**CHAPTER 2**

**FOUNDATIONS OF MODERN TRADE THEORY: COMPARATIVE ADVANTAGE**

**SYNOPSIS OF CHAPTER CONTENT**

This chapter focuses on why nations trade with each other, how we determine the gains or benefits to nations from trade, and which factors influence the pattern of each nation's exports and imports.

Beginning in the early 1500s with the period of nation building in Europe, a group known as the **mercantilists** emphasized the benefits to a nation from generating a trade surplus. Such a surplus, an excess of exports over imports, would lead to payments in gold or silver by other nations in order to finance their corresponding trade deficits. These revenues would enable governments to increase domestic spending and output, and also to finance armies committed to defending or expanding national borders or spheres of influence. This perspective reflects a "zero-sum game" view of international trade, with surplus nations gaining at the expense of deficit nations.

David Hume developed a **price-specie-flow doctrine** to show that national use of trade barriers to achieve such trade surpluses would be self-defeating, since the revenue inflows would soon raise domestic price levels, making the nation's exports less competitive and eventually converting the trade surplus into a balanced trade position.

With the publication of Adam Smith's famous *Wealth of Nations* in 1776, the perspective shifted to a "positive-sum game" view of trade, recognizing that trade enables all participating nations to benefit from higher consumption levels. In Smith's model, labor productivities differ from one nation to another. Each nation specializes in producing that item in which it has an **absolute advantage** based on lower labor costs, exporting some of this output in order to import at a lower opportunity cost those items in which other nations have absolute advantages. Such international division of labor according to absolute advantage enables each nation to benefit from lower-cost imports. This result led Smith to advocate policies of free trade to secure such benefits, rather than the restrictive trade policies favored by the mercantilists in order to achieve trade surpluses. An essential insight of Smith's theory is that the gains from trade are consumption benefits in the form of low-cost imports, with exports representing the cost of acquiring such imports rather than something to be valued in themselves as contributing to a trade surplus.

David Ricardo went beyond Adam Smith's analysis to develop the **principle of comparative advantage**, again using a model based on labor productivity. Ricardo's model, however, showed that even a nation that is absolutely less efficient in producing all products can gain by exporting the product in which its absolute disadvantage is least; even the nation with an absolute advantage in all products can gain from importing that product in which its absolute advantage is proportionately least. Stated differently, each nation exports that product in which it has a comparative advantage,and imports that product in which it has a comparative disadvantage. Thus, in a simple two-country, two-product model, a nation with absolute cost disadvantages in both products still can compete effectively in international trade by exporting that product in which it has a comparative advantage. Both nations will benefit by importing those products that can be produced abroad comparatively more efficiently than at home.

The benefits from specialization according to comparative advantage can be demonstrated in examples where nations trade on a barter basis, for instance exchanging bottles of wine for yards of cloth. Without trade, the **barter exchange rate** between wine and cloth in each country reflects the relative productivity of labor in producing wine versus cloth in that country. Wine will be relatively less expensive (in terms of yards of cloth) in that country whose labor productivity gives it a comparative advantage in producing wine. A barter exchange rate between those that would prevail in each country without trade will create an incentive for each country to specialize in production according to its own comparative advantage, and to import from the other country that product in which it has a comparative disadvantage.

In the real world, most of us deal with prices in money rather than barter terms. Simple examples can be modified to show how differing labor productivities will be reflected in relative prices in each country without trade (for instance, the dollar price of a bottle of wine relative to the dollar price of a yard of cloth). Then, in an example involving the United States and the United Kingdom, one can show that for a given set of dollar prices in the United States and pound prices in the United Kingdom, the exchange rate between the dollar and the pound must fall within a certain range in order for trade and specialization according to comparative advantage to appear profitable within each country.

Even such simple models, although static in nature, can be made more dynamic by showing how changing labor productivities over a period of time can eliminate a nation's historical comparative advantage in a particular product or create a new set of comparative advantages among nations, contributing to dramatic changes in trade patterns over time. This also helps to bring out the importance of national government policies as they affect labor productivity and either enhance or alter each nation's comparative advantage in a dynamic context. Incorporating money prices also makes it possible to show how more rapid inflation in one country than in another eventually can price that nation's export products out of the market if the exchange rate does not adjust to reflect this difference in relative inflation rates.

Ricardo's simple model of comparative advantage, because it is based on constant opportunity costs, leads to **complete specialization**, with each nation producing only that product in which it has a comparative advantage and importing all that it consumes of the other product. The vulnerability that this implies might lead nations to use import barriers to preserve domestic production in critical sectors such as agriculture and national defense.

A somewhat more realistic view of international trade emerges when we recognize that the opportunity cost of producing a good is not constant as in the Smith and Ricardo models, but rather increases as more of a particular good is produced. In an example with wheat and auto production, increasing costs would result because resources more suited to wheat production and less suited to auto production would be reallocated as a nation shifted from an emphasis on wheat to a greater emphasis on auto production. The principle of **diminishing marginal productivity** also helps explain the rising unit production costs as more autos are produced.

With increasing costs, a nation's **production possibilities schedule** or **transformation schedule**, showing the production possibilities for wheat and autos, becomes bowed out, in contrast to the straight-line transformation schedules of the Smith and Ricardo models. Thus, the **marginal rate of transformation** (MRT), representing each nation's ability to shift from wheat to auto production, is reflected in the slope of the transformation schedule and thus changes from one point to another along this schedule.

For example, if Canada has a comparative advantage in wheat and the United State in autos, the MRT initially will be steeper for Canada than for the United States, reflecting the higher relative cost of autos in Canada. As trade takes place and specialization begins, the MRT will become flatter for Canada as it moves toward more wheat production, reflecting the increasing relative cost of producing wheat. The MRT for the United States will become steeper with a shift toward more auto production, reflecting the increasing relative cost of producing autos as resources are reallocated from wheat to auto production. For free and balanced trade, the MRT must be the same in Canada as in the United States, and the amount of wheat that Canada wishes to export in exchange for auto imports must equal the amount of wheat that the United States wishes to import. Such an MRT must have a slope somewhere between the initial relatively steep MRT of Canada and the relatively flat MRT of the United States.

A fundamental insight of this more realistic model is that trade leads only to **incomplete specialization**, with each nation continuing to produce some of the product that it imports. For instance, even though wheat becomes relatively more expensive in Canada as the slope of Canada's MRT decreases, the increasing relative cost of wheat production causes firms to reach a point where shifting further resources from auto to wheat production would not be profitable. Similarly, as autos become more expensive in the United States and more autos are produced, firms reach a point where the increasing relative cost of auto production makes a further shifting of resources from wheat to auto production unprofitable. Each nation thus continues to produce some of its import product as it moves toward greater specialization in production for export according to comparative advantage.

The gains from trade take the same form here as in the simpler Ricardian model. Each nation, by specializing in production according to its comparative advantage, is enabled to consume beyond its transformation schedule, potentially consuming both more wheat and more autos than the limits of its own internal production possibilities would permit. The **trade triangle**, connecting each nation's production and consumption points after trade takes place, no longer appears at a corner of the nation's transformation schedule as in the Ricardian model, where each nation specializes completely and where its imports and its consumption of the import product are equivalent. Rather, with increasing costs each nation specializes only incompletely, so the trade triangle originates at an interior point along its transformation schedule and shows that each nation's imports will equal the difference between what it consumes of its import good and what it produces of that item. As before, the trade triangle shows each nation's exports to equal the difference between how much it produces of its comparative advantage product and how much of that item it chooses to consume.

In the Ricardian theory, supply conditions determined that the domestic price line (reflecting the amount of wheat exchanged for a given number of autos) without trade would be steeper for a country with a comparative advantage in wheat than for a country with a comparative advantage in autos. The terms-of-trade line with international trade would fall between these two extremes; it would be flatter than the domestic price line for the first country, inducing it to produce wheat for export in exchange for greater numbers of autos than before trade, and it would be steeper than the domestic price line for the second country, enabling it to purchase more imported wheat for a given number of autos than it could produce internally. The Ricardian analysis was unable to specify the exact position of the terms-of-trade line between these limits, however.

Incorporating the demand side into the analysis enables us to complete this picture, as demonstrated by John Stuart Mill in his **theory of reciprocal demand**. In effect, Mill showed that a country's desire to trade at a given terms of trade would be determined by comparing its optimal production point (the tangency point of the terms-of-trade line with that country's transformation schedule) and its optimal consumption point (the tangency point of the terms-of-trade line with that country's highest attainable indifference curve). If demand patterns (indifference curves) are similar in the two countries, the different pre-trade domestic price line slopes will be determined by the different supply capabilities (transformation schedules) of the two countries. The **equilibrium terms of trade** will then be that terms-of-trade line at which one nation's desired quantity of auto imports will exactly match the other nation's desired quantity of auto exports in exchange for imported wheat.

For two nations of approximately equal size and similar demand patterns, one would expect the equilibrium terms of trade to be about halfway between the pre-trade domestic price ratios of the two nations. In this case the gains from trade would be distributed equally between the two nations. However, if one nation is considerably larger than the other, the equilibrium terms of trade would be quite close to the original domestic price ratio of that nation, in order that both nations desire equal amounts of exports and imports. In effect, the smaller nation in this case would benefit from a more favorable terms of trade and receive most of the gains from trade.

As indicated above, the terms-of-trade ratio frequently is used to measure or estimate a nation's gains from international trade. The most frequently used indicator is the **commodity terms of trade**, or the ratio of a nation's export commodity price to its import commodity price. In the example used earlier, a flatter terms-of-trade line for a wheat-exporting nation would mean that it would give up fewer units of wheat for a given number of imported autos. Essentially, the price of wheat has risen relative to the price of autos, or the nation's commodity terms of trade has improved (in mathematical terms, the commodity terms of trade is the reciprocal or inverse of the slope of the terms-of-trade line). In the real world, where many products rather than only two are traded, a nation's commodity terms of trade is calculated as an index of that nation's export commodity prices relative to an index of its import prices. A rising commodity terms of trade generally signifies that a nation's gains from trade are increasing over time, although a more complete picture of a nation's import capacity requires a consideration not only of export and import prices but also of changes in volume or quantity of that nation's exports.

These simple two-country, two-product models of international trade can be extended to include a large number of products, so that for each country many products can be arranged along a spectrum according to degree of comparative cost. The point along this spectrum separating export from import products depends on relative costs and relative strengths of demand in each country. Similarly, more than two countries can be incorporated; each country continues to export according to its comparative advantage, but more complex triangular or multilateral trading relationships among countries emerge. Thus a nation might export to another nation but import nothing from that particular nation, and trade balance requires only that each nation's global imports and exports be equal, not that it have a "bilateral" trade balance with each trading partner. This point has particular practical significance in light of the current policy focus on the bilateral trade balance between Japan and the United States.

How realistic are these relatively simple comparative advantage models? Several empirical studies have found that export and import trade patterns among nations do correlate well with relative labor productivities, with each nation tending to export those products in which it has relatively high labor productivity. However, the Ricardian model has severe limitations because of its assumption that labor is the only input to production, and extensions to incorporate other relevant factors are required in order to achieve greater realism and predictability.

**KEY CONCEPTS AND TERMS** (Define each concept, and briefly explain its significance.)

Mercantilism

Price-specie-flow mechanism

Absolute advantage

Comparative advantage

Labor theory of value

Complete specialization

Gains from international trade

Terms of trade, barter exchange rate

Transformation schedule, or production possibilities schedule

Marginal rate of transformation

Increasing opportunity costs, diminishing marginal productivity

Partial or incomplete specialization

Trade triangle

Terms-of-trade line

Theory of reciprocal demand

Equilibrium terms of trade

Commodity terms of trade

**TRUE OR FALSE?** (On an exam, be prepared to explain *why* the statement is true or false.)

T F 1. Mercantilists believed that each nation should try to achieve balanced trade, with exports equal to imports.

T F 2. Hume's price-specie-flow doctrine explained why nations would not be able continually to increase their gold holdings through ongoing trade surpluses.

T F 3. Adam Smith believed that the wealth of nations was established primarily through exports used to purchase gold and silver rather than imports.

T F 4. Smith's absolute advantage theory showed that two nations could both gain from trade by exporting products in which their labor productivity was higher than that of the other nation.

T F 5. Ricardo's principle of comparative advantage showed that nations could gain through trade by specializing in production according to comparative advantage, even if one nation had an absolute cost advantage in all products.

T F 6. The transformation schedule for Ricardo's comparative advantage model is bowed out, rather than straight.

T F 7. In Ricardo's comparative model, trade results in complete specialization.

T F 8. With trade between two countries, the equilibrium terms of trade will equal the domestic price ratio that prevailed in the smaller country before trade began.

T F 9. Mill's theory of reciprocal demand shows that the equilibrium terms of trade between two nations depends only on production costs in the two nations.

T F 10. Between two nations of unequal size, most of the gains from trade are likely to go to the smaller nation.

**MULTIPLE CHOICE**

1. In Smith's absolute advantage theory of trade,

a. a country with the absolute advantage in all products eventually will acquire all the gold and silver

b. a country with the absolute advantage will have a large trade surplus

c. both countries will gain from trade if each exports that product for which it has lower labor costs

d. a country will lose its absolute advantage if it does not protect its industry with tariff barriers

2. David Hume's price-specie-flow doctrine demonstrates that

a. the primary goal of trade is to maintain large trade surpluses in order to acquire gold and silver

b. international trade is a "zero-sum game"

c. mercantilist policies will create large gains from trade

d. trade surpluses and the resulting revenue inflows will cause domestic prices to rise, making the trade surpluses temporary rather than permanent

3. Ricardo's principle of comparative advantage shows that

a. trade leads to incomplete specialization

b. even a country with no absolute cost advantage can gain from trade by exporting that product in which its absolute cost disadvantage is relatively least

c. countries with absolute cost advantages will gain more from trade than will those without such cost advantages

d. only countries with comparative advantages will be able to achieve trade surpluses

4. If each worker in Argentina can produce either 3 bushels of wheat or 1 auto, and each worker in Brazil can produce either 4 bushels of wheat or 2 autos,

a. Brazil has an absolute advantage in wheat and autos, and Argentina has no comparative advantage

b. Argentina has an absolute advantage in wheat and autos, and Brazil has no comparative advantage

c. Brazil has an absolute advantage in wheat and autos, but Argentina has a comparative advantage in autos

d. Brazil has an absolute advantage in wheat and autos, but Argentina has a comparative advantage in wheat

5. In Question 4, a barter exchange rate that would bring about mutually beneficial trade between Argentina and Brazil is

a. 3 bushels of wheat for 1 auto

b. 4 bushels of wheat for 2 autos

c. 5 bushels of wheat for 2 autos

d. 3 bushels of wheat for 2 autos

6. A central policy lesson of the principle of comparative advantage is that a nation gains from international trade

a. by generating large export surpluses

b. by gaining access to imports at lower opportunity costs than if it produced those goods domestically

c. if it is larger than its trading partners

1. if it is absolutely more efficient than its trading partners

7. With increasing rather than constant opportunity costs, trade between

nations results in

a. complete specialization and falling production costs within each nation

b. incomplete specialization, with unchanging production costs for exports within each nation

c. incomplete specialization, with the opportunity cost of producing exports rising within each nation

d. incomplete specialization, with the opportunity cost of producing exports falling within each nation

8. Mill's theory of reciprocal demand

a. proved Ricardo's theory of comparative advantage to be wrong

b. provided new support for Adam Smith's theory of absolute advantage

c. showed how both demand and supply must be considered to determine the equilibrium terms of trade between two nations

d. showed that demand rather than supply factors determine a nation's comparative advantage and terms of trade

9. If trade occurs between a larger and a much smaller nation,

a. the larger nation will get most of the gains from trade

b. the smaller nation will get most of the gains from trade

c. the gains from trade will be shared equally

1. trade will benefit only the larger nation

10. Empirical studies of actual international trade patterns

a. support the absolute advantage theory of Adam Smith

b. are fully consistent with Ricardo's comparative advantage theory

c. provide partial support for Ricardo, but find his labor theory of value to have severe limitations

d. find that trade patterns do not correlate in any way with relative labor productivities, as predicted by Ricardo

**PROBLEMS AND SHORT ANSWER QUESTIONS**

1. Use the following example to illustrate Adam Smith's principle of absolute advantage in international trade. Construct transformation or production possibilities frontiers for each country, identify each country's absolute advantage, determine a barter exchange rate that would lead to mutually beneficial trade, construct the trading line for each country to reflect this barter exchange rate, and illustrate potential trade triangles for each country.

Argentina Brazil

Output per worker

Wheat 3 2

Autos 1 2

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Total labor supply 12 12

2. Use the following example to illustrate David Ricardo's principle of comparative advantage, repeating each step of the process outlined in Question 1. Explain also how both countries can gain from trade, even though Brazil has the absolute advantage in both wheat and autos.

Argentina Brazil

Output per worker

Wheat 3 4

Autos 1 2

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Total labor supply 12 12

3. Construct a table showing feasible choices for consumption of wheat and autos in Argentina and in Brazil before trade, and use this table also to show how specialization according to comparative advantage would enable each nation to consume both more wheat and more autos than was possible without trade. [*Hint*: Use the terms of trade that you selected to represent the gains from trade in Question 2 to determine the amount of imports which each nation could acquire for a given level of exports.]

4. Use the graphs that you constructed in Question 2 to show how the comparative advantages of each nation could be reversed if training and education in Argentina dramatically improved its labor productivity in auto production over a 10-year period.

5. Show how the economic gains from trade would be reduced if Argentina decided to use an import quota to protect its auto industry from falling below an output level of 2 cars per year.

6. Use the following pair of examples to illustrate Ricardo's principle of comparative advantage, repeating each step of the process outlined in Question 1.

a. In England, 6 units of labor are required to produce 1 unit of food, while it takes 8 units of labor to produce 1 unit of clothing. Germany can produce 1 unit of food with 2 units of labor and can produce 1 unit of clothing with 4 units of labor. Each country has 48 units of labor available. Which country has the comparative advantage in food? Which country has the comparative advantage in clothing? Give an example of a barter exchange rate between food and clothing that would bring about mutually beneficial trade between England and Germany.

b. In England,1 unit of labor can produce 1/6 unit of food or 1/8 unit of clothing. In Germany 1 unit of labor can produce 1/2 unit of food or 1/4 unit of clothing. Each country has 48 units of labor available. Which country has the comparative advantage in food? Which country has the comparative advantage in clothing? Give an example of a barter exchange rate between food and clothing that would bring about mutually beneficial trade between England and Germany.

Explain why this pair of examples actually represents two different ways of presenting the same information, leading to identical results.

7. Suppose that the curves below represent the transformation or production possibilities for Argentina and Brazil.





a. Explain how these curves reflect increasing rather than constant cost conditions. Why is this likely to occur in the real world?

b. Why is the barter exchange rate between wheat and autos steeper for Argentina than for Brazil? How does this reflect different relative opportunity costs in the two countries?

c. Draw a new terms-of-trade or barter exchange rate line for each country that would represent the potential for mutually beneficial trade. Why must this line have the same slope for both countries?

1. Explain why this terms-of-trade line leads each country to specialize only incompletely according to its comparative advantage. Draw potential trade triangles for each country to illustrate the potential gains from trade. Why must these triangles be the same size for both countries if trade balance is to occur?

8. Suppose that a nation's export price index was 102 in 1990 and 110 in 1992, and that its import price index was 90 in 1990 and 108 in 1992 (1985 = 100). Without making calculations, can you explain what happened to this nation's commodity terms of trade between 1985 and 1990? between 1985 and 1992? Calculate the terms of trade to show what happened to the commodity terms of trade between 1990 and 1992. Explain the significance of these trends.

9. Explain verbally how the simple two-country, two-product Ricardian model of comparative advantage can be extended to explore trade patterns in a world of many countries and many different products.

10. How successful have been the efforts of economists to test empirically the validity of the Ricardian model in the real world? In what ways do the assumptions of this model (for instance, that labor is the only factor of production) limit its explanatory power?

**EXPLORATIONS BEYOND THE CLASSROOM**

1. Search for newspaper or magazine articles that discuss recent developments in a particular nation's export performance, focusing particularly on major export products. What insights can you draw regarding this nation's comparative advantage in international trade?

2. What evidence can you find in recent news articles regarding strategies used by specific countries to strengthen their existing comparative advantages or to develop new comparative advantages in trade?

1. Select a country that has experienced significant economic growth and development over the past 10 or 15 years. Use publications of the International Monetary Fund to explore how this country's current pattern of exports and imports differs from what it was earlier. How does this illustrate significant changes over time in this nation's comparative advantage?

4. Consult a recent issue of the IMF *International Financial Statistics* for examples of countries that have experienced improved terms of trade in recent years, and examples of other countries whose terms of trade have declined recently. Can you find any examples of countries that have experienced increased export earnings despite a declining export price index? Explain how this would be possible.