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 in economies around the world.

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

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

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 noticed mention of these variables—exports, imports, the trade balance, and exchange rates—when reading news reports or watching the nightly 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.

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

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 are domestically produced goods and services that are sold abroad, and **imports** are foreign-produced goods and services that are 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.

exports
goods and services that are produced domestically and sold abroad

imports
goods and services that are produced abroad and sold domestically

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

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

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

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 total, a seller or a buyer in world markets for goods and services, net exports are also called the **trade balance**. If net exports are positive, exports are greater than 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 net exports are negative, exports are less than imports, indicating that the country sells fewer goods and services abroad than it buys from other

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

countries. In this case, the country is said to run a **trade deficit**. If net exports are zero, its exports and imports are exactly equal, and the country is said to have **balanced trade**.

trade deficit
an excess of imports over exports

balanced trade
a situation in which exports equal imports

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:

- The tastes of consumers 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 variables change, so does the amount of international trade.

"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 (GDP). In the 1950s, imports and exports of goods and services 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 2012, the largest

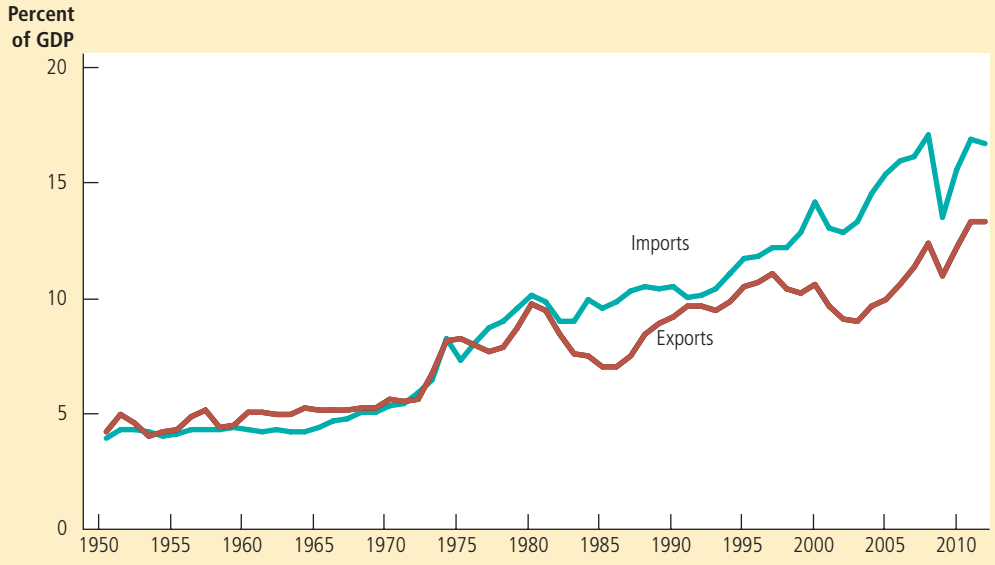


FIGURE 1

The Internationalization of the U.S. Economy
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.

trading partner, as measured by imports and exports combined, was Canada, followed by China, Mexico, Japan, Germany, 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. Because of these developments, goods that once had to be produced locally can now 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 only in summer in the United States 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 influenced by advances in telecommunications, which have allowed businesses to reach overseas customers more easily. For example, the first transatlantic telephone cable was not laid

IN THE NEWS

The Changing Nature of U.S. Exports

International trade can show up in surprising places.

Jeremy Lin and America's "New Exports"

By Austan Goolsbee

Insanity swept the nation last week. The undrafted Harvard graduate Jeremy Lin seemed to transform himself from bench-warmer to MVP candidate in a matter of days. New York Knicks #17 jerseys became the biggest seller in the NBA and interest in Mr. Lin surged world-wide.

That same week we learned that China's president-to-be, Xi Jinping, is an NBA fan. After meeting President Obama at the White House, Mr. Xi traveled to Iowa and then attended a Lakers game in Los Angeles. Mr. Obama, for his part, visited a Boeing 787 plant to tout exports as an engine of growth.

Though seemingly unrelated, these three events together highlighted one of the more promising ways out of our economic doldrums: growing exports—with exports broadly defined to include things like entertainment royalties, tourism, travel and services.

While U.S. economic conditions have improved in recent months, anxiety lingers and the slumps in housing and consumer spending remain. Exports, however, have grown impressively and have plenty of room to keep expanding.

During our last economic expansion, we focused on the home market while the other advanced economies' exports grew three times faster than ours did. Big emerging markets grew even more.

Today, growing exports are a natural opportunity for us and one of the last areas of bipartisan agreement in Washington. And exports are not confined to traditional manufactured goods.

When a foreign visitor comes to America on vacation and, like Mr. Xi, buys an NBA ticket in Los Angeles or a lunch in Muscatine, Iowa, those count in official statistics as exports. If a fan in Indonesia watches an NBA game or buys a Jeremy Lin jersey, the royalties count as an export. Many services increase our exports: tuition paid by foreign students, fares paid on U.S. airlines by foreign fliers, ad sales on Google from foreign companies.

These things add up. Last year, according to the Bureau of Economic Analysis (BEA), the U.S. exported $2.1 trillion of goods and services (the most ever) and more than $600 billion of that came from services.

Think of them as the New Exports. We already export far more of them than any other country. We export more educations than computers and more tourism than aerospace products or machinery. Unlike our massive trade deficit in goods, we run major trade surpluses in the New Exports—$179 billion of surplus in 2011 and probably more in 2012, according to the BEA. This supports millions of jobs across America.

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.

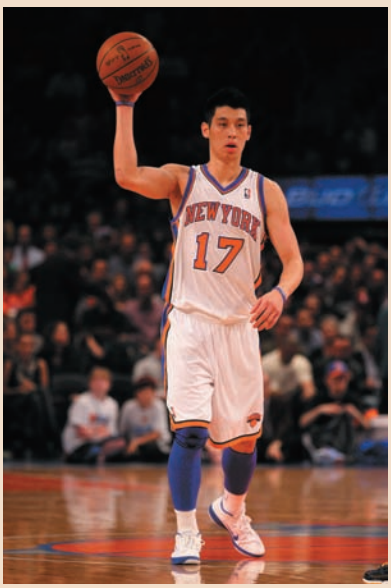
Technological progress has also fostered international trade by changing the kinds of goods that economies produce. When bulky raw materials (such as steel) and perishable goods (such as foodstuffs) were a large part of the world's output, transporting goods was often costly and sometimes impossible. 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, which makes 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.

Promoting the New Exports requires more than just the conventional prying open of foreign markets and reducing tariff and regulatory barriers to our goods. It involves fighting restrictions on Internet commerce and enforcing intellectual-property rules. It also involves some less confrontational (and often easier) strategies such as improving foreigners' opinions of America so they want to come visit or send their children to school here, and then expanding student and tourist visas to enable them to do so.

Modest investments can facilitate major private-sector economic gains. Take tourists coming from countries like Brazil. In a recent survey, 94 % of Brazilians said it was either difficult or nearly impossible to get here. To obtain a visa, they must undergo a multistage ordeal that includes traveling to a personal interview in a city with a U.S. consulate—of which there are only four in all of Brazil. Start to finish, the process can take up to five months.

Last month President Obama called for speeding up the visa process to promote tourism here. The U.S. Travel Association estimates that adding a consular official costs, with overhead, around $280,000 per year. Since the average Brazilian traveler to the U.S. spends around $5,000, the association estimates that a single official can generate as much as $50 million of travel exports for U.S. business (not to mention more than $1 million in visa fees to the U.S. government).

Supporting New Exports doesn't require diplomatic battles with China or shepherding new trade agreements through Congress.



Al Bello/Getty Images

Jeremy Lin: Export Promoter.

These are exports that other countries want us to have and that we have missed by our own short-sightedness. Last week we extended the payroll tax cut to help the economy. We have given tax incentives to encourage companies to invest. Why not also use short-run government incentives to encourage New Exports, such as limited-time discounts on airline taxes, visa-application costs and airport-landing fees?

As a Chicago Bulls fan, I find the resurgent Knicks irritating. Still, I will root for more Linsanity because with every game watched in Asia, jersey sold in Europe or visit to an NBA game by a foreign tourist, this young man is doing more than just helping his team. He's demonstrating a way for our economy to grow. Playing for a .500 team, Mr. Lin probably won't be up there cutting down the nets in celebration at the end of the year. He was an economics major, though, so if it's any consolation to him, he's already helped cut down the trade deficit.

Mr. Goolsbee is a professor of economics at the University of Chicago. He was formerly an economic adviser to President Obama.

The government's 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. The pattern of increasing trade illustrated in Figure 1 is a phenomenon that most economists and policymakers endorse and encourage.

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

So far, we have been discussing 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 she could instead use that money 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:

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

When a U.S. resident buys stock in Telmex, the Mexican telecommunications 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. If McDonald's opens up a fast-food outlet in Russia, that is an example of *foreign direct investment*. Alternatively, if an American buys stock in a Russian corporation, that is an example of *foreign portfolio investment*. 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. Capital is said to be flowing out of the country. When the net capital outflow is negative, domestic residents are buying less foreign assets than foreigners are buying domestic assets. 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 effect, 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.

More realistically, however, if you want to invest in the Japanese economy, you won't do so by holding on to Japanese currency. More likely, you would 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 them to buy a good made in Japan, such as a Nintendo Wii. As a result of the Wii purchase, U.S. imports increase. Together, the software export and the Wii 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 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 all started when a U.S. programmer sold 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. One possibility is that 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 have seen earlier in this book, 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 GDP. The economy's GDP (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

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

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 greater than zero. 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

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

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 greater than zero.

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.

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 three decades to finance large trade deficits. Why did the United States do this, and should this event 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 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, the net capital outflow is often 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 3.1 percent of GDP. This 2.6 percentage point change is largely attributable to a fall in national saving of 3.2 percentage points.

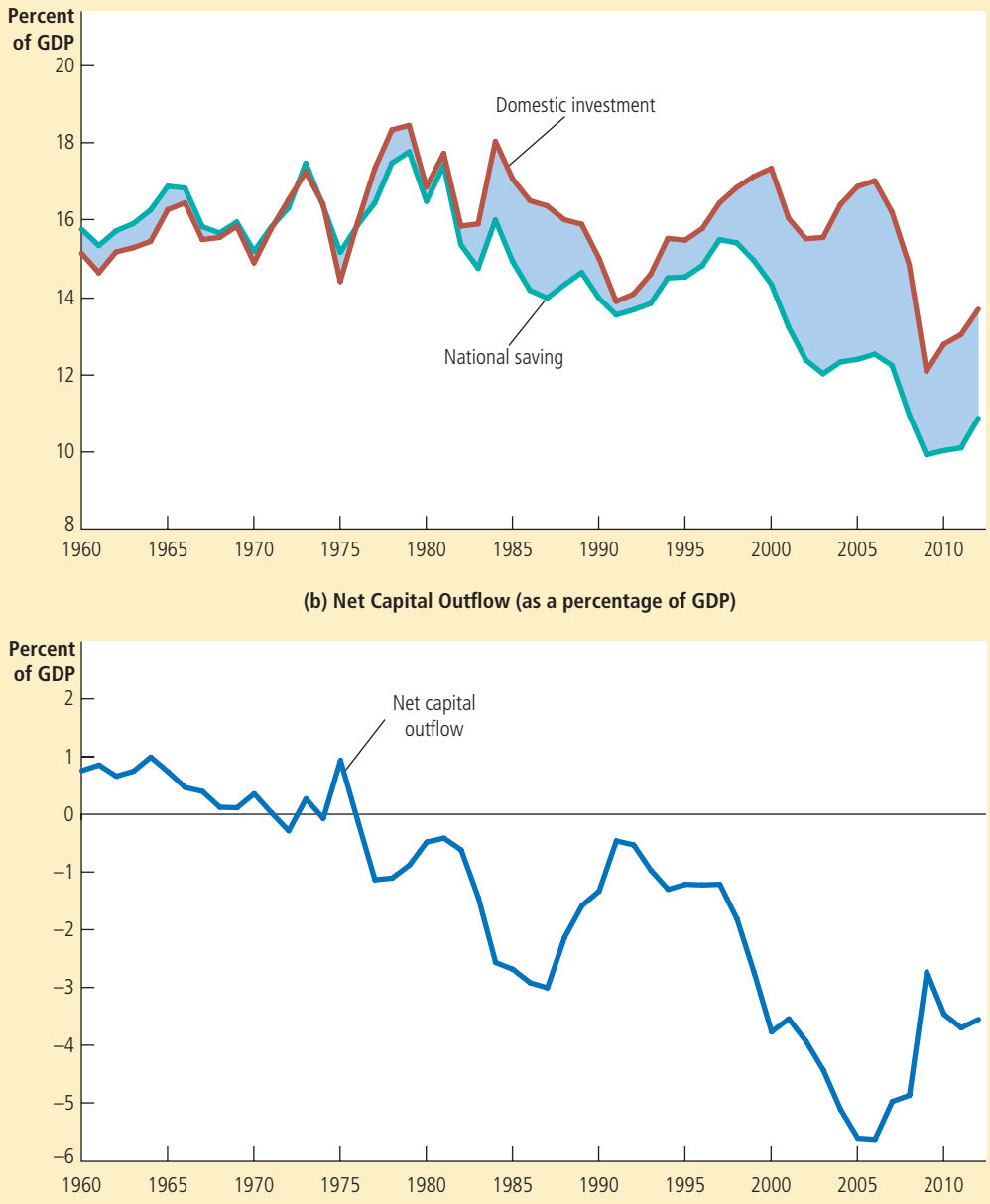


FIGURE 2

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.

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, while he found his proposed cuts in nondefense spending harder to enact.

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 3.8 percent of GDP. None of this 3.3 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

13.4 to 17.8 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: During the period from 2000 to 2012, 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, both of which fell by about 4.5 percentage points. Investment fell because tough economic times starting in 2008 made additional capital less profitable, while national saving fell because the government began running extraordinarily large budget deficits in response to the downturn. At the end of this period, national saving was financing only about two-thirds of domestic investment, while flows of capital from abroad financed the rest.

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 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, given that 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 debt that is being 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 *Define* net exports *and* net capital outflow. *Explain how they are related.*

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.

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

31-2a Nominal Exchange Rates

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.

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

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

FYI

The Euro

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 use a common currency called the *euro*. The euro started circulating on January 1, 2002, when twelve nations began using it as their official money. As of 2013, there were seventeen nations using the euro. Several European nations, such as the United Kingdom, Sweden, and Denmark, have declined joining and have kept their own currencies.

PETER STONE / ALAMY

Monetary policy for the euro area is set by the European Central Bank (ECB), with 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 that each of the fifty 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 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 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 2012, the euro question heated up as several European nations dealt with a variety of 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 government had an additional tool—a national monetary policy. The possibility of Greece's leaving the euro area and reintroducing its own currency was even discussed. As this book was going to press, however, that outcome looked unlikely.

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 takes into account 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. To see how, consider an 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:

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

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

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

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

$$= \text{½ bushel of Japanese rice/bushel of American rice.}$$

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 *Define* nominal exchange rate *and* real exchange rate, *and explain how they are related.* • *If the nominal exchange rate goes from 100 to 120 yen per dollar, has the dollar appreciated or depreciated?*

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 be used to 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 bought 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

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

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.

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 $1/P$ quantity 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 money 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. This means that the two countries share a single monetary policy and that the inflation rates in the two countries will be closely linked. 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 produces more or less inflation in Europe than the Federal Reserve does in the United States.

case study

The Nominal Exchange Rate during a Hyperinflation

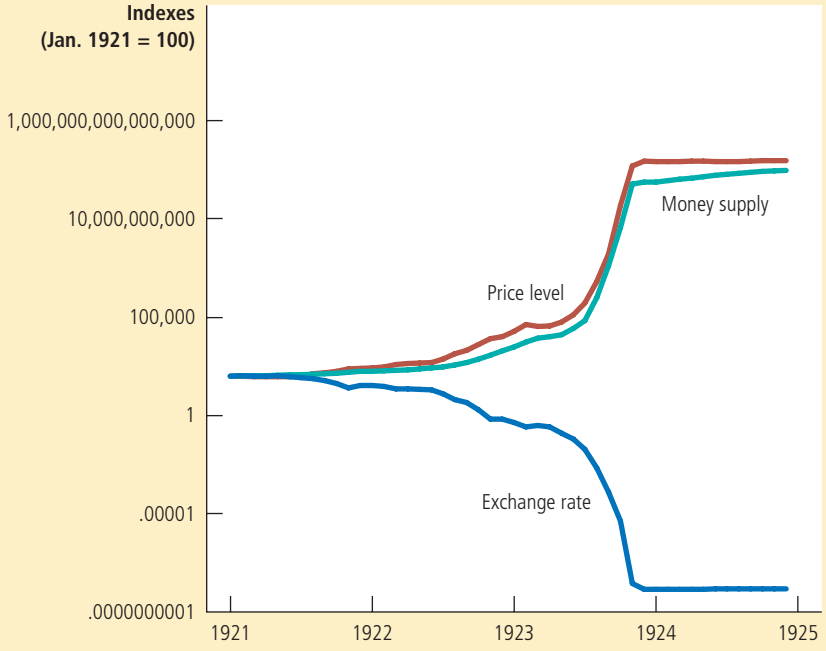
Macroeconomists can only rarely conduct controlled experiments. Most often, they must glean what they can from the natural experiments that history gives them. One natural experiment is hyperinflation—the high inflation that arises when a government turns to the printing press to pay for large amounts 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.

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.

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.

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 compared 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.

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

You can find a Big Mac almost anywhere you look.

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 the Big Mac the same in the two countries. For instance, if the price of a Big Mac is $3 in the United States and 300 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 2013, when the price of a Big Mac was $4.37 in the United States:

Country	Price of a Big Mac	Predicted Exchange Rate	Actual Exchange Rate
Indonesia	27,939 rupiah	6,393 rupiah/$	9,767 rupiah/$
South Korea	3,700 won	847 won/$	1,085 won/$
Japan	320 yen	72 yen/$	91 yen/$
Sweden	48.4 krona	11.1 krona/$	6.4 krona/$
Mexico	37 pesos	8.5 pesos/$	12.7 pesos/$
Euro area	3.59 euros	0.82 euros/$	0.74 euros/$
Britain	2.69 pounds	0.62 pound/$	0.63 pound/$

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 usually in the same ballpark. Purchasing-power parity is not a precise theory of exchange rates, but it often provides a reasonable first approximation.

Quick Quiz *Over the past 20 years, Mexico has had high inflation and Japan has had low inflation. What do you predict has happened to the number of Mexican pesos a person can buy with a Japanese yen?*

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.

Summary

- 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. 660*
open economy, *p. 660*
exports, *p. 660*
imports, *p. 660*
net exports, *p. 660*
trade balance, *p. 660*
trade surplus, *p. 660*
trade deficit, *p. 661*
balanced trade, *p. 661*
net capital outflow, *p. 664*
nominal exchange rate, *p. 670*
appreciation, *p. 671*
depreciation, *p. 671*
real exchange rate, *p. 672*
purchasing-power parity, *p. 674*

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 500,000 yen, a similar American car costs $10,000, 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?

Quick Check Multiple Choice

1. Comparing the U.S. economy today to that of 1950, one finds that today, as a percentage of GDP,
   a. exports and imports are both higher.
   b. exports and imports are both lower.
   c. exports are higher, and imports are lower.
   d. exports are lower, and imports are higher.
2. In an open economy, national saving equals domestic investment
   a. plus the net outflow of capital abroad.
   b. minus the net exports of goods and services.
   c. plus the government's budget deficit.
   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.

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 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. ¼ euro per dollar
   b. ⅓ euro per dollar
   c. 3 euros per dollar
   d. 4 euros per dollar
6. 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

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 net exports or net capital outflow? Be sure to say 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. How would the following transactions affect U.S. net capital outflow? Also, state whether each involves 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 Electric 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 $0.75 in the United States and 12 pesos in Mexico. What is the peso-dollar exchange rate if purchasing-power parity holds? If a monetary expansion caused all prices in Mexico to double, so that soda rose to 24 pesos, what would happen to the peso-dollar exchange rate?
8. Assume that American rice sells for $100 per bushel, Japanese rice sells for 16,000 yen per bushel, and the nominal exchange rate is 80 yen per dollar.
   a. Explain how you could make a profit from this situation. What would be your profit per bushel of rice? If other people were to exploit the same opportunity, what would happen to the price of rice in Japan and the price of rice in the United States?
   b. Suppose that rice is the only commodity in the world. What would happen to the real exchange rate between the United States and Japan?

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

Country	Price of a Big Mac	Predicted Exchange Rate	Actual Exchange Rate
Chile	2,050 pesos	____ pesos/$	472 pesos/$
Hungary	830 forints	____ forints/$	217 forints/$
Czech Republic	70 korunas	____korunas/$	18.9 korunas/$
Brazil	11.25 real	____ real/$	1.99 real/$
Canada	5.41 C$	____ C$/$	1.00 C$/$

   a. For each country, compute the predicted exchange rate of the local currency per U.S. dollar. (Recall that the U.S. price of a Big Mac was $4.37.)
   b. According to purchasing-power parity, what is the predicted exchange rate between the Hungarian forint and the Canadian dollar? What is the actual exchange rate?
   c. How well does the theory of purchasing-power parity explain exchange rates?

10. Purchasing-power parity holds between the nations of Ectenia and Wiknam, where the only commodity is Spam.
   a. In 2000 a can of Spam costs 2 dollars in Ectenia and 6 pesos in Wiknam. What is the exchange rate between Ectenian dollars and Wiknamian pesos?
   b. Over the next 20 years, inflation is 3.5 percent per year in Ectenia and 7 percent per year in Wiknam. What will happen over this period to the price of Spam and the exchange rate? (*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.

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