

2. Comparative Advantage and Ricardian Trade

Learning Objectives

- ❑ Develop a broad understanding of comparative advantage and its significance for international trade theory by examination of a simplistic but rigorous analytical model.
- ❑ Use the Ricardian model to begin a formal analysis of common objections to free trade.
- ❑ Become familiar with early empirical evidence on the relevance of the Ricardian model to actual patterns of world trade.

Readings

Paul Krugman and Maruice Obstfeld, International Economics, Theory and Policy, 8th ed. (2009). Chapter 3, “Labor Productivity and Comparative Advantage: The Ricardian Model”.

Students interested in original sources may wish to see:

- ❑ David Ricardo, Principles of Political Economy and Taxation (1817), chapter 7, “On Foreign Trade”. Available at

<http://socserv.mcmaster.ca/econ/ugcm/3l13/ricardo/Principles.pdf>

- ❑ John Stuart Mill, Principles of Political Economy (1848), book 3, chapter 17, “Of International Trade”. Available at

<http://socserv.mcmaster.ca/econ/ugcm/3l13/mill/prin/book3/bk3ch17>

Outline

1. Introduction. This is the simplest of all models of international trade. While Ricardo (1817) is credited with formalizing the principle of comparative advantage, Mill (1848) institutionalized it as part of a formal canon of economic logic. The treatment here is explicit in its assumptions for purposes of understanding the model and its limitations. The basic assumptions are:
 - a. Two economies, two goods
 - b. One production input with constant returns to scale technology.
 - c. Each economy has a fixed supply of the production input, which is homogenous and perfectly mobile between sectors within an economy, but immobile between economies. Thus a single factor price will prevail within each economy.
 - d. No market distortions; competitive markets.
2. Basic model setup. Assumes that one factor of production is used to produce two goods under conditions of constant returns to scale and competitive markets for inputs. For example, assume that the factor of production is labor, L , and the two goods are x and y .

- a_x = number of labor units required to produce one unit of good x
- a_y = number of labor units required to produce one unit of good y
- Q_x = amount of good x produced
- Q_y = amount of good y produced
- L = number of labor units available

The production constraint for the economy is:

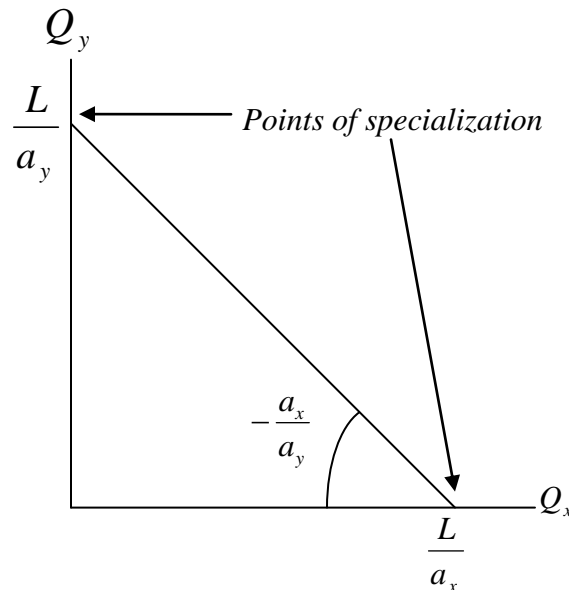
$$a_x Q_x + a_y Q_y \leq L$$

Efficiency in production implies that this production constraint is binding (that the economy produces on the “efficient frontier” of its production possibilities curve). Thus,

$$Q_y = \frac{L}{a_y} - \frac{a_x}{a_y} Q_x$$

This production constraint is illustrated in figure 1. This constraint is the economy’s production possibility frontier. It is also sometimes referred to as the economy’s transformation schedule.

Figure 1



3. Determination of the production allocation depends on relative prices – the public valuation of the goods x and y . Define the wage rate for labor in sector x as w_x , and the wage rate for labor in sector y as w_y . The assumption of competitive markets and the normal profit conditions imply the following:

$$\begin{aligned}\pi_x &= P_x Q_x - w_x Q_x \geq 0 \\ \pi_y &= P_y Q_y - w_y Q_y \geq 0\end{aligned}$$

Therefore,

$$w_x = \frac{P_x}{a_x} \quad \text{and} \quad w_y = \frac{P_y}{a_y}$$

If labor is perfectly mobile between the sectors, then wages equalize across sectors, $w_x = w_y = w$, and production of both goods occurs – the economy engages in “diversified production”. Notice further that if the wage rate is equalized across sectors, the price ratio of the outputs is proportional to the ratio of the technology parameters:

$$\text{If } w_x = w_y = w, \text{ Then } \frac{P_x}{a_x} = \frac{P_y}{a_y}, \quad \text{and} \quad \frac{P_x}{P_y} = \frac{a_x}{a_y}$$

Notice that if $w_x > w_y$, then $\frac{P_x}{a_x} > \frac{P_y}{a_y}$, and $\frac{P_x}{P_y} > \frac{a_x}{a_y}$ (The relative price of x exceeds its opportunity cost. Thus there will be a migration of resources to sector x , and a movement toward specialization in x .) Diversification only occurs when $w_x = w_y = w$.

4. Introducing the possibility of trade. Now let there be two economies – country 1 and country 2. Production in both countries occurs under the conditions just described, but there exist difference in the technology parameters of the two economies.

- a_x = number of labor units required to produce one unit of good x in country 1
- a_x^* = number of labor units required to produce one unit of good x in country 2
- a_y = number of labor units required to produce one unit of good y in country 1
- a_y^* = number of labor units required to produce one unit of good y in country 2
- Q_x = amount of good x produced in country 1
- Q_x^* = amount of good x produced in country 2
- Q_y = amount of good y produced in country 1
- Q_y^* = amount of good y produced in country 2
- L = number of labor units available in country 1
- L^* = number of labor units available in country 2

If production technology differences exist between the countries, then opportunities costs of production will differ:

$$\left\{ \frac{a_x}{a_y}, \frac{a_x^*}{a_y^*} \right\}$$

Notice that if:

$$\frac{a_x}{a_y} < \frac{a_x^*}{a_y^*} \text{ Country 1 possesses comparative advantage in good } x.$$

Then:

$$\frac{a_y}{a_x} > \frac{a_y^*}{a_x^*} \text{ Country 2 possesses comparative advantage in good } y.$$

Under these conditions, it may be shown that trade based upon comparative advantage (each country specializing in the good for which it possesses comparative advantage) can be mutually beneficial. Where there are differences in production technologies, there will be differences in relative prices of the output goods:

$$\text{If } \frac{a_x}{a_y} \neq \frac{a_x^*}{a_y^*}, \text{ Then } \frac{P_x}{P_y} \neq \frac{P_x^*}{P_y^*}$$

Furthermore, with trade, the equilibrium relative price will fall between the pre-trade (autarky) price ratios:

$$\frac{a_x}{a_y} \leq \left(\frac{P_x}{P_y} \right)_e \leq \frac{a_x^*}{a_y^*}$$

5. Gains from trade may be demonstrated in one of two ways:
 - a. Gains from trade via indirect production.
 - b. Gains from trade via expansion of consumption possibilities.
6. Regarding the distributional effects of trade liberalization:
 - a. The distribution of gains from trade *between* countries depends on the relative prices of the goods, which in turn, implies a relative wage rate.
 - b. Because there is only one factor of production, the Ricardian model does not allow analysis of distributional effects of trade liberalization *within* countries.
7. The predictions of the Ricardian model generalize to an economy with n commodities.
8. While many of the predictions of the Ricardian model are unrealistic, empirical evidence generally supports its main prediction that countries will tend to export goods in which they have relatively high productivity.

Assignment 2

Discussion Questions

1. Discuss the following statement: “Malaysian workers earn only \$2.50 an hour; if we allow Malaysia to export as much as it likes to the U.S., our workers will be forced down to the same level. You cannot import a \$5 shirt without importing the \$2.50 wage that goes with it.”
2. Japanese labor productivity is roughly the same as that of the U.S. in the manufacturing sector (higher in some industries, lower in others), while the United States is still considerably more productive in the service sector. But many services are not traded. Some people argue that this poses a problem for the United States, because our comparative advantage lies in things we cannot sell on world markets. Critique this argument.
3. Japan is a very expensive place; although Japanese workers earn about the same as their U.S. counterparts, the purchasing power of their incomes is about one-third less. How does this observation affect your discussion of the previous question?
4. How does the existence of *non-tradable goods* affect the extent of potential gains from trade?

Problem Set

1. Consider the following table on labor hours needed to produce one unit of output for two different goods in two different countries:

	France	Italy
Computers	60	50
Wine	20	25

- a. The opportunity cost of a computer in Italy is _____.
- b. The opportunity cost of a computer in France is _____.
- c. The opportunity cost of one unit of wine in Italy is _____.
- d. The opportunity cost of one unit of wine in France is _____.
- e. Italy possesses comparative advantage in the production of _____.
- f. France possesses comparative advantage in the production of _____.

2. Refer again to the information in #1. Assume that each country has 300,000 units of labor to devote to the production of these two goods.
 - a. If both countries perfectly diversify, France will produce _____ computers and _____ units of wine. Italy will produce _____ computers and _____ units of wine.
 - b. If instead both countries specialize and trade with one another, what is a likely trading price?
 - c. Based on your stated trading price in part (b), construct a post-trade consumption allocation that is a pareto improvement over the allocation in part (a).
3. Consider a world of two countries, Home and Foreign, which can produce goods X and Y using one factor of production, labor. The following information summarizes the technologies and labor endowments of the two countries:

$$a_x = 4 \quad a_x^* = 2 \quad a_y = 6 \quad a_y^* = 8 \quad L = 150 \quad L^* = 200$$

- a. Write out the resource constraints for countries 1 and 2:
 - b. Country 1 has an absolute advantage in production of _____ because ...
 - c. Country 2 has a comparative advantage in production of _____ because ...
4. Assume that the following information describes the technologies and wage rates in two different countries in a Ricardian world:

Good, i	Technology Parameters:	
	Country 1: a_i	Country 2: a_i^*
A	1	9
B	2	6
C	3	18
D	9	6

- a. Show the initial pattern of trade if Country 1's wage rate, $w = 4$, and Country 2's wage rate, $w^* = 1$.
- b. Show how the pattern of trade changes if Country 1's wage rate falls to $w = 2$.
- c. Consider good C, and complete the following:

Under the initial wage regime ($w = 4$, $w^* = 1$), it is cost beneficial to produce good C in the _____, despite its status as a relatively _____-wage country.