

OPEN-ECONOMY MACROECONOMICS: BASIC CONCEPTS

LEARNING OBJECTIVES:

By the end of this chapter, students should understand:

- how net exports measure the international flow of goods and services.
- how net foreign investment measures the international flow of capital.
- why net exports must always equal net foreign investment.
- how saving, domestic investment, and net foreign investment are related.
- the meaning of the nominal exchange rate and the real exchange rate.
- purchasing-power parity as a theory of how exchange rates are determined.

KEY POINTS:

1. Net exports are the value of domestic goods and services sold abroad minus the value of foreign goods and services sold domestically. Net foreign investment is the acquisition of foreign assets by domestic residents minus the acquisition of domestic assets by foreigners. Because every international transaction involves an exchange of an asset for a good or service, an economy's net foreign investment always equals its net exports.
2. An economy's saving can be used to finance investment at home or buy assets abroad. Thus, national saving equals domestic investment plus net foreign investment.
3. The nominal exchange rate is the relative price of the currency of two countries, and the real exchange rate is the relative price of the goods and services of two countries. When the nominal exchange rate changes so that each dollar buys more foreign currency, the dollar is said to *appreciate* or *strengthen*. When the nominal exchange rate changes so that each dollar buys less foreign currency, the dollar is said to *depreciate* or *weaken*.
4. According to the theory of purchasing-power parity, a dollar (or a unit of any other currency) should be able to buy the same quantity of goods in all countries. This theory implies that the nominal exchange rate between the currencies of two countries should reflect the price levels in those two countries. As a result, countries with relatively high inflation should have depreciating currencies, and countries with relatively low inflation should have appreciating currencies.

CHAPTER OUTLINE:

- I. We will no longer be assuming that the economy is a closed economy.
 - A. Definition of **Closed Economy**: **an economy that does not interact with other economies in the world.**
 - B. Definition of **Open Economy**: **an economy that interacts freely with other economies around the world.**
- II. The International Flows of Goods and Capital
 - A. The Flow of Goods: Exports, Imports, and Net Exports
 1. Definition of **Exports**: **goods and services that are produced domestically and sold abroad.**
 2. Definition of **Imports**: **goods and services that are produced abroad and sold domestically.**
 3. Definition of **Net Exports**: **the value of a nation's exports minus the value of its imports, also called the trade balance.**

$$NX = \text{Exports} - \text{Imports}$$
 4. Definition of **Trade Balance**: **the value of a nation's exports minus the value of its imports, also called net exports.**
 5. Definition of **Trade Surplus**: **an excess of exports over imports.**
 6. Definition of **Trade Deficit**: **an excess of imports over exports.**
 7. Definition of **Balanced Trade**: **a situation in which exports equal imports.**
 8. Factors that Influence a Country's Exports, Imports, and Net Exports
 - a. The tastes of consumers for domestic and foreign goods.
 - b. The prices of goods at home and abroad.
 - c. The exchange rates at which people can use domestic currency to buy foreign currencies.
 - d. The incomes of consumers at home and abroad.
 - e. The cost of transporting goods from country to country.
 - f. The policies of the government toward international trade.

9. Case Study: The Increasing Openness of the U.S. Economy

Figure 29-1

- a. Figure 29-1 shows the total value of exports and imports (expressed as a percentage of GDP) for the United States since 1950.
- b. Advances in transportation, telecommunications, and technological progress are some of the reasons why international trade has increased over time.
- c. Policymakers around the world have also become more accepting of free trade over time.

B. The Flow of Capital: Net Foreign Investment

1. Definition of **Net Foreign Investment**: the purchase of foreign assets by domestic residents minus the purchase of domestic assets by foreigners.

$$\text{NFI} = \begin{array}{cc} \text{purchases of foreign assets} & - & \text{purchases of domestic assets} \\ \text{by domestic residents} & & \text{by foreigners} \end{array}$$

2. Foreign investment takes two forms.
 - a. Foreign direct investment occurs when a capital investment is owned and operated by a foreign entity.
 - b. Foreign portfolio investment involves an investment that is financed with foreign money but operated by domestic residents.
3. Factors that Influence a Country's Net Foreign Investment
 - a. The real interest rates being paid on foreign assets.
 - b. The real interest rates being paid on domestic assets.
 - c. The perceived economic and political risks of holding assets abroad.
 - d. The government policies that affect foreign ownership of domestic assets.
4. *In the News: It's the 21st Century, Do You Know Where Your Capital Is?*
 - a. High rates of return on foreign assets have attracted buyers from the United States.
 - b. This is an article from *The New York Times* discussing the increase in purchases of foreign stocks and bonds.

C. The Equality of Net Exports and Net Foreign Investment

1. Net exports and net foreign investment each measure a type of imbalance in a world market.
 - a. Net exports measures the imbalance between a country's exports and imports in world markets for goods and services.
 - b. Net foreign investment measures the imbalance between the amount of foreign assets bought by domestic residents and the amount of domestic assets bought by foreigners in world financial markets.

2. For an economy, net exports must be equal to net foreign investment.

$$\text{NFI} = \text{NX}$$

3. Example: Boeing sells some airplanes to a Japanese airline.
 - a. Boeing gives planes to the Japanese firm, and the Japanese firm gives yen to Boeing. Exports have increased (which raises net exports) and the U.S. has acquired some foreign assets in terms of yen (which raises net foreign investment).
 - b. Or, Boeing may exchange its yen for dollars with another entity that wants yen. Suppose an American mutual funds wants to buy some stock in a Japanese company. In this case, Boeing's net export of planes equals the mutual fund's net foreign investment in stock.
 - c. Or, Boeing may exchange its yen with an American firm that wants to buy some good or service from a Japanese company. In this case, the imports will exactly offset the exports, so net exports is unchanged. Note that net foreign investment remains the same as well.
4. Every international transaction involves exchange. When a seller country transfers a good or service to a buyer country, the buyer country gives up some asset to pay for the good or service.
5. Thus, the net value of the goods and services sold by a country (net exports) must equal the net value of the assets acquired (net foreign investment).
6. *In the News: Flows between the Developing South and the Industrial North*
 - a. Many individuals fear that developing countries will flood the world with cheap exports but will not import goods from the industrialized countries. They also fear that a great deal of capital will flow into these countries at the same time.

- b. However, because of the relationship between net exports and net foreign investment, we know that this cannot be the case.
- c. This is an article from *The New York Times* written by economist Paul Krugman explaining these incorrect views.

D. Saving, Investment, and Their Relationship to the International Flows

1. Recall that GDP (Y) is the sum of four components: consumption (C), investment (I), government purchases (G) and net exports (NX).

$$Y = C + I + G + NX$$

2. Recall that national saving is equal to the income of the nation after paying for its consumption and government purchases.

$$S = Y - C - G$$

3. We can rearrange the equation for GDP to get:

$$Y - C - G = I + NX$$

Substituting for the left-hand side, we get:

$$S = I + NX$$

4. Because net exports and net foreign investment are equal, we can rewrite this as:

$$S = I + NFI$$

5. This implies that saving is equal to the sum of domestic investment (I) and net foreign investment (NFI).
6. When an American citizen saves \$1 of his income, that dollar can be used to finance accumulation of domestic capital or it can be used to finance the purchase of capital abroad.
7. Note that, in a closed economy such as the one we assumed earlier (Chapter 25), net foreign investment would equal zero and saving would simply be equal to domestic investment.
8. *Case Study: Are U.S. Trade Deficits a National Problem?*

Figure 29-2

- a. Panel (a) of Figure 29-2 shows national saving and domestic investment for the U.S. as a percentage of GDP since 1965.

- b. Panel (b) of Figure 29-2 shows net foreign investment for the U.S. as a percentage of GDP for the same time period.
- c. Before 1980, domestic investment and national saving were very close, meaning that net foreign investment was small.
- d. National saving fell after 1980 (in part due to large government budget deficits) but domestic investment did not change by as much. This led to a dramatic increase in the size of net foreign investment (in absolute value because it was negative).
- e. Since net foreign investment was negative (indicating that foreigners were buying more U.S. assets than Americans were buying abroad), net exports must have also been negative (indicating that the United States was importing more than it was exporting).
- f. Most economists do not worry about the trade deficit because the real problem here is lower national saving. If net exports were not negative, then net foreign investment would not be either.

III. The Prices for International Transactions: Real and Nominal Exchange Rates

A. Nominal Exchange Rates

1. Definition of **Nominal Exchange Rate**: the rate at which a person can trade the currency of one country for the currency of another.
2. An exchange rate can be expressed in two ways.
 - a. Example: 80 yen per dollar.
 - b. This can also be written as 1/80 dollar (or 0.0125 dollar) per yen.
3. Definition of **Appreciation**: an increase in the value of a currency as measured by the amount of foreign currency it can buy.
4. Definition of **Depreciation**: a decrease in the value of a currency as measured by the amount of foreign currency it can buy.
5. When a currency appreciates, it is said to *strengthen*; when a currency depreciates, it is said to *weaken*.

B. The Real Exchange Rate

1. Definition of **Real Exchange Rate**: the rate at which a person can trade the goods and services of one country for the goods and services of another.

2. Example: A bushel of American rice sells for \$100 and a bushel of Japanese rice sells for 16,000 yen. The nominal exchange rate is 80 yen per dollar.
3. The real exchange rate depends on the nominal exchange rate and on the prices of goods in the two countries measured in the local currencies.

$\text{real exchange rate} = \frac{\text{Nominal exchange rate} \times \text{Domestic price}}{\text{Foreign price}}$
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4. In our example:

$$\text{real exchange rate} = \frac{(80 \text{ yen}/\$1)(\$100/\text{bushel of American rice})}{16,000 \text{ yen/bushel of Japanese rice}}$$

$$\text{real exchange rate} = \frac{8,000 \text{ yen/bushel of American rice}}{16,000 \text{ yen/bushel of Japanese rice}}$$

$$\text{real exchange rate} = 1/2 \text{ bushel of Japanese rice/bushel of American rice.}$$
5. The real exchange rate is a key determinant of how much a country exports and imports.
6. When studying an economy as a whole, economists focus on overall prices instead of the prices of individual goods and services.
 - a. Price indexes are used to measure the level of overall prices.
 - b. Assume that P is the price index for the United States, P^* is a price index for prices abroad, and e is the nominal exchange rate between the U.S. dollar and foreign currencies.

$\text{real exchange rate} = \frac{e \times P}{P^*}$
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7. The real exchange rate measures the price of a basket of goods and services available domestically relative to the price of a basket of goods and services available abroad.
8. A depreciation in the U.S. real exchange rate means that U.S. goods have become cheaper relative to foreign goods. U.S. exports will rise, imports will fall, and net exports will increase.
9. Likewise, an appreciation in the U.S. real exchange rate means that U.S. goods have become more expensive relative to foreign goods. U.S. exports will fall, imports will rise, and net exports will decline.

C. *FYI: The Euro*

1. Many European nations have decided to give up their national currencies and start using a new common currency called the *Euro*.

2. A benefit of a common currency is that it makes trade easier.
3. However, because there is only one currency, there can be only one monetary policy.

IV. A First Theory of Exchange-Rate Determination: Purchasing-Power Parity

- A. Definition of **Purchasing-Power Parity: a theory of exchange rates whereby a unit of any given currency should be able to buy the same quantity of goods in all countries.**
- B. The Basic Logic of Purchasing-Power Parity
 1. The law of one price suggests that a good must sell for the same price in all locations.
 - a. If a good sold for less in one location than another, a person could make a profit by buying the good in the location where it is cheaper and selling it in the location where it is more expensive.
 - b. The process of taking advantage of differences in prices in different markets is called *arbitrage*.
 - c. Note what will happen as people take advantage of the differences in prices. The price in the location where the good is cheaper will rise (because the demand is now higher) and the price in the location where the good was more expensive will fall (because the supply is greater). This will continue until the two prices are equal.
 2. The same logic should apply to currency.
 - a. A U.S. dollar should buy the same quantity of goods and services in the United States and Japan; a Japanese yen should buy the same quantity of goods and services in the United States and Japan.
 - b. Purchasing-power parity suggests that a unit of all currencies must have the same real value in every country.
 - c. If this was not the case, people would take advantage of the profit-making opportunity and this arbitrage would then push the real values of the currencies to equality.
- C. Implications of Purchasing-Power Parity
 1. Purchasing-power parity means that the nominal exchange rate between the currencies of two countries will depend on the price levels in those countries.
 2. If a dollar buys the same amount of goods and services in the United States (where prices are measured in dollars) as it does in Japan (where

prices are measured in yen), then the nominal exchange rate (the number of yen per dollar) must reflect the cost of goods and services in the two countries.

3. Suppose that P is the price of a basket of goods in the United States (measured in dollars), P^* is the price of a basket of goods in Japan (measured in yen), and e is the nominal exchange rate (the number of yen each dollar can buy).

- a. In the United States the purchasing power of \$1 is $1/P$.
- b. In Japan, \$1 can be exchanged for e units of yen, which in turn have the purchasing power of e/P^* .
- c. Purchasing-power parity implies that the two must be equal:

$$1/P = e/P^*$$

- d. Rearranging, we get:

$$1 = (e P) / P^*$$

Note that the left-hand side is a constant and the right-hand side is the real exchange rate. This implies that if the purchasing power of a dollar is always the same at home and abroad, then the real exchange rate cannot change.

- e. We can rearrange again to see that:

$$e = P/P^*$$

This implies that the nominal exchange rate is determined by the ratio of the foreign price level to the domestic price level. This means that nominal exchange rates will change when price levels change.

4. Because the nominal exchange rate depends on the price levels, it must also depend on the money supply and money demand in each country.
 - a. If the central bank increases the supply of money in a country and raises the price level, it also causes the country's currency to depreciate relative to other currencies in the world.
 - b. When a central bank prints a large amount of money, that money loses value both in terms of the goods and services it can buy and in terms of the amount of other currencies it can buy.

5. *Case Study: The Nominal Exchange Rate during a Hyperinflation*

Figure 29-3

- a. Figure 29-3 shows the German money supply, the German price level, and the nominal exchange rate (measured as U.S. cents

per German mark) during the country's hyperinflation in the 1920s.

- b. When the supply of money begins growing, the price level also increases and the German mark depreciates.

D. Limitations of Purchasing-Power Parity

1. Exchange rates do not always move to ensure that a dollar has the same real value in all countries.
2. There are two reasons why the theory of purchasing-power parity does not always hold in practice.
 - a. Many goods are not easily traded (haircuts in Paris versus haircuts in New York). Thus, arbitrage would be too limited to eliminate the difference in prices between the locations.
 - b. Tradable goods are not perfect substitutes when they are produced in different countries (American beer versus German beer). There is no opportunity for arbitrage here, because the price difference reflects the different values the consumer places on the two products.
3. *Case Study: The Hamburger Standard*
 - a. *The Economist*, an international news magazine, occasionally compares the cost of a Big Mac in various countries all around the world.
 - b. Once we have the prices of Big Macs in two countries, we can compute the nominal exchange rate predicted by the theory of purchasing-power parity and compare it with the actual exchange rate.
 - c. In an article from April 1997, it was shown that the exchange rates predicted by the theory were not exactly equal to the actual rates. However, the predicted rates were fairly close to the actual rates.