CHAPTER

32

A Macroeconomic Theory of the Open Economy

Over the past three decades, the United States has persistently 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 quota on textiles from China or cars from Japan? Or should you try to influence 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, and the real and nominal exchange rates. This chapter develops a model that identifies the forces that determine these variables and shows 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 supplies 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 complicated 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. 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:

$$S = I + NCO$$

$$\text{Saving} = \begin{matrix}\text{Domestic} \\ \text{investment}\end{matrix} + \begin{matrix}\text{Net capital} \\ \text{outflow}\end{matrix}.$$

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 encourages people to save and, therefore, raises the quantity of loanable funds supplied. A higher interest rate also makes borrowing to finance capital projects more costly; thus, it discourages investment and reduces the quantity of loanable funds demanded.

In addition to influencing national saving and domestic investment, the real interest rate in a country affects that country's 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 high U.S. real interest rate reduces U.S. net capital outflow.

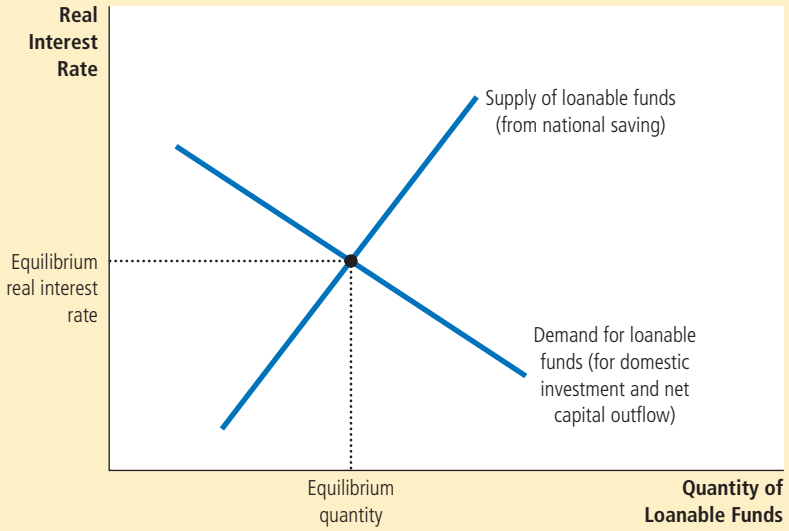
We illustrate the market for loanable funds on the familiar supply-and-demand diagram in Figure 1. As in our earlier analysis of the financial system, the supply curve slopes upward because a higher interest rate increases the quantity of loanable funds supplied, and the demand curve slopes downward 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

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 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 loanable funds exactly balances the demand. That is, *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:

$$NCO = NX$$

Net capital outflow = Net exports.

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 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.

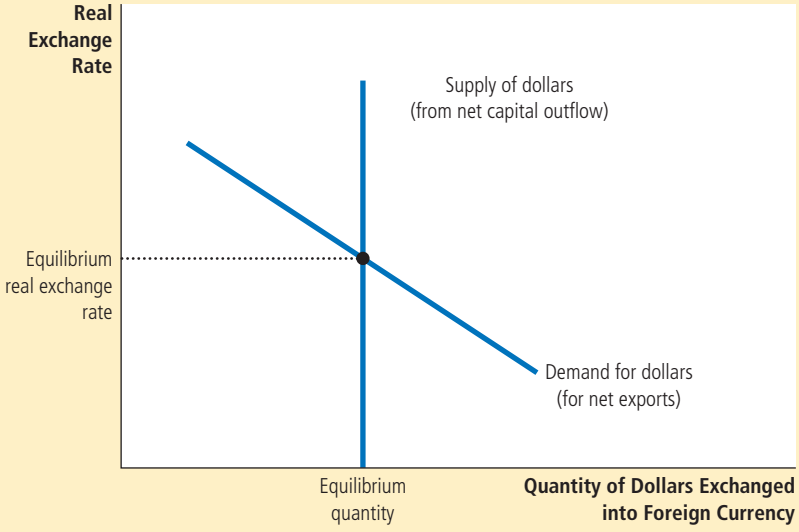
What price balances the supply and demand in the market for foreign-currency exchange? The answer is the real exchange rate. As we saw in the preceding chapter, the real exchange rate is the relative price of domestic and foreign goods and, therefore, is a key determinant of net exports. When the U.S. 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:

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 is downward sloping. 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.



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.)

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 this would 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, a high value of the dollar makes it less expensive for an American to buy stock in a Japanese company, but when that stock pays dividends, those will be in yen. As these yen are exchanged for dollars, the high value of the dollar means that the dividend will buy fewer dollars. 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. That is, 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

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 preceding chapter developed a theory of the exchange rate 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, rather than being downward sloping, 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, concentrates on the more realistic case in which the demand curve for foreign-currency exchange is downward sloping. This allows for the possibility that the real exchange rate changes over time, as in fact it often does in the real world.

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.*

Quick Quiz *Describe the sources of supply and demand in the market for loanable funds and the market for foreign-currency exchange.*

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.

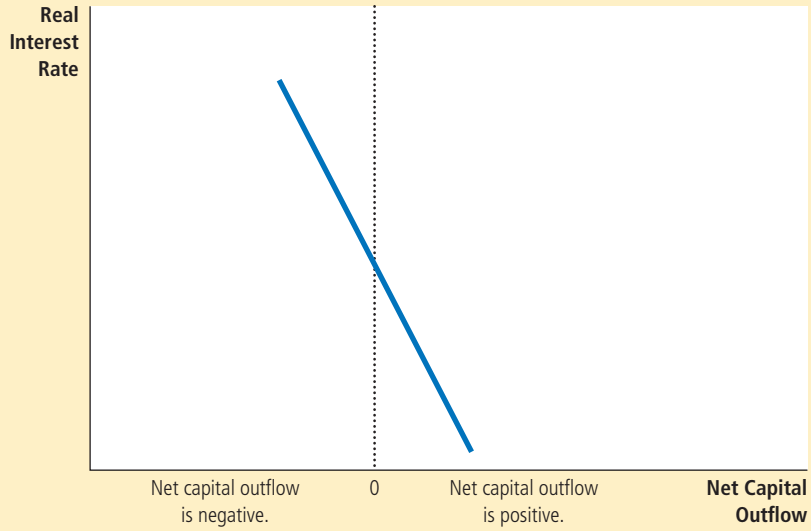
Net capital outflow is the variable that links these two markets. In the market for loanable funds, net capital outflow is a piece of demand. An American who wants to buy an asset abroad must finance this purchase by obtaining resources in the U.S. market for loanable funds. In the market for foreign-currency 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 more 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). It shows how the interest rate from panel (a) determines net capital outflow. A higher interest rate at home makes domestic assets more attractive, and this in turn reduces net capital outflow. Therefore, the net-capital-outflow curve in panel (b) slopes downward.

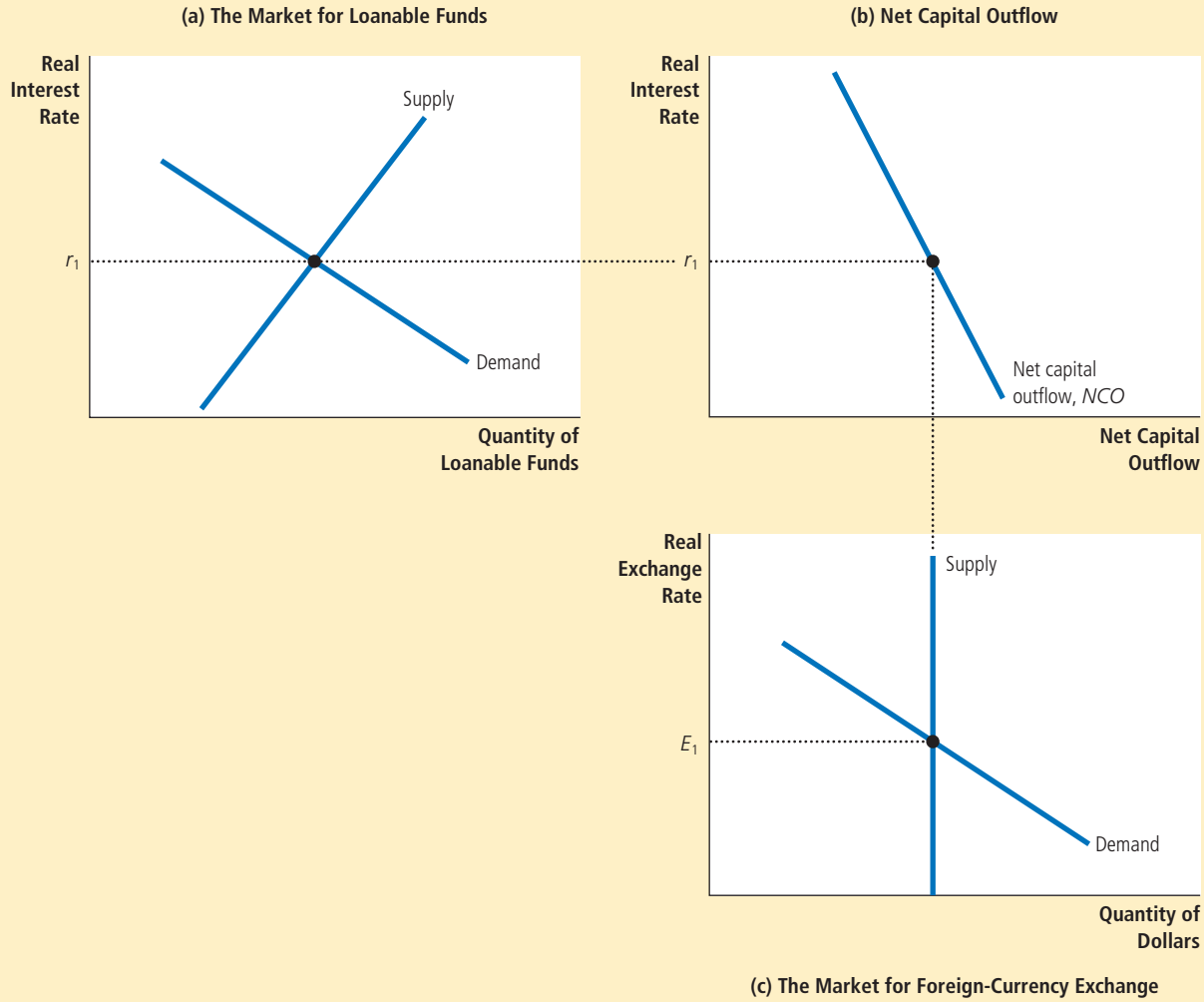
Panel (c) of the figure shows the market for foreign-currency exchange (taken from Figure 2). Because foreign assets must be purchased with foreign currency, the quantity of net capital outflow from panel (b) determines the supply of dollars to be exchanged into foreign currencies. The real exchange 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 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

FIGURE 4

The Real Equilibrium in an Open Economy

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.



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. In a moment, we will use this model to see how all these variables change when some policy or event causes one of these curves to shift.

Quick Quiz *In the model of the open economy just developed, two markets determine two relative prices. What are the markets? What are the two relative prices?*

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 which 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. This is true 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 would have worked. 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. ◢

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 which way 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, which way does this supply curve shift? Again as in a closed economy, a budget deficit represents *negative* public saving, so it reduces national

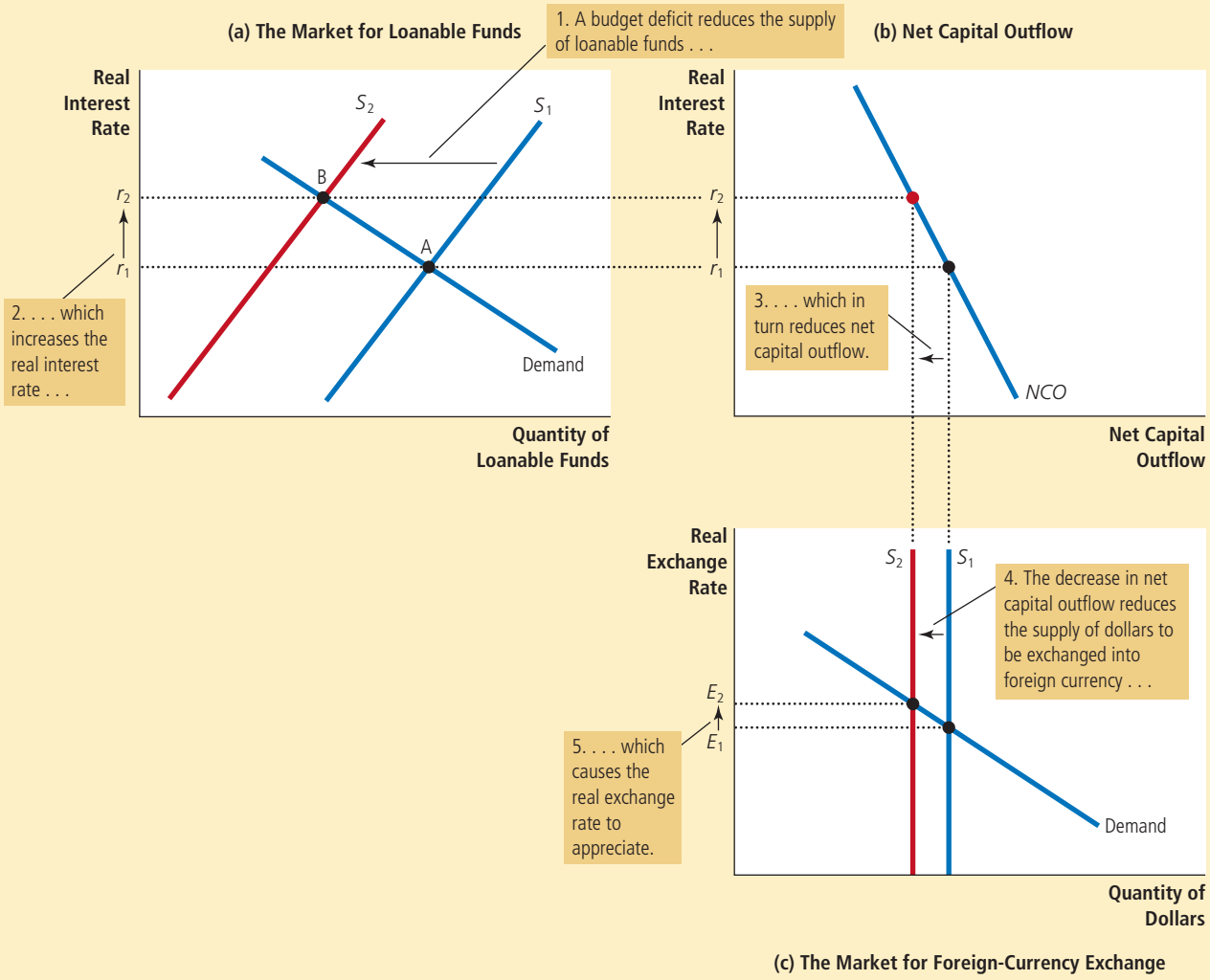
saving and shifts the supply curve for loanable funds to the left. This is shown as the shift from S_1 to S_2 in panel (a) of Figure 5.

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. With fewer funds 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

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.



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 compared to foreign currencies. This appreciation, in turn, makes U.S. goods more expensive compared 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 cuts in taxes, but they did not cut government spending by nearly as much. The result was a large budget deficit. Our model of the open economy 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
a government policy that directly influences the quantity of goods and services that a country imports or exports

A **trade policy** is a 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. Trade policies are common throughout the world, although sometimes they are disguised. For example, the U.S. government has sometimes pressured Japanese automakers to reduce the number of cars they sell in the United States. These so-called voluntary export restrictions are not really voluntary and, in essence, are a form of import quota.

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

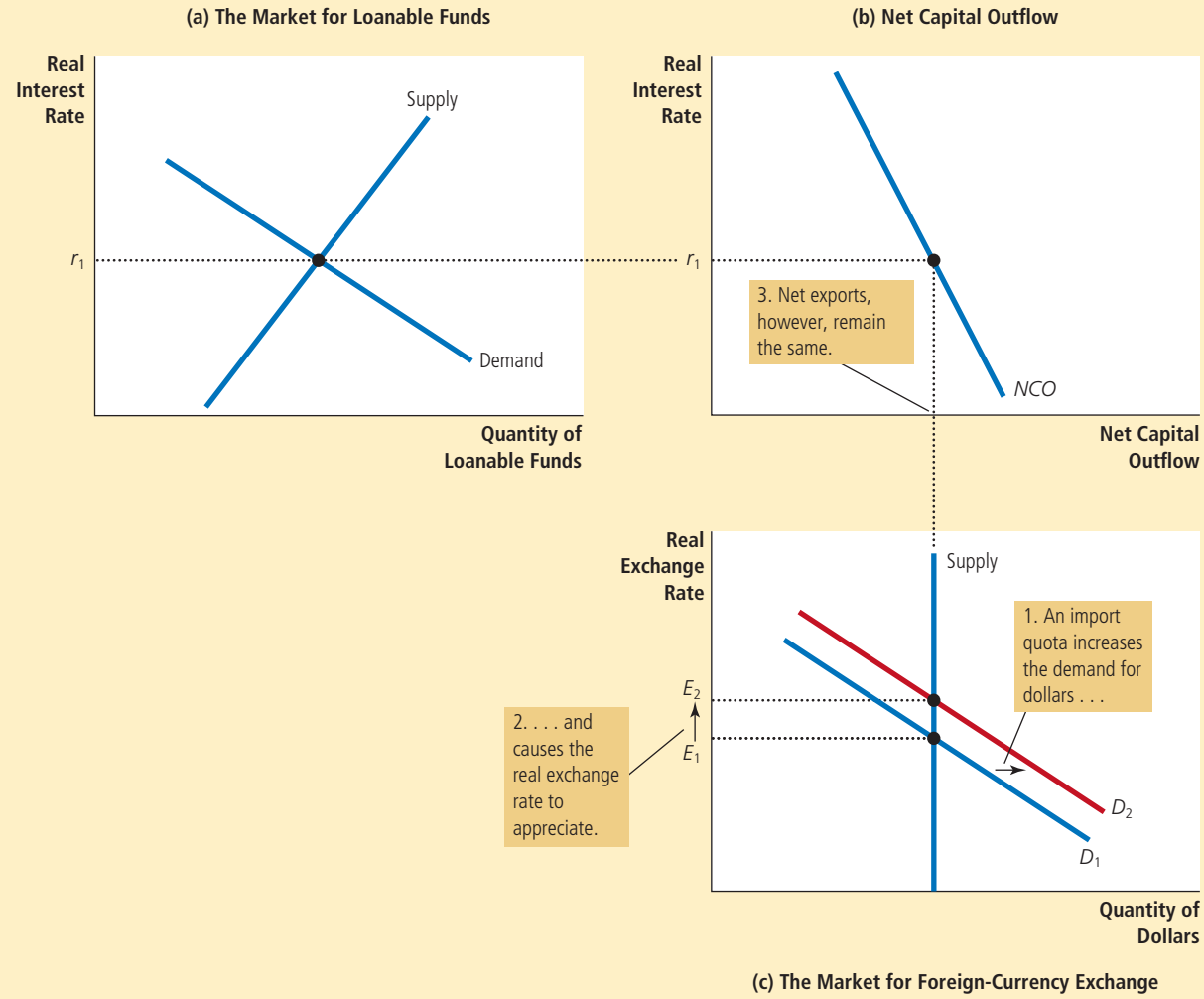
imported from Japan. In making their case, lobbyists for the auto industry assert that the trade restriction would shrink the size of the U.S. trade deficit. Are they right? Our model, as illustrated in Figure 6, offers an answer.

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.

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.



The second step is to determine which way 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, there is an increased 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 value 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 work to 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 come to a surprising implication: *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:

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

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 will sell more cars. At the same time, because the dollar has appreciated in value, Boeing, the U.S. aircraft maker, will find it harder to compete with Airbus, the European aircraft maker. U.S. exports of aircraft will fall, and U.S. imports of aircraft will rise. In this case, the import quota on Japanese cars will increase net exports of cars and decrease net exports of planes. In addition, it will increase net exports from the United States to Japan and decrease 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 claim (incorrectly) 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 for 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, thus, 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 to 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 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 which way 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 does make Mexican assets more attractive, this 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 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 in value from 29 to 15 U.S. cents per peso.

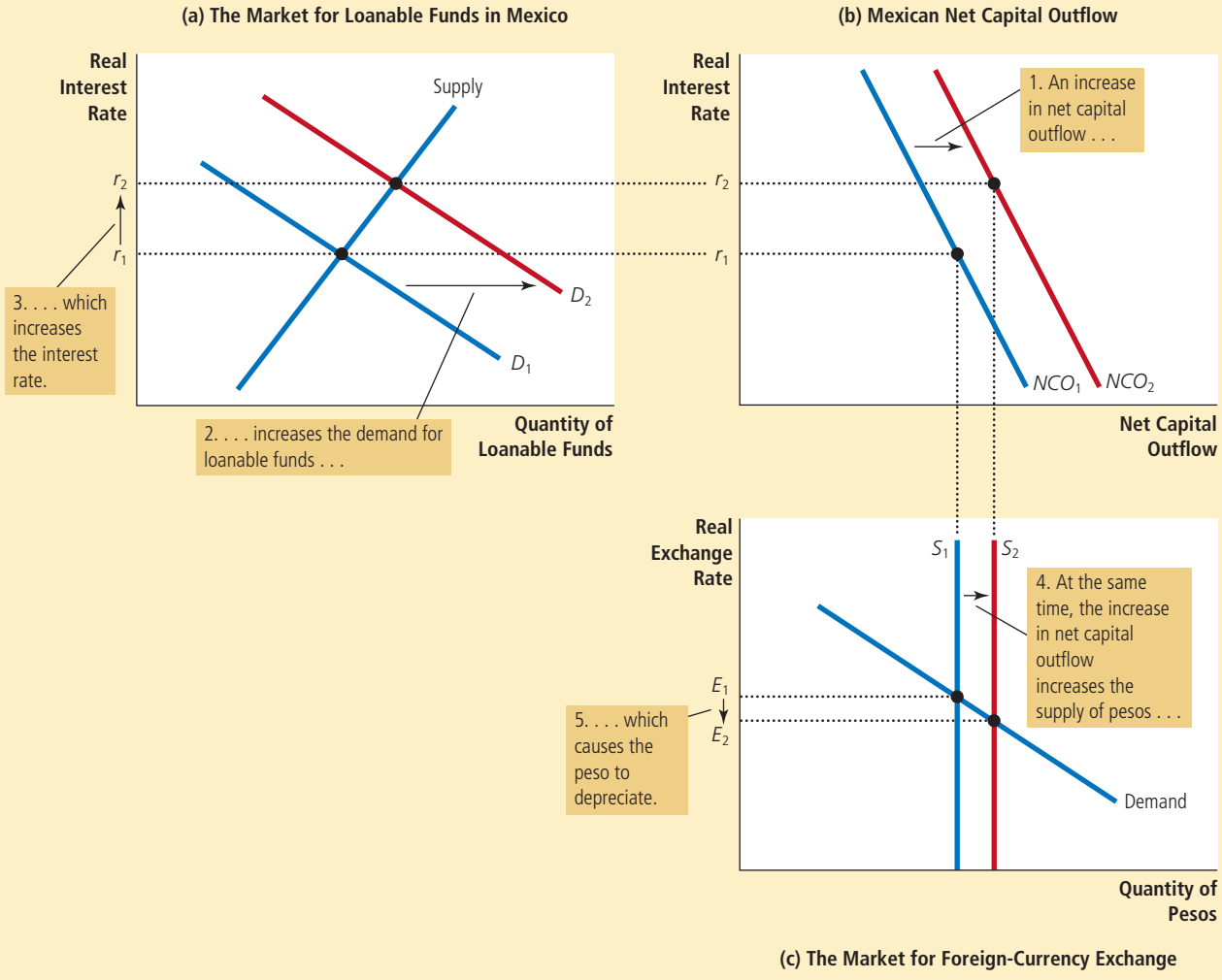
These price changes that result from capital flight influence some key macroeconomic quantities. The depreciation of the currency makes exports cheaper and imports more expensive, pushing the trade balance toward surplus. At the same time, the increase in the interest rate reduces domestic investment,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

FIGURE 7

The Effects of Capital Flight

If people decide that Mexico is a risky place to keep their savings, they will move their capital to safer 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), and this drives 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 compared to other currencies.



coincides with a fall in U.S. net capital outflow. As the peso depreciates in value and Mexican interest rates rise, the dollar appreciates in value 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 so large compared to 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, inducing 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 being 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 one of the ongoing policy disputes between the United States and China. In recent years, the Chinese government has tried to depress the value of its currency—the renminbi—in foreign exchange markets to promote its export industries. It does this by accumulating foreign assets, including substantial amounts of U.S government bonds. As of the end of 2012, China's total reserves of foreign assets were about $3 trillion.

The U.S. government has at times objected to China's interventions in foreign-exchange markets. By holding down the value of the renminbi, the policy makes Chinese goods less expensive, which in turn contributes to the U.S. trade deficit and hurts American producers who make products that compete with imports from China. Because of these effects, the U.S. government has encouraged China to stop influencing the exchange value of its currency with government-sponsored capital flows. Some members of Congress have even gone so far as to advocate tariffs on Chinese imports unless China ceases its "currency manipulation."

Yet the impact of the Chinese policy on the U.S. economy is not all bad. American consumers of Chinese imports benefit from lower prices. In addition, the inflow of capital from China lowers U.S. interest rates, which in turn increases investment in the U.S. economy. To some extent, the Chinese government is financing U.S. economic growth. The Chinese policy of investing in the U.S. economy creates winners and losers among Americans. All things considered, the net impact on the U.S. economy is probably small.

The harder question concerns the motives behind the policy: Why are the Chinese leaders interested in producing for export and investing abroad, rather than producing for domestic consumption and investing at home? There is no obvious answer. One possibility is that China wants to accumulate a reserve of foreign assets on which it can draw in emergencies—a kind of national "rainy-day fund." Another possibility is that the policy is simply misguided. ◢

Quick Quiz *Suppose that Americans decided to spend a smaller fraction of their incomes. What would be the effect on saving, investment, interest rates, the real exchange rate, and the trade balance?*

IN THE NEWS

Is a Strong Currency Always in a Nation's Interest?

An economist tries to decode the political rhetoric about the exchange rate.

Needed: Plain Talk About the Dollar

By Christina D. Romer

At a recent news conference, Ben S. Bernanke, the Federal Reserve chairman, was asked about the falling dollar. He parried the question, saying that the Treasury secretary was the government's spokesman on the exchange rate—and, of course, that the United States favors a strong dollar.

Listening to that statement, I flashed back to one of my first experiences as an adviser to Barack Obama. In November 2008, I was sharing a cab in Chicago with Larry Summers, the former Treasury secretary and a fellow economic adviser to the president-elect. To help prepare me for the interviews and the hearings to come, Larry graciously asked me questions and critiqued my answers.

When he asked about the exchange rate for the dollar, I began: "The exchange rate is a price much like any other price, and is determined by market forces."

"Wrong!" Larry boomed. "The exchange rate is the purview of the Treasury. The United States is in favor of a strong dollar."

For the record, my initial answer was much more reasonable. Our exchange rate is just a price—the price of the dollar in terms of other currencies. It is not controlled by anyone. And a high price for the dollar, which is what we mean by a strong dollar, is not always desirable.

Some countries, like China, essentially fix the price of their currency. But since the early 1970s, the United States has let the dollar's value move in response to changes in the supply and demand of dollars in the foreign exchange market. The Treasury no more determines the price of the dollar than the Department of Energy determines the price of gasoline. Both departments have a small reserve that they can use to combat market instability, but neither has the resources or the mandate to hold the relevant price away from its market equilibrium value for very long.

In practice, all that "the exchange rate is the purview of the Treasury" means is that no official other than the Treasury secretary is supposed to talk about it (and even he isn't supposed to say very much). That strikes me as a shame. Perhaps if government officials could talk about the exchange rate forthrightly, there would be more understanding of the issues and more rational policy discussions.

Such discussions would start with some basic economics. The desire to trade with other countries or invest in them is what gives rise to the market for foreign exchange. You need euros to travel in Spain or to buy a German government bond, so you need a way to exchange currencies.

The supply of dollars to the foreign exchange market comes from Americans who want to buy goods, services or assets from abroad. The demand for dollars comes from foreigners who want to buy from the United States.

Anything that increases the demand for dollars or reduces the supply drives up the dollar's price. Anything that lowers the demand for dollars or raises the supply causes the dollar to weaken.

Consider two examples. Suppose American entrepreneurs create many products that foreigners want to buy, and start many companies they want to invest in. That will increase the demand for dollars and so cause the dollar's price to rise. Such innovation will also make Americans want to buy more goods and assets in the United States—and fewer abroad. The supply of dollars to the foreign exchange market will fall, further strengthening the dollar. This example describes very

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

well the conditions of the late 1990s—when the dollar was indeed strong.

Now suppose the United States runs a large budget deficit that causes domestic interest rates to rise. Higher American interest rates make both foreigners and Americans want to buy more American bonds and fewer foreign bonds. Thus the demand for dollars increases and the supply decreases. The price of the dollar will again rise.

This example describes conditions in the early 1980s, when President Ronald Reagan's tax cuts and military buildup led to large deficits. Those deficits, along with the anti-inflationary policies of the Fed, where Paul A. Volcker was then the chairman, led to high American interest rates. The dollar was very strong in this period.

Both developments—brilliant American innovation and troublesome American budget deficits—caused the dollar to strengthen. Yet one is clearly a positive for the American economy, the other a negative. The point is that there is no universal good or bad direction for the dollar to move. The desirability of any shift in the exchange rate depends on why the dollar is moving.

It also depends on the state of the economy. At full employment, a strong dollar is good for standards of living. A high price for the dollar means that our currency buys a lot in foreign countries.

But in a depressed economy, it isn't so clear that a strong dollar is desirable. A weaker dollar means that our goods are cheaper relative to foreign goods. That stimulates our exports and reduces our imports. Higher net exports raise domestic production and employment. Foreign goods are more expensive, but more Americans are working. Given the desperate need for jobs, on net we are almost surely better off with a weaker dollar for a while.

Bloomberg/Getty Images

Christina Romer

Fed policy is determined by inflation and unemployment in the United States. But if Mr. Bernanke could discuss the exchange rate openly, he would probably tell you that one way any monetary expansion helps a distressed economy is by weakening the dollar. That is taught in every introductory economics course, yet the Fed is asked to pretend it isn't true.

Likewise, fiscal policy is determined by domestic considerations. But trimming our budget deficit, as we should over the coming years, would also weaken the dollar. And that, in turn, would blunt the negative impact of deficit reduction on employment and output in the short run.

Strangely, every politician seems to understand that it would be desirable for the dollar to weaken against one particular currency: the Chinese renminbi. For years, China has deliberately accumulated United States Treasury bonds to keep the dollar's value high in renminbi terms. The United States would export more and grow faster if China allowed the dollar's price to fall. Congress routinely threatens retaliation if China doesn't take steps that amount to weakening the dollar.

But in the very next breath, the same members of Congress shout about the importance of a strong dollar. If a decline in its value relative to the renminbi would be beneficial, a fall relative to the currency of many countries would help even more in the current situation.

To say this openly risks being branded not just an extremist but possibly un-American. Perhaps it is time for a more adult conversation. The exchange rate is the purview of market economics, not of the Treasury or strong-dollar ideologues.

Ms. Romer is an economics professor at University of California at Berkeley and was chair of the President Obama's Council of Economic Advisers from 2009 to 2010.

Source: *The New York Times*, May 22, 2011.

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 try to separate myth from reality. The tools you have learned in the past two chapters should help in that endeavor.

Summary

- 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 is part of the demand for loanable funds and because it 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 reduces net capital outflow, which reduces 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 in value, 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. 694*

capital flight, *p. 697*

Questions for Review

1. Describe supply and demand in the market for loanable funds and 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?

Quick Check Multiple Choice

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.
3. 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 real exchange rate _____.
   a. falls, outflow, appreciation
   b. falls, outflow, depreciation
   c. falls, inflow, appreciation
   d. rises, inflow, appreciation

4. The nation of Ectenia has long banned the export of its highly prized puka shells. A newly elected president, however, removes the export ban. This change in policy will cause the nation's currency to _____, making the goods Ectenia imports _____ expensive.
   a. appreciate, less
   b. appreciate, more
   c. depreciate, less
   d. depreciate, more
5. A civil war abroad causes foreign investors to seek a safe haven for their funds in 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
6. If business leaders in Great Britain become more confident in their economy, their optimism will induce them to 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

Problems and Applications

1. Japan generally runs a significant trade surplus. Do you think this 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 due largely 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 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 dollars in the market for foreign-currency exchange?
   c. What happens to the quantity of 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 will affect U.S. net capital outflow. Then explain how it will affect U.S. net exports by using a formula from the chapter and by drawing a diagram. What will happen 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?