

# **Chapter 4**

## **Demand and Supply, Offer Curves, and the Terms of Trade**

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*"The market price of every particular commodity is regulated by the proportion between the quantity which is actually brought to market, and the demand of those who are willing to pay the natural price of the commodity, or the whole value of rent, labor, and profit, which must be paid in order to bring it thither."*

Adam Smith, Wealth of Nations, Book I, Chapter VI.

### **I. Chapter Outline**

- 4.1 Introduction
- 4.2 The Equilibrium Relative Commodity Price with Trade - Partial Equilibrium Analysis
- 4.3 Offer Curves
  - 4.3a Origin and Definition of Offer Curves
  - 4.3b Derivation and Shape of the Offer Curve of Nation 1
  - 4.3c Derivation and Shape of the Offer Curve of Nation 2
- 4.4 The Equilibrium Relative Commodity Price with Trade - General Equilibrium Analysis
- 4.5 Relationship between General and Partial Equilibrium Analysis
- 4.6 The Terms of Trade
  - 4.6a Definition and Measurement of the Terms of Trade
  - 4.6b Illustration of the Terms of Trade
  - 4.6c Usefulness of the Model

### **II. Chapter Summary and Review**

Chapters 2 and 3 established that mutually beneficial trade can occur if the domestic opportunity costs of production prior to trade differ between countries, or equivalently, if relative prices prior to trade differ between countries. As each country specializes in its low-cost good, increasing costs will mean an increase in the price of that good and a decrease in the price of its high-cost good. This means that each country's price ratio will converge and the equilibrium international price ratio will lie somewhere in between the pre-trade relative prices of the two countries. (This will not hold only if demand is such that both countries have to produce the same good in order to meet that demand.) The

equilibrium international price ratio will be one such that the quantity supplied of exports from each country will equal the quantity demanded for those exports by the other country. If the quantities supplied and demanded are not equal, then the international price ratio will change until the quantity supplied equals the quantity demanded.

The equilibrium international price ratio can be shown in two ways. **Partial equilibrium** analysis describes the equilibrium international price ratio by looking at supply and demand in one industry, which assumes that any changes in that industry are not large enough to affect other industries. Partial equilibrium analysis uses the familiar tools of supply and demand to show equilibrium, as demonstrated in Questions 1 and 2 below.

**General equilibrium** analysis considers all industries simultaneously (which is simply two industries in our simple model) in order to capture inter-industry effects within each nation. General equilibrium analysis uses **offer curves** to establish the relative price at which quantity supplied equals quantity demanded for both exports and imports. The offer curve of a nation, also called the **reciprocal demand curve**, shows at each relative price the quantity supplied of exports and the quantity demanded for imports. International equilibrium occurs when the quantity supplied of exports equals the quantity demanded for imports by the other country, or where the offer curves intersect. Offer curves are developed and applied in Questions 3-6 below.

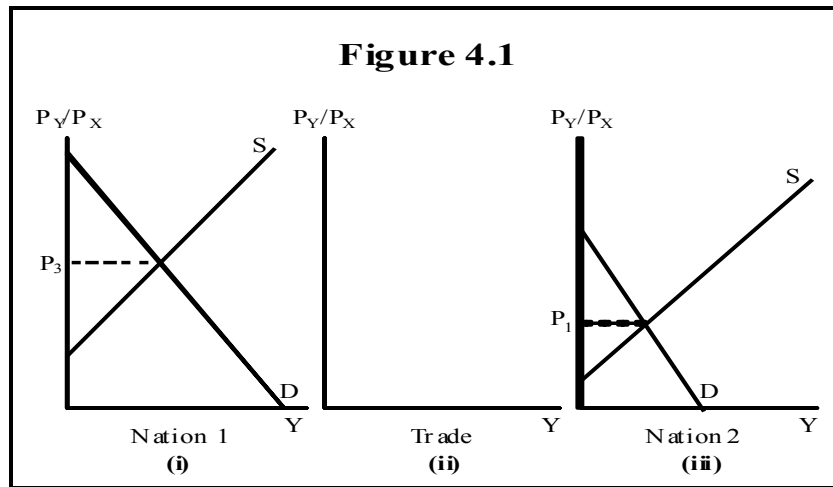
The international price ratio is known as the **terms of trade**. The terms of trade is defined as the ratio of the price of exports to the price of imports. For two trading countries, because one country's imports are another's exports, the terms of trade of one country is just the inverse of the terms of trade of the other.

The terms of trade is simply the price a nation receives for goods sold to its trading partner relative to the price that a nation pays for goods bought from its trading partner. The domestic counterpart of the terms of trade for a private individual is the price of those things sold by the individual divided by the cost of things bought. For labor, work time is sold, so the price of things sold is the nominal wage rate. The things purchased by labor are goods and services, so the price of things bought is the cost of living. Thus, the terms of trade for a private individual is the nominal real wage divided by a price index (cost of living). In this sense, the terms of trade for a nation are comparable to a nation's *international* real wage.

With more than two goods, the terms of trade is expressed as the ratio of a price index of exports to a price index of imports. When expressed in terms of prices, or price indices, the terms of trade represent the rate at which one good can be traded for another. For example, if  $(P_X/P_Y)_{\text{terms of trade}}=3/1$ , then three units of Y can be exchanged for one unit of X. Because the ratio of prices indicates the rate at which goods can be traded, it is called the **net barter, or commodity terms of trade**. Generally speaking, an increase in the terms of trade represents an improvement in a nation's welfare because it means an increased price of exports relative to the price of imports. A nation that earns more from its exports and pays less for its imports will be better off.

### III. Questions

1. a) Use each nation's domestic supply and demand curves for good Y in Fig. 4.1, shown in panels (i) and (iii), to draw the supply of exports and the demand for imports for good Y in panel (ii).



b) For the case shown in Fig. 4.1, will the equilibrium terms of trade lay in between the two nations' price ratios?

c) Which nation has the comparative advantage in good Y?

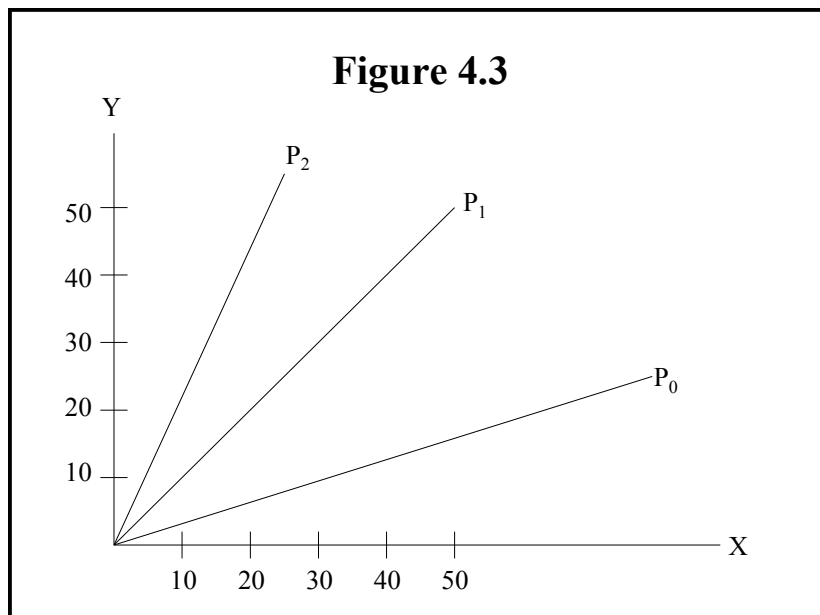
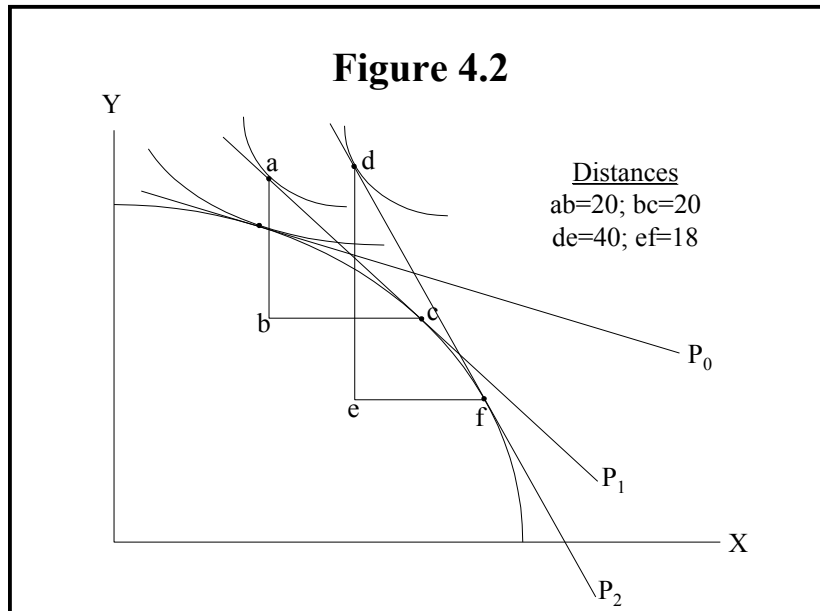
d) Is the demand for imports' schedule flatter or steeper than the domestic demand for the good? Based on the shape of the supply and demand curves in panel (i), explain why.

e) At a price of  $P_3$ , what is the state of the world market for good Y?

2. Suppose that the international market for fresh tomatoes is initially in equilibrium with Italy exporting fresh tomatoes to Greece. Use the supply and demand curves for fresh tomatoes in Greece, Italy, and trade between the two nations to determine the effect of the following events on the equilibrium international relative price of fresh tomatoes and on the equilibrium quantity of fresh tomatoes traded between Italy and Greece.

- a) An increase in demand for tomatoes in Italy
- b) An increase in demand for tomatoes in Greece
- c) Tomato crop failure in Italy
- d) Tomato crop failure in Greece
- e) Recession in both Greece and Italy, which causes the demand for tomatoes in both countries to fall, but leaves supply in both countries unchanged
- f) A per-tomato tax is imposed by the Italian government on growers of the tomatoes
- g) War in Italy and Greece that causes a decrease in the supply of tomatoes in both countries

3. a) The ppf for a country is shown in Fig. 4.2. Based on Fig. 4.2 and the indicated distances, trace out the offer curve in Fig. 4.3.

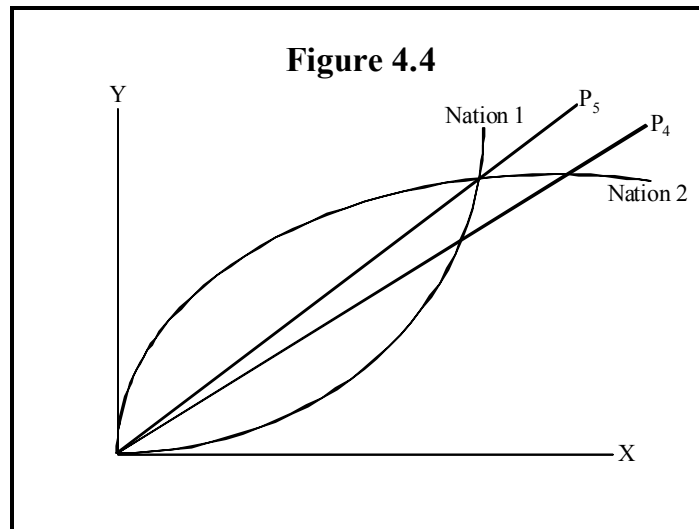


- b) At prices  $P_1$  and  $P_2$ , which good does this country export and which good does this country import?
- c) If the international relative price is  $P_1$ , what is the quantity that this country will

export and what is the quantity that this country will import?

d) Does an increase in the relative price of X from  $P_1$  to  $P_2$ , *ceteris paribus*, improve this country's welfare?

4. The offer curves of Nation 1 and Nation 2 are shown in Fig. 4.4



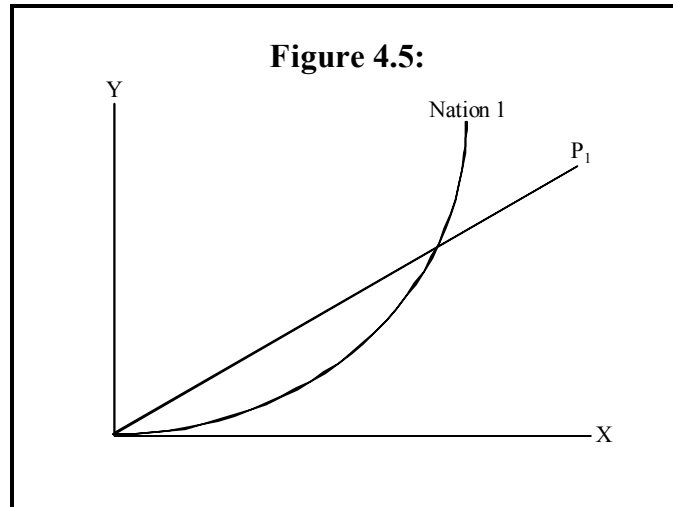
a) Describe the state of the international market for goods Y and X at an international relative price of  $P_4$ , i.e., is there an excess supply, excess demand, or equilibrium in the market for goods Y and X?

b) Based on your answer in part a, what must happen to the price of X relative to the price of Y?

c) Based on b, in which direction must the line labeled  $P_4$  in Fig. 4.4 move?

d) What is the state of the market at an international relative price of  $P_5$ ?

5. What effect will the following have on Nation 1's offer curve in Fig. 4.5? Pick a price, say  $P_1$ , and determine whether Nation 1 will want to export more or less X for a given Y at that price.



a) Nation 1's tastes shift towards good X.

b) Technical advance in Nation 1 in the production of good X.

**6.** a) Based on Question 5a, what effect will Nation 1's shift in tastes towards good X have on its equilibrium terms of trade and the amount of X exported?

b) Based on Question 5b, what effect will Nation 1's technical change in the producing good X have on its equilibrium terms of trade and the amount of X exported?