PART

IV MACRO POLICIES FOR OPEN ECONOMIES

CHAPTER

21 How Does the Open Macroeconomy Work?

The analysis of Part III brought us part of the way toward a judgment of what kinds of policies toward foreign exchange would best serve a nation's needs. Chapters 18, 19, and 20 in particular spelled out some of the implications of different policies for the performance of the foreign exchange market, in terms of the efficiency—or inefficiency—of the market itself.

In Part IV, our focus shifts to the other kind of performance issue previewed when the basic policy choices were laid out at the start of Chapter 20. This and the next two chapters address the problem of *macroeconomic* performance—the behavior of national output, jobs, and prices in the face of changing world conditions. There are many ways in which the national economy and the world economy interact. Yet some valuable conclusions about policy can be established. Once these conclusions have been laid out in Chapters 21 through 23, Chapter 24 can provide a series of lessons about where the international macroeconomic system is headed and how well different exchange rate institutions work.

This chapter develops a general framework for analyzing the performance of a national economy that is open to international transactions. It provides a picture of how the open macroeconomy works. This framework will then be used in Chapters 22 and 23 to examine macroeconomic performance in settings of fixed exchange rates and floating exchange rates.

The Performance of a National Economy

Each of us is comfortable judging our own performance in various activities. Did I perform in a sport up to the level that I am capable? How did I perform on an examination relative to my own capabilities in the subject and relative to how others in the class performed? Judgments about performance also drive most macroeconomic analysis. How well is a country's economy performing? Is it performing up to its potential—for instance, its capabilities for producing goods and services? How close is it to achieving broad objectives that most people would

agree are desirable, such as stability in average product prices (no inflation), low unemployment, or the maintenance of a reasonable balance of payments with the rest of the world?

We judge a country's macroeconomic performance against a number of broad objectives or goals. We can usefully divide these broad goals into two categories. The first category involves two objectives oriented to the domestic economy. One objective is keeping actual national production up to the economy's capabilities so that (1) the country achieves *full employment* of its labor and other resources and (2) the economy's production grows over time. Another domestic objective is achieving *price stability* (or, at least, a low or acceptable rate of product price inflation). These two domestically oriented goals taken together define the goal of achieving **internal balance.**

The other category involves objectives related to the country's international economic activities. This is the problem of **external balance,** which is usually defined as the achievement of a reasonable and sustainable makeup of a country's balance of payments with the rest of the world. Specifying a precise goal here is not so simple. Most broadly, the goal may be to achieve balance in the country's overall balance of payments. For instance, the goal may be to achieve a balance of approximately zero in the country's official settlements balance, at least over a number of years, so that the country is not losing official reserves or building up unwanted official reserves. This implies that the sum of the current account and the capital account (excluding official reserves transactions) should be approximately zero. If it is substantially different from zero for a long enough time, then we have the disequilibrium in the country's balance of payments (and exchange rate) that we discussed in Chapter 20.

For some purposes we focus on a somewhat narrower reading of external balance, one that focuses on the country's current account (or balance on goods and services trade). The goal here need not be a zero balance. Rather, it is a position that is sustainable in that the value for the current account balance can readily be financed by international capital flows (or official reserves transactions). Some rich industrialized countries probably achieve external balance by running a current account surplus because this allows the country to use some of its national saving to act as a net investor in the rest of the world (capital outflows or capital account deficit). Other countries that are in the process of developing their economies can achieve external balance while running a current account deficit. The deficit may include imports of machinery that directly are part of the development effort. The deficit can be financed by borrowing from the rest of the world (capital inflows or capital account surplus). As long as the surpluses and deficits on current account are not too large, then the positions are sustainable over time. Each can become too large, however, and can become an external imbalance.

A Framework for Macroeconomic Analysis

To analyze the performance of an economy, we need a picture of how the economy functions. Such a picture is not without controversy—macroeconomists do not fully agree on the correct way to analyze the macroeconomy. One of the

main difficulties has been to form a satisfactory framework for predicting both changes in national production and changes in the price level. We will use a synthesis that attempts to use the strongest features from several different schools of thought. Our analysis of the behavior of the economy in the short run (say, a time period of one year or less) is relatively Keynesian in that the price level is not immediately responsive to aggregate demand and supply conditions in the economy. The price level is sticky or sluggish in the short run. Our view of the economy in the longer run is more monetarist or classical. As we move beyond the short run, the price level does respond to demand and supply conditions. Furthermore, the amount of price inflation that the economy experiences eventually depends mainly on the growth rate of the country's money supply. In addition, the economy tends toward full employment in the long run. We have already developed some of the key features and implications of this long-run analysis in the discussion of the monetary approach in Chapter 18. Here and in the next two chapters we focus more on the economy in the shorter run. We want to develop a picture of how the economy works in the short run that is pragmatic and useful, even if it is not perfect.

The next three major sections of this chapter focus on the determinants of real GDP (representing both national product and national income) and the relationships between international trade and national income. Then the next major section adds the market for money and the country's overall balance of payments, resulting in a broad and flexible model of the open economy in the short run. The final two sections of the chapter take up issues related to product prices in order to enhance the framework. These final sections explore the determinants of changes in the country's product price level (or its inflation rate) over time and the effects of international price competitiveness on a country's international trade.

National Production Depends on Aggregate Demand

A major performance goal of an economy is to achieve production of goods and services that is close to the economy's potential. The economy's potential for producing is determined by the supply-side capabilities of the economy. Supply-side capabilities include both the factor resources (labor, capital, land, and natural resources) that the economy has available—the factor endowments from Parts I and II—and intangible influences such as technology, resource quality, climate, and motivation. The intangibles determine the productivity of the resources.

The value of production of goods and services is the economy's real GDP (Y). Because production activity creates income (in the form of wages, profits and other returns to capital, and rents to landowners), real GDP is nearly the same thing as real national income.

In the short run (and within the economy's supply-side capabilities), national production is determined by aggregate demand (AD) for the country's products. Essentially, if someone demands a product, some business (or other organization) will try to produce it. Aggregate demand can be split into four components that represent different sources of demand: household consumption of goods

and services (C); domestic investment (I_d) in new real assets like machinery, buildings, housing, and inventories; government spending on goods and services (G); and net exports of goods and services ($X-M$). Net exports add foreign demand for our exports (X) as a source of demand for our products, but subtract our demand for imports (M) because these imports are already included in the other kinds of spending but actually represent demand for the products of other countries.

Equilibrium occurs when national production (Y, our GDP) equals desired demand for domestically produced goods and services:

$$Y = \text{AD} = C + I_d + G + (X - M) \tag{21.1}$$

The level of actual national production (relative to the economy's potential for producing) tends to be closely related to the economy's labor unemployment rate. Increases of actual GDP (relative to potential) tend to decrease the unemployment rate, while decreases tend to increase the unemployment rate.

In order to focus on international trade issues, we can add up the domestic spending components into national expenditures (E) on goods and services:

$$E = C + I_d + G \tag{21.2}$$

From basic macroeconomic analysis, we know something about the determinants of each of these domestic components.

Household consumption expenditures are positively related to disposable income, and disposable income is (approximately) the difference between total income (Y) and taxes (T) paid to the government. Many taxes are based directly on income or are related indirectly to income because they are based on spending (for instance, sales or value added taxes). Rather than carry around all of this detail, we will summarize the major determinant of consumption as income:

$$C = C(Y) \tag{21.3}$$

remembering that the relationship incorporates taxes that have to paid out of income before consumer spending is done. There are other influences on consumption, including interest rates that set the cost of borrowing to finance the purchase of items like automobiles, as well as household wealth and consumer sentiment about the future. We do not formally build these other influences into the framework to keep the formal analysis simple. Instead, we can treat major changes in these other influences as shocks that occasionally disturb the economy.

Real domestic investment spending is negatively related to the level of interest rates (i) in the economy:

$$I_d = I_d(i) \tag{21.4}$$

Higher interest rates increase the cost of financing the capital assets, thus reducing the amount of real investment undertaken. Again, there are a number of other influences on real investment spending, including business sentiment about the future, current capacity utilization, and the emergence of new technologies that require capital investments in order to bring the technologies into use. Again, we can picture these other influences as a source of shocks to the economy.

We treat government spending on goods and services as a political decision. Decisions about government spending are a major part of a country's **fiscal policy**—the other part of fiscal policy is decisions about taxation.

Trade Depends on Income

According to a host of empirical estimates for many countries, the volume of a nation's imports depends positively on the level of real national income or production. This positive relationship seems to have two explanations. One is that imports are often used as inputs into the production of the goods and services that constitute national product. The other explanation is that imports respond to the total real spending or "absorption" (E) in our economy. The more we spend on all goods and services, the more we tend to spend on the part of them that we buy from abroad. Although a nation's expenditures on goods and services are not the same thing as its national income from producing goods and services, the close statistical correlation between income and expenditure allows us to gloss over this distinction. We can estimate the amount by which our imports increase when our income goes up by one dollar. This amount is called the **marginal propensity to import** (m).

It is also possible that the volume of our *exports* depends on *our* national income. If domestic national income is raised by a surge in domestic aggregate demand, there is a good chance that the increase in national income will be accompanied by a drop in export volumes, as domestic buyers bid away resources that otherwise would have been used to produce exports. Although such a negative dependence of export volumes on national-income-as-determined-by-domestic-demand is plausible, the evidence for it is somewhat sparse. We will assume that export volumes are independent of this country's national income.[1]

Exports nonetheless do depend on income—the income of foreign countries. If foreign income is higher, then foreigners tend to buy more of all kinds of things, including more of our exports. The amount by which their imports (our exports) increase if foreign income increases is the foreign marginal propensity to import.

Equilibrium GDP and Spending Multipliers

With these pieces of the framework we can gain some major insights into macroeconomic performance in an open economy. To gain these insights we make a few assumptions that are useful now (but will be relaxed in later analysis). We assume that all price and pricelike variables are constant. In relation to our discussion so far, this means that the interest rate (in addition to the average product price level) is constant.

[1]Another way that export volumes can vary with our national income is through the supply side. A supply-side expansion of the economy permits production to increase, and some of this extra production may be available to increase exports.

Equilibrium GDP

The condition for equilibrium real GDP is that it must equal desired aggregate demand, which in turn equals desired national expenditure plus net exports. Holding interest rates constant, our desired national expenditure depends on national income, as does our volume of imports. These relationships indicate that the value of aggregate demand itself depends on national income. The equilibrium condition is

$$Y = \text{AD}(Y) = E(Y) + X - M(Y) \tag{21.5}$$

Although our exports depend on foreign income, we initially ignore this (or assume that foreign income is constant).

Figure 21.1A illustrates the equilibrium level of national production and income, showing the matching between national income and aggregate demand at point A. At levels of national income below 100, the aggregate demand would exceed the level of production, as shown by the fact that the AD curve is above the 45-degree line to the left of A. At any such lower levels of income, the combination of home and foreign demand for what this nation is producing would be so great as to deplete the inventories of goods held by firms, and the firms would have to respond by raising production and creating more jobs and incomes, moving the economy up toward A. Similarly, levels of income above 100 would yield insufficient demand, accumulating inventories, and cutbacks in production and jobs until the economy returned to equilibrium at point A.

Figure 21.1A does not demonstrate how the nation's foreign trade and investment relate to the process of achieving the equilibrium national production. To underline the role of the foreign sector, it is convenient to convert the equilibrium condition into a different form. This can be done with an algebraic step like one taken in Chapter 15, when we were discussing the current account of the balance of payments. National saving (S) equals the difference between national income (Y) and national expenditures on noninvestment items (C and G). Subtracting ($C + G$) from both sides of Equation 21.5, the condition becomes an equilibrium between saving and investment:

$$Y = E + X - M$$
$$(Y - C - G) = (E - C - G) + (X - M)$$

or

$$S = I_d + I_f \tag{21.6}$$

In other words, desired saving, which is the nation's net accumulation of assets, must match its desired domestic investment in new real assets (buildings, equipment, and inventories) plus its desired net foreign investment, or its net buildup of claims on the rest of the world.

Figure 21.1B expresses this saving–investment equilibrium in a way highlighting the current account balance ($X - M$, or I_f). As drawn here, Figure 21.1B shows a country having a current account deficit with more imports than exports

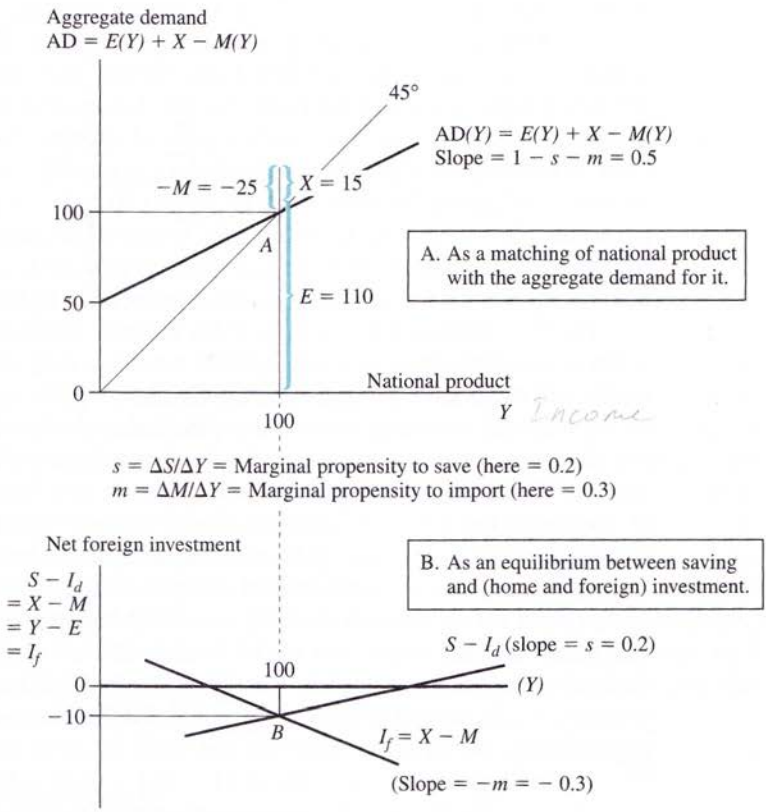


FIGURE 21.1
Equilibrium National Income in an Open Economy Shown in Two Equivalent Ways

of goods and services. For the equilibrium at point B, the country's domestic saving is less than its domestic investment, so the extra domestic investment must be financed by borrowing from foreigners (or selling off previously acquired foreign assets, including the country's official reserve assets). This could serve as a schematic view of Canada's usual past situation since Canada typically has a deficit in its current account balance, financed by net capital inflows. This is also the situation of the United States since 1982. In contrast, Japan has usually had its version of point B lying above the horizontal axis, representing a net export surplus and positive net foreign investment.

The Spending Multiplier in a Small, Open Economy

When national spending rises in an economy in which actual production initially is below the economy's supply-side potential, this extra spending sets off a multiplier process of expansion of national production and income, whether or not the country is involved in international trade. Yet, the way in which the country is involved in trade does affect the size of the spending multiplier. Suppose that the government raises its purchases of goods and services by 10 units and holds

them at this higher level. The extra 10 means an extra 10 income for whoever sells the extra goods and services to the government. The extent to which this initial income gain gets transmitted into further income gains depends on how the first gainers allocate their extra income. Let us assume, as we already have in Figure 21.1, that out of each extra dollar of income, people within this nation save 20 cents (part of which is "saved" by the government as taxes on their extra income) and spend the remaining 80 cents (30 cents of it on imports of foreign goods and services). In other words, the marginal propensity to save (s, including the marginal tax rate) is 0.2; the marginal propensity to consume domestic product ($1 - s - m$) is 0.5; and the marginal propensity to import (m) is 0.3.

The first round of generating extra income produces an extra two units in saving, an extra three in imports, and an extra five in spending on domestic goods and services. Of these, only the five in domestic spending will be returned to the national economy as a further demand stimulus. Both the two saved and the three spent on imports represent "leakages" from the domestic expenditure stream. Whatever their indirect effects, they do not directly create new demand or income in the national economy. (Extra imports could feed demand back into our own economy by raising foreign incomes and stimulating their demand for our exports. But we do not consider this possibility until the next section, and we will assume for the present that this is a small country that has no impact on production or income in the rest of the world.) In the second round of income and expenditures, only five will be passed on and divided up into further domestic spending (2.5), saving (1), and imports (1.5). And for each succeeding round of expenditures, as for these first two, the share of extra income that becomes further expenditures is ($1 - s - m$), or ($1 - 0.2 - 0.3$) = 0.5.

The overall effects of this process are summarized in the spending multiplier. Its formula is easily derived from the fact that the final change in production and income equals the initial rise in government spending plus the extra demand for this nation's product that was stimulated by the rise in income itself:

$$\Delta Y = \Delta G + (1 - s - m)\Delta Y \tag{21.7}$$

so that

$$\Delta Y\,(1 - 1 + s + m) = \Delta G \tag{21.8}$$

and

$$\text{The } \textbf{spending multiplier in a small, open economy} = \frac{\Delta Y}{\Delta G} = \frac{1}{(s + m)} \tag{21.9}$$

In our example, the rise in government spending by 10 billion ultimately leads to twice as great an expansion of national income since the multiplier equals $1/(0.2 + 0.3) = 2$. The value of this multiplier is the same, of course, whether the initial extra spending is made by the government or results from a surge in consumption, a rise in private investment spending, or a rise in exports. Note also that the value of the multiplier is smaller in a small open economy than the multiplier in a closed economy. Had m been zero, the multiplier would have been $1/s = 5$.

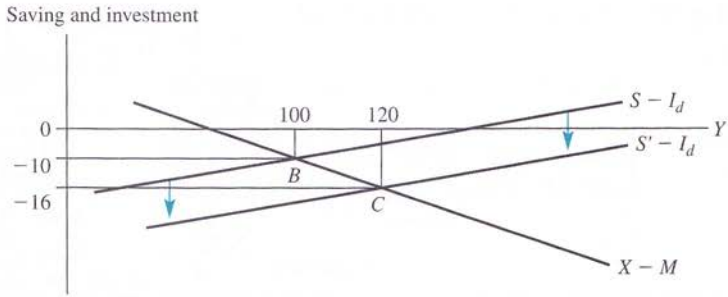


FIGURE 21.2
The Effect of a Rise in Government Spending on Foreign Trade and National Income

The results of the multiplier expansion in response to a rise in domestic spending can be reexpressed in a diagram like Figure 21.2. Here the initial rise in government spending is portrayed by a downward shift of the $S - I_d$ curve. It can be portrayed this way because a rise in government spending by 10 is a change in government saving by -10 since government saving is the difference between government tax revenue and government spending. The rise in government spending by 10 produces the same final rise in national income by 20 here as in the discussion above. Note further that the multiplier of 2 works its effects not only on the final rise in income, but also on the final rise in imports. Imports rose by 3, thanks to the first round of new expenditures, but rose by twice as much, or $[m/(s + m)] \bullet \Delta G = 6$ over all rounds of new expenditures, the amount of trade balance worsening shown in Figure 21.2.

Foreign Income Repercussions

In describing the marginal propensity to import as a leakage, we have argued as though whatever is spent on imports is permanently lost as a component of aggregate demand for our national product. This assumption works well enough for a small country whose trade is negligible as an average or marginal share of world income. However, when a nation looms larger in the economies of its trading partners, this assumption underestimates the multiplier. When a large nation's extra spending leads to extra imports, these imports noticeably raise foreign incomes and create foreign jobs. The expansion of foreign incomes encourages foreign purchases of the first country's exports in amounts dictated by the foreign marginal propensities to import from that country. The extra demand for exports raises the country's income further, thus raising the value of the multiplier response to the initial domestic spending. Thus, *the more our country's imports affect foreign incomes, the more the true spending multiplier exceeds the simple formula* $1/(s + m)$.

Figure 21.3 illustrates the process of foreign repercussions. An initial rise in our government purchases of goods and services, on the left, creates extra income in our national economy. Some fraction (s) of the extra income will be saved, some will be spent on domestic national product, and some will be spent on imports. The fraction (m) spent on imports will create an equal amount of income for foreign sellers. They, in turn, will save a fraction of this additional

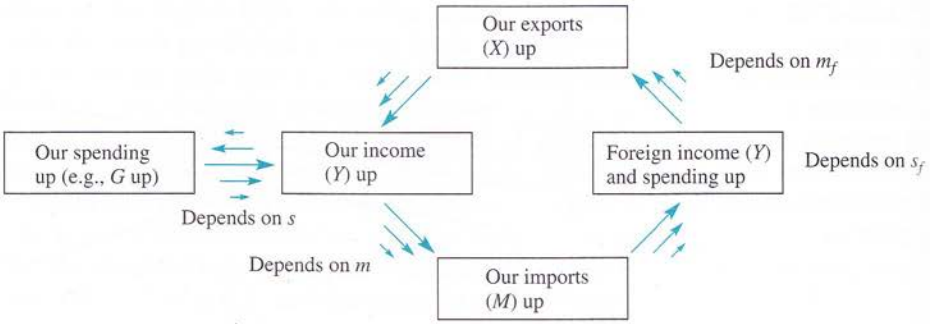


FIGURE 21.3
Foreign Trade and Income Repercussions Starting from a Rise in Our Spending

income (s_f), spend some in their own countries, and import a fraction (m_f) from us. We then divide that extra export income into saving, domestic purchases, and imports, and the cycle continues. Each round passes along a smaller stimulus until the multiplier process comes to rest with a finite overall expansion.

The existence of such foreign-income repercussions helps account for the parallelism in business cycles that has been observed among the major industrial economies. Throughout much of the 20th century, when America has sneezed, Europe and Japan have caught cold. Such a tendency was already evident in the business cycles in Europe and the United States in the mid-19th century, though the correlation between the European cycles and the U.S. cycles was far from perfect. The Great Depression of the 1930s also reverberated back and forth among countries, as each country's slump caused a cut in imports (helped by beggar-thy-neighbor import barriers that were partly a response to the slump itself) and thereby cut foreign exports and incomes. Correspondingly, the outbreak of the Korean War brought economic boom to West Germany, Italy, and Japan, as surging U.S. war spending raised their exports and incomes, leading to a further partial increase in their purchases from the United States.

The same interdependence of incomes persists today. The "locomotive theory" represents a recent application of repercussions analysis. The theory is based on the fact that the three largest economies in the world are the United States, Japan, and Germany. During times when world real growth is sluggish, such as the late 1970s and early 1990s, increasing growth in two or three of these countries may be sufficient to raise world growth overall. Growth in the largest economies raises their imports, tending to pull the rest of the world along, with repercussions reinforcing the higher growth of all countries.

Economists have estimated the spending multipliers in major industrial countries that are subject to foreign-income repercussions. They came up with plausible patterns like those in Figure 21.4. The multipliers tell the tales we would expect of such international multipliers even though they are expressed in elasticity form (*percent* change/*percent* change), instead of the usual multiplier form (absolute change/absolute change). To follow the numbers across the top row, Figure 21.4 says that U.S. national income would be raised 1.3 percent if aggregate demand rose by 1 percent in the United States alone, or by 0.1 percent if demand rose 1 percent in Japan alone, 0.1 percent if demand rose by 1 percent

FIGURE 21.4

Spending Multipliers with Foreign Income Repercussions for Five Industrial Countries

	The Effects of a 1 Percent Rise of Spending in				
On Real National Product in	*United States*	*Japan*	*Germany*	*United Kingdom*	*Canada*
United States	1.3	0.1	0.1	<0.05	0.1
Japan	1.0	2.1	0.1	0.1	0.1
Germany	0.9	0.2	1.7	0.3	0.1
United Kingdom	0.5	0.1	0.2	1.1	<0.05
Canada	0.8	0.1	<0.05	<0.05	1.0

Each number gives the *percent* rise in the national product of the country whose row is named on the left that is caused by a 1 percent rise in the spending of the country whose column is named along the top of the table. In the analysis short-term interest rates and exchange rates are held constant. The multipliers shown here are the results for the third year after the initial increase in spending.

Source: Richardson (1988), Annex Table 2.

in Germany alone, and so forth. Or following the numbers down the Japan column, the estimates say that a 1 percent rise in Japanese spending would raise U.S. national income by 0.1 percent, Japanese national income by 2.1 percent, German national income by 0.2 percent, and so forth.

A basic pattern emerging from the estimates in Figure 21.4 is the role of *national size.* The bigger the country, the more its spending affects other countries. The effect of U.S. spending in any other country is greater than the effect of any other foreign country's spending. For example, Germany is more affected by spending shifts in the United States (0.9 percent) than it is by those in Japan or Canada (0.2 or 0.1).

How Aggregate Demand and Supply Can Affect the Trade Balance

We have seen that a rise in domestic aggregate demand can, by raising our national income, raise our imports. To the extent that this worsens the trade balance, it is a force that will contribute (in the chapters that follow) to either a bigger balance-of-payments deficit or to a drop in the exchange value of our home currency. But we cannot simply say that whatever raises our national income worsens our balance of trade. We must take a more careful look at three realistic cases:

1. *If our income is raised by increases in domestic spending,* then the trade balance will *probably*[2] *"worsen"* (shift toward net imports). This is just a corollary of the multiplier process sketched in connection with Figure 21.3. We make use of this in the next two chapters, when analyzing the performance of both the fixed exchange rates implied here and various floating-rate regimes.

[2]A rise in domestic spending could actually improve the trade balance. Suppose that the foreign marginal propensity to import from us is larger than our marginal propensity to import from them. Each round of increase in imports by us could trigger not only immediate foreign purchases of our exports, but further export increases as well, in response to the foreign multiplier process. Under some possible parameter values, this could ensure the perverse result: Our spending increase would actually raise our trade balance.

2. *If our income is raised by an international demand shift* from foreign to home-country goods and services (e.g., due to a change in tastes or a lowering of foreign import barriers), the home country's trade balance will *clearly improve.*

3. *If our income is raised by improvements in our supply capabilities,* our trade balance will *probably improve.* The analysis of this case is not easily handled within the framework that dominates this chapter since that framework lets changes in income be dictated by aggregate demand. Yet the importance of supply capabilities is easy to see. Suppose that our aggregate supply is raised by technological improvements (or peaceful settlements of labor strikes) that are evenly distributed across the exportable, import-competing, and nontraded sectors. Our extra ability to supply and compete will win more export markets as well as home markets away from foreign suppliers. This will increase export volumes and may decrease import volumes. The value of the trade balance usually improves, unless the price of exports declines severely as a result of the export expansion.[3]

A More Complete Framework: Three Markets

The discussion of spending multipliers provides insights into macroeconomic performance, but it is too limited to be useful as a full framework for our analysis. We need to be able to picture three major components of the macroeconomy at the same time, adding the supply and demand for money and the country's overall balance of payments. In the process of developing this more complete framework, we can also drop the assumption that interest rates are constant. In fact, we will focus on the level of interest rates in the country as a second variable of major interest in addition to the country's real GDP.

Figure 21.5 sketches the basic approach. The three markets that give us a broader picture of the country's economy are shown in the center. The first two, the goods and services market and the market for money, directly determine two key variables of interest (Y and i). At the same time, these two variables have a major impact on the country's balance of payments and thus on the foreign exchange market. All three of the markets can be affected by different kinds of outside (exogenous) forces, shown on the left side of the figure. These outside forces represent shocks or disturbances that create pressures for macroeconomic changes.

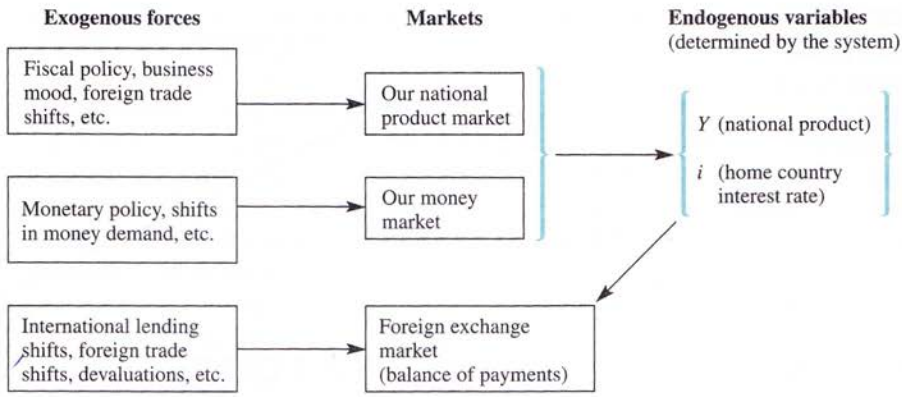
The National Product Market

The aggregate demand for what our country produces depends not only on income (Y). It also depends on the interest rate (i) since a higher real interest rate discourages spending. We can picture these relationships in a graph as an IS

[3]Yes, it is necessary to add this last qualifying clause. Improved domestic supply can do more to the trade balance than simply raise the physical volume of exports and cut the physical volume of imports. It can also change prices. In an extreme case of very inelastic demand for our exports, it is conceivable that their price would drop far enough to make the innovation worsen the trade balance. This is closely related to our discussion of immiserizing growth in Chapter 5.

FIGURE 21.5

An Overview of the Macromodel of an Open Economy



In addition to the linkages shown here, pressure in the foreign exchange market (or imbalance in the country's balance of payments) can feed back into and affect the country through the national product market or the money market. The ways in which this occurs depend on whether the country has a fixed or a floating exchange rate. These issues are taken up in the next two chapters.

curve. (*IS* stands for investment–saving.) The **IS curve** shows all combinations of national product or income levels and interest rates for which the national product market is in equilibrium. As in the previous section of this chapter, we can think of this equilibrium as following from the condition $Y = C + I_d + G + (X - M)$, or we can think of it as following from the condition that national saving S equals the sum of domestic and foreign investment ($I_d + I_f$). If we use the latter (following literally the name of the curve), the national product market is in equilibrium when

$$\overset{+}{S}(Y) = I_d(\overset{-}{i}) + I_f(\overset{-}{Y}) \tag{21.10}$$

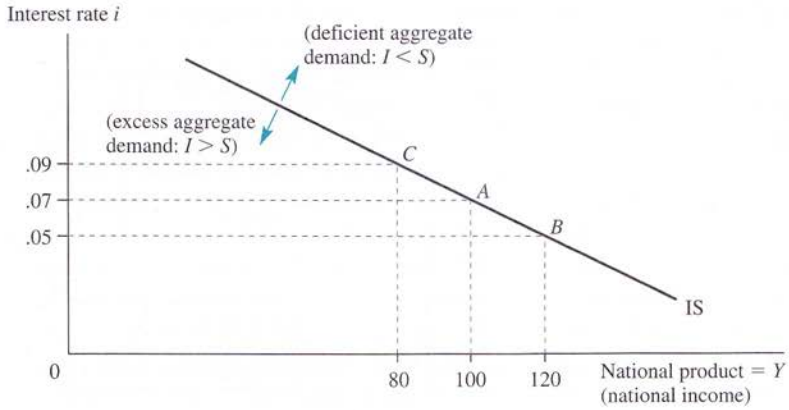
Here the signs above the equation indicate the direction of each influence in parentheses on the values of the variables.[4] The negative influence of income on foreign investment follows because foreign investment is equal to net exports. Net exports themselves are negatively related to income because imports are positively related.

To see why the IS curve slopes downward, let's start with one equilibrium point on it and then ask where other equilibria could lie. Let us start at point A in Figure 21.6, where national income equals 100 and the interest rate is 0.07 (7 percent a year). We somehow know that this combination brings an equilibrium in the national product market. That is, given other basic economic conditions, having $Y = 100$ and $i = 0.07$ makes investment $I_d + I_f$ match savings S. How

[4]Additional influences of Y and i are possible. S may be a positive function of i, for instance, if higher interest rates reduce borrowing (that is, reduce negative saving) by households. I_d may be a positive function of Y, for instance, if high current production levels make the need for new investment to expand capacity more urgent. These additions would somewhat change the slope of the IS curve, but the picture would not be different in its essentials.

FIGURE 21.6

The IS Curve: Equilibria in the National Product Market



could equilibrium in the product market be maintained if the interest rate were lower, say only 0.05? The lower interest rate would make the nation invest in more real capital. The higher level of aggregate demand (because I_d is larger) results in a higher level of national product. (In fact, because of the spending multiplier, the increase in national product is larger than the increase in real domestic investment resulting directly from the lower interest rate.) According to the IS curve, the higher level of national product matching aggregate demand for that low interest rate is $Y = 120$, as represented at point B. Similarly, if point A is one equilibrium, then others with higher interest rates must lie at lower income levels, as at point C. So, the IS curve must slope downward. The higher the interest rate, the lower the level of national product that is consistent with it. Points that are not on the IS curve find the national product market out of equilibrium.

Changes in any influence other than interest rates that can directly affect aggregate demand cause a shift in the IS curve. These are the exogenous forces or shocks discussed previously. For instance, an increase in government spending, or an improvement in consumer sentiment that leads people to increase their consumption spending, increases aggregate demand and shifts the IS curve to the right.

The Money Market

The next market in which macroeconomic forces interact is that for the money of each nation. As usual, there is a balancing of supply and demand.

The supply side of the market for owning units of a nation's money is, roughly, the conventional "money supply." **Monetary policy,** the set of central-bank policies, institutions, and bank behavioral patterns governing the availability of bank checking deposits and currency in circulation, is the top influence on money supply.

Our view of the demand for money is an extension of the money demand discussed in Chapter 18. There we posited that the (nominal) demand for money

depends on the value of (nominal) GDP, which equals the price level P times Y (real GDP). Money is held to carry out transactions, and the value of transactions should be correlated with the value of income or production. The larger national product is during a time period such as a year, the greater the amount of money balances that firms and households will want to keep on hand to cover uncertain amounts of spending needs. In addition to the benefits of money in facilitating transactions, there is an opportunity cost to holding money. The opportunity cost is the interest that the holder of money could earn if her wealth were instead invested in other financial assets such as bonds. Some forms of money (currency and coin, traveler's checks, zero-interest checking accounts) earn no interest. Others (interest-paying checking accounts) earn some interest, but the interest rate earned is generally relatively low. Interest forgone is an opportunity cost of holding money. This cost leads us to attempt to economize on our money holdings, and we attempt to economize more as the interest rate available on other financial assets rises. A higher interest rate tempts people to hold interest-earning bonds rather than money. That is, it lowers the demand for money.

The demand for (nominal) money L is positively related to nominal GDP and negatively related to the level of interest rates available on other financial assets:

$$L = L(\overset{+}{PY}, \overset{-}{i}) \tag{21.11}$$

The equilibrium between money supply and money demand is then

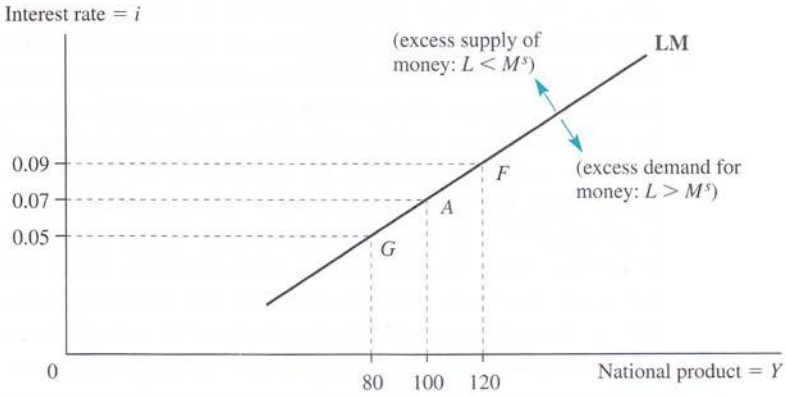
$$M^s = L(\overset{+}{PY}, \overset{-}{i}) \tag{21.12}$$

where the plus and minus signs again serve to remind us of the direction of influence of PY and i.

The money market equilibrium can be pictured as the "LM curve" of Figure 21.7. The **LM curve** shows all combinations of income levels and interest rates for which the money market is in equilibrium, given the money supply (set by policy), the price level P, and the money demand function (representing how people decide their money holdings). LM stand for liquidity-money, where money demand is viewed as demand for the most highly liquid financial assets in the economy.

To see why the LM curve slopes upward, begin with the equilibrium at point A and think of where the other equilibria could lie. If the interest rate were higher, say at 0.09, people would hold less money in order to earn the higher interest rate by holding bonds instead. To have the money market in equilibrium at that higher interest rate, people would have to have some other reason to hold the same amount of money as at point A. They would be willing to hold the extra money only if the level of national income were higher, raising their transactions demand for holding money. That happens to just the right extent at point F. another equilibrium. In contrast, going in the other direction, we can ask how people would be content to hold the same money supply as at point A if the interest they gave up by holding money were suddenly lower than at point A. By

FIGURE 21.7
The LM Curve: Equilibria in the Money Market



itself, the lower interest rate on bonds would mean a greater demand for cash because cash is convenient. People would be willing to refrain from holding extra cash only if some other change reduced the demand. One such change is lower national product, meaning lower transactions demand for cash. Point *G* is a point at which the lower interest rate and lower income leave the demand for money the same as at point *A*.

Changes in any of the given factors listed above represent exogenous forces that shift the entire LM curve. Consider an increase in the nominal money supply M^s by the central bank. If the price level *P* is sticky in the short run (so there is no immediate effect on the country's price level or inflation rate), then the increase in the money supply tends to reduce interest rates (or, equivalently, the increased money supply can support a higher level of national income and transactions). The LM curve shifts down (or to the right).

So far, we have two markets whose equilibria depend on how national product (*Y*) and interest rates (*i*) interact in each market. For any given set of basic economic conditions (fiscal policy, the business mood, consumer sentiment, foreign demand for the country's exports, monetary policy, and so forth), these two markets simultaneously determine the level of national product and the level of the interest rate in the economy. The intersection of the IS and LM curves shows the levels of *Y* and *i* that represent equilibrium in both the market for goods and services and the market for money. For instance, if the IS curve from Figure 21.6 is added to Figure 21.7, the intersection is at point *A*. The short-run equilibrium level of real GDP (*Y*) is 100, and the equilibrium interest rate is 0.07 (7 percent).

The Foreign Exchange Market (or Balance of Payments)

The third market is the one where the availability of foreign currency is balanced against the demand for it. This market can be called either the "foreign exchange market," if we want to keep the exchange rate in mind, or "the balance of payments," if we are using the country's official settlements balance (*B*) to reflect the net private or nonofficial trading between our currency and foreign currency. In order to picture this third market, it is easier to think through the balance-of-payments approach.

The county's official settlements balance is the sum of the country's current account balance (CA) and its capital account balance (KA, which does not include official reserves transactions). The influences on B can be divided into trade flow effects and financial flow effects. How do our key variables—real product or income (Y) and the country's interest rate (i)—affect the country's balance of payments? Previous discussion has shown two major effects. First, the balance on goods and services trade (or the current account) depends negatively on our national product, through the demand for imports. Second, international capital flows depend on interest rates (both at home and abroad). A higher interest rate in our country will attract a capital inflow, provided that the higher domestic interest rate is not immediately offset by higher foreign interest rates.

The easy intuition that a higher interest rate in our economy will attract investment from abroad and give us a capital inflow is valid, but only in the short run (say, for a year or less after the interest rate rises). Over the longer run, this effect stops and is even reversed for at least two reasons:

1. A higher interest rate attracts a lot of capital inflow from abroad at first, as investors adjust the shares of their stock of wealth held in assets from our country. Soon, though, the inflow will dwindle because portfolios have already been adjusted.
2. If a higher interest rate in our country succeeds in attracting funds from abroad and raising B in the short run, it may have the opposite effect later on for the simple reason that bonds mature and loans must be repaid. If a higher interest rate gives us borrowed funds now, we must repay with interest later. We cannot talk of using higher interest rates to attract capital (lending) to this country without reflecting on the fact that those higher interest rates will have to be paid out in the future, along with the borrowed principal.[5]

For these reasons, the notion that a higher interest rate in our country can "improve" the balance of payments is valid only in the short run. We can use the short-run reasoning if the issue before us is the effect on B right now. We will often use this short-run focus, but only with the warning that in the long run a higher interest rate has an ambiguous effect on the overall balance of payments.

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[5]The balance-of-payments cost of attracting the extra capital from abroad could be even greater than the interest rate alone might suggest. To see how, let us suppose that the home country (a) is a net debtor country and (b) is large enough to be able to raise its own interest rate even though it is part of a larger world lending market. Let us imagine Canada is in this position.

Suppose that a rise in Canada's interest rate from 9 percent to 12 percent succeeds in raising foreign investments into Canada from $500 billion to $600 billion. What interest will Canada pay out each year on the extra $100 billion of borrowing (a temporarily higher B)? The annual interest bill on the new $100 billion itself comes to $12 billion a year. But, in addition, to continue to hold the original investments of $500 billion within the country—that is, to "roll over" these bonds and loans as they come up for renewal or repayment—Canadian borrowers have to pay an extra $15 billion [= $500 billion × (.12 − .09)]. The total extra interest outflow each year is thus the $12 billion plus the extra $15 billion, or payments of $27 billion just to hold onto an extra $100 billion in borrowings. That's an effective interest rate of 27 percent, not just 12 percent. This is an expensive way to attract international "hot money."

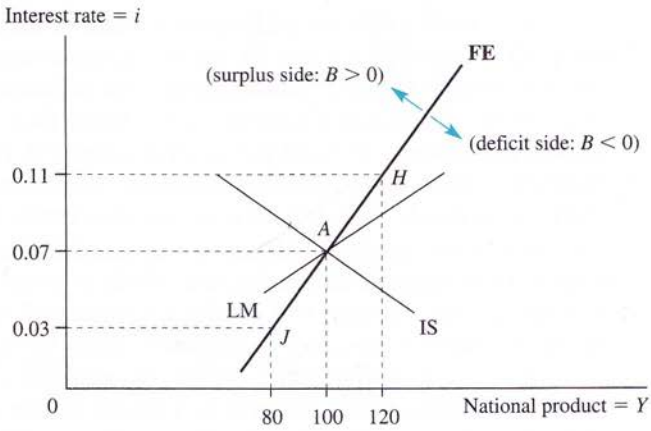

FIGURE 21.8
The FE Curve: Balance-of-Payment Equilibria

We can reexpress the dependence of the balance of payments (or the foreign exchange market) on income and interest rates in two other ways. One is with an equation. The official settlements balance B equals the current account balance CA (which is approximately equal to net exports, X − M) plus the capital account balance KA:

$$B = \mathrm{CA}(\overset{-}{Y}) + \mathrm{KA}(\overset{+}{i}) \tag{21.13}$$

Raising our national product lowers the current account surplus (or raises the deficit) because it gives us more demand for imports of foreign goods and services. Raising our interest rate, on the other hand, attracts an inflow of capital from abroad, raising our capital account surplus (or reducing the deficit).

To link the balance of payments with i and Y, we can also use the FE curve of Figure 21.8. For a given set of other basic economic conditions that can influence the country's balance of payments, the **FE curve** shows the set of all interest-and-income combinations in our country that result in a zero value for the country's official settlements balance.

The FE curve, like the LM curve, slopes upward. To see why, begin again with an equilibrium at point A. Let's say that this is the same point A as in the previous two figures, although it need not be. If point A finds our international payments in overall balance, how could they still be in balance if the interest rate is higher, say at 11 percent? That higher interest rate attracts a greater inflow of capital, bringing an official-settlements-balance surplus unless something else also changes. With the higher interest rate, B could still be zero (no surplus, no deficit) if income is higher. A higher income induces us to spend more on everything, including imports. The extra imports shift the balance of payments toward a deficit. In just the right amounts, extra income and a higher interest rate could cancel each other's effect on the balance of payments, leaving $B = 0$. That happens at point H. Correspondingly, some combinations of lower interest rates and lower incomes could also keep our payments in balance, as at point J.

How does the slope of the FE curve compare to the slope of the LM curve? As draw in Figure 21.8, the FE curve is steeper. This is not the only possibility, though. It depends on how responsive money demand and the balance of payments are to changes in the interest rate and national product. If, for instance, capital flows are very sensitive to interest rates then the FE curve is relatively flat, flatter than the LM curve. The FE curve is relatively flat because only a small increase in the interest rate is needed to draw in capital and offset the decline in the current account if national product is higher. (Point H would be lower, with an interest rate that is not much above 0.07.) If capital flows are extremely sensitive to interest rates, then we have the case of **perfect capital mobility,** and the FE curve is essentially completely flat (a horizontal line).

What happens when some other condition or variable that affects the country's balance of payments changes? These are the exogenous forces of Figure 21.5. When one of these changes occurs, it shifts the FE curve (just as a change in an exogenous condition relevant to the IS curve or the LM curve causes a shift in that curve). For instance, an increase in foreign income increases demand for our exports, improving our balance of payments and shifting the FE curve to the right. Or, an increase in foreign interest rates causes a capital outflow from our country, deteriorating our balance of payments, and shifting the FE curve to the left.

Three Markets Together

Bringing the three markets together, we get a determination of the level of national product (Y), the interest rate (i), and the overall balance of payments (B). The economy will gravitate toward a simultaneous equilibrium in the national product market (on the IS curve) and the money market (the LM curve). With Y and i thus determined, we also know the state of the balance of payments (B). The official settlements balance is in surplus if the IS–LM equilibrium is to the left of the FE curve; the balance is zero if it is on the FE curve (for example, point A in Figure 21.8), and it is in deficit if the IS–LM intersection is to the right of the FE curve. This section has given the same reason about three markets in three alternative forms: the causal-arrow sketch of Figure 21.5, the listing of Equations 21.10, 21.12, and 21.13, and the use of IS–LM–FE diagrams (Figures 21.6 through 21.8).

The way that we use this framework—especially the way that we use the FE curve—depends on the type of exchange rate policy that the country has adopted. As we will examine in the next chapter, if a country adopts a fixed exchange rate, then any divergence between the IS–LM intersection and the FE curve shows that official intervention is needed to defend the fixed rate. The official settlements balance is not zero—official intervention to defend the fixed rate results in official reserves transactions. As we will examine in Chapter 23, if the country adopts a clean float, then the official settlements balance must be zero, and somehow a triple intersection between the IS, LM, and FE curves must occur. In different ways, to be explored in each chapter, these situations create pressures for adjustments that affect the country's macroeconomic performance.

The Price Level Does Change

In developing the framework so far, we have generally ignored the product price level (P). We assumed that the price level is a constant for the short run, given by previous history. While this may be reasonable for most short-run analysis, it is clearly not appropriate generally. The price level does change over time for three basic reasons.

First, most countries have some amount of ongoing inflation. This amount can be anticipated and built into inflation expectations. Generally, ongoing positive inflation requires sufficient ongoing growth of the country's nominal money supply. The role of ongoing inflation was prominent in Chapter 18, especially in discussing the monetary approach.

Second, strong or weak aggregate demand can put pressure on the country's price level. If the price level is somewhat sluggish, then this effect will not be felt in the immediate short run, but it will have an impact as the economy moves beyond the initial short run. The strength of aggregate demand must be evaluated against the economy's supply-side capabilities for producing goods and services. If aggregate demand is very strong, then actual production strains against the economy's supply capabilities. The economy will "overheat" and there will be upward pressure on the price level. (In a setting in which there is ongoing inflation, this really means that the price level will rise more than it otherwise would have anyway. The inflation rate will increase.) If aggregate demand is weak, then product markets will be weak, creating downward pressure on the price level because of the "discipline" effect of weak demand. (Again, in a setting of ongoing inflation, this really means that the inflation rate will be lower than it otherwise would have been—the price level may still be rising, but it will rise more slowly.)

Third, shocks occasionally can cause large changes in the price level even in the short run. One dramatic example was the pair of oil price shocks in the 1970s. Another source of a price shock is a large abrupt change in the exchange rate value of a country's currency. As we will discuss in the next chapter, a large devaluation or depreciation is likely to cause a large increase in the domestic-currency price of imported products. The general price level tends to increase quickly because of both the direct effects of higher import prices and the indirect effects on costs and other prices in the country.

For subsequent analysis using our framework, the effect of strong or weak aggregate demand on the price level is of major interest. As we move beyond the initial short run, we do expect adjustment in the country's product price level. This can have an impact on the country's international price competitiveness, as discussed in the next section. If international price competitiveness is affected, then the country's current account balance changes. (The FE curve shifts over time.) In addition, although we will not focus on this effect in subsequent analysis, a change in the price level changes money demand (through the PY term). If the nation's money supply is not changing in line with the change in money demand, then the LM curve will shift over time.[6]

[6]If the aggregate demand pressure continues for a sufficient period of time, it can also affect the ongoing rate of inflation. For instance, the United States went into the 1990–91 recession with an ongoing inflation

Trade Also Depends on Price Competitiveness

As previously discussed, a country's exports, imports, and net exports depend on incomes in both this country and the rest of the world. Standard microeconomics indicates that demand for exports and imports each should also be affected by the prices of these products. Quantity demanded depends on both income and relative prices.

Our demand for imports depends not only on our income, but also on the price of imports relative to the price (P) of domestic products that are substitutes for these imports. What is this relative price? Consider that an imported product (say, a bottle of French wine) is initially priced in foreign currency (say, 45 French francs). Once imported into the United States, its price is converted into dollars using the going exchange rate (say, $.20 per franc). The domestic currency price of the import is then equal to $P_f r$ ($9.00 for the bottle).[7] Our decision about whether to buy this import depends partly on its dollar price relative to the price of a comparable domestic product (say, a bottle of California wine). The price ratio is $(P_f r)/P$. This ratio may look familiar—it is essentially the real exchange rate introduced in Chapter 18.

Thus, demand for imports has two major determinants:

$$M = M(Y, P_f r/P) \qquad (21.14)$$
$$(+, -)$$

The volume of imports tends to be higher if our income is higher, but lower if imports are relatively expensive (meaning $P_f r/P$ is high).

Foreign demand for our exports depends not only on foreign income, but also on the price of our products exported into the foreign market relative to the prices of their comparable local products (P_f). Our export product (say, a personal computer) is initially priced in our currency (say, $1,500). This can be converted into a foreign currency (say, yen) at the going exchange rate (say, $0.01 per yen). The foreign currency price of our export is then equal to P/r. (Here $1,500/.01 = 150,000 yen.) The foreign decision about whether to buy their domestic product (say, an NEC computer) or our exported product is based partly on the relative price, which equals $P_f/(P/r)$ or $(P_f r)/P$. The higher is this ratio, the less attractive is their domestic product, and the more attractive is our exported product.

Thus, the demand for our exports has two major determinants:

$$X = X(Y_f, P_f r/P) \qquad (21.15)$$
$$(+, +)$$

The volume of our exports tends to be higher if foreign income is higher or if foreign substitute products are relatively expensive.

rate of about 4.5 percent. The weak aggregate demand that caused the recession (and slowed the subsequent recovery) reduced the actual inflation rate to less than 3 percent. In addition, the ongoing inflation rate expected to continue into the future (even when the economy had fully recovered from the recession) was reduced to about 3.5 percent, according to most estimates.

[7]To simplify the notation a little, in Part IV we use the symbol r to represent the spot exchange rate. We drop the subscript "s."

Thus, in addition to the income effects, net exports ($X - M$) tend to be higher if the price competitiveness of our products is higher, both because the volume of exports tends to be larger and because the volume of imports tends to be smaller. Our general indicator of international price competitiveness is the ratio $(P_f r)/P$ (the real exchange rate).[8] Our international price competitiveness improves if the foreign-currency price of foreign substitute products (P_f) is higher, if the domestic-currency price of our products (P) is lower, or if the nominal exchange rate value of our currency is lower (r is higher). Over time, our price competitiveness improves if the foreign inflation rate is higher, our inflation rate is lower, or our currency appreciates less (or depreciates more).

Changes in international price competitiveness can be incorporated into our IS–LM–FE framework. They are one of the other economic conditions (or exogenous forces) that can cause shifts in the curves. A change in international price competitiveness shifts two curves: the FE curve and the IS curve. To see this, consider an improvement in a country's international price competitiveness, perhaps because the country has had low product price inflation or because the country's currency has depreciated or devalued. The improved price competitiveness increases exports and decreases imports. If the current account improves, the FE curve shifts to the right. In addition, the increase in net exports increases aggregate demand so the IS curve shifts to the right.

[8]While the real exchange rate provides a useful broad indicator of a country's international price competitiveness, it is not perfect. For any particular product, the relative price is affected by several influences not usually captured in the ratio. First, transport costs and government barriers to imports can alter the price ratio by increasing the price of the imported product. Second, exporters may use strategic pricing so that the local-currency price of the imported product is not just the domestic-currency price in the home market converted at the going exchange rate. This reflects international price discrimination. It is particularly interesting here because exporters may resist passing through the full effect of any exchange rate change into foreign-currency prices for their products. This is called *incomplete pass-through* or *pricing to market.* When the yen appreciated sharply from 1985 to 1987, Japanese firms did raise the dollar prices of the products that they exported to the United States, but by far less than the amount of the exchange rate change. They did this, presumably, to minimize their loss of export sales. From the point of view of the U.S. economy, this means that the volume of imports did not fall as much as might have been expected following the large dollar depreciation.

Summary

The performance of a country's macroeconomy has both internal and external dimensions. We evaluate the country's internal balance against goals oriented toward the domestic economy. **Internal balance** focuses on achieving national production that matches the country's supply capabilities so that resources are fully employed, while also achieving price-level stability or an acceptably low rate of inflation. We evaluate external balance against goals related to the country's international transactions. **External balance** focuses on achieving an overall balance of payments that is sustainable over time.

A key aspect of how an open macroeconomy works is the relationship between national

production and international trade in goods and services. International trade in goods and services is one component of total aggregate demand, which determines national product and income in the short run. In addition, national income has an impact on international trade, especially through the demand for imports.

These relationships influence how shifts in aggregate demand affect our national production. Holding interest rates (as well as the product price level and exchange rates) constant, we generally expect that an increase in some component of aggregate demand (like government spending) has a larger effect on national production—a phenomenon summarized in the **spending multiplier.** In a closed economy, the size of the multiplier is $1/s$, where s is the marginal propensity to save (including any government saving "forced" through the marginal tax rate). For the open macroeconomy, a rise in national product and income increases imports. The size of the spending multiplier for the small open macroeconomy is $1/(s + m)$, where m is the **marginal propensity to import.** The larger is the country's propensity to import, the smaller is the spending multiplier. The leakage into imports, like the leakage into saving, dampens the effects of the initial extra spending on the ultimate change in national product and income.

If the country is not small, then changes in its demand for imports have noticeable effects on other countries, with several specific implications. First, any boom or slump in one country's aggregate demand can spread to other countries. Second, the changes in production and income in the other countries can then feed back into the first country—**foreign-income repercussions.** These foreign-income repercussions make the true spending multiplier larger than the simple formula $1/(s + m)$. Swings in the business cycle (recession or expansion) are not only internationally contagious, but also self-reinforcing, a conjecture easily supported by the experience of the 1930s. More recently, the "locomotive theory" posits that growth in the United States, Japan, and Germany (the three largest economies in the world) can spur growth in the entire world.

The forces that change national income might or might not "worsen" our balance of trade (i.e., shift it toward deficit). The result depends on which of three kinds of forces are at work: (1) A rise in domestic spending will probably worsen the balance of trade. (2) An international shift in demand toward our product (e.g., due to a shift in tastes) will definitely improve our trade balance. (3) A rise in our aggregate supply, that is, in our ability to cut costs and to compete, will probably improve our balance of trade.

A more complete framework for analyzing a country's macroeconomy in the short run requires that we are able to picture not only national product, income, and aggregate demand, but also supply and demand for money and the country's overall balance of payments. The IS–LM–FE approach provides this framework.

The **IS curve** shows all combinations of interest rate and national product that are equilibriums in the national market for goods and services. Because lower interest rates encourage borrowing and spending, the IS curve slopes downward. The **LM curve** shows all combinations of interest rate and national product that are equilibriums between money supply and money demand. For money demand to remain equal to a given, unchanged money supply, the increase in money demand that accompanies a higher national product must be offset by a higher interest rate that reduces money demand so that the LM curve slopes upward.

The **FE curve** shows all combinations of interest rate and national product that result in a zero balance in the country's overall international payments (its official settlements balance). The FE curve also generally slopes upward. An increase in national product and income increases demand for imports so that

the country's current account and overall payments balance deteriorate. This can be offset (at least in the short run) by a higher interest rate that draws in foreign financial capital (or reduces capital outflows) so that the capital account (excluding official reserves transactions) improves.

The intersection of the IS and LM curves indicates the short-run equilibrium values for national product Y and the interest rate i for the country. The position of the FE curve relative to this IS–LM intersection indicates whether the official settlements balance is positive or negative.

Although we often assume that the country's product price level is constant in the short run, over time the price level changes. Most countries have some amount of ongoing inflation that is expected to continue. The monetary approach presented in Chapter 18 emphasizes that ongoing inflation is related to continuing growth of the money supply. In addition, the strength of aggregate demand relative to the economy's supply capabilities can affect the price level or inflation rate. If aggregate demand is too strong, the economy overheats and the price level or inflation rate rises. If aggregate demand is weak, the discipline effect of weak market demand tends to lower the price level or inflation rate. Furthermore, price shocks can cause large changes in the price level or inflation rate even in the short run.

International price competitiveness is another key determinant of a country's international trade in goods and services, in addition to the effects of national income on the country's imports and foreign income on the country's exports. If the price of foreign products relative to the price of our country's products is higher, our demand for imports tends to be lower, and foreign demand for our exports tends to be higher. The real exchange rate (introduced in Chapter 18) is a useful general indicator of this relative price and thus of the country's international price competitiveness. A change in international price competitiveness shifts both the FE curve and the IS curve because the current account balance changes. For instance, if competitiveness improves, then exports increase and imports decline. The improvement in the country's payments position shifts the FE curve to the right, and the increase in aggregate demand shifts the IS curve to the right.

Suggested Reading

Algebraic treatments of foreign-trade repercussions are given in Vanek (1962, Chapters 6–9) and Stern (1973, Chapter 7). Bosworth (1993, Chapter 2) discusses the concepts of internal and external balance and develops the IS–LM–FE model. Richardson (1988) and Bryant et al. (1988) present empirical estimates of the domestic and foreign effects of policy changes using dynamic macroeconomic models that incorporate trade and other linkages among countries. Helliwell and Padmore (1984) summarize earlier empirical work using dynamic "linkage models."

Questions and Problems

1. According to Figure 21.4, which two countries (excluding the United States) have the largest multiplier impacts on each other? Why do you think that this is so?
2. "A recession in the United States is likely to raise the growth of real GDP in Europe." Do you agree or disagree? Why?
3. An economy has a marginal propensity to save of 0.2 and a marginal propensity to import of 0.1. An increase of $1 billion in government spending now occurs. (Assume that the economy is initially producing at a level that is below its supply-side capabilities.)
   a. According to the spending multiplier for a small open economy, by how much will national product and income increase?
   b. If instead this is a closed economy with a marginal propensity to save of 0.2, by how much would national product and income increase if government spending increases by $1 billion? Explain the economics of why this answer is different from the answer to part *a*.
4. An economy has a marginal propensity to save of 0.15 and a marginal propensity to import of 0.4. Real domestic spending now decreases by $2 billion.
   a. According to the spending multiplier (for a small open economy), by how much will national product and income change?
   b. What is the change in the country's imports?
   c. If this country is large, what effect will this have on foreign product and income? Explain.
   d. Will the change in foreign product and income tend to counteract or reinforce the change in the first country's national product and income? Explain.
5. How does the intersection of the IS and LM curves relate to the concept of internal balance?
6. How does the FE curve relate to the concept of external balance?
7. Explain the effect of each of the following on the LM curve:
   a. The country's central bank decreases the money supply.
   b. The country's interest rate increases.
8. Explain the effect of each of the following on the IS curve:
   a. Government spending decreases.
   b. Foreign demand for the country's exports increases.
   c. The country's interest rate increases.
9. Explain the effect of each of the following on the FE curve:
   a. Foreign demand for the country's exports increases.
   b. The foreign interest rate increases.
   c. The country's interest rate increases.
10. Explain the impact of each of the following on our country's exports and imports:
    a. Our national product and income increase.
    b. Foreign national product and income decrease.
    c. Our price level increases by 5 percent, with no change in the (nominal) exchange rate value of our currency and no change in the foreign price level.
    d. Our price level increases by 5 percent, the foreign price level increases by 10 percent, but there is no change in the (nominal) exchange rate value of our currency.