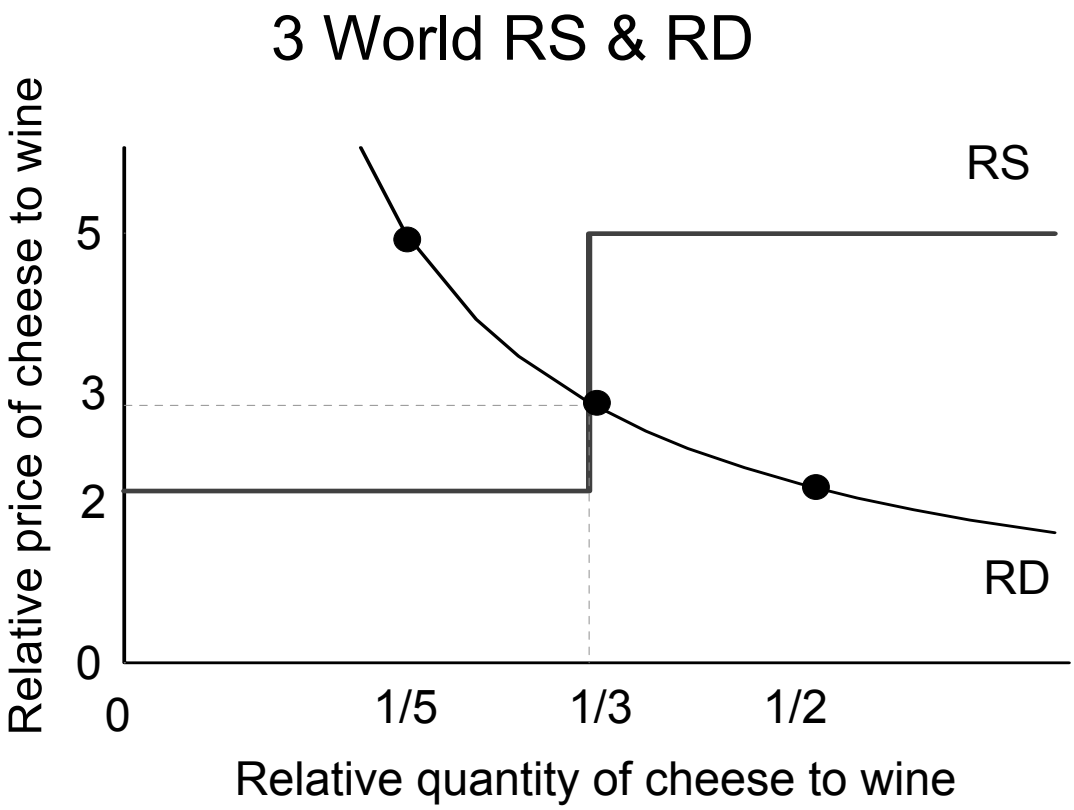
Compare the slopes of the two trade possibilities frontiers.

Same as the two countries face same relative price under free trade

GRAPH OF TRADE POSSIBILITIES FRONTIER*: cheese endpoint 60; wine endpoint 180; TPF* label; position of TPF* outside PPF*


1&5 U.S. PPF and TPF
180
120
0
TPF
PPF
Quantity of wine (bottles)
0
60
Quantity of cheese (pounds)


2&6 Italian PPF and TPF
180
Quantity of wine (bottles)
TPF*
PPF*
0
0
36
60
Quantity of cheese (pounds)


3 World RS & RD
Relative price of cheese to wine
5
3
2
0
0
1/5
1/3
1/2
RS
RD
Relative quantity of cheese to wine