CHAPTER 31

Open-Economy Macroeconomics: Basic Concepts

When you decide to buy a car, you may compare the latest models offered by Ford and Toyota. When you take your next vacation, you may consider spending it on a beach in Florida or in Mexico. When you start saving for your retirement, you may choose between a mutual fund that buys stock in U.S. companies and one that buys stock in foreign companies. In all these cases, you are participating not just in the U.S. economy but also in economies around the world.

International trade yields clear benefits: Trade allows people to produce what they produce best and to consume the great variety of goods and services produced around the world. Indeed, one of the *Ten Principles of Economics* in Chapter 1 is that trade can make everyone better off. International trade can raise living standards in all countries by allowing each country to specialize in producing those goods and services in which it has a comparative advantage.

So far, our development of macroeconomics has largely ignored the domestic economy's interaction with other economies around the world. For most questions in macroeconomics, international issues are peripheral. For instance, when we discuss the natural rate of unemployment and the causes of inflation, the effects of international trade can safely be ignored. Indeed, to

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closed economy
an economy that does not interact with other economies in the world

open economy
an economy that interacts freely with other economies around the world

keep their models simple, macroeconomists often assume a **closed economy**—an economy that does not interact with other economies.

Yet when macroeconomists study an **open economy**—an economy that interacts freely with other economies around the world—they encounter a whole set of new issues. This chapter and the next provide an introduction to open-economy macroeconomics. We begin in this chapter by discussing the key macroeconomic variables that describe an open economy's interactions in world markets. You may have heard of these variables—exports, imports, the trade balance, and exchange rates—from the news. Our first job is to understand what these data mean. In the next chapter, we develop a model to explain how these variables are determined and how they are affected by various government policies.

31-1 The International Flows of Goods and Capital

An open economy interacts with other economies in two ways: It buys and sells goods and services in world product markets, and it buys and sells capital assets such as stocks and bonds in world financial markets. Here we discuss these two activities and the close relationship between them.

31-1a The Flow of Goods: Exports, Imports, and Net Exports

exports
goods and services produced domestically and sold abroad

imports
goods and services produced abroad and sold domestically

net exports
the value of a nation's exports minus the value of its imports; also called the trade balance

trade balance
the value of a nation's exports minus the value of its imports; also called net exports

trade surplus
an excess of exports over imports

trade deficit
an excess of imports over exports

balanced trade
a situation in which exports equal imports

Exports are goods and services that are produced domestically and sold abroad, and **imports** are goods and services that are produced abroad and sold domestically. When Boeing, the U.S. aircraft manufacturer, builds a plane and sells it to Air France, the sale is an export for the United States and an import for France. When Volvo, the Swedish car manufacturer, makes a car and sells it to a U.S. resident, the sale is an import for the United States and an export for Sweden.

The **net exports** of any country are the difference between the value of its exports and the value of its imports:

$$\text{Net exports} = \text{Value of country's exports} - \text{Value of country's imports.}$$

The Boeing sale raises U.S. net exports, and the Volvo sale reduces U.S. net exports. Because net exports tell us whether a country is, in sum, a seller or a buyer in world markets for goods and services, net exports are also called the **trade balance**. If a country's net exports are positive, its exports are greater than its imports, indicating that the country sells more goods and services abroad than it buys from other countries. In this case, the country is said to run a **trade surplus**. If a country's net exports are negative, its exports are less than its imports, indicating that the country sells fewer goods and services abroad than it buys from other countries. In this case, the country is said to run a **trade deficit**. If a country's net exports are zero, its exports and imports are exactly equal, and the country is said to have **balanced trade**.

In the next chapter, we develop a theory that explains an economy's trade balance, but even at this early stage, it is easy to think of many factors that might influence a country's exports, imports, and net exports. Those factors include the following:

- Consumer tastes for domestic and foreign goods
- The prices of goods at home and abroad
- The exchange rates at which people can use domestic currency to buy foreign currencies

- The incomes of consumers at home and abroad
- The cost of transporting goods from country to country
- Government policies toward international trade

As these factors change, so does the amount of international trade.

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"But we're not just talking about buying a car—we're talking about confronting this country's trade deficit with Japan."

CASE STUDY

THE INCREASING OPENNESS OF THE U.S. ECONOMY

One dramatic change in the U.S. economy over the past six decades has been the increasing importance of international trade and finance. This change is illustrated in Figure 1, which shows the total value of goods and services exported to other countries and imported from other countries expressed as a percentage of gross domestic product. In the 1950s, imports and exports were typically between 4 and 5 percent of GDP. In recent years, they have been about three times that level. The trading partners of the United States include a diverse group of countries. As of 2018, the largest trading partner, as measured by the sum of imports and exports, was China, followed by Canada, Mexico, Japan, Germany, South Korea, and the United Kingdom.

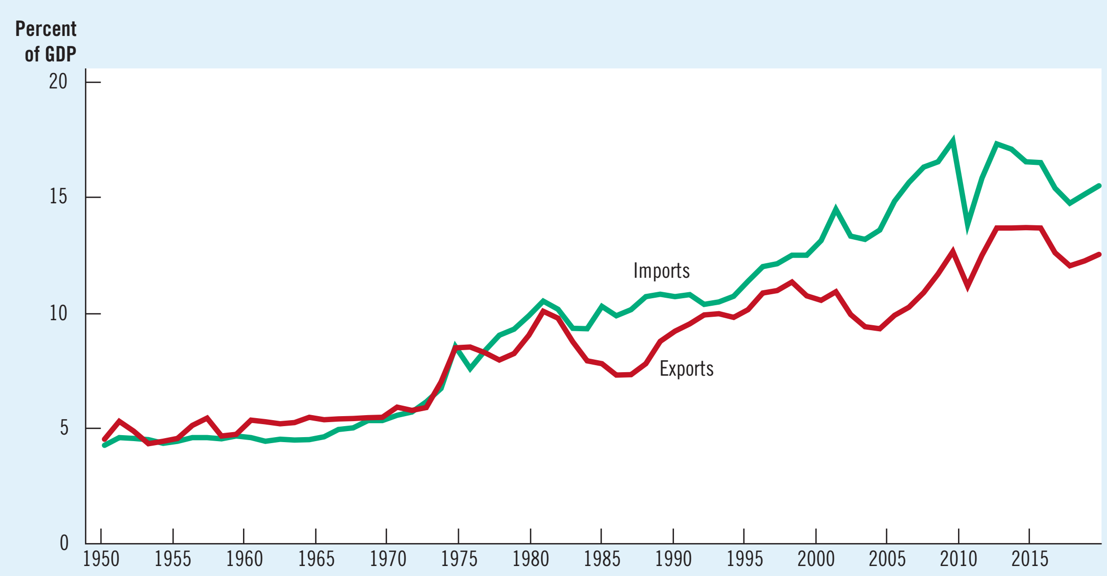
The increase in international trade over the past several decades is partly due to improvements in transportation. In 1950, the average merchant ship carried less than 10,000 tons of cargo; today, many ships carry more than 100,000 tons. The long-distance jet was introduced in 1958 and the wide-body jet in 1967, making air transport far cheaper than it had been previously. These developments

This figure shows exports and imports of the U.S. economy as a percentage of U.S. GDP since 1950. The substantial increases over time show the increasing importance of international trade and finance.

Source: U.S. Department of Commerce.

FIGURE 1

The Internationalization of the U.S. Economy



allow goods that once had to be produced locally to be traded around the world. Cut flowers grown in Israel are flown to the United States to be sold. Fresh fruits and vegetables that can grow in the United States only in summer can now be consumed in winter as well because they can be shipped from countries in the Southern Hemisphere.

The increase in international trade has also been facilitated by advances in telecommunications, which have allowed businesses to reach overseas customers more easily. For example, the first transatlantic telephone cable was not laid until 1956. As recently as 1966, the technology allowed only 138 simultaneous conversations between North America and Europe. Today, because e-mail is such a common form of business communication, it is almost as easy to communicate with a customer across the world as it is to communicate with one across town.

Technological progress has also fostered international trade by changing the kinds of goods that economies produce. When bulky raw materials (such as steel) and perishable goods (such as foodstuffs) were a large part of the world's output, transporting goods was often costly and sometimes impossible. By contrast, goods produced with modern technology are often light and easy to transport. Consumer electronics, for instance, have low weight for every dollar of value, making them easy to produce in one country and sell in another. An even more extreme example is the film industry. Once a studio in Hollywood makes a movie, it can send copies of the film around the world at almost zero cost. And indeed, movies are a major export of the United States.

Governments' trade policies have also been a factor in increasing international trade. As we discussed earlier in this book, economists have long believed that free trade between countries is mutually beneficial. Over time, most policymakers around the world have come to accept these conclusions. International agreements, such as the North American Free Trade Agreement (NAFTA) and the General Agreement on Tariffs and Trade (GATT), have gradually lowered tariffs, import quotas, and other trade barriers. Thus, the pattern of increasing trade illustrated in Figure 1 is a phenomenon that most economists and policymakers have endorsed and encouraged.

As this book was going to press, however, President Donald Trump was challenging these trends. He believes that the United States has failed to benefit from past trade agreements. He has used his authority to impose tariffs on many foreign goods, hoping these tariffs will motivate other nations to renegotiate the trade agreements with terms more favorable to the United States. Whether President Trump's approach will lead to better trade deals or just higher trade barriers remains to be seen. ●

31-1b The Flow of Financial Resources: Net Capital Outflow

So far, we have discussed how residents of an open economy participate in world markets for goods and services. In addition, residents of an open economy participate in world financial markets. A U.S. resident with $25,000 could use that money to buy a car from Toyota or, instead, to buy stock in the Toyota Corporation. The first transaction would represent a flow of goods, whereas the second would represent a flow of capital.

net capital outflow
the purchase of foreign assets by domestic residents minus the purchase of domestic assets by foreigners

The term **net capital outflow** refers to the difference between the purchase of foreign assets by domestic residents and the purchase of domestic assets by foreigners:

$$\text{Net capital outflow} = \text{Purchase of foreign assets by domestic residents}$$
$$- \text{ Purchase of domestic assets by foreigners.}$$

When a U.S. resident buys stock in Petrobras, the Brazilian energy company, the purchase increases the first term on the right side of this equation and, therefore, increases U.S. net capital outflow. When a Japanese resident buys a bond issued by the U.S. government, the purchase increases the second term on the right side of this equation and, therefore, decreases U.S. net capital outflow.

The flow of capital between the U.S. economy and the rest of the world takes two forms: *foreign direct investment* and *foreign portfolio investment*. An example of foreign direct investment is McDonald's opening up a fast-food outlet in Russia. An example of foreign portfolio investment is an American buying stock in a Russian corporation. In the first case, the American owner (McDonald's Corporation) actively manages the investment, whereas in the second case, the American owner (the stockholder) has a more passive role. In both cases, U.S. residents are buying assets located in another country, so both purchases increase U.S. net capital outflow.

The net capital outflow (sometimes called *net foreign investment*) can be either positive or negative. When it is positive, domestic residents are buying more foreign assets than foreigners are buying domestic assets, and capital is said to be flowing out of the country. When the net capital outflow is negative, domestic residents are buying fewer foreign assets than foreigners are buying domestic assets, and capital is said to be flowing into the country. That is, when net capital outflow is negative, a country is experiencing a capital inflow.

We develop a theory to explain net capital outflow in the next chapter. Here let's consider briefly some of the more important variables that influence net capital outflow:

- The real interest rates paid on foreign assets
- The real interest rates paid on domestic assets
- The perceived economic and political risks of holding assets abroad
- The government policies that affect foreign ownership of domestic assets

For example, consider U.S. investors deciding whether to buy Mexican government bonds or U.S. government bonds. (Recall that a bond is, in essence, an IOU of the issuer.) To make this decision, U.S. investors compare the real interest rates offered on the two bonds. The higher a bond's real interest rate, the more attractive it is. While making this comparison, however, U.S. investors must also take into account the risk that one of these governments might default on its debt (that is, not pay interest or principal when it is due), as well as any restrictions that the Mexican government has imposed, or might impose in the future, on foreign investors in Mexico.

31-1c The Equality of Net Exports and Net Capital Outflow

We have seen that an open economy interacts with the rest of the world in two ways—in world markets for goods and services and in world financial markets. Net exports and net capital outflow each measure a type of imbalance in these markets. Net exports measure an imbalance between a country's exports and its imports. Net capital outflow measures an imbalance between the amount of foreign assets bought by domestic residents and the amount of domestic assets bought by foreigners.

An important but subtle fact of accounting states that, for an economy as a whole, net capital outflow (NCO) must always equal net exports (NX):

$$NCO = NX.$$

This equation holds because every transaction that affects one side of this equation affects the other side by exactly the same amount. This equation is an *identity*—an equation that must hold because of how the variables in the equation are defined and measured.

To see why this accounting identity is true, let's consider an example. Imagine that you are a computer programmer residing in the United States. One day, you write some software and sell it to a Japanese consumer for 10,000 yen. The sale of software is an export of the United States, so it increases U.S. net exports. What else happens to ensure that this identity holds? The answer depends on what you do with the 10,000 yen you are paid.

First, let's suppose that you simply stuff the yen in your mattress. (We might say you have a yen for yen.) In this case, you are using some of your income to invest in the Japanese economy. That is, a domestic resident (you) has acquired a foreign asset (the Japanese currency). The increase in U.S. net exports is matched by an increase in the U.S. net capital outflow.

But if you want to invest in the Japanese economy, you probably won't do so by holding on to Japanese currency. More likely, you will use the 10,000 yen to buy stock in a Japanese corporation, or you might buy a Japanese government bond. Yet the result of your decision is much the same: A domestic resident ends up acquiring a foreign asset. The increase in U.S. net capital outflow (the purchase of the Japanese stock or bond) exactly equals the increase in U.S. net exports (the sale of software).

Let's now change the example. Suppose that instead of using the 10,000 yen to buy a Japanese asset, you use it to buy a good made in Japan, such as a Sony TV. As a result of the TV purchase, U.S. imports increase. Together, the software export and the TV import represent balanced trade. Because exports and imports increase by the same amount, net exports are unchanged. In this case, no American ends up acquiring a foreign asset and no foreigner ends up acquiring a U.S. asset, so there is also no impact on U.S. net capital outflow.

A final possibility is that you go to a local bank to exchange your 10,000 yen for U.S. dollars. But this decision doesn't change the situation because the bank now has to do something with the 10,000 yen. It can buy Japanese assets (a U.S. net capital outflow); it can buy a Japanese good (a U.S. import); or it can sell the yen to another American who wants to make such a transaction. In the end, U.S. net exports must equal U.S. net capital outflow.

This example started with a U.S. programmer selling some software abroad, but the story is much the same when Americans buy goods and services from other countries. For example, if Walmart buys $50 million of clothing from China and sells it to American consumers, something must happen to that $50 million. China could use the $50 million to invest in the U.S. economy. This capital inflow from China might take the form of Chinese purchases of U.S. government bonds. In this case, the purchase of the clothing reduces U.S. net exports, and the sale of bonds reduces U.S. net capital outflow. Alternatively, China could use the $50 million to buy a plane from Boeing, the U.S. aircraft manufacturer. In this case, the U.S. import of clothing balances the U.S. export of aircraft, so net exports and net capital outflow are both unchanged. In all cases, the transactions have the same effect on net exports and net capital outflow.

We can summarize these conclusions for the economy as a whole.

- When a nation is running a trade surplus ($NX > 0$), it is selling more goods and services to foreigners than it is buying from them. What is it doing with the foreign currency it receives from the net sale of goods and services abroad? It must be using it to buy foreign assets. Capital is flowing out of the country ($NCO > 0$).

- When a nation is running a trade deficit ($NX < 0$), it is buying more goods and services from foreigners than it is selling to them. How is it financing the net purchase of these goods and services in world markets? It must be selling assets abroad. Capital is flowing into the country ($NCO < 0$).

The international flow of goods and services and the international flow of capital are two sides of the same coin.

31-1d Saving, Investment, and Their Relationship to the International Flows

A nation's saving and investment are crucial to its long-run economic growth. As we saw in an earlier chapter, saving and investment are equal in a closed economy. But matters are not as simple in an open economy. Let's now consider how saving and investment are related to the international flows of goods and capital as measured by net exports and net capital outflow.

As you may recall, the term *net exports* appeared earlier in the book when we discussed the components of gross domestic product. The economy's GDP (denoted Y) is divided among four components: consumption (C), investment (I), government purchases (G), and net exports (NX). We write this as

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

Total expenditure on the economy's output of goods and services is the sum of expenditure on consumption, investment, government purchases, and net exports. Because each dollar of expenditure is placed into one of these four components, this equation is an accounting identity: It must be true because of the way the variables are defined and measured.

Recall that national saving is the income of the nation that is left after paying for current consumption and government purchases. National saving (S) equals $Y - C - G$. If we rearrange the equation to reflect this fact, we obtain

$$\begin{aligned} Y - C - G &= I + NX \\ S &= I + NX. \end{aligned}$$

Because net exports (NX) also equal net capital outflow (NCO), we can write this equation as

$$\begin{array}{ccccc} S & = & I & + & NCO \\ \text{Saving} & = & \begin{array}{c}\text{Domestic}\\ \text{investment}\end{array} & + & \begin{array}{c}\text{Net capital}\\ \text{outflow}\end{array}. \end{array}$$

This equation shows that a nation's saving must equal its domestic investment plus its net capital outflow. In other words, when a U.S. citizen saves a dollar of her income for the future, that dollar can be used to finance the accumulation of domestic capital or it can be used to finance the purchase of foreign capital.

This equation should look somewhat familiar. Earlier in the book, when we analyzed the role of the financial system, we considered this identity for the special case of a closed economy. In a closed economy, net capital outflow is zero ($NCO = 0$), so saving equals investment ($S = I$). By contrast, an open economy has two uses for its saving: domestic investment and net capital outflow.

As before, we can view the financial system as standing between the two sides of this identity. For example, suppose the Garcia family decides to save some of its income for retirement. This decision contributes to national saving, the left side of our equation. If the Garcias deposit their saving in a mutual fund, the mutual fund may use some of the deposit to buy stock issued by General Motors, which uses the proceeds to build a factory in Ohio. In addition, the mutual fund may use some of the Garcias' deposit to buy stock issued by Toyota, which uses the proceeds to build a factory in Osaka. These transactions show up on the right side of the equation. From the standpoint of U.S. accounting, the General Motors expenditure on a new factory is domestic investment, and the purchase of Toyota stock by a U.S. resident is net capital outflow. Thus, all saving in the U.S. economy shows up as investment in the U.S. economy or as U.S. net capital outflow.

The bottom line is that saving, investment, and international capital flows are inextricably linked. When a nation's saving exceeds its domestic investment, its net capital outflow is positive, indicating that the nation is using some of its saving to buy assets abroad. When a nation's domestic investment exceeds its saving, its net capital outflow is negative, indicating that foreigners are financing some of this investment by purchasing domestic assets.

31-1e Summing Up

Table 1 summarizes many of the ideas presented so far in this chapter. It describes the three possibilities for an open economy: a country with a trade deficit, a country with balanced trade, and a country with a trade surplus.

Consider first a country with a trade surplus. By definition, a trade surplus means that the value of exports exceeds the value of imports. Because net exports are exports minus imports, net exports, NX, are positive. As a result, income, $Y = C + I + G + NX$, must be greater than domestic spending, $C + I + G$. But if income, Y, is more than spending, $C + I + G$, then saving, $S = Y - C - G$, must be more than investment, I. Because the country is saving more than it is investing, it must be sending some of its saving abroad. That is, the net capital outflow must be positive.

Similar logic applies to a country with a trade deficit (such as the U.S. economy in recent years). By definition, a trade deficit means that the value of exports is less than the value of imports. Because net exports are exports minus imports, net exports, NX, are negative. Thus, income, $Y = C + I + G + NX$, must be less than domestic spending, $C + I + G$. But if income, Y, is less than spending, $C + I + G$, then saving, $S = Y - C - G$, must be less than investment, I. Because the country is investing more than it is saving, it must be financing some domestic investment by selling assets abroad. That is, the net capital outflow must be negative.

A country with balanced trade falls between these cases. Exports equal imports, so net exports are zero. Income equals domestic spending, and saving equals investment. The net capital outflow equals zero.

TABLE 1

International Flows of Goods and Capital: Summary
This table shows the three possible outcomes for an open economy.

Trade Deficit	Balanced Trade	Trade Surplus
Exports < Imports	Exports = Imports	Exports > Imports
Net Exports < 0	Net Exports = 0	Net Exports > 0
$Y < C + I + G$	$Y = C + I + G$	$Y > C + I + G$
Saving < Investment	Saving = Investment	Saving > Investment
Net Capital Outflow < 0	Net Capital Outflow = 0	Net Capital Outflow > 0

CASE STUDY

IS THE U.S. TRADE DEFICIT A NATIONAL PROBLEM?

You may have heard the press call the United States "the world's largest debtor." The nation earned that description by borrowing heavily in world financial markets during the past four decades to finance large trade deficits. Why did the United States do this, and should this practice give Americans reason to worry?

To answer these questions, let's see what the macroeconomic accounting identities tell us about the U.S. economy. Panel (a) of Figure 2 shows national saving and domestic investment as a percentage of GDP since 1960. Panel (b) shows net

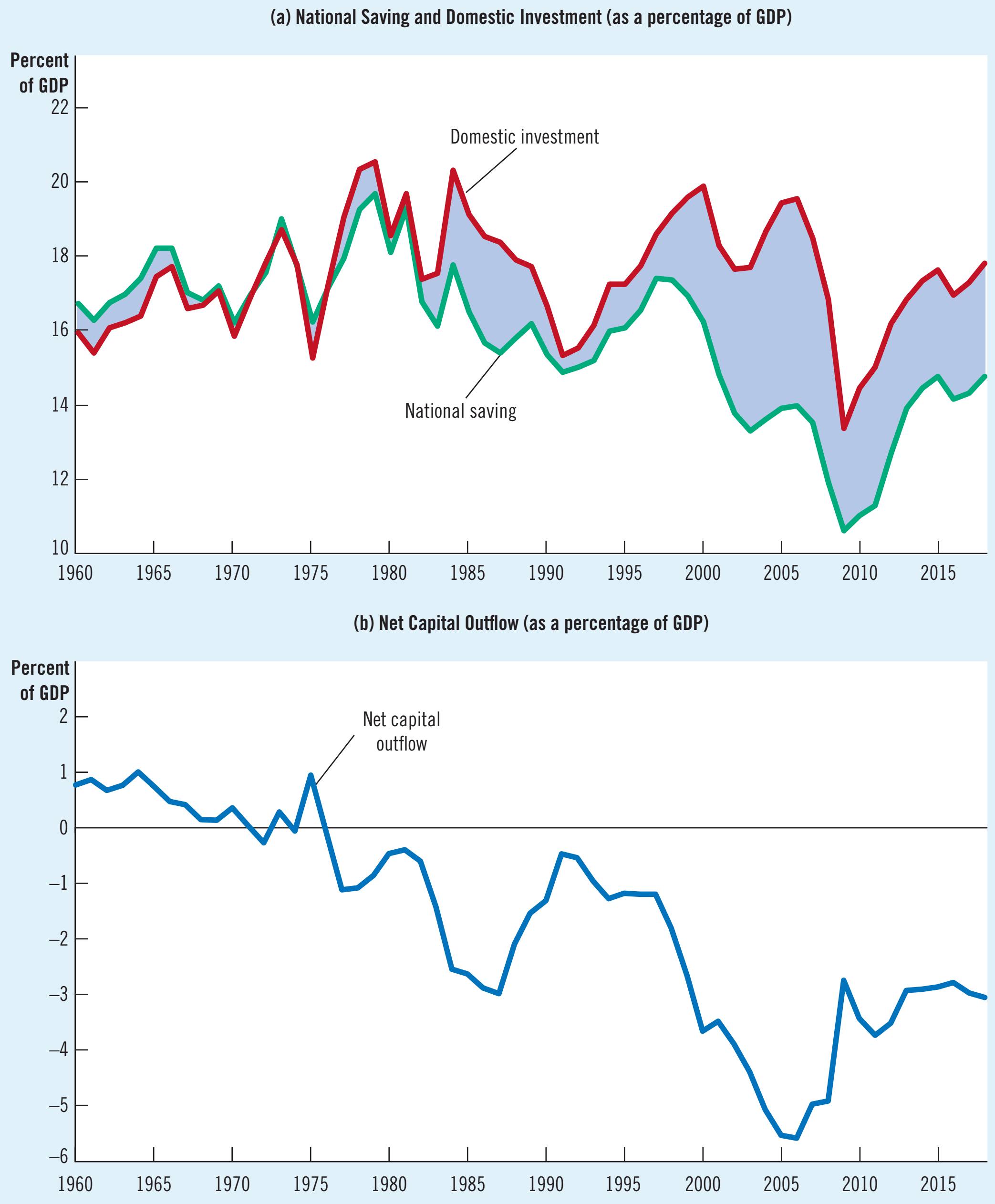


FIGURE 2

National Saving, Domestic Investment, and Net Capital Outflow

Panel (a) shows national saving and domestic investment as a percentage of GDP. Panel (b) shows net capital outflow as a percentage of GDP. You can see from the figure that national saving has been lower since 1980 than it was before 1980. This fall in national saving has been reflected primarily in reduced net capital outflow rather than in reduced domestic investment.

Source: U.S. Department of Commerce.

capital outflow (that is, the trade balance) as a percentage of GDP. Notice that, as the identities require, net capital outflow always equals national saving minus domestic investment. The figure shows that both national saving and domestic investment, as a percentage of GDP, fluctuate substantially over time. Before 1980, they tended to fluctuate together, so the net capital outflow was typically small—between −1 and 1 percent of GDP. Since 1980, national saving has often fallen well below domestic investment, leading to sizable trade deficits and substantial inflows of capital. That is, in recent decades, the net capital outflow has often been a large negative number.

To understand the fluctuations in Figure 2, we need to go beyond these data and discuss the policies and events that influence national saving and domestic investment. History shows that there is no single cause of trade deficits. Rather, they can arise under a variety of circumstances. Here are three prominent historical episodes.

Unbalanced fiscal policy: From 1980 to 1987, the flow of capital into the United States went from 0.5 to 3.0 percent of GDP. This 2.5 percentage point change is largely attributable to a fall in national saving of 2.7 percentage points. This decline in national saving, in turn, is often explained by the decline in public saving—that is, the increase in the government budget deficit. These budget deficits arose because President Ronald Reagan cut taxes and increased defense spending without being able to enact his proposed cuts in nondefense spending.

An investment boom: A different story explains the trade deficits that arose during the following decade. From 1991 to 2000, the capital flow into the United States went from 0.5 to 3.7 percent of GDP. None of this 3.2 percentage point change is attributable to a decline in saving; in fact, saving increased over this time, as the government's budget switched from deficit to surplus. But investment went from 15.3 to 19.8 percent of GDP, as the economy enjoyed a boom in information technology and many firms were eager to make these high-tech investments.

An economic downturn and recovery: During the period from 2000 to 2018, the capital flow into the United States remained large. The consistency of this variable, however, stands in stark contrast to the remarkable changes in saving and investment. From 2000 to 2009, both fell by about 6 percentage points. Investment fell because tough economic times made capital accumulation less profitable, while national saving fell because the government began running extraordinarily large budget deficits in response to the downturn. From 2009 to 2018, as the economy recovered, these forces reversed themselves, and both saving and investment increased by about 4 percentage points.

Are these trade deficits and international capital flows a problem for the U.S. economy? There is no easy answer to this question. One has to evaluate the circumstances and the possible alternatives.

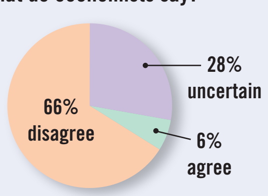
Consider first a trade deficit induced by a fall in saving, as occurred during the 1980s. Lower saving means that the nation is putting away less of its income to provide for its future. Once national saving has fallen, however, there is no reason to deplore

ASK THE EXPERTS

Trade Balances and Trade Negotiations

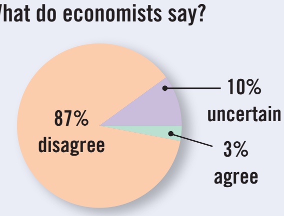
"A typical country can increase its citizens' welfare by enacting policies that would increase its trade surplus (or decrease its trade deficit)."

What do economists say?



"An important reason why many workers in Michigan and Ohio have lost jobs in recent years is because U.S. presidential administrations over the past 30 years have not been tough enough in trade negotiations."

What do economists say?



Source: IGM Economic Experts Panel, December 9, 2014 and March 22, 2016.

the resulting trade deficits. If national saving fell without inducing a trade deficit, investment in the United States would have to fall. This fall in investment, in turn, would adversely affect the growth in the capital stock, labor productivity, and real wages. In other words, once U.S. saving has declined, it is better to have foreigners invest in the U.S. economy than no one at all.

Now consider a trade deficit induced by an investment boom, like the trade deficits of the 1990s. In this case, the economy is borrowing from abroad to finance the purchase of new capital goods. If this additional capital provides a good return in the form of higher production of goods and services, then the economy should be able to handle the debts it has accumulated. On the other hand, if the investment projects fail to yield the expected returns, the debts will look less desirable, at least with the benefit of hindsight.

Just as an individual can go into debt in either a prudent or a profligate manner, so can a nation. A trade deficit is not a problem in itself, but it can sometimes be a symptom of a problem. ●

Quick**Quiz**

1. As a percentage of U.S. GDP, today exports are _________ and imports are _________ than they were in 1950.
   a. higher; higher
   b. lower; lower
   c. higher; lower
   d. lower; higher
2. In an open economy, national saving equals domestic investment
   a. plus the government's budget deficit.
   b. minus the net exports of goods and services.
   c. plus the net outflow of capital.
   d. minus foreign portfolio investment.
3. If the value of a nation's imports exceeds the value of its exports, which of the following is NOT true?
   a. Net exports are negative.
   b. GDP is less than the sum of consumption, investment, and government purchases.
   c. Domestic investment is greater than national saving.
   d. The nation is experiencing a net outflow of capital.

Answers at end of chapter.

31-2 The Prices for International Transactions: Real and Nominal Exchange Rates

So far, we have discussed measures of the flow of goods and services and the flow of capital across a nation's border. In addition to these quantity variables, macroeconomists also study variables that measure the prices at which these international transactions take place. Just as the price in any market serves the important role of coordinating buyers and sellers in that market, international prices help coordinate the decisions of consumers and producers as they interact in world markets. Here we discuss the two most important international prices: the nominal and real exchange rates.

31-2a Nominal Exchange Rates

nominal exchange rate
the rate at which a person can trade the currency of one country for the currency of another

The **nominal exchange rate** is the rate at which a person can trade the currency of one country for the currency of another. For example, when you go to a bank, you might see a posted exchange rate of 80 yen per dollar. If you give the bank

1 U.S. dollar, you will receive 80 Japanese yen in return; and if you give the bank 80 Japanese yen, you will receive 1 U.S. dollar. (In actuality, the bank will post slightly different prices for buying and selling yen. The difference gives the bank some profit for offering this service. For our purposes here, we can ignore these differences.)

An exchange rate can always be expressed in two ways. If the exchange rate is 80 yen per dollar, it is also 1/80 (= 0.0125) dollar per yen. Throughout this book, we always express the nominal exchange rate as units of foreign currency per U.S. dollar, such as 80 yen per dollar.

appreciation
an increase in the value of a currency as measured by the amount of foreign currency it can buy

depreciation
a decrease in the value of a currency as measured by the amount of foreign currency it can buy

If the exchange rate changes so that a dollar buys more foreign currency, that change is called an **appreciation** of the dollar. If the exchange rate changes so that a dollar buys less foreign currency, that change is called a **depreciation** of the dollar. For example, when the exchange rate rises from 80 to 90 yen per dollar, the dollar is said to appreciate. At the same time, because a Japanese yen now buys less of the U.S. currency, the yen is said to depreciate. When the exchange rate falls from 80 to 70 yen per dollar, the dollar is said to depreciate, and the yen is said to appreciate.

At times, you may have heard the media report that the dollar is either "strong" or "weak." These descriptions usually refer to recent changes in the nominal exchange rate. When a currency appreciates, it is said to *strengthen* because it can then buy more foreign currency. Similarly, when a currency depreciates, it is said to *weaken*.

For any country, there are many nominal exchange rates. The U.S. dollar can be used to buy Japanese yen, British pounds, Mexican pesos, and so on. When economists study changes in the exchange rate, they often use indexes that average these many exchange rates. Just as the consumer price index turns the many prices in the economy into a single measure of the price level, an exchange-rate index turns these many exchange rates into a single measure of the international value of a currency. So when economists talk about the dollar appreciating or depreciating, they often are referring to an exchange-rate index that includes many individual exchange rates.

31-2b Real Exchange Rates

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

The **real exchange rate** is the rate at which a person can trade the goods and services of one country for the goods and services of another. For example, if you go shopping and find that a pound of Swiss cheese is twice as expensive as a pound of American cheese, the real exchange rate is ½ pound of Swiss cheese per pound of American cheese. Notice that, like the nominal exchange rate, we express the real exchange rate as units of the foreign item per unit of the domestic item. But in this instance, the item is a good rather than a currency.

Real and nominal exchange rates are closely related. For example, suppose that a bushel of American rice sells for \$100 and a bushel of Japanese rice sells for 16,000 yen. What is the real exchange rate between American and Japanese rice? To answer this question, we must first use the nominal exchange rate to convert the prices into a common currency. If the nominal exchange rate is 80 yen per dollar, then a price for American rice of \$100 per bushel is equivalent to 8,000 yen per bushel. American rice is half as expensive as Japanese rice. The real exchange rate is ½ bushel of Japanese rice per bushel of American rice.

We can summarize this calculation for the real exchange rate with the following formula:

$$\text{Real exchange rate} = \frac{\text{Nominal exchange rate} \times \text{Domestic price}}{\text{Foreign price}}.$$

FYI The Euro

PETER STONE/ALAMY STOCK PHOTO

You may have once heard of, or perhaps even seen, currencies such as the French franc, the German mark, or the Italian lira. These types of money no longer exist. During the 1990s, many European nations decided to give up their national currencies and instead use a common currency called the *euro*. The euro started circulating on January 1, 2002, when 12 nations began using it as their official money. As of 2019, there were 23 nations using the euro. Several European countries, such as the United Kingdom, Sweden, and Denmark, have declined to join these nations and have kept their own currencies.

Monetary policy for the euro area is set by the European Central Bank (ECB), which brings together representatives from all of the participating countries. The ECB issues the euro and controls the supply of this money, much as the Federal Reserve controls the supply of dollars in the U.S. economy.

Why did these countries adopt a common currency? One benefit of a common currency is that it makes trade easier. Imagine if each of the 50 U.S. states had a different currency. Every time you crossed a state border, you would need to change your money and perform the kind of exchange-rate calculations discussed in the text. This exercise would be inconvenient, and it might deter you from buying goods and services outside your own state. The countries of Europe decided that as their economies became more integrated, it would be better to avoid this inconvenience.

To some extent, the adoption of a common currency in Europe was a political decision based on concerns beyond the scope of standard economics. Some advocates of the euro wanted to reduce nationalistic feelings and to make Europeans appreciate more fully their shared history and destiny. A single money for most of the continent, they argued, would help achieve this goal.

There are, however, costs of choosing a common currency. If the nations of Europe have only one money, they can have only one monetary policy. If they disagree about what monetary policy is best, they will have to reach some kind of agreement, rather than each country going its own way. Because adopting a single money has both benefits and costs, there is debate among economists about whether Europe's adoption of the euro was a good decision.

From 2010 to 2015, the euro question heated up as several European nations dealt with various economic difficulties. Greece, in particular, had run up a large government debt and found itself facing possible default. As a result, it had to raise taxes and cut back government spending substantially. Some observers suggested that dealing with these problems would have been easier if the Greek government had had an additional tool—a national monetary policy. The possibility of Greece leaving the euro area and reintroducing its own currency was discussed, but in the end that outcome did not occur. ■

Using the numbers in our example, the formula applies as follows:

$$\begin{aligned}\text{Real exchange rate} &= \frac{(80 \text{ yen/dollar}) \times (\$100\text{/bushel of American rice})}{16{,}000 \text{ yen/bushel of Japanese rice}}\\ &= \frac{8{,}000 \text{ yen/bushel of American rice}}{16{,}000 \text{ yen/bushel of Japanese rice}}\\ &= \tfrac{1}{2} \text{ bushel of Japanese rice/bushel of American rice.}\end{aligned}$$

Thus, 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.

Why does the real exchange rate matter? As you might guess, the real exchange rate is a key determinant of how much a country exports and imports. When Uncle Ben's, Inc., is deciding whether to buy U.S. rice or Japanese rice to put into its boxes, it will ask which rice is cheaper. The real exchange rate gives the answer. As another example, imagine that you are deciding whether to take a seaside vacation in Miami, Florida, or in Cancún, Mexico. You might ask your travel agent the price of a hotel room in Miami (measured in dollars), the price of a hotel room in

Cancún (measured in pesos), and the exchange rate between pesos and dollars. If you decide where to vacation by comparing costs, you are basing your decision on the real exchange rate.

When studying an economy as a whole, macroeconomists focus on overall prices rather than the prices of individual items. That is, to measure the real exchange rate, they use price indexes, such as the consumer price index, which measure the price of a basket of goods and services. By using a price index for a U.S. basket (P), a price index for a foreign basket (P^*), and the nominal exchange rate between the U.S. dollar and foreign currencies (e), we can compute the overall real exchange rate between the United States and other countries as follows:

$$\text{Real exchange rate} = (e \times P)/P^*.$$

This real exchange rate measures the price of a basket of goods and services available domestically relative to a basket of goods and services available abroad.

As we examine more fully in the next chapter, a country's real exchange rate is a key determinant of its net exports of goods and services. A depreciation (fall) in the U.S. real exchange rate means that U.S. goods have become cheaper relative to foreign goods. This change encourages consumers both at home and abroad to buy more U.S. goods and fewer goods from other countries. As a result, U.S. exports rise and U.S. imports fall; both of these changes raise U.S. net exports. Conversely, an appreciation (rise) in the U.S. real exchange rate means that U.S. goods have become more expensive compared to foreign goods, so U.S. net exports fall.

Quick**Quiz**

4. If a nation's currency doubles in value on foreign exchange markets, the currency is said to _________, reflecting a change in the _________ exchange rate.
   a. appreciate; nominal
   b. appreciate; real
   c. depreciate; nominal
   d. depreciate; real

5. If the U.S. dollar appreciates and prices remain the same at home and abroad, foreign goods become _________ expensive relative to American goods, pushing the U.S. trade balance toward _________.
   a. more; surplus
   b. more; deficit
   c. less; surplus
   d. less; deficit

6. The dollar–yen exchange rate falls from 100 to 80 yen per dollar. At the same time, the price level in the United States rises from 180 to 200, and the price level in Japan remains the same. As a result,
   a. American goods have become more expensive relative to Japanese goods.
   b. American goods have become less expensive relative to Japanese goods.
   c. the relative price of American and Japanese goods has not changed.
   d. both American and Japanese goods have become relatively less expensive.

Answers at end of chapter.

31-3 A First Theory of Exchange-Rate Determination: Purchasing-Power Parity

Exchange rates vary substantially over time. In 1970, a U.S. dollar could buy 3.65 German marks or 627 Italian lira. In 1998, as both Germany and Italy were getting ready to adopt the euro as their common currency, a U.S. dollar could buy 1.76 German marks or 1,737 Italian lira. In other words, over this period, the value of the dollar fell by more than half compared to the mark, while it more than doubled compared to the lira.

What explains these large and opposite changes? Economists have developed many models to explain how exchange rates are determined, each emphasizing just some of the many forces at work. Here we develop the simplest theory of exchange rates, called **purchasing-power parity**. This theory states that a unit of any given currency should be able to buy the same quantity of goods in all countries. Many economists believe that purchasing-power parity describes the forces that determine exchange rates in the long run. We now consider the logic on which this long-run theory of exchange rates is based, as well as the theory's implications and limitations.

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

31-3a The Basic Logic of Purchasing-Power Parity

The theory of purchasing-power parity is based on a principle called the *law of one price*. This law asserts that a good must sell for the same price in all locations. Otherwise, there would be opportunities for profit left unexploited. For example, suppose that coffee beans sold for less in Seattle than in Dallas. A person could buy coffee in Seattle for, say, $4 a pound and then sell it in Dallas for $5 a pound, making a profit of $1 per pound from the difference in price. The process of taking advantage of price differences for the same item in different markets is called *arbitrage*. In our example, as people took advantage of this arbitrage opportunity, they would increase the demand for coffee in Seattle and increase the supply in Dallas. The price of coffee would rise in Seattle (in response to greater demand) and fall in Dallas (in response to greater supply). This process would continue until, eventually, the prices were the same in the two markets.

Now consider how the law of one price applies to the international marketplace. If a dollar (or any other currency) could buy more coffee in the United States than in Japan, international traders could profit by buying coffee in the United States and selling it in Japan. This export of coffee from the United States to Japan would drive up the U.S. price of coffee and drive down the Japanese price. Conversely, if a dollar could buy more coffee in Japan than in the United States, traders could buy coffee in Japan and sell it in the United States. This import of coffee into the United States from Japan would drive down the U.S. price of coffee and drive up the Japanese price. In the end, the law of one price tells us that a dollar must buy the same amount of coffee in all countries.

This logic leads us to the theory of purchasing-power parity. According to this theory, a currency must have the same purchasing power in all countries. That is, a U.S. dollar must buy the same quantity of goods in the United States and Japan, and a Japanese yen must buy the same quantity of goods in Japan and the United States. Indeed, the name of this theory describes it well. *Parity* means equality, and *purchasing power* refers to the value of money in terms of the quantity of goods it can buy. *Purchasing-power parity* states that a unit of a currency must have the same real value in every country.

31-3b Implications of Purchasing-Power Parity

What does the theory of purchasing-power parity say about exchange rates? It tells us that the nominal exchange rate between the currencies of two countries depends on the price levels in those countries. If a dollar buys the same quantity of goods in the United States (where prices are measured in dollars) as in Japan (where prices are measured in yen), then the number of yen per dollar must reflect the prices of goods in the United States and Japan. For example, if a pound of coffee costs 500 yen in Japan and \$5 in the United States, then the nominal exchange rate must be 100 yen per dollar (500 yen/\$5 = 100 yen per dollar). Otherwise, the purchasing power of the dollar would not be the same in the two countries.

To see more fully how this works, it is helpful to use just a bit of mathematics. 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 a dollar can buy). Now consider the quantity of goods a dollar can buy at home and abroad. At home, the price level is P, so the purchasing power of \$1 at home is $1/P$. That is, a dollar can buy $1/P$ units of goods. Abroad, a dollar can be exchanged into e units of foreign currency, which in turn have purchasing power e/P^*. For the purchasing power of a dollar to be the same in the two countries, it must be the case that

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

With rearrangement, this equation becomes

$$1 = eP/P^*.$$

Notice that the left side of this equation is a constant and the right side is the real exchange rate. Thus, *if the purchasing power of the dollar is always the same at home and abroad, then the real exchange rate—the relative price of domestic and foreign goods—cannot change.*

To see the implication of this analysis for the nominal exchange rate, we can rearrange the last equation to solve for the nominal exchange rate:

$$e = P^*/P.$$

That is, the nominal exchange rate equals the ratio of the foreign price level (measured in units of the foreign currency) to the domestic price level (measured in units of the domestic currency). *According to the theory of purchasing-power parity, the nominal exchange rate between the currencies of two countries must reflect the price levels in those countries.*

A key implication of this theory is that nominal exchange rates change when price levels change. As we saw in the preceding chapter, the price level in any country adjusts to bring the quantity of money supplied and the quantity of money demanded into balance. Because the nominal exchange rate depends on the price levels, it also depends on the money supply and demand in each country. When a central bank in any country increases the money supply and causes the price level to rise, it also causes that country's currency to depreciate relative to other currencies in the world. In other words, *when the central bank prints large quantities 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*.

We can now answer the question that began this section: Why did the U.S. dollar lose value compared to the German mark and gain value compared to the Italian lira? The answer is that Germany pursued a less inflationary monetary policy than the United States, and Italy pursued a more inflationary monetary policy. From 1970 to 1998, inflation in the United States was 5.3 percent per year. By contrast, inflation was 3.5 percent in Germany and 9.6 percent in Italy. As U.S. prices rose relative to German prices, the value of the dollar fell relative to the mark. Similarly, as U.S. prices fell relative to Italian prices, the value of the dollar rose relative to the lira.

Germany and Italy now have a common currency—the euro. Sharing a currency means that the two countries share a single monetary policy and, as a result, have similar inflation rates. But the historical lessons of the lira and the mark will apply to the euro as well. Whether the U.S. dollar buys more or fewer euros 20 years from now than it does today depends on whether the European Central Bank generates more or less inflation in Europe than the Federal Reserve does in the United States.

CASE STUDY

THE NOMINAL EXCHANGE RATE DURING A HYPERINFLATION

Macroeconomists can only rarely conduct controlled experiments. Most often, they must glean what they can from the natural experiments that history gives them. One natural experiment is hyperinflation—the high inflation that arises when a government turns to the printing press to pay for large amounts of government spending. Because hyperinflations are so extreme, they illustrate some basic economic principles with clarity.

Consider the German hyperinflation of the early 1920s. Figure 3 shows the German money supply, the German price level, and the nominal exchange rate (measured as U.S. cents per German mark) for that period. Notice that these series move closely together. When the supply of money starts growing quickly, the price level also takes off, and the German mark depreciates. When the money supply stabilizes, so do the price level and the exchange rate.

The pattern shown in this figure appears during every hyperinflation. It leaves no doubt that there is a fundamental link among money, prices, and the nominal exchange rate. The quantity theory of money discussed in the previous chapter explains how the money supply affects the price level. The theory of purchasing-power parity discussed here explains how the price level affects the nominal exchange rate. ●

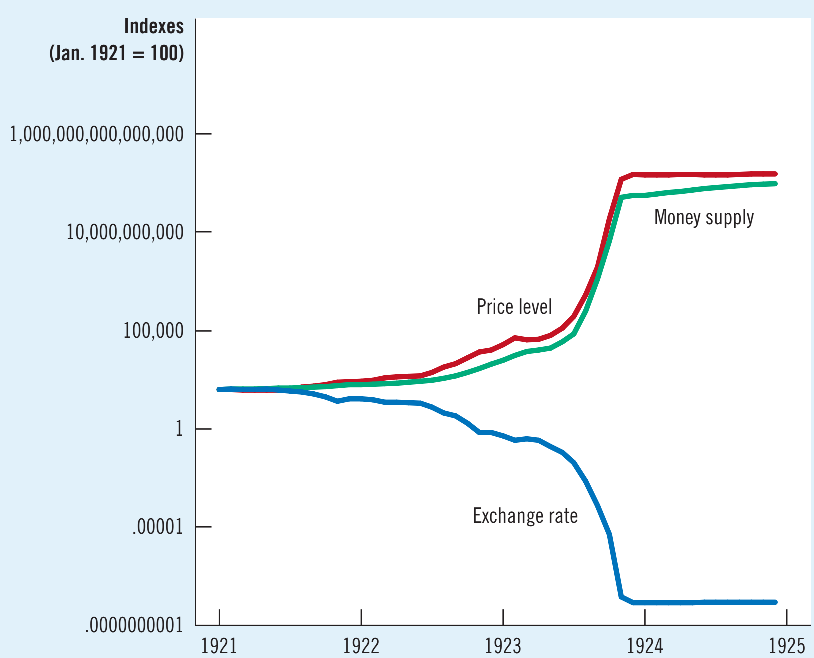


FIGURE 3

Money, Prices, and the Nominal Exchange Rate during the German Hyperinflation
This figure shows the money supply, the price level, and the nominal exchange rate (measured as U.S. cents per mark) for the German hyperinflation from January 1921 to December 1924. Notice how similarly these three variables move. When the quantity of money started growing quickly, the price level followed and the mark depreciated relative to the dollar. When the German central bank stabilized the money supply, the price level and exchange rate stabilized as well.

Source: Adapted from Thomas J. Sargent, "The End of Four Big Inflations," in Robert Hall, ed., *Inflation* (Chicago: University of Chicago Press, 1983), pp. 41–93.

31-3c Limitations of Purchasing-Power Parity

Purchasing-power parity provides a simple model of how exchange rates are determined. For understanding many economic phenomena, the theory works well. In particular, it can explain many long-term trends, such as the depreciation of the U.S. dollar against the German mark and the appreciation of the U.S. dollar against the Italian lira. It can also explain the major changes in exchange rates that occur during hyperinflations.

Yet the theory of purchasing-power parity is not completely accurate. That is, exchange rates do not always move to ensure that a dollar has the same real value in all countries all the time. There are two reasons the theory of purchasing-power parity does not always hold in practice.

The first reason is that many goods are not easily traded. Imagine, for instance, that haircuts are more expensive in Paris than in New York. International travelers might avoid getting their haircuts in Paris, and some haircutters might move from New York to Paris. Yet such arbitrage would be too limited to eliminate the differences in prices. Thus, the deviation from purchasing-power parity might persist, and a dollar (or euro) would continue to buy less of a haircut in Paris than in New York.

The second reason that purchasing-power parity does not always hold is that even tradable goods are not always perfect substitutes when they are produced in different countries. For example, some consumers prefer German cars, and others prefer American cars. Moreover, consumer tastes can change over time. If German cars suddenly become more popular, the increase in demand will drive up the price of German cars relative to American cars. Despite this difference in prices in the two markets, there might be no opportunity for profitable arbitrage because consumers do not view the two cars as equivalent.

Thus, both because some goods are not tradable and because some tradable goods are not perfect substitutes for their foreign counterparts, purchasing-power parity is not a perfect theory of exchange-rate determination. For these reasons, real exchange rates fluctuate over time. Nonetheless, the theory of purchasing-power parity does provide a useful first step in understanding exchange rates. The basic logic is persuasive: As the real exchange rate drifts from the level predicted by purchasing-power parity, people have greater incentive to move goods across national borders. Even if the forces of purchasing-power parity do not completely fix the real exchange rate, they provide a reason to expect that changes in the real exchange rate are most often small or temporary. As a result, large and persistent movements in nominal exchange rates typically reflect changes in price levels at home and abroad.

TESTING/SHUTTERSTOCK.COM

You can find a Big Mac almost anywhere you look.

CASE STUDY

THE HAMBURGER STANDARD

When economists apply the theory of purchasing-power parity to explain exchange rates, they need data on the prices of a basket of goods available in different countries. One analysis of this sort is conducted by *The Economist*, an international newsmagazine. The magazine occasionally collects data on a basket of goods consisting of "two all-beef patties, special sauce, lettuce, cheese, pickles, onions, on a sesame seed bun." It's called the "Big Mac" and is sold by McDonald's around the world.

Once we have the prices of Big Macs in two countries denominated in the local currencies, we can compute the exchange rate predicted by the theory of purchasing-power parity. The predicted exchange rate is the one that makes the cost of a Big Mac the same in the two countries. For instance, if the price of a Big Mac is $5 in the United States and 500 yen in Japan, purchasing-power parity would predict an exchange rate of 100 yen per dollar.

How well does purchasing-power parity work when applied using Big Mac prices? Here are some examples from January 2019, when the price of a Big Mac was $5.58 in the United States:

Country	Price of a Big Mac	Predicted Exchange Rate	Actual Exchange Rate
Indonesia	33,000 rupiah	5,914 rupiah/$	14,090 rupiah/$
South Korea	4,500 won	806 won/$	1,119 won/$
Japan	390 yen	70 yen/$	108 yen/$
Sweden	52 krona	9.3 krona/$	8.9 krona/$
Mexico	49 pesos	8.8 pesos/$	19.3 pesos/$
China	20.9 renminbi	3.7 renminbi/$	6.8 renminbi/$
Euro area	4.05 euros	0.73 euros/$	0.87 euros/$
Britain	3.19 pounds	0.57 pounds/$	0.78 pounds/$

You can see that the predicted and actual exchange rates are not exactly the same. After all, international arbitrage in Big Macs is not easy. Yet the two exchange rates are often in the same ballpark. Purchasing-power parity is not a precise theory of exchange rates, but it can provide a reasonable first approximation. ●

Quick**Quiz**

7. If a cup of coffee costs 2 euros in Paris and $6 in New York and purchasing-power parity holds, what is the exchange rate?
   a. 1/4 euro per dollar
   b. 1/3 euro per dollar
   c. 3 euros per dollar
   d. 4 euros per dollar

8. The theory of purchasing-power parity says that higher inflation in a nation causes the nation's currency to _________, leaving the _________ exchange rate unchanged.
   a. appreciate; nominal
   b. appreciate; real
   c. depreciate; nominal
   d. depreciate; real

Answers at end of chapter.

31-4 Conclusion

The purpose of this chapter has been to develop some basic concepts that macroeconomists use to study open economies. You should now understand how a nation's trade balance is related to the international flow of capital and how national saving can differ from domestic investment in an open economy. You should understand that when a nation is running a trade surplus, it must be sending capital abroad, and that when it is running a trade deficit, it must be experiencing a capital inflow. You should also understand the meaning of the nominal and real exchange rates, as well as the implications and limitations of purchasing-power parity as a theory of how exchange rates are determined.

The macroeconomic variables defined here offer a starting point for analyzing an open economy's interactions with the rest of the world. In the next chapter, we develop a model that can explain what determines these variables. We can then discuss how various events and policies affect a country's trade balance and the rate at which nations make exchanges in world markets.

CHAPTER IN A NUTSHELL

- Net exports are the value of domestic goods and services sold abroad (exports) minus the value of foreign goods and services sold domestically (imports). Net capital outflow is the acquisition of foreign assets by domestic residents (capital outflow) minus the acquisition of domestic assets by foreigners (capital inflow). Because every international transaction involves an exchange of an asset for a good or service, an economy's net capital outflow always equals its net exports.
- An economy's saving can be used either to finance investment at home or to buy assets abroad. Thus, national saving equals domestic investment plus net capital outflow.
- 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*.
- 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 countries. As a result, countries with relatively high inflation should have depreciating currencies, and countries with relatively low inflation should have appreciating currencies.

KEY CONCEPTS

closed economy, p. 640
open economy, p. 640
exports, p. 640
imports, p. 640
net exports, p. 640
trade balance, p. 640
trade surplus, p. 640
trade deficit, p. 640
balanced trade, p. 640
net capital outflow, p. 642
nominal exchange rate, p. 649
appreciation, p. 650
depreciation, p. 650
real exchange rate, p. 650
purchasing-power parity, p. 653

QUESTIONS FOR REVIEW

1. Define *net exports* and *net capital outflow*. Explain how and why they are related.
2. Explain the relationship among saving, investment, and net capital outflow.
3. If a Japanese car costs 1,500,000 yen, a similar American car costs $30,000, and a dollar can buy 100 yen, what are the nominal and real exchange rates?
4. Describe the economic logic behind the theory of purchasing-power parity.
5. If the Fed started printing large quantities of U.S. dollars, what would happen to the number of Japanese yen a dollar could buy? Why?

PROBLEMS AND APPLICATIONS

1. How would the following transactions affect U.S. exports, imports, and net exports?
   a. An American art professor spends the summer touring museums in Europe.
   b. Students in Paris flock to see the latest movie from Hollywood.
   c. Your uncle buys a new Volvo.
   d. The student bookstore at Oxford University in England sells a copy of this textbook.
   e. A Canadian citizen shops at a store in northern Vermont to avoid Canadian sales taxes.
2. Would each of the following transactions be included in U.S. net exports or in U.S. net capital outflow? Indicate whether it would represent an increase or a decrease in that variable.
   a. An American buys a Sony TV.
   b. An American buys a share of Sony stock.
   c. The Sony pension fund buys a bond from the U.S. Treasury.
   d. A worker at a Sony plant in Japan buys some Georgia peaches from an American farmer.

3. Describe the difference between foreign direct investment and foreign portfolio investment. Who is more likely to engage in foreign direct investment—a corporation or an individual investor? Who is more likely to engage in foreign portfolio investment?

4. Explain how the following transactions would affect U.S. net capital outflow. For each transaction, state whether it represents direct investment or portfolio investment.
   a. An American cellular phone company establishes an office in the Czech Republic.
   b. Harrods of London sells stock to the General Motors pension fund.
   c. Honda expands its factory in Marysville, Ohio.
   d. A Fidelity mutual fund sells its Volkswagen stock to a French investor.

5. Would each of the following groups be happy or unhappy if the U.S. dollar appreciated? Explain.
   a. Dutch pension funds holding U.S. government bonds
   b. U.S. manufacturing industries
   c. Australian tourists planning a trip to the United States
   d. an American firm trying to purchase property overseas

6. What is happening to the U.S. real exchange rate in each of the following situations? Explain.
   a. The U.S. nominal exchange rate is unchanged, but prices rise faster in the United States than abroad.
   b. The U.S. nominal exchange rate is unchanged, but prices rise faster abroad than in the United States.
   c. The U.S. nominal exchange rate declines, and prices are unchanged in the United States and abroad.
   d. The U.S. nominal exchange rate declines, and prices rise faster abroad than in the United States.

7. A can of soda costs $1.25 in the United States and 25 pesos in Mexico. What is the peso–dollar exchange rate (measured in pesos per dollar) if purchasing-power parity holds? If a monetary expansion causes all prices in Mexico to double, so that a soda now costs 50 pesos, what happens to the peso–dollar exchange rate?

8. A case study in the chapter analyzed purchasing-power parity using the prices of Big Macs in several countries. Here are data for a few more countries:

Country	Price of a Big Mac	Predicted Exchange Rate	Actual Exchange Rate
Chile	2,640 pesos	_____ pesos/$	679 pesos/$
Hungary	850 forints	_____ forints/$	280 forints/$
Czech Republic	85 korunas	_____ korunas/$	22.3 korunas/$
Brazil	16.9 real	_____ real/$	3.72 real/$
Canada	6.77 C$	_____ C$/$	1.33 C$/$

   a. For each country, compute the predicted exchange rate in terms of the local currency per U.S. dollar. (Recall that the U.S. price of a Big Mac was $5.58.)
   b. According to purchasing-power parity, what is the predicted exchange rate between the Chilean peso and the Canadian dollar? What is the actual exchange rate?
   c. How well does the theory of purchasing-power parity explain exchange rates?

9. Purchasing-power parity holds between the nations of Ectenia and Wiknam, where the only commodity is Spam.
   a. In 2020, a can of Spam costs 4 dollars in Ectenia and 24 pesos in Wiknam. What is the exchange rate between Ectenian dollars and Wiknamian pesos?
   b. Over the next 20 years, inflation is expected to be 3.5 percent per year in Ectenia and 7 percent per year in Wiknam. If this inflation comes to pass, what will the price of Spam and the exchange rate be in 2040? (*Hint*: Recall the rule of 70 from Chapter 27.)
   c. Which of these two nations will likely have a higher nominal interest rate? Why?
   d. A friend of yours suggests a get-rich-quick scheme: Borrow from the nation with the lower nominal interest rate, invest in the nation with the higher nominal interest rate, and profit from the interest-rate differential. Do you see any potential problems with this idea? Explain.

Quick**Quiz Answers**

1. **a** 2. **c** 3. **d** 4. **a** 5. **d** 6. **b** 7. **b** 8. **d**

CHAPTER 32

A Macroeconomic Theory of the Open Economy

Over the past three decades, the United States has consistently imported more goods and services than it has exported. That is, U.S. net exports have been negative. While economists debate whether these trade deficits are a problem for the U.S. economy, the nation's business community often has a strong opinion. Many business leaders claim that the trade deficits reflect unfair competition: Foreign firms are allowed to sell their products in U.S. markets, they contend, while foreign governments impede U.S. firms from selling U.S. products abroad.

Imagine that you are the president and you want to end these trade deficits. What should you do? Should you try to limit imports, perhaps by imposing a tariff on textiles from China or a quota on cars from Japan? Or should you try to address the nation's trade deficit in some other way?

To understand the factors that determine a country's trade balance and how government policies can affect it, we need a macroeconomic theory that explains how an open economy works. The preceding chapter introduced some of the key macroeconomic variables that describe an economy's relationship with other economies, including net exports, net capital outflow,

ISTOCK.COM/LOLOSTOCK; ISTOCK.COM/EUROBANKS and the real and nominal exchange rates. This chapter develops a model that identifies the forces that determine these variables and explains how these variables are related to one another.

To develop this macroeconomic model of an open economy, we build on our previous analysis in two ways. First, the model takes the economy's GDP as given. We assume that the economy's output of goods and services, as measured by real GDP, is determined by the quantities of the factors of production and by the available production technology that turns these inputs into output. Second, the model takes the economy's price level as given. We assume that the price level adjusts to bring the supply and demand for money into balance. In other words, this chapter takes as a starting point the lessons learned in previous chapters about the determination of the economy's output and price level.

The goal of the model in this chapter is to highlight the forces that determine the economy's trade balance and exchange rate. In one sense, the model is simple: It applies the tools of supply and demand to an open economy. Yet the model is also more complex than others we have seen because it involves looking simultaneously at two related markets: the market for loanable funds and the market for foreign-currency exchange. After we develop this model of the open economy, we use it to examine how various events and policies affect the economy's trade balance and exchange rate. We will then be able to determine the government policies that are most likely to reverse the trade deficits that the U.S. economy has experienced over the past three decades.

32-1 Supply and Demand for Loanable Funds and for Foreign-Currency Exchange

To understand the forces at work in an open economy, we focus on supply and demand in two markets. The first is the market for loanable funds, which coordinates the economy's saving, investment, and flow of loanable funds abroad (called the net capital outflow). The second is the market for foreign-currency exchange, which coordinates people who want to exchange the domestic currency for the currency of other countries. In this section, we discuss supply and demand in each of these markets separately. In the next section, we put these markets together to explain the overall equilibrium for an open economy.

32-1a The Market for Loanable Funds

When we first analyzed the role of the financial system in Chapter 26, we made the simplifying assumption that the financial system consists of only one market, called the *market for loanable funds*. All savers go to this market to deposit their saving, and all borrowers go to this market to get their loans. In this market, there is one interest rate, which is both the return to saving and the cost of borrowing.

To understand the market for loanable funds in an open economy, the place to start is the identity discussed in the preceding chapter:

$$\begin{array}{ccccc} S & = & I & + & NCO \\ \text{Saving} & = & \begin{array}{c}\text{Domestic}\\ \text{investment}\end{array} & + & \begin{array}{c}\text{Net capital}\\ \text{outflow}\end{array}. \end{array}$$

Whenever a nation saves a dollar of its income, it can use that dollar to finance the purchase of domestic capital or to finance the purchase of an asset abroad. The two sides of this identity represent the two sides of the market for loanable funds. The supply of loanable funds comes from national saving (*S*), and the demand for loanable funds comes from domestic investment (*I*) and net capital outflow (*NCO*).

Loanable funds should be interpreted as the domestically generated flow of resources available for capital accumulation. The purchase of a capital asset adds to the demand for loanable funds, regardless of whether that asset is located at home (*I*) or abroad (*NCO*). Because net capital outflow can be either positive or negative, it can either add to or subtract from the demand for loanable funds that arises from domestic investment. When $NCO > 0$, the country is experiencing a net outflow of capital; the net purchase of capital overseas adds to the demand for domestically generated loanable funds. When $NCO < 0$, the country is experiencing a net inflow of capital; the capital resources coming from abroad reduce the demand for domestically generated loanable funds.

As we learned in our earlier discussion of the market for loanable funds, the quantity of loanable funds supplied and the quantity of loanable funds demanded depend on the real interest rate. A higher real interest rate means a higher return to saving, which encourages people to save and therefore raises the quantity of loanable funds supplied. A higher interest rate also means a higher cost of borrowing to finance capital projects, which discourages investment and reduces the quantity of loanable funds demanded.

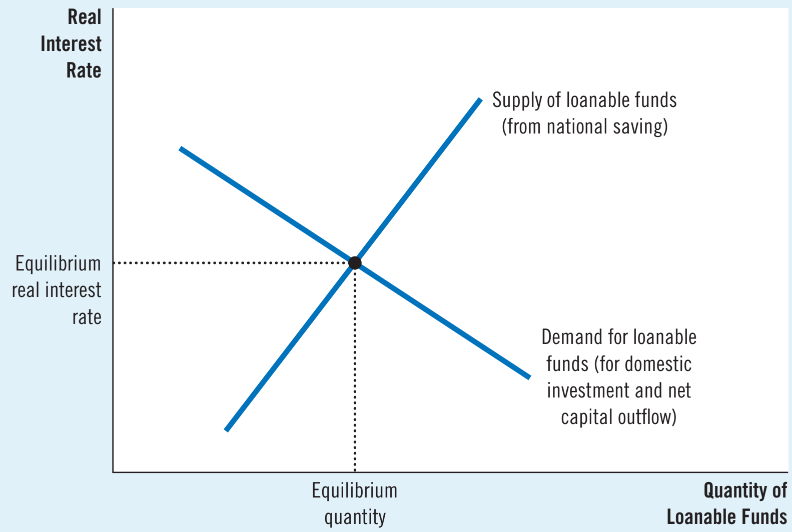
In addition to influencing national saving and domestic investment, a country's real interest rate affects its net capital outflow. To see why, consider two mutual funds—one in the United States and one in Germany—deciding whether to buy a U.S. government bond or a German government bond. Each mutual fund manager would make this decision in part by comparing the real interest rates in the United States and Germany. When the U.S. real interest rate rises, the U.S. bond becomes more attractive to both mutual funds. Thus, an increase in the U.S. real interest rate discourages Americans from buying foreign assets and encourages foreigners to buy U.S. assets. For both reasons, a rise in the U.S. real interest rate reduces U.S. net capital outflow.

We illustrate the market for loanable funds using the familiar supply-and-demand diagram in Figure 1. As in our earlier analysis of the financial system, the supply curve slopes upward because a higher interest rate increases the quantity of loanable funds supplied, and the demand curve slopes downward because a higher interest rate decreases the quantity of loanable funds demanded. Unlike the situation in our previous discussion, however, the demand side of the market now represents both domestic investment and net capital outflow. That is, in an open economy, the demand for loanable funds comes not only from those who want loanable funds to buy domestic capital goods but also from those who want loanable funds to buy foreign assets.

The interest rate adjusts to bring the supply and demand for loanable funds into balance. If the interest rate were below the equilibrium level, the quantity of loanable funds supplied would be less than the quantity demanded. The resulting shortage of loanable funds would push the interest rate upward. Conversely, if the interest rate were above the equilibrium level, the quantity of loanable funds supplied would exceed the quantity demanded. The surplus of loanable funds would drive the interest rate downward. At the equilibrium interest rate, the supply of

FIGURE 1

The Market for Loanable Funds
The interest rate in an open economy, as in a closed economy, is determined by the supply and demand for loanable funds. National saving is the source of the supply of loanable funds. Domestic investment and net capital outflow are the sources of the demand for loanable funds. At the equilibrium interest rate, the amount that people want to save exactly balances the amount that people want to borrow for the purpose of buying domestic capital and foreign assets.



loanable funds exactly balances the demand. In other words, *at the equilibrium interest rate, the amount that people want to save exactly balances the desired quantities of domestic investment and net capital outflow*.

32-1b The Market for Foreign-Currency Exchange

The second market in our model of the open economy is the market for foreign-currency exchange. Participants in this market trade U.S. dollars in exchange for foreign currencies. To understand the market for foreign-currency exchange, we begin with another identity from the last chapter:

$$\begin{array}{ccc} NCO & = & NX \\ \text{Net capital outflow} & = & \text{Net exports.} \end{array}$$

This identity states that the imbalance between the purchase and sale of capital assets abroad (*NCO*) equals the imbalance between exports and imports of goods and services (*NX*). For example, when the U.S. economy is running a trade surplus ($NX > 0$), foreigners are buying more U.S. goods and services than Americans are buying foreign goods and services. What are Americans doing with the foreign currency they are getting from this net sale of goods and services abroad? They must be buying foreign assets, so U.S. capital is flowing abroad ($NCO > 0$). Conversely, if the United States is running a trade deficit ($NX < 0$), Americans are spending more on foreign goods and services than they are earning from selling goods and services abroad. Some of this spending must be financed by selling American assets abroad, so foreign capital is flowing into the United States ($NCO < 0$).

Our model of the open economy treats the two sides of this identity as representing the two sides of the market for foreign-currency exchange. Net capital outflow represents the quantity of dollars supplied for the purpose of buying foreign assets. For example, when a U.S. mutual fund wants to buy a Japanese government bond, it needs to change dollars into yen, so it supplies dollars in the market for foreign-currency exchange. Net exports represent the quantity of dollars demanded for the purpose of buying U.S. net exports of goods and services. For example, when a Japanese airline wants to buy a plane made by Boeing, it needs to change its yen into dollars, so it demands dollars in the market for foreign-currency exchange.

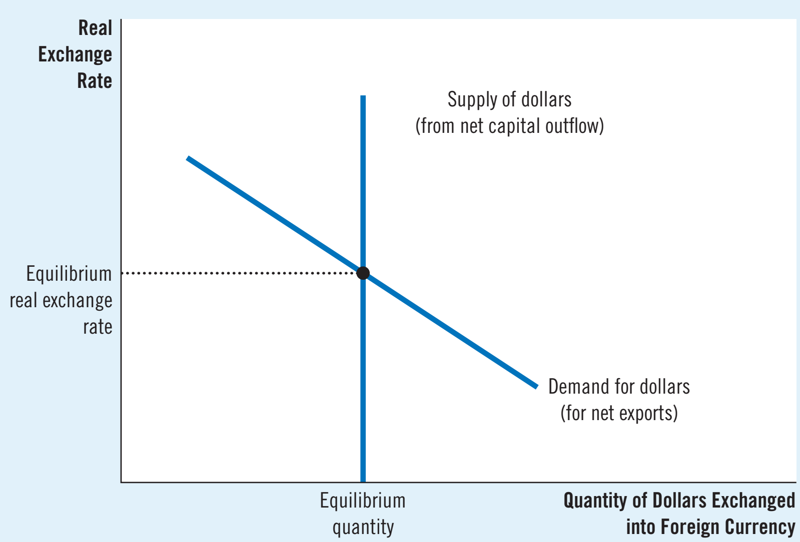
What price balances the supply and demand in the market for foreign-currency exchange? The answer is the real exchange rate. As we saw in the preceding chapter, the real exchange rate is the relative price of domestic and foreign goods and, therefore, is a key determinant of net exports. When the U.S. real exchange rate appreciates, U.S. goods become more expensive relative to foreign goods, making U.S. goods less attractive to consumers both at home and abroad. As a result, exports from the United States fall, and imports into the United States rise. For both reasons, net exports fall. Hence, an appreciation of the real exchange rate reduces the quantity of dollars demanded in the market for foreign-currency exchange.

Figure 2 shows supply and demand in the market for foreign-currency exchange. The demand curve slopes downward for the reason we just discussed: A higher real exchange rate makes U.S. goods more expensive and reduces the quantity of dollars demanded to buy those goods. The supply curve is vertical because the quantity of dollars supplied for net capital outflow does not depend on the real exchange rate. (As discussed earlier, net capital outflow depends on the real interest rate. When discussing the market for foreign-currency exchange, we take the real interest rate and net capital outflow as given.)

FIGURE 2

The Market for Foreign-Currency Exchange

The real exchange rate is determined by the supply and demand for foreign-currency exchange. The supply of dollars to be exchanged into foreign currency comes from net capital outflow. Because net capital outflow does not depend on the real exchange rate, the supply curve is vertical. The demand for dollars comes from net exports. Because a lower real exchange rate stimulates net exports (and thus increases the quantity of dollars demanded to pay for these net exports), the demand curve slopes downward. At the equilibrium real exchange rate, the number of dollars people supply to buy foreign assets exactly balances the number of dollars people demand to buy net exports.



It might seem strange at first that net capital outflow does not depend on the exchange rate. After all, a higher exchange value of the U.S. dollar not only makes foreign goods less expensive for American buyers but also makes foreign assets less expensive. One might guess that a stronger dollar would therefore make foreign assets more attractive. But remember that an American investor will eventually want to turn the foreign asset, as well as any profits earned on it, back into dollars. For example, an increase in the value of the dollar makes it less expensive for an American to buy stock in a Japanese company. But any dividends that the stock pays will be in yen. As these yen are exchanged for dollars, the higher value of the dollar means that the dividends will buy fewer dollars than before. Thus, changes in the exchange rate influence both the cost of buying foreign assets and the benefit of owning them, and these two effects offset each other. For these reasons, our model of the open economy posits that net capital outflow does not depend on the real exchange rate, as represented by the vertical supply curve in Figure 2.

The real exchange rate moves to ensure equilibrium in this market. It adjusts to balance the supply and demand for dollars just as the price of any good adjusts to balance supply and demand for that good. If the real exchange rate were below the equilibrium level, the quantity of dollars supplied would be less than the quantity demanded. The resulting shortage of dollars would push the value of the dollar upward. Conversely, if the real exchange rate were above the equilibrium level, the quantity of dollars supplied would exceed the quantity demanded. The surplus of dollars would drive the value of the dollar downward. *At the equilibrium real exchange rate, the demand for dollars by foreigners arising from the U.S. net exports of goods and services exactly balances the supply of dollars from Americans arising from U.S. net capital outflow.*

FYI Purchasing-Power Parity as a Special Case

An alert reader of this book might ask: Why are we developing a theory of the exchange rate here? Didn't we already do that in the preceding chapter?

As you may recall, the theory of the exchange rate developed in the preceding chapter is called *purchasing-power parity*. This theory asserts that a dollar (or any other currency) must buy the same quantity of goods and services in every country. As a result, the real exchange rate is fixed, and all changes in the nominal exchange rate between two currencies reflect changes in the price levels in the two countries.

The model of the exchange rate developed here is related to the theory of purchasing-power parity. According to the theory of purchasing-power parity, international trade responds quickly to international price differences. If goods were cheaper in one country than in another, they would be exported from the first country and imported into the second until the price difference disappeared. In other words, the theory of purchasing-power parity assumes that net exports are highly responsive to small changes in the real exchange rate. If net exports were in fact so responsive, the demand curve in Figure 2 would be horizontal.

Thus, the theory of purchasing-power parity can be viewed as a special case of the model considered here. In that special case, the demand curve for foreign-currency exchange, instead of sloping downward, is horizontal at the level of the real exchange rate that ensures parity of purchasing power at home and abroad.

While this special case is a good place to start when studying exchange rates, it is far from the end of the story. In practice, foreign and domestic goods are not always perfect substitutes, and there are costs that impede trade. This chapter, therefore, assumes that the demand curve for foreign-currency exchange slopes downward. This assumption allows for the possibility that the real exchange rate changes over time, as in fact it often does in the real world. ■

QuickQuiz

1. Holding other things constant, an increase in a nation's interest rate reduces
   a. national saving and domestic investment.
   b. national saving and the net capital outflow.
   c. domestic investment and the net capital outflow.
   d. national saving only.

2. Holding other things constant, an appreciation of a nation's currency causes
   a. exports to rise and imports to fall.
   b. exports to fall and imports to rise.
   c. both exports and imports to rise.
   d. both exports and imports to fall.

Answers at end of chapter.

32-2 Equilibrium in the Open Economy

So far, we have discussed supply and demand in two markets: the market for loanable funds and the market for foreign-currency exchange. Let's now consider how these markets are related to each other.

32-2a Net Capital Outflow: The Link between the Two Markets

We begin by recapping what we've learned so far in this chapter. We have been discussing how the economy coordinates four important macroeconomic variables: national saving (*S*), domestic investment (*I*), net capital outflow (*NCO*), and net exports (*NX*). Keep in mind the following identities:

$$S = I + NCO$$

and

$$NCO = NX.$$

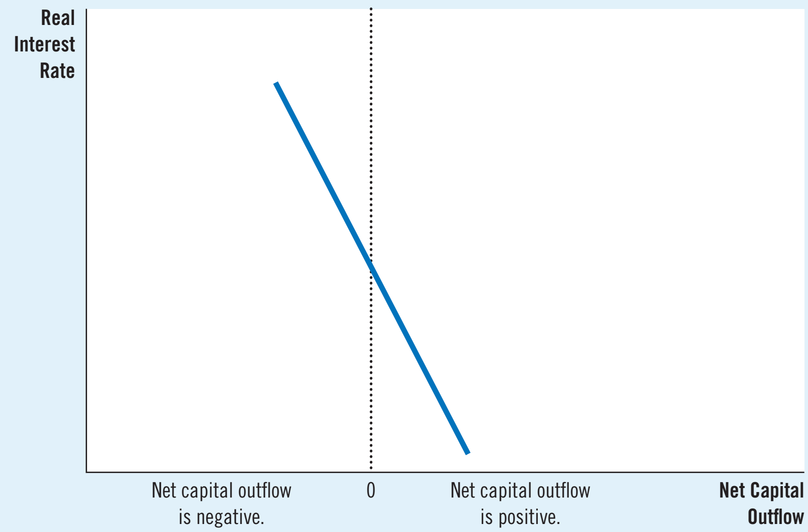
In the market for loanable funds, supply comes from national saving (*S*), demand comes from domestic investment (*I*) and net capital outflow (*NCO*), and the real interest rate balances supply and demand. In the market for foreign-currency exchange, supply comes from net capital outflow (*NCO*), demand comes from net exports (*NX*), and the real exchange rate balances supply and demand.

Net capital outflow is the variable that links these two markets. In the market for loanable funds, net capital outflow is a component of demand. An American who wants to buy an asset abroad must finance this purchase by obtaining resources in the U.S. market for loanable funds. In the market for foreign-currency exchange, net capital outflow is the source of supply. An American who wants to buy an asset in another country must supply dollars to exchange them for the currency of that country.

The key determinant of net capital outflow, as we have discussed, is the real interest rate. When the U.S. interest rate is high, owning U.S. assets is attractive, and U.S. net capital outflow is low. Figure 3 shows this negative relationship between the interest rate and net capital outflow. This net-capital-outflow curve is the link between the market for loanable funds and the market for foreign-currency exchange.

FIGURE 3

How Net Capital Outflow Depends on the Interest Rate
Because a higher domestic real interest rate makes domestic assets more attractive, it reduces net capital outflow. Note the position of zero on the horizontal axis: Net capital outflow can be positive or negative. A negative value of net capital outflow means that the economy is experiencing a net inflow of capital.



32-2b Simultaneous Equilibrium in Two Markets

We can now put all the pieces of our model together in Figure 4. This figure shows how the market for loanable funds and the market for foreign-currency exchange jointly determine the important macroeconomic variables of an open economy.

Panel (a) of the figure shows the market for loanable funds (taken from Figure 1). As before, national saving is the source of the supply of loanable funds. Domestic investment and net capital outflow are the source of the demand for loanable funds. The equilibrium real interest rate (r_1) brings the quantity of loanable funds supplied and the quantity of loanable funds demanded into balance.

Panel (b) of the figure shows net capital outflow (taken from Figure 3). The interest rate comes from panel (a) and then determines net capital outflow. A higher interest rate at home makes domestic assets more attractive, reducing net capital outflow. Therefore, the net-capital-outflow curve in panel (b) slopes downward.

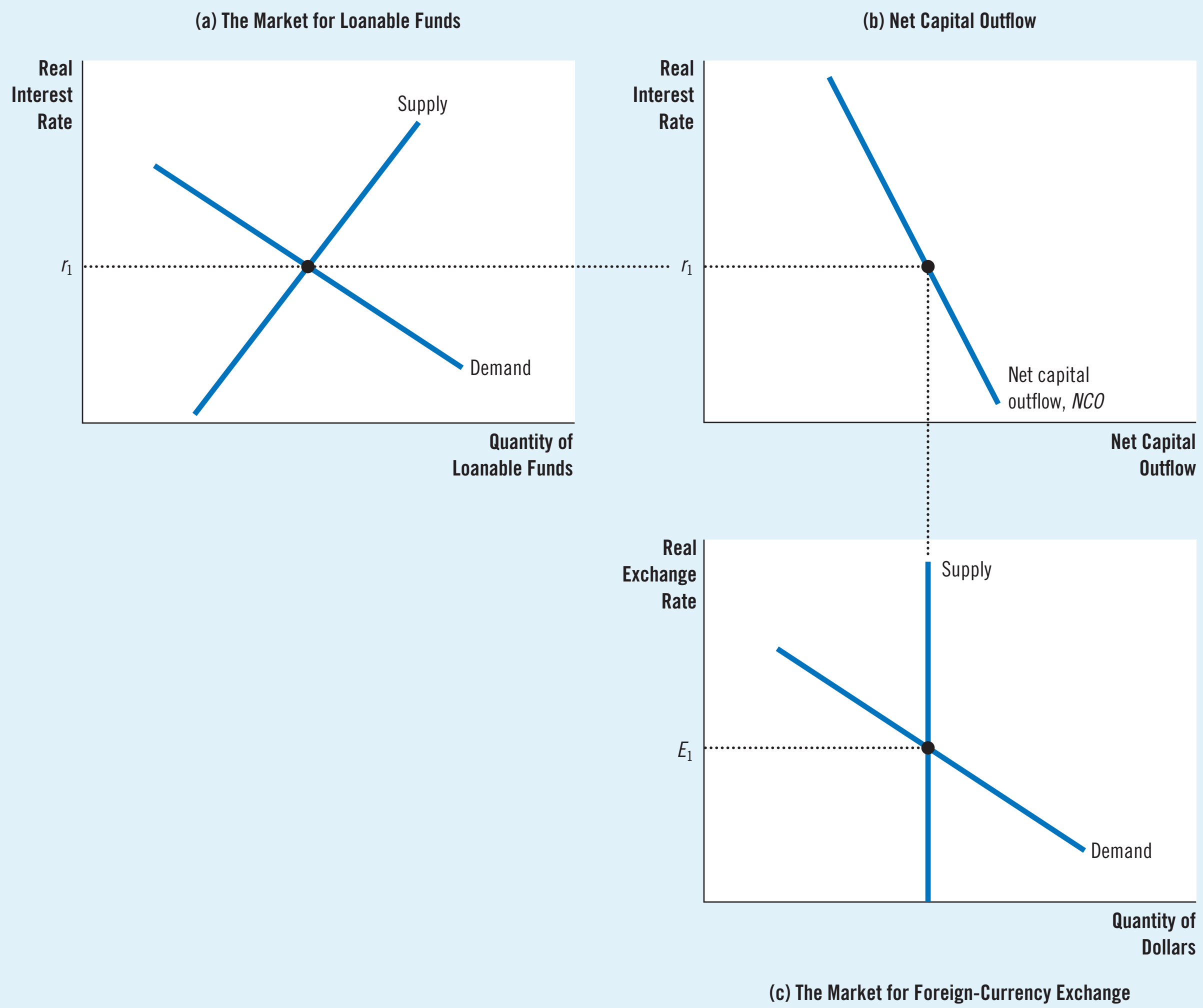
Panel (c) of the figure shows the market for foreign-currency exchange (taken from Figure 2). Because foreign assets must be purchased with foreign currency, the quantity of net capital outflow from panel (b) determines the supply of dollars to be exchanged into foreign currencies. The real exchange rate does not affect net capital outflow, so the supply curve is vertical. The demand for dollars comes from net exports. Because a depreciation of the real exchange rate increases net exports, the demand curve for foreign-currency exchange slopes downward. The equilibrium real exchange rate (E_1) brings into balance the quantity of dollars supplied and the quantity of dollars demanded in the market for foreign-currency exchange.

The two markets shown in Figure 4 determine two relative prices: the real interest rate and the real exchange rate. The real interest rate determined in panel (a) is

In panel (a), the supply and demand for loanable funds determine the real interest rate. In panel (b), the interest rate determines net capital outflow, which provides the supply of dollars in the market for foreign-currency exchange. In panel (c), the supply and demand for dollars in the market for foreign-currency exchange determine the real exchange rate.

FIGURE 4

The Real Equilibrium in an Open Economy



the price of goods and services in the present relative to goods and services in the future. The real exchange rate determined in panel (c) is the price of domestic goods and services relative to foreign goods and services. These two relative prices adjust simultaneously to balance supply and demand in these two markets. As they do so, they determine national saving, domestic investment, net capital outflow, and net exports. We can use this model to see how all these variables change when some policy or event causes one of these curves to shift.

FYI Disentangling Supply and Demand

Suppose the owner of an apple orchard decides to consume some of his own apples. Does this decision represent an increase in the demand for apples or a decrease in the supply? Either answer is defensible, and as long as we are careful in our subsequent analysis, nothing important will hinge on the answer we choose. Sometimes how we divide things between supply and demand is a bit arbitrary.

In the macroeconomic model of the open economy developed in this chapter, the division of transactions between "supply" and "demand" is also a bit arbitrary—both in the market for loanable funds and in the market for foreign-currency exchange.

Consider first the market for loanable funds. The model treats the net capital outflow as part of the demand for loanable funds. Yet instead of writing $S = I + NCO$, we could just as easily have written $S - NCO = I$. When the equation is rewritten in this way, a capital outflow looks like a reduction in the supply of loanable funds. Either way works. The first interpretation ($S = I + NCO$) emphasizes loanable funds generated domestically whether used at home or abroad. The second interpretation ($S - NCO = I$) emphasizes loanable funds available for domestic investment whether generated at home or abroad. The difference is more semantic than substantive.

Similarly, consider the market for foreign-currency exchange. In our model, net exports are the source of the demand for dollars, and net capital outflow is the source of the supply. Thus, when a U.S. resident imports a car made in Japan, our model treats that transaction as a decrease in the quantity of dollars demanded (because net exports fall) rather than an increase in the quantity of dollars supplied. Similarly, when a Japanese citizen buys a U.S. government bond, our model treats that transaction as a decrease in the quantity of dollars supplied (because net capital outflow falls) rather than an increase in the quantity of dollars demanded. This definition of terms may seem somewhat unnatural at first, but it will prove useful when analyzing the effects of various policies. ■

Quick**Quiz**

3. In the model just developed, two markets determine two prices, which are
   a. the nominal exchange rate and the nominal interest rate.
   b. the nominal exchange rate and the real interest rate.
   c. the real exchange rate and the nominal interest rate.
   d. the real exchange rate and the real interest rate.

4. Other things equal, an increase in the U.S. net capital outflow _________ the demand for loanable funds and _________ the supply of dollars in the market for foreign currency exchange.
   a. increases; increases
   b. increases; decreases
   c. decreases; increases
   d. decreases; decreases

Answers at end of chapter.

32-3 How Policies and Events Affect an Open Economy

Having developed a model to explain how key macroeconomic variables are determined in an open economy, we can now use the model to analyze how changes in policy and other events alter the economy's equilibrium. As we proceed, keep in mind that our model is just supply and demand in two markets: the market for loanable funds and the market for foreign-currency exchange. When using the model to analyze any event, we can apply the three steps outlined in Chapter 4. First, we determine which of the supply and demand curves the event affects. Second, we determine the direction in which the curves shift. Third, we use the supply-and-demand diagrams to examine how these shifts alter the economy's equilibrium.

32-3a Government Budget Deficits

When we first discussed the supply and demand for loanable funds earlier in the book, we examined the effects of government budget deficits, which occur when government spending exceeds government revenue. Because a government budget deficit represents *negative* public saving, it reduces national saving (the sum of public and private saving). Thus, a government budget deficit reduces the supply of loanable funds, drives up the interest rate, and crowds out investment.

Now let's consider the effects of a budget deficit in an open economy. First, which curve in our model shifts? As in a closed economy, the initial impact of the budget deficit is on national saving and, therefore, on the supply curve for loanable funds. Second, in which direction does this supply curve shift? Again as in a closed economy, a budget deficit represents *negative* public saving, so it reduces national saving and shifts the supply curve for loanable funds to the left. This result is shown as the shift from S_1 to S_2 in panel (a) of Figure 5.

Our third and final step is to compare the old and new equilibria. Panel (a) shows the impact of a U.S. budget deficit on the U.S. market for loanable funds. Because fewer funds are available for borrowers in U.S. financial markets, the interest rate rises from r_1 to r_2 to balance supply and demand. Faced with a higher interest rate, borrowers in the market for loanable funds choose to borrow less. This change is represented in the figure as the movement from point A to point B along the demand curve for loanable funds. In particular, households and firms reduce their purchases of capital goods. As in a closed economy, budget deficits crowd out domestic investment.

In an open economy, however, the reduced supply of loanable funds has additional effects. Panel (b) shows that the increase in the interest rate from r_1 to r_2 reduces net capital outflow. [This fall in net capital outflow is also part of the decrease in the quantity of loanable funds demanded in the movement from point A to point B in panel (a).] Because saving kept at home now earns higher rates of return, investing abroad is less attractive, and domestic residents buy fewer foreign assets. Higher interest rates also attract foreign investors, who want to earn the higher returns on U.S. assets. Thus, when budget deficits raise interest rates, both domestic and foreign behavior cause U.S. net capital outflow to fall.

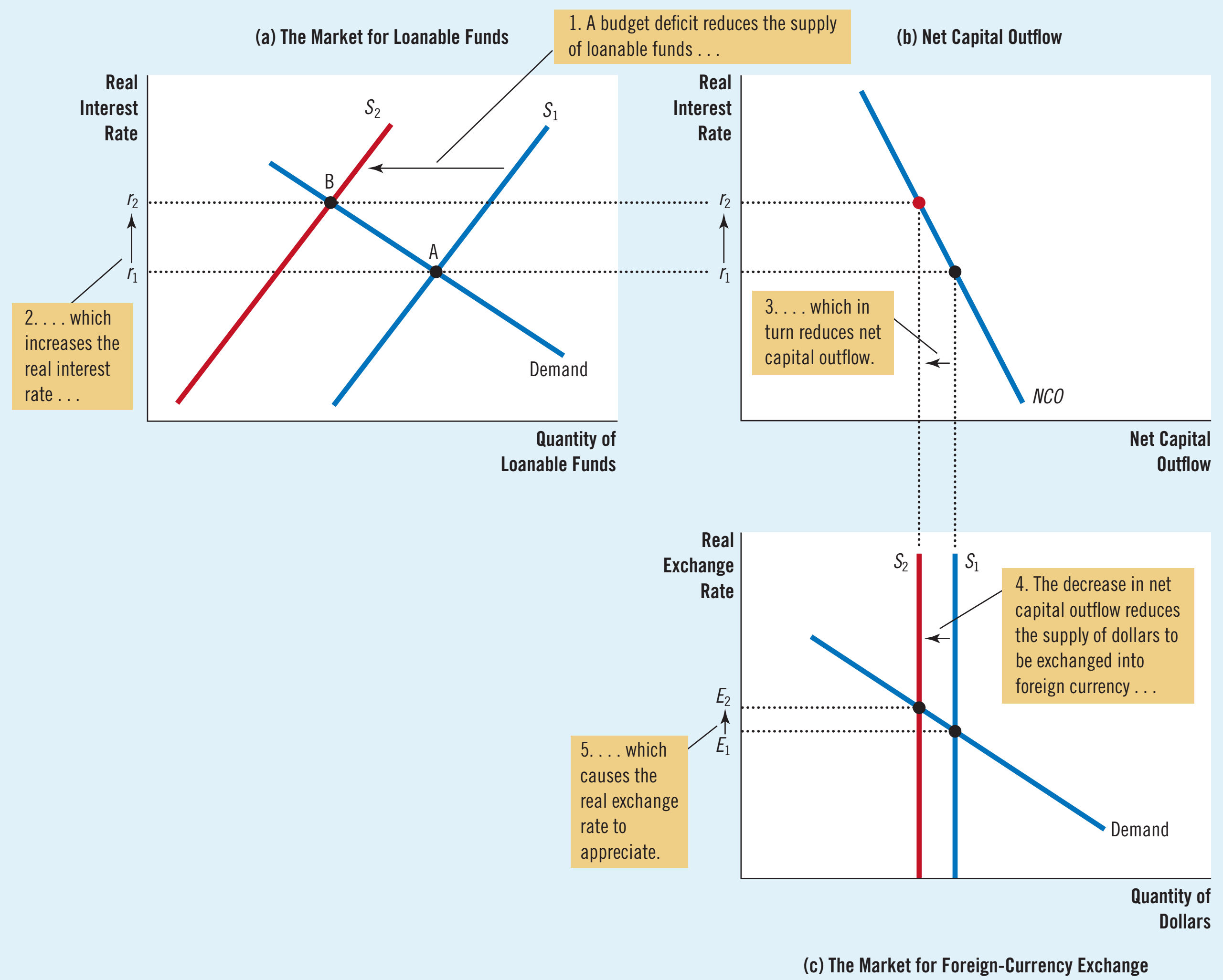
Panel (c) shows how budget deficits affect the market for foreign-currency exchange. Because net capital outflow is reduced, Americans need less foreign currency to buy foreign assets and, therefore, supply fewer dollars in the market for foreign-currency exchange. The supply curve for dollars shifts leftward from S_1 to S_2. The reduced supply of dollars causes the real exchange rate to appreciate from E_1 to E_2. That is, the dollar becomes more valuable relative to foreign currencies. This appreciation, in turn, makes U.S. goods more expensive relative to foreign goods. Because people both in the United States and abroad switch their purchases away from the more expensive U.S. goods, exports from the United States fall and imports into the United States rise. For both reasons, U.S. net exports fall. Hence, *in an open economy, government budget deficits raise real interest rates, crowd out domestic investment, cause the currency to appreciate, and push the trade balance toward deficit*.

An important example of this lesson occurred in the United States in the 1980s. Shortly after Ronald Reagan was elected president in 1980, the fiscal policy of the U.S. federal government changed dramatically. The president and Congress enacted large tax cuts, but they did not reduce government spending by nearly as much. The result was a large budget deficit. Our model of the open economy

FIGURE 5

The Effects of a Government Budget Deficit

When the government runs a budget deficit, it reduces the supply of loanable funds from S_1 to S_2 in panel (a). The interest rate rises from r_1 to r_2 to balance the supply and demand for loanable funds. In panel (b), the higher interest rate reduces net capital outflow. Reduced net capital outflow, in turn, reduces the supply of dollars in the market for foreign-currency exchange from S_1 to S_2 in panel (c). This fall in the supply of dollars causes the real exchange rate to appreciate from E_1 to E_2. The appreciation of the exchange rate pushes the trade balance toward deficit.



predicts that such a policy should have led to a trade deficit, and in fact it did, as we saw in a case study in the preceding chapter. Because the budget deficit and trade deficit during this period were so closely related in both theory and practice, they were nicknamed the *twin deficits*. We should not, however, view these twins as identical, for many factors beyond fiscal policy can influence the trade deficit.

32-3b Trade Policy

Trade policy is government policy that directly influences the quantity of goods and services that a country imports or exports. Trade policy takes various forms, usually with the purpose of supporting a particular domestic industry. One common trade policy is a *tariff*, a tax on imported goods. Another is an *import quota*, a limit on the quantity of a good produced abroad that can be sold domestically.

Let's consider the macroeconomic impact of trade policy. Suppose that the U.S. auto industry, concerned about competition from Japanese automakers, convinces the U.S. government to impose a quota on the number of cars that can be imported from Japan. In making their case, lobbyists for the auto industry assert that the trade restriction would shrink the size of the U.S. trade deficit. Are they right? Our model, illustrated in Figure 6, offers an answer.

The first step in analyzing the trade policy is to determine which curve shifts. The initial impact of the import restriction is, not surprisingly, on imports. Because net exports equal exports minus imports, the policy also affects net exports. And because net exports are the source of demand for dollars in the market for foreign-currency exchange, the policy affects the demand curve in this market.

The second step is to determine the direction in which this demand curve shifts. Because the quota restricts the number of Japanese cars sold in the United States, it reduces imports at any given real exchange rate. Net exports, which equal exports minus imports, will therefore *rise* for any given real exchange rate. Because foreigners need dollars to buy U.S. net exports, the rise in net exports increases the demand for dollars in the market for foreign-currency exchange. This increase in the demand for dollars is shown in panel (c) of Figure 6 as the shift from D_1 to D_2.

The third step is to compare the old and new equilibria. As we can see in panel (c), the increase in the demand for dollars causes the real exchange rate to appreciate from E_1 to E_2. Because nothing has happened in the market for loanable funds in panel (a), there is no change in the real interest rate. Because there is no change in the real interest rate, there is also no change in net capital outflow, shown in panel (b). And because there is no change in net capital outflow, there can be no change in net exports, even though the import quota has reduced imports.

It might seem puzzling that net exports stay the same while imports fall. This puzzle is resolved by noting the change in the real exchange rate: When the dollar appreciates in the market for foreign-currency exchange, domestic goods become more expensive relative to foreign goods. This appreciation encourages imports and discourages exports, and both of these changes offset the direct increase in net exports due to the import quota. In the end, an import quota reduces both imports and exports, but net exports (exports minus imports) are unchanged.

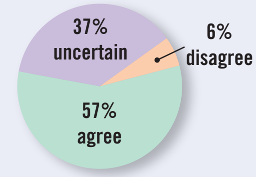
We have thus arrived at a surprising result: *Trade policies do not affect the trade balance*. That is, policies that directly influence exports or imports do not alter net exports. This conclusion seems less surprising if one recalls the accounting identity:

$$NX = NCO = S - I.$$

ASK THE EXPERTS
Deficits

"If the United States reduced its fiscal deficit, then its trade deficit would also shrink."

What do economists say?



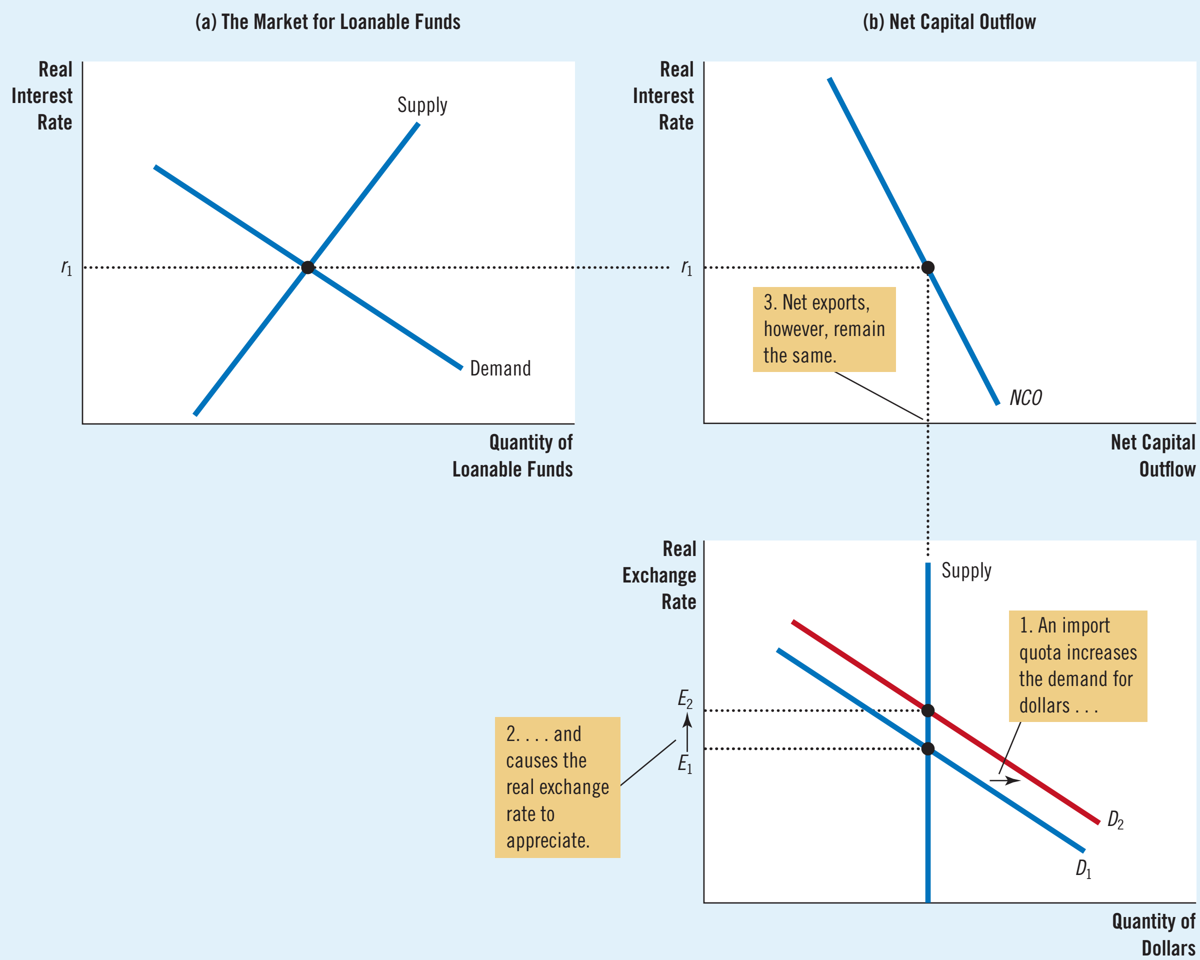
Source: IGM Economic Experts Panel, June 21, 2017.

trade policy
government policy that directly influences the quantity of goods and services that a country imports or exports

FIGURE 6

The Effects of an Import Quota

When the U.S. government imposes a quota on the import of Japanese cars, nothing happens in the market for loanable funds in panel (a) or to net capital outflow in panel (b). The only effect is a rise in net exports (exports minus imports) for any given real exchange rate. As a result, the demand for dollars in the market for foreign-currency exchange rises, as shown by the shift from D_1 to D_2 in panel (c). This increase in the demand for dollars causes the value of the dollar to appreciate from E_1 to E_2. This appreciation of the dollar tends to reduce net exports, offsetting the direct effect of the import quota on the trade balance.



(c) The Market for Foreign-Currency Exchange

Net exports equal net capital outflow, which equals national saving minus domestic investment. Trade policies do not alter the trade balance because they do not alter national saving or domestic investment. For given levels of national saving and domestic investment, the real exchange rate adjusts to keep the trade balance the same, regardless of the trade policies the government puts in place.

Although trade policies do not affect a country's overall trade balance, these policies do affect specific firms, industries, and countries. When the U.S. government imposes an import quota on Japanese cars, General Motors has less competition from abroad and sells more cars. At the same time, because the dollar has appreciated, Boeing, the U.S. aircraft maker, finds it harder to compete with Airbus, the European aircraft maker. U.S. exports of aircraft fall, and U.S. imports of aircraft rise. In this case, the import quota on Japanese cars increases net exports of cars and decreases net exports of planes. In addition, it increases net exports from the United States to Japan and decreases net exports from the United States to Europe. The overall trade balance of the U.S. economy, however, stays the same.

The effects of trade policies are, therefore, more microeconomic than macroeconomic. Although advocates of trade policies sometimes suggest (contrary to what our model predicts) that these policies can alter a country's trade balance, they are usually more motivated by concerns about particular firms or industries. One should not be surprised, for instance, to hear an executive from General Motors advocating import quotas on Japanese cars. Economists usually oppose such trade policies. Free trade allows economies to specialize in doing what they do best, making residents of all countries better off. Trade restrictions interfere with these gains from trade and, therefore, reduce overall economic well-being.

32-3c Political Instability and Capital Flight

In 1994, political instability in Mexico, including the assassination of a prominent political leader, made world financial markets nervous. People began to view Mexico as a much less stable country than they had previously thought. They decided to pull some of their assets out of Mexico and move these funds to the United States and other "safe havens." Such a large and sudden movement of funds out of a country is called **capital flight**. To see the implications of capital flight for the Mexican economy, we again follow our three steps for analyzing a change in equilibrium. But this time, we apply our model of the open economy from the perspective of Mexico rather than the United States.

capital flight
a large and sudden reduction in the demand for assets located in a country

Consider first which curves in our model capital flight affects. When investors around the world observe political problems in Mexico, they decide to sell some of their Mexican assets and use the proceeds to buy U.S. assets. This act increases Mexican net capital outflow and, therefore, affects both markets in our model. Most obviously, it affects the net-capital-outflow curve, and this change in net capital outflow in turn influences the supply of pesos in the market for foreign-currency exchange. In addition, because the demand for loanable funds comes from both domestic investment and net capital outflow, capital flight affects the demand curve in the market for loanable funds.

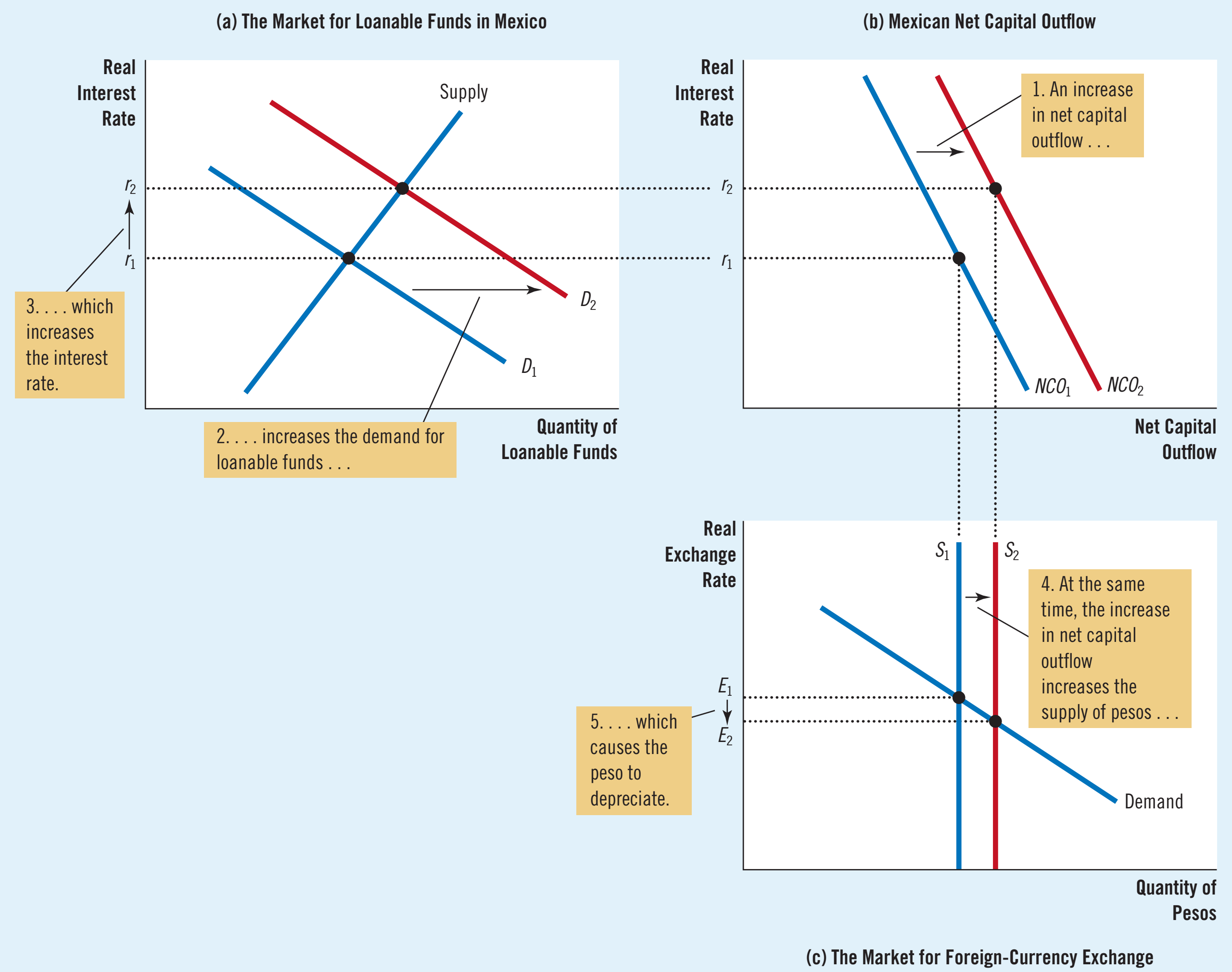
Now consider the direction in which these curves shift. When net capital outflow increases, there is greater demand for loanable funds to finance these purchases of capital assets abroad. Thus, as panel (a) of Figure 7 shows, the demand curve for loanable funds shifts to the right from D_1 to D_2. In addition, because net capital outflow is higher for any interest rate, the net-capital-outflow curve also shifts to the right from NCO_1 to NCO_2, as in panel (b).

To see the effects of capital flight on the Mexican economy, we compare the old and new equilibria. Panel (a) of Figure 7 shows that the increased demand for loanable funds causes the interest rate in Mexico to rise from r_1 to r_2. Panel (b) shows that Mexican net capital outflow increases. (Although the rise in the interest rate makes Mexican assets more attractive, this change only partly offsets the impact of capital flight on net capital outflow.) Panel (c) shows that the increase in net capital outflow raises the supply of pesos in the market for foreign-currency exchange from S_1 to S_2. That is, as people try to get out of Mexican assets, there is a large supply

FIGURE 7

The Effects of Capital Flight

If people decide that Mexico is a risky place to keep their savings, they will move their funds to safe havens such as the United States, resulting in an increase in Mexican net capital outflow. Consequently, the demand for loanable funds in Mexico rises from D_1 to D_2, as shown in panel (a), driving up the Mexican real interest rate from r_1 to r_2. Because net capital outflow is higher for any interest rate, that curve also shifts to the right from NCO_1 to NCO_2 in panel (b). At the same time, in the market for foreign-currency exchange, the supply of pesos rises from S_1 to S_2, as shown in panel (c). This increase in the supply of pesos causes the peso to depreciate from E_1 to E_2, so the peso becomes less valuable relative to other currencies.



of pesos to be converted into dollars. This increase in supply causes the peso to depreciate from E_1 to E_2. Thus, *capital flight from Mexico increases Mexican interest rates and decreases the value of the Mexican peso in the market for foreign-currency exchange.* This is exactly what was observed in 1994. From November 1994 to March 1995, the interest rate on short-term Mexican government bonds rose from 14 percent to 70 percent, and the peso depreciated from 29 to 15 U.S. cents per peso.

These price changes that result from capital flight influence some key macroeconomic quantities. The depreciation of the currency makes exports cheaper and imports more expensive, pushing the trade balance toward surplus. At the same time, the increase in the interest rate reduces domestic investment, slowing capital accumulation and economic growth.

Capital flight has its largest impact on the country from which capital is fleeing, but it also affects other countries. When capital flows out of Mexico into the United States, for instance, it has the opposite effect on the U.S. economy as it has on the Mexican economy. In particular, the rise in Mexican net capital outflow coincides with a fall in U.S. net capital outflow. As the peso depreciates and Mexican interest rates rise, the dollar appreciates and U.S. interest rates fall. The size of this impact on the U.S. economy is small, however, because the economy of the United States is much larger than that of Mexico.

The events that we have been describing in Mexico could happen to any economy in the world, and, in fact, they do from time to time. In 1997, the world learned that the banking systems of several Asian economies, including Thailand, South Korea, and Indonesia, were at or near the point of bankruptcy, and this news induced capital to flee from these nations. In 1998, the Russian government defaulted on its debt, prompting international investors to take whatever money they could and run. A similar (but more complicated) set of events unfolded in Argentina in 2002. In each of these cases of capital flight, the results were much as our model predicts: rising interest rates and a falling currency.

CASE STUDY

CAPITAL FLOWS FROM CHINA

According to our analysis of capital flight, a nation that experiences an outflow of capital sees its currency weaken in foreign exchange markets, and this depreciation in turn increases the nation's net exports. The country into which the capital is flowing sees its currency strengthen, and this appreciation pushes its trade balance toward deficit.

With these lessons in mind, consider this question: Suppose a nation's government, as a matter of policy, encourages capital to flow to another country, perhaps by making foreign investments itself. What effects would this policy have? The answer is much the same: Other things equal, it leads to a weaker currency and a trade surplus for the nation encouraging the capital outflows and a stronger currency and a trade deficit for the recipient of those capital flows.

This analysis sheds light on a recent policy dispute between the United States and China. The Chinese government has at times tried to depress the value of its currency, the renminbi, in foreign exchange markets to promote its export industries. It did this by accumulating foreign assets, including substantial amounts of U.S. government bonds. From 2000 to 2014, China's total reserves of foreign assets rose from $160 billion to about $4 trillion.

The U.S. government at times objected to China's interventions in foreign exchange markets. By holding down the value of the renminbi, the policy made Chinese goods less expensive relative to American goods, pushing the U.S. trade balance toward deficit and hurting American producers who made products that competed with imports from China. Because of these effects, the U.S. government encouraged China to stop influencing the exchange value of its currency using government-sponsored capital flows. Some members of Congress even went so far as to advocate tariffs on Chinese imports unless China ceased its "currency manipulation."

Yet the impact of the Chinese policy on the U.S. economy was not all bad. American consumers of Chinese imports benefited from lower prices. In addition,

IN THE NEWS

Separating Fact from Fiction

Politicians on both the right and left often hold mistaken views about the role of international trade in a nation's economic well-being.

Five Big Truths About Trade

By Alan S. Blinder

International trade is, once again, a hot-button political issue, making this an unpropitious time for rational discourse about the subject. Nonetheless, here are five issues on which the overwhelming majority of economists, liberal and conservative, agree.

1. Most job losses are not due to international trade. Every month roughly five million new jobs are created in the U.S. and almost that many are destroyed, leaving a small net increment. International trade accounts for only a minor share of that staggering job churn. Vastly more derives from the hurly-burly of competition and from technological change, which literally creates and destroys entire industries. Competition and technology are widely and correctly applauded—international trade is not so fortunate.

2. Trade is more about efficiency—and hence wages—than about the number of jobs. You probably don't sew your own clothes or grow your own food. Instead, you buy these things from others, using the wages you earn doing something you do better. Imagine how much lower your standard of living would be if you had to sew your own clothes, grow your own food . . . and a thousand other things.

The case for international trade is no different. It's not mainly about creating or destroying jobs. It's about using labor more efficiently, which is one key to higher wages.

But there is a catch: Whenever trade patterns change, some people will gain (either jobs or wages) but others will lose. The federal government could and should help them more, but it doesn't. So Americans who do lose their jobs due to international trade have a legitimate gripe.

3. Bilateral trade imbalances are inevitable and mostly uninteresting. Each month I run a trade deficit with Public Service Electric & Gas. They sell me gas and electricity; I sell them nothing. But I run a bilateral trade surplus with Princeton University, to which I sell teaching services but from which I buy little. Should I seek balanced trade with PSE&G or Princeton? Of course not. Neither should countries.

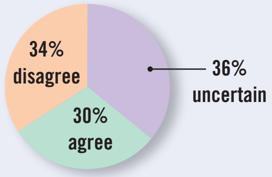
4. Running an overall trade deficit does not make us "losers." The U.S. multilateral trade balance—its balance with all of its trading partners—has been in deficit for decades. Does that mean that our country is in some sort of trouble? Probably not. For example, people who claim that our trade deficit kills jobs need to explain how the U.S. managed to achieve 4% unemployment in 2000, when our trade deficit was larger, as a share of GDP, than it is today.

ASK THE EXPERTS

Currency Manipulation

"Economic analysis can identify whether countries are using their exchange rates to benefit their own people at the expense of their trading partners' welfare."

What do economists say?



Source: IGM Economic Experts Panel, June 16, 2015.

the inflow of capital from China reduced U.S. interest rates, increasing investment in the U.S. economy. To some extent, the Chinese government was financing U.S. economic growth. The Chinese policy of investing in the U.S. economy created winners and losers among Americans. All things considered, the net impact on the U.S. economy was probably small.

The harder question concerns the motives behind the policy: Why were the Chinese leaders interested in producing for export and investing abroad rather than producing for domestic consumption and investment? One possibility is that China wanted to accumulate a reserve of foreign assets on which it could draw in emergencies—a kind of national "rainy-day fund." In any case, after 2014, as growth in the Chinese economy slowed, the Chinese government started to spend some of the fund. From 2014 to 2018, its reserves of foreign assets fell by almost $1 trillion. ●

A trade deficit means that foreigners send us more goods and services than we send them. To balance the books, they get our IOUs, which means they wind up holding paper—U.S. Treasury bills, corporate bonds or other private debt instruments. That doesn't sound so terrible for us, does it?

One exceptional country—the U.S.—is the source of the world's major international reserve currency, the U.S. dollar. Since ever-expanding world commerce requires ever more dollars, the U.S. must run trade deficits regularly. That's sometimes called our "exorbitant privilege," since we get to import more than we export.

5. Trade agreements barely affect a nation's trade balance. Much of the political angst is directed not at trade in general, but at specific international trade agreements. The North American Free Trade Agreement allegedly shipped U.S. jobs to Mexico. . . .

There is a grain of truth here. Some U.S. jobs were indeed destroyed when NAFTA liberalized trade with Mexico—and those people deserved better treatment from the government than they got. But NAFTA also created a number of new jobs in the U.S. (See No. 2.)

But there's more. "Trade" and "trade agreements" are not synonyms. We traded with Mexico long before NAFTA, and that trade was growing. Our trade with China has burgeoned in recent decades without a succession of trade agreements.

Most fundamentally, but least understood, a nation's overall trade balance is determined by its domestic decisions, not by trade deals. Think about the accounting involved here.

As noted above, borrowing from abroad is the bookkeeping counterpart of running a trade deficit. One implies the other. The amount we borrow from abroad must equal the gap between our total spending as a nation (including government spending) and our total income (including the government's income from taxation). Spendthrift nations like the U.S. have trade deficits because we don't save much. But these saving decisions are domestic; they do not derive from trade agreements.

America's chronic trade deficits stem from the dollar's international role and from Americans' decisions not to save much, not from trade deals. Trade deficits are not a major cause of either job losses or job gains. But some people do lose their jobs from shifting trade patterns; and the government should do more to help them. Importantly, trade makes American workers more productive and, presumably, better paid.

Now, would someone please tell this to Bernie Sanders and Donald Trump? ■

Questions to Discuss

1. Do you think running a trade deficit necessarily puts a nation at a disadvantage? Why or why not? According to the dictionary, the word *deficit* means "an excess of expenditure over revenue," but another definition is "deficiency or disadvantage." Might this dual meaning mislead pundits and policymakers into being more worried about trade deficits than Professor Blinder is?
2. How do you think the government should help workers who lose their jobs because of changing patterns of trade? Should these workers receive government assistance different from that given to workers who lose jobs for other reasons, such as changing technology?

Mr. Blinder is a professor of economics at Princeton University.

Source: *The Wall Street Journal*, April 22, 2016.

Quick**Quiz**

5. The government in an open economy cuts spending to reduce the budget deficit. As a result, the interest rate _________, leading to a capital _________ and a currency _________.
   a. falls; outflow; appreciation
   b. falls; outflow; depreciation
   c. falls; inflow; appreciation
   d. rises; inflow; appreciation
6. The nation of Elbonia has long banned the export of its highly prized puka shells. A newly elected president, however, removes the export ban. This change in policy causes the nation's currency to _________, making the goods Elbonia imports _________ expensive.
   a. depreciate; less
   b. depreciate; more
   c. appreciate; less
   d. appreciate; more
7. A civil war abroad causes foreign investors to move their funds to the safe haven of the United States, leading to _________U.S. interest rates and a _________ U.S. dollar.
   a. higher; weaker
   b. higher; stronger
   c. lower; weaker
   d. lower; stronger
8. If business leaders in Great Britain become more confident in their economy, they will increase investment, causing the British pound to _________ and pushing the British trade balance toward _________.
   a. appreciate; deficit
   b. appreciate; surplus
   c. depreciate; deficit
   d. depreciate; surplus

Answers at end of chapter.

32-4 Conclusion

International economics is a topic of increasing importance. More and more, American citizens are buying goods produced abroad and producing goods to be sold overseas. Through mutual funds and other financial institutions, they borrow and lend in world financial markets. As a result, a full analysis of the U.S. economy requires an understanding of how the U.S. economy interacts with other economies in the world. This chapter has provided a basic model for thinking about the macroeconomics of open economies.

The study of international economics is valuable, but we should be careful not to exaggerate its importance. Policymakers and commentators are often quick to blame foreigners for problems facing the U.S. economy. By contrast, economists more often view these problems as homegrown. For example, politicians often discuss foreign competition as a threat to American living standards, while economists are more likely to lament the low level of national saving. Low saving impedes growth in capital, productivity, and living standards, regardless of whether the economy is open or closed. Foreigners are a convenient target for politicians because blaming foreigners provides a way to avoid responsibility without insulting any domestic constituency. Whenever you hear popular discussions of international trade and finance, therefore, it is especially important to separate myth from reality. The tools you have learned in this chapter and the preceding one should help in that endeavor.

CHAPTER IN A NUTSHELL

- Two markets are central to the macroeconomics of open economies: the market for loanable funds and the market for foreign-currency exchange. In the market for loanable funds, the real interest rate adjusts to balance the supply of loanable funds (from national saving) and the demand for loanable funds (for domestic investment and net capital outflow). In the market for foreign-currency exchange, the real exchange rate adjusts to balance the supply of dollars (from net capital outflow) and the demand for dollars (for net exports). Because net capital outflow contributes to the demand for loanable funds and also provides the supply of dollars for foreign-currency exchange, it is the variable that connects these two markets.
- A policy that reduces national saving, such as a government budget deficit, reduces the supply of loanable funds and drives up the interest rate. The higher interest rate causes the net capital outflow to decline, reducing the supply of dollars in the market for foreign-currency exchange. The dollar appreciates, and net exports fall.
- Although restrictive trade policies, such as tariffs or quotas on imports, are sometimes advocated as a way to alter the trade balance, they do not necessarily have that effect. A trade restriction increases net exports for any given exchange rate and, therefore, increases the demand for dollars in the market for foreign-currency exchange. As a result, the dollar appreciates, making domestic goods more expensive relative to foreign goods. This appreciation offsets the initial impact of the trade restriction on net exports.
- When investors change their attitudes about holding assets of a country, the ramifications for the country's economy can be profound. In particular, political instability can lead to capital flight, which tends to increase interest rates and cause the currency to depreciate.

KEY CONCEPTS

trade policy, *p. 673*

capital flight, *p. 675*

QUESTIONS FOR REVIEW

1. Describe supply and demand in the market for loanable funds and in the market for foreign-currency exchange. How are these markets linked?
2. Why are budget deficits and trade deficits sometimes called the twin deficits?
3. Suppose that a textile workers' union encourages people to buy only American-made clothes. What would this policy do to the trade balance and the real exchange rate? What is the impact on the textile industry? What is the impact on the auto industry?
4. What is capital flight? When a country experiences capital flight, what is the effect on its interest rate and exchange rate?

PROBLEMS AND APPLICATIONS

1. Japan generally runs a significant trade surplus. Do you think this surplus is most related to high foreign demand for Japanese goods, low Japanese demand for foreign goods, a high Japanese saving rate relative to Japanese investment, or structural barriers against imports into Japan? Explain your answer.
2. Suppose that Congress is considering an investment tax credit, which subsidizes domestic investment.
   a. How does this policy affect national saving, domestic investment, net capital outflow, the interest rate, the exchange rate, and the trade balance?
   b. Representatives of several large exporters oppose the policy. Why might that be the case?
3. The chapter notes that the rise in the U.S. trade deficit during the 1980s was largely due to the rise in the U.S. budget deficit. On the other hand, the popular press sometimes claims that the increased trade deficit resulted from a decline in the quality of U.S. products relative to foreign products.
   a. Assume that U.S. products did decline in relative quality during the 1980s. How did this decline affect net exports *at any given exchange rate*?
   b. Draw a three-panel diagram to show the effect of this shift in net exports on the U.S. real exchange rate and trade balance.
   c. Is the claim in the popular press consistent with the model in this chapter? Does a decline in the quality of U.S. products have any effect on our standard of living? (*Hint*: When we sell our goods to foreigners, what do we receive in return?)
4. An economist discussing trade policy in *The New Republic* wrote, "One of the benefits of the United States removing its trade restrictions [is] the gain to U.S. industries that produce goods for export. Export industries would find it easier to sell their goods abroad—even if other countries didn't follow our example and reduce their trade barriers." Explain in words why U.S. *export* industries would benefit from a reduction in restrictions on *imports* to the United States.
5. Suppose the French suddenly develop a strong taste for California wines. Answer the following questions in words and with a diagram.
   a. What happens to the demand for dollars in the market for foreign-currency exchange?
   b. What happens to the value of the dollar in the market for foreign-currency exchange?
   c. What happens to U.S. net exports?
6. A senator renounces his past support for protectionism: "The U.S. trade deficit must be reduced, but import quotas only annoy our trading partners. If we subsidize U.S. exports instead, we can

reduce the deficit by increasing our competitiveness." Using a three-panel diagram, show the effect of an export subsidy on net exports and the real exchange rate. Do you agree with the senator?

7. Suppose the United States decides to subsidize the export of U.S. agricultural products, but it does not increase taxes or decrease any other government spending to offset this expenditure. Using a three-panel diagram, show what happens to national saving, domestic investment, net capital outflow, the interest rate, the exchange rate, and the trade balance. Also explain in words how this U.S. policy affects the amount of imports, exports, and net exports.

8. Suppose that real interest rates increase across Europe. Explain how this development affects U.S. net capital outflow. Then explain how it affects U.S. net exports by using a formula from the chapter and by drawing a diagram. What happens to the U.S. real interest rate and real exchange rate?

9. Suppose that Americans decide to increase their saving.
   a. If the elasticity of U.S. net capital outflow with respect to the real interest rate is very high, will this increase in private saving have a large or small effect on U.S. domestic investment?
   b. If the elasticity of U.S. exports with respect to the real exchange rate is very low, will this increase in private saving have a large or small effect on the U.S. real exchange rate?

Quick**Quiz Answers**

1. **c** 2. **b** 3. **d** 4. **a** 5. **b** 6. **c** 7. **d** 8. **a**