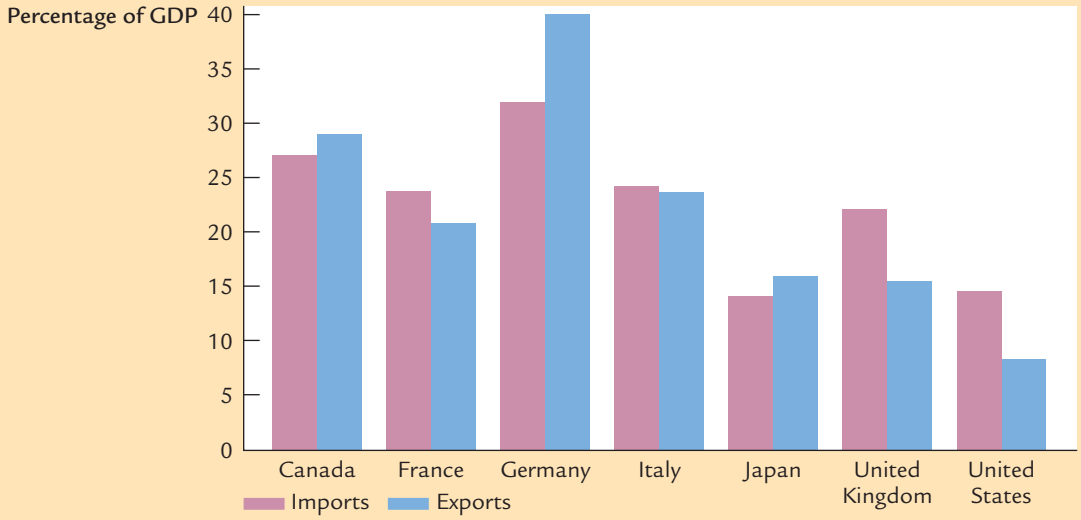
FIGURE 5-1



Imports and Exports as a Percentage of Output: 2007 While international trade is important for the United States, it is even more vital for other countries.

Source: International Monetary Fund.

rate at which the domestic currency trades for foreign currencies. Our model shows how protectionist trade policies—policies designed to protect domestic industries from foreign competition—influence the amount of international trade and the exchange rate.

5-1 The International Flows of Capital and Goods

The key macroeconomic difference between open and closed economies is that, in an open economy, a country's spending in any given year need not equal its output of goods and services. A country can spend more than it produces by borrowing from abroad, or it can spend less than it produces and lend the difference to foreigners. To understand this more fully, let's take another look at national income accounting, which we first discussed in Chapter 2.

The Role of Net Exports

Consider the expenditure on an economy's output of goods and services. In a closed economy, all output is sold domestically, and expenditure is divided into three components: consumption, investment, and government purchases. In an

open economy, some output is sold domestically and some is exported to be sold abroad. We can divide expenditure on an open economy's output Y into four components:

- C^d, consumption of domestic goods and services,
- I^d, investment in domestic goods and services,
- G^d, government purchases of domestic goods and services,
- X, exports of domestic goods and services.

The division of expenditure into these components is expressed in the identity

$$Y = C^d + I^d + G^d + X.$$

The sum of the first three terms, $C^d + I^d + G^d$, is domestic spending on domestic goods and services. The fourth term, X, is foreign spending on domestic goods and services.

A bit of manipulation can make this identity more useful. Note that domestic spending on *all* goods and services equals domestic spending on *domestic* goods and services plus domestic spending on *foreign* goods and services. Hence, total consumption C equals consumption of domestic goods and services C^d plus consumption of foreign goods and services C^f; total investment I equals investment in domestic goods and services I^d plus investment in foreign goods and services I^f; and total government purchases G equals government purchases of domestic goods and services G^d plus government purchases of foreign goods and services G^f. Thus,

$$C = C^d + C^f,$$

$$I = I^d + I^f,$$

$$G = G^d + G^f.$$

We substitute these three equations into the identity above:

$$Y = (C - C^f) + (I - I^f) + (G - G^f) + X.$$

We can rearrange to obtain

$$Y = C + I + G + X - (C^f + I^f + G^f).$$

The sum of domestic spending on foreign goods and services $(C^f + I^f + G^f)$ is expenditure on imports (IM). We can thus write the national income accounts identity as

$$Y = C + I + G + X - IM.$$

Because spending on imports is included in domestic spending $(C + I + G)$, and because goods and services imported from abroad are not part of a country's output, this equation subtracts spending on imports. Defining **net exports** to be exports minus imports $(NX = X - IM)$, the identity becomes

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

This equation states that expenditure on domestic output is the sum of consumption, investment, government purchases, and net exports. This is the most common form of the national income accounts identity; it should be familiar from Chapter 2.

The national income accounts identity shows how domestic output, domestic spending, and net exports are related. In particular,

$$NX = \quad Y \quad - (C + I + G)$$

$$\text{Net Exports} = \text{Output} - \text{Domestic Spending}.$$

This equation shows that in an open economy, domestic spending need not equal the output of goods and services. *If output exceeds domestic spending, we export the difference: net exports are positive. If output falls short of domestic spending, we import the difference: net exports are negative.*

International Capital Flows and the Trade Balance

In an open economy, as in the closed economy we discussed in Chapter 3, financial markets and goods markets are closely related. To see the relationship, we must rewrite the national income accounts identity in terms of saving and investment. Begin with the identity

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

Subtract C and G from both sides to obtain

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

Recall from Chapter 3 that $Y - C - G$ is national saving S, which equals the sum of private saving, $Y - T - C$, and public saving, $T - G$, where T stands for taxes. Therefore,

$$S = I + NX.$$

Subtracting I from both sides of the equation, we can write the national income accounts identity as

$$S - I = NX.$$

This form of the national income accounts identity shows that an economy's net exports must always equal the difference between its saving and its investment.

Let's look more closely at each part of this identity. The easy part is the right-hand side, NX, the net export of goods and services. Another name for net exports is the **trade balance,** because it tells us how our trade in goods and services departs from the benchmark of equal imports and exports.

The left-hand side of the identity is the difference between domestic saving and domestic investment, $S - I$, which we'll call **net capital outflow.** (It's sometimes called *net foreign investment*.) Net capital outflow equals the amount that domestic residents are lending abroad minus the amount that foreigners are lending to us. If net capital outflow is positive, the economy's saving exceeds its

investment, and it is lending the excess to foreigners. If the net capital outflow is negative, the economy is experiencing a capital inflow: investment exceeds saving, and the economy is financing this extra investment by borrowing from abroad. Thus, net capital outflow reflects the international flow of funds to finance capital accumulation.

The national income accounts identity shows that net capital outflow always equals the trade balance. That is,

$$\text{Net Capital Outflow} = \text{Trade Balance}$$

$$S - I \quad = \quad NX.$$

If $S - I$ and NX are positive, we have a **trade surplus.** In this case, we are net lenders in world financial markets, and we are exporting more goods than we are importing. If $S - I$ and NX are negative, we have a **trade deficit.** In this case, we are net borrowers in world financial markets, and we are importing more goods than we are exporting. If $S - I$ and NX are exactly zero, we are said to have **balanced trade** because the value of imports equals the value of exports.

The national income accounts identity shows that the international flow of funds to finance capital accumulation and the international flow of goods and services are two sides of the same coin. If domestic saving exceeds domestic investment, the surplus saving is used to make loans to foreigners. Foreigners require these loans because we are providing them with more goods and services than they are providing us. That is, we are running a trade surplus. If investment exceeds saving, the extra investment must be financed by borrowing from abroad. These foreign loans enable us to import more goods and services than we export. That is, we are running a trade deficit. Table 5-1 summarizes these lessons.

Note that the international flow of capital can take many forms. It is easiest to assume—as we have done so far—that when we run a trade deficit, foreigners make loans to us. This happens, for example, when the Japanese buy the debt issued by U.S. corporations or by the U.S. government. But the flow of capital can also take the form of foreigners buying domestic assets, such as when a citizen of Germany buys stock from an American on the New York Stock Exchange.

TABLE 5-1

International Flows of Goods and Capital: Summary

This table shows the three outcomes that an open economy can experience.

Trade Surplus	Balanced Trade	Trade Deficit
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

Whether foreigners buy domestically issued debt or domestically owned assets, they obtain a claim to the future returns to domestic capital. In both cases, foreigners end up owning some of the domestic capital stock.

International Flows of Goods and Capital: An Example

The equality of net exports and net capital outflow is an identity: it must hold because of how the variables are defined and the numbers are added up. But it is easy to miss the intuition behind this important relationship. The best way to understand it is to consider an example.

Imagine that Bill Gates sells a copy of the Windows operating system to a Japanese consumer for 5,000 yen. Because Mr. Gates is a U.S. resident, the sale represents an export of the United States. Other things equal, U.S. net exports rise. What else happens to make the identity hold? It depends on what Mr. Gates does with the 5,000 yen.

Suppose Mr. Gates decides to stuff the 5,000 yen in his mattress. In this case, Mr. Gates has allocated some of his saving to an investment in the Japanese

FYI

The Irrelevance of Bilateral Trade Balances

The trade balance we have been discussing measures the difference between a nation's exports and its imports with the rest of the world. Sometimes you might hear in the media a report on a nation's trade balance with a specific other nation. This is called a *bilateral* trade balance. For example, the U.S. bilateral trade balance with China equals exports that the United States sells to China minus imports that the United States buys from China.

The overall trade balance is, as we have seen, inextricably linked to a nation's saving and investment. That is not true of a bilateral trade balance. Indeed, a nation can have large trade deficits and surpluses with specific trading partners, while having balanced trade overall.

For example, suppose the world has three countries: the United States, China, and Australia. The United States sells $100 billion in machine tools to Australia, Australia sells $100 billion in wheat to China, and China sells $100 billion in toys to the United States. In this case, the United States has a bilateral trade deficit with China, China has a bilateral trade deficit with Australia, and Australia has a bilateral trade deficit with the United States. But each of the three nations has balanced trade overall, exporting and importing $100 billion in goods.

Bilateral trade deficits receive more attention in the political arena than they deserve. This is in part because international relations are conducted country to country, so politicians and diplomats are naturally drawn to statistics measuring country-to-country economic transactions. Most economists, however, believe that bilateral trade balances are not very meaningful. From a macroeconomic standpoint, it is a nation's trade balance with all foreign nations put together that matters.

The same lesson applies to individuals as it does to nations. Your own personal trade balance is the difference between your income and your spending, and you may be concerned if these two variables are out of line. But you should not be concerned with the difference between your income and spending with a particular person or firm. Economist Robert Solow once explained the irrelevance of bilateral trade balances as follows: "I have a chronic deficit with my barber, who doesn't buy a darned thing from me." But that doesn't stop Mr. Solow from living within his means—or getting a haircut when he needs it.

economy (in the form of the Japanese currency) rather than to an investment in the U.S. economy. Thus, U.S. saving exceeds U.S. investment. The rise in U.S. net exports is matched by a rise in the U.S. net capital outflow.

If Mr. Gates wants to invest in Japan, however, he is unlikely to make currency his asset of choice. He might use the 5,000 yen to buy some stock in, say, the Sony Corporation, or he might buy a bond issued by the Japanese government. In either case, some of U.S. saving is flowing abroad. Once again, the U.S. net capital outflow exactly balances U.S. net exports.

The opposite situation occurs in Japan. When the Japanese consumer buys a copy of the Windows operating system, Japan's purchases of goods and services ($C + I + G$) rise, but there is no change in what Japan has produced (Y). The transaction reduces Japan's saving ($S = Y - C - G$) for a given level of investment (I). While the U.S. experiences a net capital outflow, Japan experiences a net capital inflow.

Now let's change the example. Suppose that instead of investing his 5,000 yen in a Japanese asset, Mr. Gates uses it to buy something made in Japan, such as a Sony Walkman MP3 player. In this case, imports into the United States rise. Together, the Windows export and the Walkman import represent balanced trade between Japan and the United States. Because exports and imports rise equally, net exports and net capital outflow are both unchanged.

A final possibility is that Mr. Gates exchanges his 5,000 yen for U.S. dollars at a local bank. But this doesn't change the situation: the bank now has to do something with the 5,000 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. If you follow the money, you can see that, in the end, U.S. net exports must equal U.S. net capital outflow.

5-2 Saving and Investment in a Small Open Economy

So far in our discussion of the international flows of goods and capital, we have rearranged accounting identities. That is, we have defined some of the variables that measure transactions in an open economy, and we have shown the links among these variables that follow from their definitions. Our next step is to develop a model that explains the behavior of these variables. We can then use the model to answer questions such as how the trade balance responds to changes in policy.

Capital Mobility and the World Interest Rate

In a moment we present a model of the international flows of capital and goods. Because the trade balance equals the net capital outflow, which in turn equals saving minus investment, our model focuses on saving and investment. To develop this model, we use some elements that should be familiar from Chapter 3, but

in contrast to the Chapter 3 model, we do not assume that the real interest rate equilibrates saving and investment. Instead, we allow the economy to run a trade deficit and borrow from other countries or to run a trade surplus and lend to other countries.

If the real interest rate does not adjust to equilibrate saving and investment in this model, what *does* determine the real interest rate? We answer this question here by considering the simple case of a **small open economy** with perfect capital mobility. By "small" we mean that this economy is a small part of the world market and thus, by itself, can have only a negligible effect on the world interest rate. By "perfect capital mobility" we mean that residents of the country have full access to world financial markets. In particular, the government does not impede international borrowing or lending.

Because of this assumption of perfect capital mobility, the interest rate in our small open economy, r, must equal the **world interest rate** r^*, the real interest rate prevailing in world financial markets:

$$r = r^*.$$

Residents of the small open economy need never borrow at any interest rate above r^*, because they can always get a loan at r^* from abroad. Similarly, residents of this economy need never lend at any interest rate below r^* because they can always earn r^* by lending abroad. Thus, the world interest rate determines the interest rate in our small open economy.

Let's discuss briefly what determines the world real interest rate. In a closed economy, the equilibrium of domestic saving and domestic investment determines the interest rate. Barring interplanetary trade, the world economy is a closed economy. Therefore, the equilibrium of world saving and world investment determines the world interest rate. Our small open economy has a negligible effect on the world real interest rate because, being a small part of the world, it has a negligible effect on world saving and world investment. Hence, our small open economy takes the world interest rate as exogenously given.

Why Assume a Small Open Economy?

The analysis in the body of this chapter assumes that the nation being studied is a small open economy. (The same approach is taken in Chapter 12, which examines short-run fluctuations in an open economy.) This assumption raises some questions.

Q: Is the United States well described by the assumption of a small open economy?

A: No, it is not, at least not completely. The United States does borrow and lend in world financial markets, and these markets exert a strong influence over the U.S. real interest rate, but it would be an exaggeration to say that the U.S. real interest rate is determined solely by world financial markets.

Q: So why are we assuming a small open economy?

A: Some nations, such as Canada and the Netherlands, are better described by the assumption of a small open economy. Yet the main reason for making this assumption is to develop understanding and intuition for the macroeconomics of

open economies. Remember from Chapter 1 that economic models are built with simplifying assumptions. An assumption need not be realistic to be useful. Assuming a small open economy simplifies the analysis greatly and, therefore, will help clarify our thinking.

Q: Can we relax this assumption and make the model more realistic?

A: Yes, we can, and we will. The appendix to this chapter (and the appendix to Chapter 12) considers the more realistic and more complicated case of a large open economy. Some instructors skip directly to this material when teaching these topics because the approach is more realistic for economies such as that of the United States. Others think that students should walk before they run and, therefore, begin with the simplifying assumption of a small open economy.

The Model

To build the model of the small open economy, we take three assumptions from Chapter 3:

- The economy's output Y is fixed by the factors of production and the production function. We write this as

$$Y = \bar{Y} = F(\bar{K}, \bar{L}).$$

- Consumption C is positively related to disposable income $Y - T$. We write the consumption function as

$$C = C(Y - T).$$

- Investment I is negatively related to the real interest rate r. We write the investment function as

$$I = I(r).$$

These are the three key parts of our model. If you do not understand these relationships, review Chapter 3 before continuing.

We can now return to the accounting identity and write it as

$$NX = (Y - C - G) - I$$

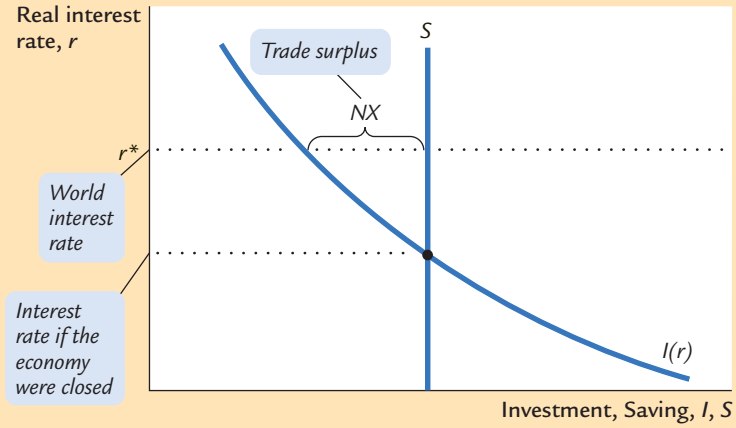
$$NX = S - I.$$

Substituting the Chapter 3 assumptions recapped above and the assumption that the interest rate equals the world interest rate, we obtain

$$\begin{aligned} NX &= [\bar{Y} - C(\bar{Y} - T) - G] - I(r^*) \\ &= \quad \bar{S} \quad - I(r^*). \end{aligned}$$

This equation shows that the trade balance NX depends on those variables that determine saving S and investment I. Because saving depends on fiscal policy (lower government purchases G or higher taxes T raise national saving) and investment depends on the world real interest rate r^* (a higher interest rate makes some investment projects unprofitable), the trade balance depends on these variables as well.

FIGURE 5-2



Saving and Investment in a Small Open Economy In a closed economy, the real interest rate adjusts to equilibrate saving and investment. In a small open economy, the interest rate is determined in world financial markets. The difference between saving and investment determines the trade balance. Here there is a trade surplus, because at the world interest rate, saving exceeds investment.

In Chapter 3 we graphed saving and investment as in Figure 5-2. In the closed economy studied in that chapter, the real interest rate adjusts to equilibrate saving and investment—that is, the real interest rate is found where the saving and investment curves cross. In the small open economy, however, the real interest rate equals the world real interest rate. *The trade balance is determined by the difference between saving and investment at the world interest rate.*

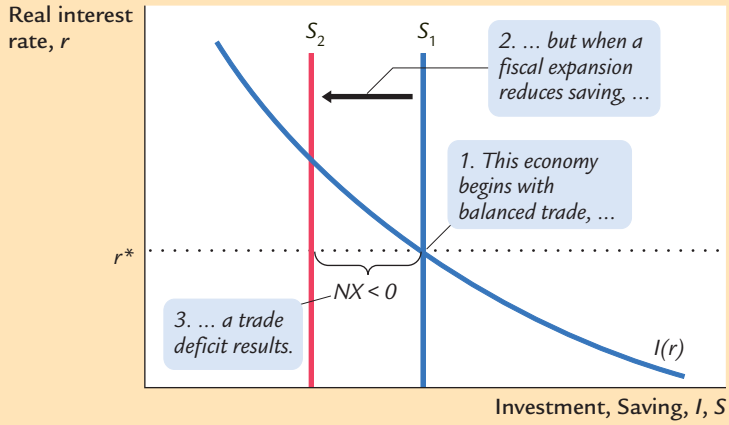
At this point, you might wonder about the mechanism that causes the trade balance to equal the net capital outflow. The determinants of the capital flows are easy to understand. When saving falls short of investment, investors borrow from abroad; when saving exceeds investment, the excess is lent to other countries. But what causes those who import and export to behave so as to ensure that the international flow of goods exactly balances this international flow of capital? For now we leave this question unanswered, but we return to it in Section 5-3 when we discuss the determination of exchange rates.

How Policies Influence the Trade Balance

Suppose that the economy begins in a position of balanced trade. That is, at the world interest rate, investment I equals saving S, and net exports NX equal zero. Let's use our model to predict the effects of government policies at home and abroad.

Fiscal Policy at Home Consider first what happens to the small open economy if the government expands domestic spending by increasing government purchases. The increase in G reduces national saving, because $S = Y - C - G$. With an unchanged world real interest rate, investment remains the same. Therefore, saving falls below investment, and some investment must now be financed by borrowing from abroad. Because $NX = S - I$, the fall in S implies a fall in NX. The economy now runs a trade deficit.

FIGURE 5-3



A Fiscal Expansion at Home in a Small Open Economy An increase in government purchases or a reduction in taxes reduces national saving and thus shifts the saving schedule to the left, from S_1 to S_2. The result is a trade deficit.

The same logic applies to a decrease in taxes. A tax cut lowers T, raises disposable income $Y - T$, stimulates consumption, and reduces national saving. (Even though some of the tax cut finds its way into private saving, public saving falls by the full amount of the tax cut; in total, saving falls.) Because $NX = S - I$, the reduction in national saving in turn lowers NX.

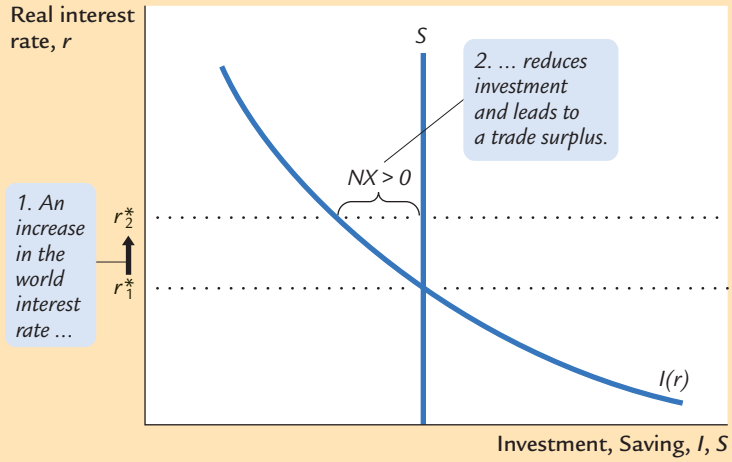
Figure 5-3 illustrates these effects. A fiscal policy change that increases private consumption C or public consumption G reduces national saving $(Y - C - G)$ and, therefore, shifts the vertical line that represents saving from S_1 to S_2. Because NX is the distance between the saving schedule and the investment schedule at the world interest rate, this shift reduces NX. *Hence, starting from balanced trade, a change in fiscal policy that reduces national saving leads to a trade deficit.*

Fiscal Policy Abroad Consider now what happens to a small open economy when foreign governments increase their government purchases. If these foreign countries are a small part of the world economy, then their fiscal change has a negligible impact on other countries. But if these foreign countries are a large part of the world economy, their increase in government purchases reduces world saving. The decrease in world saving causes the world interest rate to rise, just as we saw in our closed-economy model (remember, Earth is a closed economy).

The increase in the world interest rate raises the cost of borrowing and, thus, reduces investment in our small open economy. Because there has been no change in domestic saving, saving S now exceeds investment I, and some of our saving begins to flow abroad. Because $NX = S - I$, the reduction in I must also increase NX. Hence, reduced saving abroad leads to a trade surplus at home.

Figure 5-4 illustrates how a small open economy starting from balanced trade responds to a foreign fiscal expansion. Because the policy change is occurring abroad, the domestic saving and investment schedules remain the same. The only change is an increase in the world interest rate from r_1^* to r_2^*. The trade balance is the difference between the saving and investment schedules; because

FIGURE 5-4

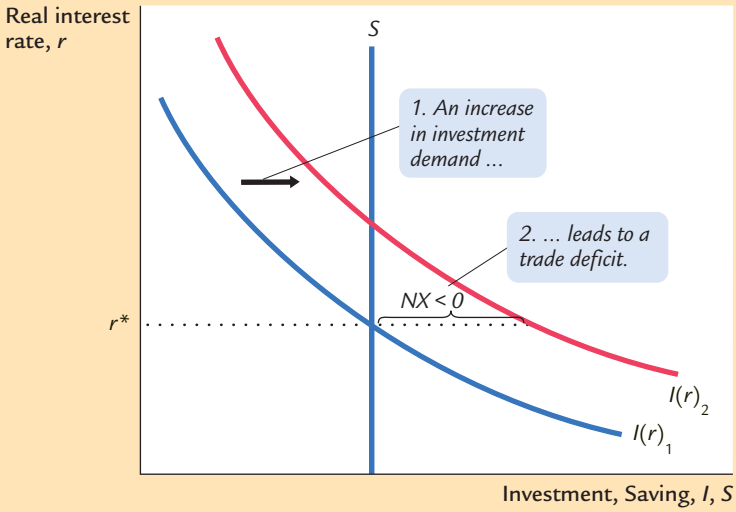


A Fiscal Expansion Abroad in a Small Open Economy A fiscal expansion in a foreign economy large enough to influence world saving and investment raises the world interest rate from r_1^* to r_2^*. The higher world interest rate reduces investment in this small open economy, causing a trade surplus.

saving exceeds investment at r_2^*, there is a trade surplus. *Hence, starting from balanced trade, an increase in the world interest rate due to a fiscal expansion abroad leads to a trade surplus.*

Shifts in Investment Demand Consider what happens to our small open economy if its investment schedule shifts outward—that is, if the demand for investment goods at every interest rate increases. This shift would occur if, for example, the government changed the tax laws to encourage investment by providing an investment tax credit. Figure 5-5 illustrates the impact of a shift in the

FIGURE 5-5



A Shift in the Investment Schedule in a Small Open Economy An outward shift in the investment schedule from $I(r)_1$ to $I(r)_2$ increases the amount of investment at the world interest rate r^*. As a result, investment now exceeds saving, which means the economy is borrowing from abroad and running a trade deficit.

investment schedule. At a given world interest rate, investment is now higher. Because saving is unchanged, some investment must now be financed by borrowing from abroad. Because capital flows into the economy to finance the increased investment, the net capital outflow is negative. Put differently, because $NX = S - I$, the increase in I implies a decrease in NX. *Hence, starting from balanced trade, an outward shift in the investment schedule causes a trade deficit.*

Evaluating Economic Policy

Our model of the open economy shows that the flow of goods and services measured by the trade balance is inextricably connected to the international flow of funds for capital accumulation. The net capital outflow is the difference between domestic saving and domestic investment. Thus, the impact of economic policies on the trade balance can always be found by examining their impact on domestic saving and domestic investment. Policies that increase investment or decrease saving tend to cause a trade deficit, and policies that decrease investment or increase saving tend to cause a trade surplus.

Our analysis of the open economy has been positive, not normative. That is, our analysis of how economic policies influence the international flows of capital and goods has not told us whether these policies are desirable. Evaluating economic policies and their impact on the open economy is a frequent topic of debate among economists and policymakers.

When a country runs a trade deficit, policymakers must confront the question of whether it represents a national problem. Most economists view a trade deficit not as a problem in itself, but perhaps as a symptom of a problem. A trade deficit could be a reflection of low saving. In a closed economy, low saving leads to low investment and a smaller future capital stock. In an open economy, low saving leads to a trade deficit and a growing foreign debt, which eventually must be repaid. In both cases, high current consumption leads to lower future consumption, implying that future generations bear the burden of low national saving.

Yet trade deficits are not always a reflection of an economic malady. When poor rural economies develop into modern industrial economies, they sometimes finance their high levels of investment with foreign borrowing. In these cases, trade deficits are a sign of economic development. For example, South Korea ran large trade deficits throughout the 1970s, and it became one of the success stories of economic growth. The lesson is that one cannot judge economic performance from the trade balance alone. Instead, one must look at the underlying causes of the international flows.

CASE STUDY

The U.S. Trade Deficit

During the 1980s, 1990s, and 2000s, the United States ran large trade deficits. Panel (a) of Figure 5-6 documents this experience by showing net exports as a percentage of GDP. The exact size of the trade deficit fluctuated over time, but