Chapter 5
The Circular Flow of Income and Product

After reading this chapter, you will understand:

1. How households and firms are linked by incomes and expenditures.
2. How income is related to money.
3. How the concepts of supply and demand can be applied to the economy as a whole.
4. How the various sectors of the economy—households, firms, government, and financial markets—fit together.
5. How the U.S. economy is linked to the rest of the world.

Before reading this chapter, make sure you understand the meaning of:

1. Theories and models
2. Investment
3. Equilibrium
4. Inventories
5. Gross domestic product
6. Real and nominal values
7. Transfer payments

THE TWILIGHT ZONE

"For about 20 months the U.S. economy has been operating in a twilight zone: growing too fast to meet the classic definition of a recession, but too slowly to meet the usual criteria for economic recovery. There's nothing particularly mysterious about our situation. But recent news coverage and commentary—in particular, the enthusiastic headlines that followed a modest increase in growth and a modest decline in jobless claims—suggest that some people still don't get it." This was the opening of a *New York Times* column by economist Paul Krugman in August 2003.

The only way to figure out what was happening in the U.S. economy was to try to put together the pieces of the puzzle provided by the latest government statistics. An important piece of the puzzle was a newly issued report that the economy's real output had grown by an estimated 2.4 percent in the second quarter of 2003. Not a spectacular rate, but better than in the recent past. Other vital bits of information concerned what was happening in individual parts of the economy. Forecasters were especially encouraged by growth in consumer spending, the largest component of the demand for goods and services in the economy.

Would the recovery last, or was it just a spurt? Krugman noted weakness in the employment situation. Citing almost 400,000 new jobless claims filed with the government, Krugman's economic outlook was somewhat bleak.

Later, in November 2003, preliminary estimates put third-quarter real output growth at 8.2%. After these estimates were released, Krugman wrote, "I've heard it said that I should try, just once, to write something upbeat." Despite gains in the economy's total real output, the employment situation seems to be lagging behind. This has caused concern among economists like Krugman, as well as for U.S. policy makers.

INFLATION, UNEMPLOYMENT, AND real output are three key macroeconomic indicators. But as the data just cited shows, there are many other pieces to the puzzle besides these three. Interest rates, inventories, consumer spending, exports, defense spending, even cardboard boxes—how can they all possibly fit together? How do the actions of millions of individual firms and households, each making decisions independently, interact to produce recessions, recoveries, slowdowns, and booms? This chapter identifies the major pieces of the puzzle and their relationships to one another. In so doing, it lays the foundation for all of the macroeconomic models that follow.

## THE CIRCULAR FLOW IN A SIMPLE ECONOMY

The model around which this chapter is built is the **circular flow of income and product**—that is, the flow of goods and services between households and firms, balanced by the flow of payments made in exchange for them.

To see the circular flow in its simplest form, we will begin with an economy in which there is no government, no financial markets, and no imports or exports. To make things even simpler, imagine that the households in this economy live entirely from hand to mouth, spending all their income on consumer goods as soon as they receive it, and that the firms sell all their output directly to consumers as soon as they produce it.

The Basic Circular Flow

Figure 5.1 shows the circular flow of income and product for this ultrasimple economy. Real goods and services are shown flowing in a clockwise direction. Two sets of markets link households and firms. *Product markets,* which appear at the top of the diagram, are those in which households buy the goods and services that firms produce. *Factor markets,* which appear at the bottom, are those in which firms obtain the factors of production they need—labor services, capital, and natural resources—from households.

Figure 5.1   The Basic Circular Flow
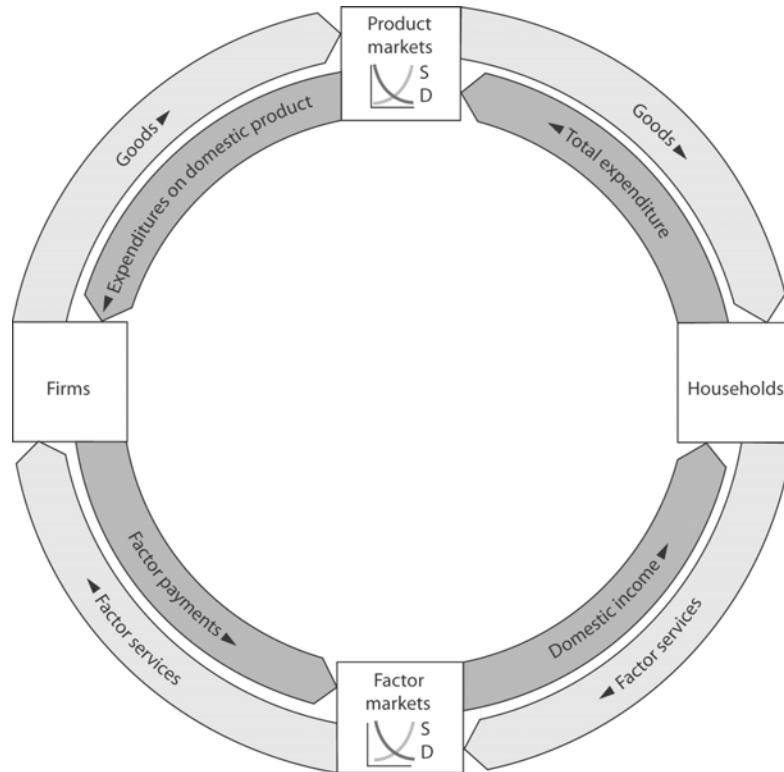
In this simple economy, households spend all their income on consumer goods as soon as they receive it and firms sell all their output to households as soon as they produce it. Goods and services flow clockwise, and the corresponding payments flow counterclockwise.

The clockwise flows of goods and services through these markets are balanced by counterclockwise flows of payments. Households make payments for the things they buy in product markets. Firms make *factor payments*—wages, interest payments, rents, royalties, and so on—in exchange for the labor services and other resources they buy.

By convention, when firms use factors of production that they themselves own, they are counted as "buying" them from the households that are the proprietors, partners, or stockholders who own the firms. All production costs therefore can be viewed as payments for factors of production purchased from households. If a firm has something left over after meeting all its costs, it earns a profit. Profits too are counted as flowing directly to the households that own the firms, even though a firm may retain some profit to increase its owners' equity rather than paying it out as dividends. For the purposes of the circular flow, then, profit is lumped together with factor payments.

Stocks and Flows

We refer to all the amounts shown as arrows in Figure 5. 1 as **flows** because they are continuously occurring processes. Flows are measured in units per time period—dollars per year, gallons per minute, or tons per month. Measurements of flows are measurements of rates at which things are happening.

Flows must be distinguished from stock. **Stocks** are quantities that exist at a given point in time. Stocks are measured in terms of dollars, gallons, tons, and so on at a given point in time. The amusement park ride described in *Applying Economic Ideas 5.1* provides a simple illustration of the relationship between stocks and flows.

Applying Economic Ideas 5.1
WHITE WATER CANYON

King's Dominion is a huge amusement park near Richmond, Virginia. The summer weather is hot there, which helps explain why one of the most popular rides in the park is one called White Water Canyon.

In White Water Canyon, riders are seated in a round rubber raft. After they are buckled in, the raft is swept down a twisting concrete chute through a series of wild rapids. Riders get soaked to the skin in cool water as they hit waves and shoot under waterfalls. Then they get back in line, hoping to reach the boarding point again before they dry off.

The chute down which the rafts ride looks much like a real river, but it is artificial. An electric pump circulates the water from a pond at the bottom of the chute back up to the top. The speed of the ride is controlled by the speed of the motor. When the motor runs faster, more water is pumped through the chute and the rafts are carried along at a higher speed. If the speed of the pump is reduced, the rafts slow down until they hit bottom and cease to move at all.

The system is connected to a pipeline that can be used to add water to replace water lost through splashing and evaporation. However, adding water does not in itself control the speed of the ride. If the pump's speed remains constant, extra water added to the system simply collects in the pond at the bottom of the chute.

This amusement park ride provides a simple illustration of the concepts of stocks and flows. The *stock* of water used in the ride is the number of gallons the system contains at any given time. When the pumps are turned off for the night, the stock of water in the system stays the same; all those gallons just trickle down into the pond at the bottom of the chute. When the pumps are turned on in the morning, the same stock of water is set in motion again.

The *flow* of water through the ride is the number of gallons per minute passing a given point in the system—say, the point at which riders board the rafts. The faster the pumps run, the faster the flow. When the pumps are turned off, the flow falls to zero even though the stock of water remains constant.

Money in the Circular Flow

The fluid that keeps the economy's plumbing system working is money. *Money* is what we use as a means of payment for buying goods and services. (A formal definition of money will be given in Chapter 10.) The forms of money that are most familiar to consumers are coins, paper currency, and bank account balances. Just as there is a certain stock of water in the White Water Canyon ride on any given day, there is a given stock of money in the economy at any point in time—so many dimes, so many $20 bills, and so on. For example, in January 2003, the U.S. money stock was $5.8 trillion, according to a widely used measure. Unless the government or private banks do something to change the stock of money (such as printing more $20 bills and putting them into circulation), that $5.8 trillion is what the economy has to work with, just as the stock of water in the ride is what its operators have to work with (unless they change it by opening the drain or inlet valve).

The economy's money stock, like the water in the ride, does not just lie there. To do any useful work, it must be constantly circulated through the plumbing. Economic flows, such as income and expenditures, are measures of the speed with which money is moving through the system. These economic flows are measured in dollars per year in the same way that the flow of water in the ride is measured in gallons per minute. Gross domestic product—in dollars per year—is greater than the stock of money because each unit of money can be spent more than once each year: workers spend their pay at supermarkets; supermarkets spend their revenues to meet their payrolls; checkout clerks spend their paychecks at gas stations; and so on. For example, in 2002 domestic product was flowing at just over $10 trillion per year even though the stock of money was just $5.8 trillion.

In both the White Water Canyon ride and the U.S. economy, stocks and flows are related, and changes in one are often associated with changes in the other. Yet stocks and flows can also vary independently:

- In the case of the ride, turning on the inlet valve will increase the stock of water. However, as long as the pumps continue to run at the same speed, the added water will just sit at the bottom and the rate of flow through the chute will not change. On the other hand, the flow can be increased by speeding up the pump even while the drain and inlet valves remain closed and the stock of water in the system stays fixed.
- In the case of the economy, adding more money—in the form of $20 bills, bank balances, or whatever—will not speed up the flow of income if the new money just sits in people's pockets and bank accounts. On the other hand, the flow of income can be speeded up even if the stock of money remains fixed if people increase the rate at which they pass the money from hand to hand.

The relationship between the stock of money in the economy and the flow of income is one of the crucial keys to understanding macroeconomics. We will return to this relationship repeatedly in later chapters.

Domestic Income and Product

Look again at Figure 5.1. Two of the flows shown there deserve special attention. The first is labeled "domestic product." **Domestic product** is the total value of all goods and services produced annually in a given country. Expenditures on domestic product constitute the dollar flow to firms that balances the flow of products from firms to product markets; an example would be the payments for clothing that manufacturers receive in return for the shirts and blouses that consumers acquire. The second important flow is labeled "domestic income." **Domestic income** is the total income of all types, including wages, rents, interest payments, and profits, received in return for supplying the factors of production used in producing domestic product. Domestic income and domestic product are, by definition, equal in this simple economy.[1] This can be verified in two ways.

First, consider household expenditures as a link between domestic income and domestic product. Households are assumed to spend all their income on consumer goods as soon as they receive it, and firms are assumed to sell all their output directly to households. The payments made by buyers must equal the payments received by sellers; thus, viewed from this side of the circular flow, domestic product must equal domestic income.

Second, consider payments for labor and other factors as a link between domestic income and domestic product. When firms receive money for the goods and services they sell, they use part of it to pay workers, owners of natural resources, and suppliers of capital. Anything left over is profit. Thus, factor payments, including profits, account for all the money earned by households, and total factor payments are equal to domestic income. From this it follows that domestic income and domestic product are equal when viewed from this side of the circular flow, too.

Saving, Investment, and Financial Markets

The circular flow shown in Figure 5.1 is only a first step in laying out the linkages between households and firms. The next step is to add a second set of linkages that involve saving, investment, and financial markets. These linkages are shown in Figure 5.2. To simplify this and the following circular flow diagrams, the clockwise flows of goods and services are omitted.

SAVING   On the average, households spend less each year than they receive in income. The portion of household income that is not used to buy goods and services or to pay taxes is termed **saving**. (There are no taxes in this economy yet, but they will soon be added.)

Figure 5.2   The Circular Flow with Saving and Investment
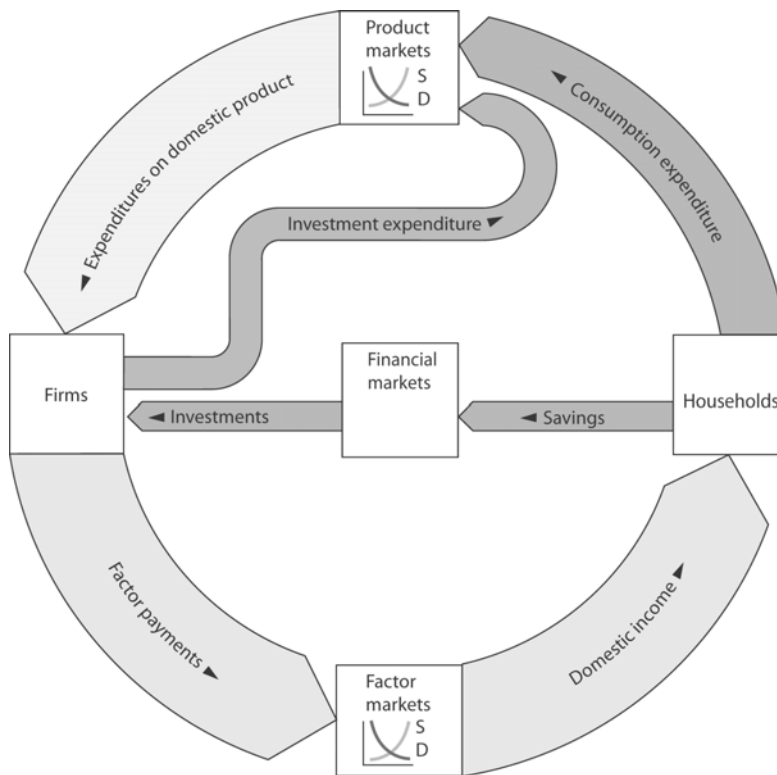
When saving and investment are added to the circular flow, there are two paths by which funds can travel on their way from households to product markets. One path is direct, via consumption expenditures. The other is indirect, via saving, financial markets, and investment. The clockwise flows of goods and services have been omitted from this diagram; only flows of funds are shown.

The most familiar form of saving is the use of part of a household's income to make deposits in bank accounts or to buy stocks, bonds, or other financial instruments, rather than to buy goods and services. However, economists take a broader view of saving. They also consider households to be saving when they repay debts. Debt repayments are a form of saving because they, too, are income that is not devoted to consumption or taxes.

INVESTMENT   Whereas households, on the average, spend less each year than they receive in income, business firms, on the average, spend more each year than they receive from the sale of their products. They do so because, in addition to paying for the productive resources they need to carry out production at its current level, they desire to undertake *investment.* Investment includes all spending that is directed toward increasing the economy's stock of capital.

If we examine this topic more closely, we can distinguish between two categories of investment. The first, **fixed investment**, means the purchase of newly produced capital goods,

such as production machinery, office equipment, and newly built structures. The second is **inventory investment**—the accumulation of stocks of raw materials prior to use or of finished products prior to sale. Inventories held by businesses are counted as part of the economy's stock of capital; they are just as necessary to the production process as capital in the form of machinery or buildings. Inventory investment can be less than zero in periods when firms are reducing their stocks of raw materials and finished products. The term *investment* used alone refers to the sum of fixed investment and inventory investment.

Investment is defined somewhat more narrowly in economics than in everyday usage. In everyday usage it means the purchase of almost any kind of asset; thus, a person or firm might be said to "invest" in corporate stocks, a previously built house, or secondhand oil tankers. However, none of these purchases is an investment in the economic sense because it adds nothing to the economy's total stock of capital goods or total inventories.

Suppose, for example, that Exxon buys a brand-new, custom-built oil tanker. That would be an investment, because the tanker is a new addition to the economy's stock of capital. A few years later Exxon decides to sell the tanker to Mobil. For carrying oil, a used tanker is just as good as a new one. Yet the purchase is not an investment in the economic sense; it is not an addition to the economy's stock of capital in the year in which it changes hands. Likewise, purchases of other used capital goods, real estate (other than new structures), mineral deposits, forests, and so on are not investments in the economic sense. They are simply transfers of assets from the balance sheet of one household or firm to that of another.

FINANCIAL MARKETS As we have seen, households tend to spend less each year than they receive in income, whereas firms tend to spend more than they receive from the sale of their products. The economy contains a special set of institutions whose function is to channel the flow of funds from households, as savers, to firms, as borrowers.[2] These are known as **financial markets**. Financial markets are pictured in the center of the circular-flow diagram in Figure 5.2.

Banks are among the most familiar and important institutions found in financial markets. Banks, together with insurance companies, pension funds, mutual funds, and certain other institutions, are termed **financial intermediaries** because their role is to gather funds from savers and channel them to borrowers in the form of loans.

More than half of all saving flows through financial intermediaries. The remainder is obtained directly from households through the sale of stocks, bonds, and other securities. **Common stocks** are certificates of shared ownership in a corporation that give the owner a vote in the selection of the firm's management and the right to a share in its profits. (The word *stock,* when used as shorthand for *common stock,* has nothing to do with the concept of stocks as distinguished from flows, defined earlier.) **Bonds** are certificates that represent a promise, in return for borrowed funds, to repay the loan over a period of years, with interest, according to an agreed-upon schedule. Bonds, stocks, and certain other financial instruments are collectively referred to as **securities**. A variety of markets exist in which securities are bought, sold, and

resold among households, firms, and financial intermediaries. The New York Stock Exchange, located on Wall Street in New York City, is the best known of the securities markets.

AGGREGATE SUPPLY AND DEMAND

Adding saving and investment to the circular flow raises a new issue. There are now two pathways along which funds flow from households to product markets: a direct path, through consumption expenditures, and an indirect path, through saving and financial markets to investment expenditures. Corresponding to these two paths are two separate sets of decision makers: households, which make consumption decisions, and businesses, which make investment decisions. How can we be sure that when the two types of expenditures are added together they will match the amount of available goods and services? In other words, how can we be certain that domestic income will still equal domestic product?

These questions can be answered using the familiar concepts of supply and demand in a new way. First, we define **aggregate supply** as the value of all goods and services produced in the economy. We already have another term for the same thing: *domestic product.* Next, we define **aggregate demand** as the value of all the purchases of newly produced goods and services that buyers plan to make. Thus, we can compare aggregate supply and aggregate demand to see whether, for the economy as a whole, buyers' plans mesh with sellers' plans in the same way that we compare supply and demand in the case of a single market.

Equilibrium in the Circular Flow

To see how aggregate supply can be compared with aggregate demand, imagine an economy in which only three goods are produced: apples, radios, and milling machines. The firms in this economy plan to produce apples at a rate of $30,000 per year, radios at a rate of $30,000 per year, and milling machines at a rate of $40,000 per year. As they carry out their plans, output flows at a rate of $100,000 per year. This flow, which can be called either domestic product or aggregate supply, is shown in lines 1 through 4 of Figure 5.3.

While producers are busy carrying out their plans, buyers are making their own plans. Consumers plan to buy apples at a rate of $30,000 per year and radios at a rate of $30,000 per year. The firms that make radios plan to buy milling machines at a rate of $40,000 per year to increase their radio-producing capacity. No one plans to increase or decrease the stocks of finished products held in inventory; therefore, planned inventory investment is zero. All of these buying plans are expressed in lines 5 through 11 of Figure 5.3. The value of all planned expenditures (consumption plus fixed investment plus planned inventory investment) is shown in line 11 as aggregate demand.

Figure 5.3   Examples of a Simple Economy in Equilibrium

Output Resulting from Producers' Plans		
1. Total domestic product (aggregate supply)		$100,000
2. Apples	$30,000	
3. Radios	30,000	
4. Milling machines	40,000	
Expenditures Resulting from Buyers' Plans		
5. Total consumption expenditures		$60,000
6. Apples	$30,000	
7. Radios	30,000	
8. Total planned investment		40,000
9. Fixed investment (milling machines)	40,000	
10. Planned inventory investment	0	
11. Total planned expenditure (aggregate demand)		$100,000

This figure shows a simple economy in which aggregate supply is exactly equal to aggregate demand. The plans of buyers and sellers match when they are carried out in the marketplace, and no unplanned changes in inventory occur. Domestic product and total planned expenditures are equal.

Comparing line 1 with line 11, we see that in this example buyers' and sellers' plans match perfectly. Aggregate supply and aggregate demand are equal. When the plans of buyers and sellers mesh in this way, we say that the circular flow as a whole is in *equilibrium,* just as we say that a market is in equilibrium when the plans of buyers and sellers in that market mesh.

Disequilibrium

In practice, the plans of buyers and sellers almost never fit together as neatly as they do in Figure 5.3. In fact, it would be surprising if they did. After all, buyers and sellers do not always consult one another before production takes place. Each firm bases its production plans on the information available to it. Buyers base their plans on market prices and on their expectations about the future. Because production plans are often set before buyers' plans have been formed, there is no way to be sure the two sets of plans will mesh.

Suppose, for example, that the preceding example is changed so that consumers plan to buy only $25,000 worth of apples and firms plan to buy only $35,000 worth of investment goods (milling machines). Thus, aggregate demand is only $90,000, even though aggregate supply is still $100,000.

When these plans are tested in the marketplace, there will be some disappointment: All the radios will be sold, but $5,000 worth of apples and $5,000 worth of milling machines will be left over. What will happen to these unsold goods? Once they have been produced, they will not

vanish into thin air; instead, they will pile up as inventories in the warehouses of apple farmers and machine tool companies. Those producers did not *plan* to make any inventory investments, but they nonetheless find themselves doing so. The $5,000 of unsold apples and the $5,000 of unsold milling machines are therefore classified as *unplanned* inventory investments. Because buyers' and sellers' plans do not mesh, the circular flow is said to be in *disequilibrium.*

Reactions to Disequilibrium

In the example just given, aggregate supply exceeds aggregate demand, so there is an unplanned buildup of inventories. Because firms would not want this inventory buildup to continue, they would limit or reverse it by doing one or both of two things. First, they might cut their prices in order to stimulate sales. If they did this, the volume of the circular flow measured in nominal terms (that is, in terms of dollars' worth of goods and services at current prices) would shrink. Second, they might cut their rate of output. If they did this, the circular flow would shrink both in real terms (that is, in terms of output of goods and services adjusted for changes in prices) and in nominal terms.

At another time, aggregate demand might exceed aggregate supply. Suppose, for example, that with output the same as before, consumers plan to buy $35,000 worth of apples and firms plan to buy $45,000 worth of milling machines. When these plans are carried out in the marketplace, sales will exceed current output. The result will be unplanned depletion of inventories as stocks of apples and milling machines are used to meet the strong demand. Firms will react in a way that is opposite to their reaction to an unplanned inventory buildup. If they try to stop the inventory depletion by raising their prices, the circular flow will grow in nominal terms. If they also increase output, the circular flow will grow in both real and nominal terms.

Equality of Domestic Income and Product

As these examples show, domestic product (aggregate supply) equals planned expenditure (aggregate demand) only when the economy is in equilibrium. However, whether or not the economy is in equilibrium, domestic product always equals **realized expenditure**—that is, the total of planned and unplanned expenditures. This is so because unplanned inventory investment acts as a balancing item. When planned expenditure falls short of aggregate supply, inventories pile up. In that case, adding unplanned inventory investment to planned expenditure makes total realized expenditure equal to aggregate supply. On the other hand, if planned expenditure exceeds aggregate supply, inventories are run down. In that case, adding the negative unplanned inventory investment to planned consumption and investment makes total realized expenditure equal to aggregate supply. In equation form:

Domestic product = Total planned expenditure + Unplanned inventory investment = Total realized expenditure.

Another way of writing the same thing is:

Aggregate supply = Aggregate demand + Unplanned inventory investment.

Having shown that domestic product equals total realized expenditure in this economy, we can also show that domestic product equals domestic income. As in the case of the ultrasimple economy of Figure 5.1, the equality of domestic income and product can be shown in one of two ways.

First, we can take advantage of the fact that payments for factor services and profits provide a link between domestic income and domestic product. In our examples, firms produce $100,000 worth of goods each year, all of which is either sold to investors and consumers or added to inventory. In the course of producing this quantity of goods, firms incur costs, which enter the domestic income stream as wages, interest payments, rental payments, and so on. Anything left over after all costs have been paid is profit for the firms—and this, too, is counted as going into the domestic income stream. The total of factor payments plus profits thus account for the entire $100,000 of domestic product (sales to final users plus inventory change).

Second, the equality of domestic income and product can be shown using expenditures as a link. In Figure 5.3 households plan to spend $60,000 on consumer goods (radios and apples). The other $40,000 leaves the circular flow as saving. Firms plan to invest $40,000 in milling machines, so the $40,000 is injected back into the economy as investment spending. Total expenditures (consumption plus investment) thus are equal to domestic income (saving plus consumption). Also, total expenditures, as shown earlier, are equal to domestic product.

Even if the plans of households and firms do not mesh so neatly, total realized expenditures still provide a link between domestic income and domestic product. For example, if households plan to spend just $55,000 and save $45,000, while firms plan to invest only $35,000, saving will exceed planned investment by $10,000. However, as we saw before, the $10,000 of goods that firms produce but that no one plans to buy do not vanish into thin air; instead, they pile up in inventory, where they are counted as unplanned inventory investment. When this is taken into account, total **realized investment** ($35,000 planned plus $10,000 unplanned) equals saving. Again, therefore, domestic income (saving plus consumption) equals total realized expenditure (consumption plus realized investment) and, as always, total realized expenditure equals domestic product.

ADDING GOVERNMENT TO THE CIRCULAR FLOW

The next step in our analysis of the circular flow is to add the public sector. Government is linked to the rest of the economy through taxes, expenditures, and government borrowing. These three links are added to the circular flow in Figure 5.4.

Figure 5.4 The Circular Flow with Government Included
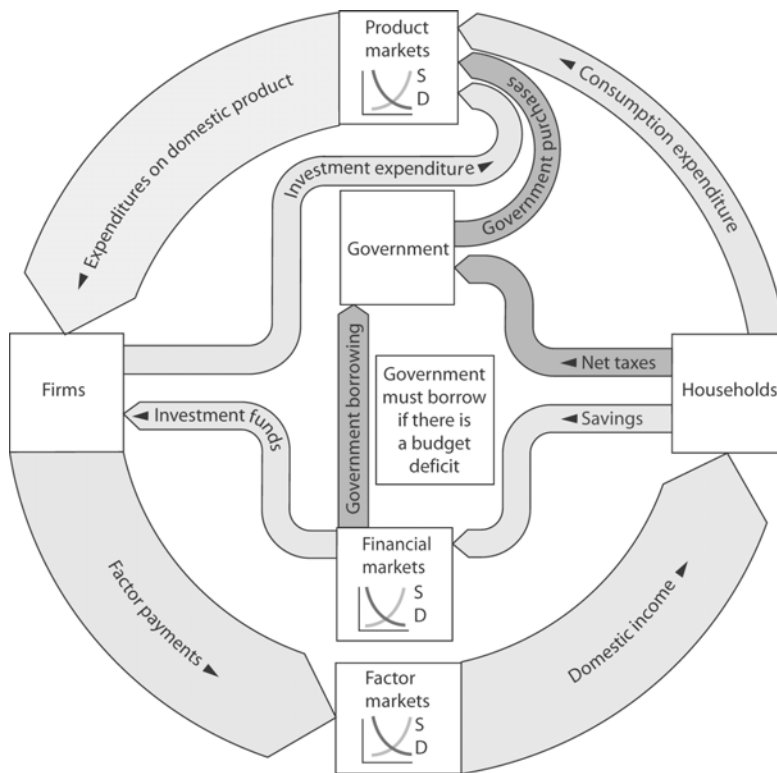
This circular-flow diagram shows three links between government and the rest of the economy. The first is net taxes (taxes minus transfer payments), which flow from households to government. The second is government purchases, which flow from government to product markers. If government purchases exceed net taxes (a budget deficit), the government must borrow from financial markets. The deficit case is shown here. If net taxes exceed government purchases, government repayments of past borrowing will exceed new government borrowing, resulting in a net flow of funds from government to financial markets. This case is not shown here.

First, consider taxes. For purposes of macroeconomic theory, we need to measure the flow of funds withdrawn from the household sector by government. Clearly, taxes—including income, payroll, and property taxes—are withdrawals. However, this flow of funds from the household sector is partly offset by a flow of funds returned to households in the form of transfer payments, such as social security benefits and unemployment compensation. Therefore, to get a proper measure of the net flow of funds from households to government, we must subtract transfer payments from total taxes. The difference between taxes and transfers is called **net taxes** and is indicated in Figure 5.4 by the arrow linking households and government.

Next, consider the link between government and product markets. We have already accounted for transfers in calculating net taxes. The remainder of government spending consists of purchases of goods and services, including those bought from private firms and the wages and salaries of government employees. For purposes of the circular flow, government employees'

wages and salaries are treated as if they passed through product markets on their way to households.

Finally, consider the link between government and financial markets. Governments do not always balance their budgets. The public sector as a whole, taking federal, state, and local governments together, tends to spend more than it takes in as taxes. (The federal government almost always runs a deficit. State and local governments often have surpluses, but—at least in recent decades—these have not been large enough to offset the federal deficit.)

The government deficit must be financed by borrowing in financial markets. Usually this borrowing takes the form of sales of government bonds and other securities to the public or to financial intermediaries. In Figure 5.4 the arrow from financial markets to government represents government borrowing. Over time, repeated government borrowing adds to the domestic debt. The *debt* is a stock that reflects the accumulation of annual *deficits,* which are flows.

In years when the public sector as a whole runs a budget surplus (that is, when net taxes exceed government purchases), the direction of the arrow is reversed. Governments pay off old borrowing at a faster rate than the rate at which new borrowing occurs, thereby creating a net flow of funds into financial markets. In the United States the combined government sector last showed a budget surplus in 1979.

Leakages and Injections

Take a moment to compare the circular flow shown in Figure 5.4 with the simpler version shown in Figure 5.1. In Figure 5.1, all of domestic income flows directly from households to product markets in the form of consumption spending. Nothing is withdrawn from the stream of income and consumption spending, and nothing is added to it. In Figure 5.4, however, additional flows have been added.

First, there are two uses for income that do not result directly in purchases of goods and services. These are net taxes, which flow to government rather than to product markets, and saving, which flows to financial markets rather than to product markets. These two uses of funds are termed **leakages** from the circular flow. Because saving is defined as whatever income is left over after households buy goods and services and pay net taxes, consumption plus the two leakages always add up to domestic income.

Second, there are two kinds of expenditures, namely investment and government purchases, that do not come directly from households. These are termed **injections** into the circular flow. Because investment includes unplanned inventory investment, total realized expenditures— consumption plus injections—always equal domestic income.

Equality of Domestic Income and Product

Adding government to the circular flow does not disturb the equality of domestic income and domestic product. Figure 5.5 shows an economy in equilibrium with the government sector

added. Line 1 indicates that domestic product is $100,000. Lines 2 through 6 show the spending plans of households, firms, and government. Households plan to buy $70,000 worth of consumer goods and services; firms plan to buy $15,000 worth of investment goods; and the government plans to buy $15,000 worth of goods and services. Total planned expenditures come to exactly $100,000, and there are no unplanned inventory changes. When planned expenditures (aggregate demand) just equal domestic product (aggregate supply), we know that the economy is in equilibrium.

Figure 5.5   Example of Equilibrium with Government Included

1. Domestic product		$100,000
Expenditures		
2. Consumption		$70,000
3. Investment		15,000
4. Planned	$15,000	
5. Unplanned	0	
6. Government purchases		15,000
7. Total expenditures		$100,000
8. Domestic income		$100,000
Uses of Domestic Income		
9. Consumption		$70,000
10. Saving		20,000
11. Net taxes		10,000
12. Total uses		$100,000

This figure shows the equality of domestic income and product for an economy with government purchases and taxes included. The total of consumption plus investment plus government purchases equals the total of consumption plus saving plus net taxes. As shown here, the economy is in equilibrium and there is no unplanned inventory investment. However, the equality would hold even if total realized investment included some unplanned inventory investment.

Production of $100,000 worth of goods and services generates a domestic income, consisting of wages, interest, profits, and so on, of $100,000 (line 8). Lines 9 through 11 show how this domestic income is used: $70,000 goes for consumption (as we saw before); $20,000 is saved; and $10,000 is taken in as taxes. These three uses account for the entire domestic income of $l00,000.

The relationships shown in Figure 5.5 can be summarized in the following equation:

Domestic product

    = Consumption + Investment + Government purchases

    = Consumption + Saving + Net taxes

    = Domestic income.

These equations hold even if the economy is not in equilibrium. In that case, realized investment includes some unplanned inventory investment along with planned investment. But domestic product, including planned plus unplanned investment, equals domestic income whether or not the economy is in equilibrium.

Government Influence on the Circular Flow: A Preview

A close look at Figure 5.4 suggests that the government is able to regulate the size of the overall circular flow through its control over some of the flow components. Much of the discussion in later chapters will be devoted to describing this power and how it is used. Here we will simply give a preview.

One way in which government can affect the circular flow is through its purchases of goods and services. Starting from a state of equilibrium, a reduction in government purchases would lead to unplanned inventory buildup by the firms that make the products that the government unexpectedly stopped buying. As unwanted inventories piled up, firms would react by cutting back output, reducing prices, or some of both. As they did so, the volume of the circular flow would fall in both real and nominal terms. If, on the other hand, the government increased its purchases of goods and services—again starting from equilibrium—there would be unplanned inventory depletion. Firms would react by increasing output, raising prices, or some of both. This would cause the volume of the circular flow to rise in both real and nominal terms. We see, then, that by adding to aggregate demand through increased purchases or reducing aggregate demand through lowered purchases, government can cause the level of domestic product to rise or fall.

Taxes give the government a second means of controlling the circular flow. If tax rates are increased, households will have less after-tax income to spend on consumer goods. This will reduce aggregate demand and cause an unplanned inventory buildup. In response, firms will reduce output, prices, or both, thereby reducing the volume of the circular flow. If tax rates are lowered, the process will work in reverse. With more after-tax income, consumer spending will increase. The additional aggregate demand will cause an unplanned inventory depletion, to which firms will react by increasing output, prices, or both. In this case, the volume of the circular flow and domestic product will rise. The effects of changes in taxes and government purchases, which together are known as *fiscal policy,* will be discussed later.

The government has a third, indirect means of regulating the volume of the circular flow, namely, its influence over the money stock. The Federal Reserve System, an independent unit of the federal government, can take actions that affect the stock of money in the economy. As we saw earlier in the chapter, increasing the stock of money would not necessarily cause the rate of

flow of income and product to increase if the new money lay idle in people's pockets and bank accounts. However, as we will see in coming chapters, the actions through which the Federal Reserve injects new money into the economy have many indirect effects, including effects on interest rates and financial markets. If monetary policy eases the availability of loans and lowers interest rates, firms will be encouraged to step up their rate of investment spending. This, in turn, will cause the circular flow to expand. On the other hand, if monetary policy actions cause interest rates to rise, firms will be discouraged from making investments and the circular flow will tend to shrink. These matters will be discussed in detail in future chapters.

ADDING THE FOREIGN SECTOR TO THE CIRCULAR FLOW

Up to this point we have developed the circular-flow model only for a **closed economy**—that is, one that has no links to the rest of the world. The U.S. economy is not closed to the rest of the world, however; it is an **open economy**—and increasingly so. Goods and services with a value equal to some 25 percent of domestic product cross the nation's borders in the form of either imports or exports, not to mention the hundreds of billions of dollars' worth of international financial transactions that take place each year. This section extends the circular-flow model to an open economy by adding a foreign sector to the household, firm, and government sectors already included.

Figure 5.6 shows that the foreign sector, like the government, is linked to the rest of the economy in three ways. Imports of goods and services provide the first link. Recall that all the components of the circular flow represents flows of money payments, not flows of goods. Payments for imports are shown by an arrow leading away from the economy to the rest of the world. Households, firms, and government all buy some imported goods and services. To keep Figure 5.6 manageable, however, only imports by consumers, which form part of total consumption expenditure, are shown.

Exports provide the second link between the domestic economy and the rest of the world. Funds received in payment for goods and services sold abroad flow into product markets, where they join funds received from sales of goods and services to domestic households, government, and firms. Receipts from the sale of exports are shown as an arrow leading into product markets. The value of exports minus the value of imports is referred to as **net exports**. If the value of imports exceeds that of exports, we can say that there are *negative net exports* or, more simply, *net imports*.

Figure 5.6   The Circular Flow with the Foreign Sector Included
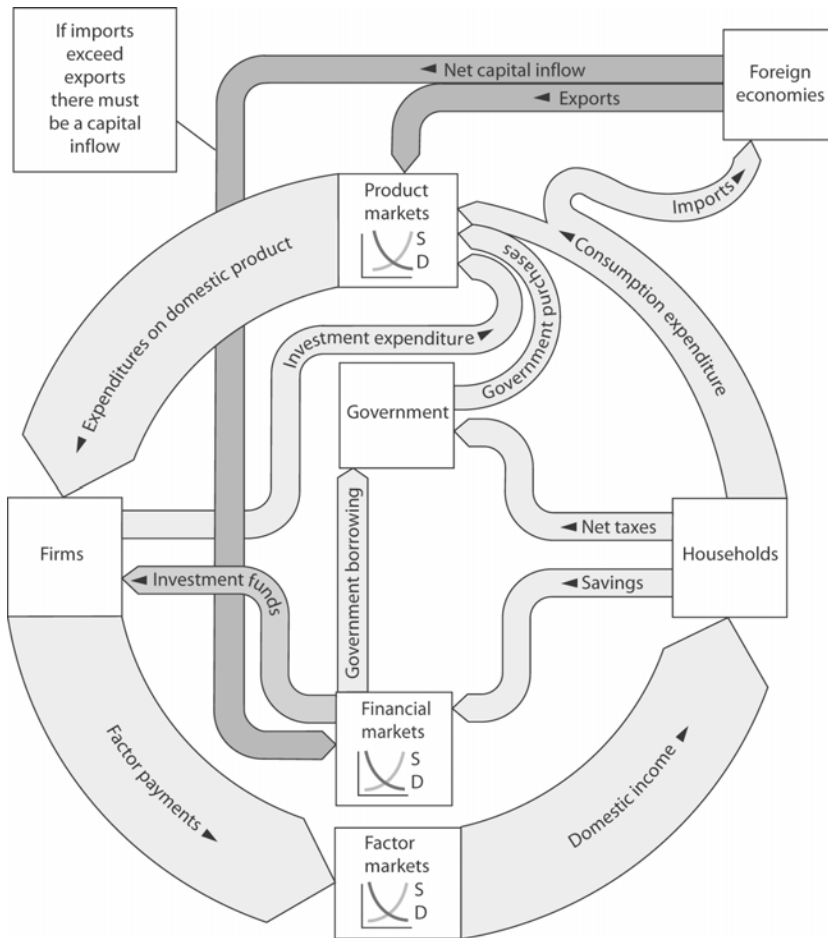
This circular-flow diagram shows three links between the domestic economy and the rest of the world. Imports are the first link. Payments for imports are shown as an arrow from households to foreign economies. Exports are the second link. Payments by foreign buyers of exports are shown as an arrow leading to domestic product markets. If too few goods and services are exported to pay for all the imports, the remaining imports must be paid for by borrowing from foreign sources or by selling real or financial assets to foreign buyers. Such transactions, known as net capital inflows, are shown as a flow into domestic financial markets. Exports might also exceed imports, in which case the arrow would be reversed to show *net capital outflows.*

The third link between the domestic economy and the rest of the world consists of international financial transactions. These include international borrowing and lending and international purchases and sales of assets. Like imports and exports of goods and services, international financial transactions give rise to flows of dollar payments into or out of the U.S. economy. Suppose, for example, that a Japanese pension fund buys a bond issued by the U.S. government. It pays for the bond with dollars; as a result, dollars flow into the U.S. economy just as they do when a Japanese firm buys a U.S.-built computer. Much the same thing happens when a U.S. chemical company borrows $1 million from a London bank. The bank is given a

promissory note and in return turns over $1 million to the U.S. firm. In both cases, there is an inflow of dollars from abroad to the U.S. economy as a result of the financial transaction.

Flows of dollars into the economy that result from net purchases of assets by foreign buyers and net borrowing from foreign financial intermediaries are known as **capital inflows**.[3] Strictly speaking, it might be better to call them *financial inflows,* because we are talking about the direction of dollar flows, not flows of capital equipment. However, the term *capital inflows* is well established.

Capital inflows have their mirror images. If a U.S. pension fund buys stock in a Swedish paper company or a U.S. bank makes a loan to a Jamaican mining concern, funds flow out of the U.S. economy. Net purchases of foreign assets and net loans to foreign borrowers by U.S. financial intermediaries are known as **capital outflows**.

There is a link between the flows of payments that arise from imports and exports of goods and services and those that arise from financial flows. The logic of this connection can be seen in a highly simplified example. Suppose you are the only person in the United States doing business with France. You want to buy French wine and, at the same time, are willing to sell U.S.-made maple syrup to the French. You place an order for $1,000 worth of wine, but you can find French buyers for only $600 worth of syrup. Does your failure to export as much as you want to import mean that you will have to cancel part of your wine order? No, because there are other ways to settle your accounts with the French: You can either borrow the $400 you need from a French bank or sell a French buyer $400 worth of common stock in your syrup company. To put it another way, you can pay for your imports via either exports or capital inflows in any combination you desire. If the tables were turned and the French wanted to buy an amount of syrup worth more than the wine you wanted to import, they would have to borrow from a U.S. financial intermediary or sell assets to a U.S. buyer. In that case there would be a capital outflow from the U.S. economy.

Later we will add details, but the principle is clear from this simple example. A country can import more than it exports if it experiences net capital inflows—that is, capital inflows that exceed capital outflows. This happens when individuals and firms in that country borrow more from abroad than foreigners borrow from them, or when they sell more assets to foreigners than foreigners buy from them. This is the case shown in Figure 5.6, and it corresponds to the experience of the United States since the early 1980s.

By the same token, a country can export more than it imports if it experiences a net capital outflow—that is, if its capital outflows are greater than its capital inflows. This happens when financial institutions in that country lend more funds to foreigners than residents of that country borrow from abroad, or when residents of the country buy more assets from foreigners than they sell to them. Thus, a country with net exports must also experience a net capital outflow. In that case, the arrow between the foreign sector and financial markets in Figure 5.6 would be reversed and labeled "net capital outflow." This would represent U.S. experience in earlier post–World War II decades.

Equality of Domestic Income and Product in a System Including a Foreign Sector

Adding the foreign sector to the circular flow still leaves all of the basic equalities intact. As in the case of a closed economy, we can show this by means of a four-part equation, as follows:

Domestic product
= Consumption + Investment + Government purchases + (Exports – Imports)
= Consumption + Saving + Net taxes
= Domestic income.

In this four-part set of equations, consumption appears twice: First as one of the categories of expenditures on domestic product, and then as one of the uses of domestic income. If we subtract consumption from both total expenditures and total income, and then shift imports to the left-hand side, we get another useful equation:

Investment + Government purchases + Exports = Saving + Net taxes + Imports.

This equation says that total injections equal total leakages. It is only the totals of leakages and injections that need to add up. The individual components do not have to match: saving need not equal investment, net taxes need not equal government purchases, and imports need not equal exports. For example, suppose that exports (an injection) exceed imports (a leakage) by $5,000, and at the same time, government purchases (an injection) exceed net taxes (a leakage) by $5,000. Despite these imbalances, it is possible for total leakages to equal total injections if saving (a leakage) exceeds investment (an injection) by $10,000. If *planned* investment is not at the level required to bring about this result, *unplanned inventory investment* will automatically occur at just the rate required to maintain the equality of total leakages with total (planned plus unplanned) injections.

In later chapters the relationship between total leakages and total injections will prove useful in understanding the domestic and international macroeconomic experience of the United States over the past decade.

SUMMARY

1. **How are households and firms linked by incomes and expenditures?** The *circular flow of income and product* is the flow of goods and services between households and firms, balanced by the flow of payments made in exchange for goods and services. In the simplest case, households spend all their money on consumer goods produced by firms and firms use all the proceeds of their sales to pay wages, rent, interest, and profits to households. *Domestic product* is the value of all goods and services produced in the economy. *Domestic income* is

the total income earned by households, including wages, rents, interest payments, and profits. The two are always equal, because for every dollar that firms receive from the sale of their products, they pay one dollar in factor payments and profits.

2. **How is income related to money?** In economics, the term *flow* refers to any process that occurs continuously through time, while a *stock* is the total amount of something that exists at a given point in time. The distinction between stocks and flows is useful for understanding the role of money. The *stock* of money consists of the coins, paper currency, and bank account balances used for transactions and saving. As money is spent it moves through the economy, creating various *flows,* such as income, saving, investment, and government purchases.

3. **How can the concepts of supply and demand be applied to the economy as a whole?** *Aggregate supply* is the value of all goods and services produced in the economy; it means the same thing as domestic product. *Aggregate demand* is the value of all planned expenditures in the economy. The circular flow is said to be in equilibrium when aggregate supply and aggregate demand are equal. In that case, there are no unplanned changes in inventories. If aggregate demand exceeds aggregate supply, there will be unplanned decreases in inventory (negative inventory investment). Firms will tend to react by increasing output, raising prices, or some of both. The circular flow will then expand. If aggregate supply exceeds aggregate demand, there will be unplanned increases in inventories. Firms' reactions will cause the circular flow to shrink.

4. **How do the various sectors of the economy—households, firms, government, and financial markets—fit together?** Firms are linked to households through product markets (expenditures on domestic product) and factor markets (domestic income). Both are linked to *financial markets,* through which household saving flows to firms, which use the funds to make investments. The government sector is connected to the circular flow in three ways. First, households pay *net taxes* (taxes minus transfer payments) to the government. Second, the government buys goods and services in product markets. Third, the government borrows from financial markets to finance a deficit, or supplies funds to financial markets when it runs a surplus.

5. **How is the U.S. economy linked to the rest of the world?** The foreign sector, like the government sector, is connected to the circular flow in three ways: First, households pay foreign sellers for imported goods. Second, foreign buyers make payments to domestic firms for exported goods. Third, the foreign sector supplies funds to U.S. financial markets if the United States has negative net exports. The funds thus supplied are called *net capital inflows.* Positive net exports by the United States must be offset by *net capital outflows* to foreign financial markets.

KEY TERMS

Circular flow of income and product

Flow

Stock

Domestic product

Domestic income

Saving

Fixed investment

Inventory investment

Financial markets

Financial intermediaries

Common stock

Bond

Securities

Aggregate supply

Aggregate demand

Realized expenditure

Realized investment

Net taxes

Leakages

Injections

Closed economy

Open economy

Net exports

Capital inflows

Capital outflows

PROBLEMS AND TOPICS FOR DISCUSSION

1. **Your personal money stock.** How much money do you own at this moment in the form of coins, paper currency, and the balance in your checking or savings account, if you have one? What was your flow of income in the past month? How would a change in your income affect your stock of money?

2. **Banks as financial intermediaries.** Many local banks provide leaflets advertising their services. Ask for information of this kind at a local bank. What services are provided to borrowers? To depositors? How are the two kinds of services related to the bank's activities as a financial intermediary?

3. **Planned inventory changes.** Not all changes in inventories are unplanned. Why would a firm plan to increase or decrease its inventories? How would you plan your inventories over the course of the year if you were a seller of children's toys? Of air conditioners? How would you plan your inventories of parts if you were the manager of an auto parts store in a town with a growing population? In one with a shrinking population?

4. **Disequilibrium with excess aggregate demand.** Rework the table in Figure 5.3 for the case of excess aggregate demand. (Let consumption of apples be $35,000, consumption of radios $30,000, and planned investment in milling machines $40,000.) How would producers tend to adjust to these changes? Now assume that radio dealers plan to add $5,000 to their inventories. What does this do to total aggregate demand? Will the dealers be able to carry out their plans?

5. **Reactions to disequilibrium in the circular flow.** Starting from a state of equilibrium, trace the effects of each of the following through the circular flow. What happens to inventories? How do firms tend to react? What happens to the size of the circular flow as measured in nominal terms?
   a. Business managers suddenly decide to increase investment in order to expand their firms' productive capacity.
   b. The federal government reduces income tax rates.
   c. Good harvests throughout the world reduce the demand for exports of U.S. farm products.

6. **Changes in real and nominal output.** In response to an increase in demand, the nation's hay farmers increase production of hay from 1 billion to 1.2 billion bales per year. At the same time, as the market moves up its supply curve, the price rises from $2 to $2.50 a bale. What happens to the output of hay measured in real terms (that is, in terms of the value of output at unchanged prices)? What happens to output measured in nominal terms (that is, in terms of the value of output with respect to the prices at which the output was sold)?

Case for Discussion
TEETERING ON THE BRINK OF RECESSION

In January 1970, the economy had just passed a business cycle peak and begun a recession. Although available data had not yet fully confirmed this fact, it was clear that the economy was weak. In these difficult circumstances, President Richard Nixon made his annual report to Congress, from which the following excerpts are taken:

As we enter 1970, continuation of a low rate of growth of sales, production, and employment for several months seems probable. Thereafter, the performance of the economy will depend on both the continued resolve of the Government and the difficult-to-predict behavior of the private sector.

Government policy must now avoid three possible dangers. One is that after a brief lull the demand for output would begin to rise too rapidly and rekindle the inflationary process, as happened in 1967. This possibility cannot be ignored. The tax bill passed in December reduced revenues for the next fiscal year by close to $3 billion, compared to my original proposals, requiring the Administration to reduce spending plans further.…

A second danger we must consider is that the moderate and necessary slowdown may become more severe. The highly restrictive stance of monetary policy is one reason for considering this possibility. Moreover, there is a question whether the rate of real output can long remain essentially flat without more adverse consequences than we have so far experienced.

A third danger is that although the economy remains on the path of slow rise, and avoids either serious recession or revived inflation, this is achieved with such tight credit conditions as to paralyze the housing industry.…

The goal of policy should therefore be moderately more rapid economic expansion in the latter part of 1970 than we have recently been experiencing or expect for several months ahead. Keeping the Federal budget in balance, as I have recommended, and a moderate degree of monetary restraint will help achieve this result. This combination of policies would also permit residential construction to revive and begin a rise toward the path of housebuilding required by our growing number of families.

Source: President's Council of Economic Advisers, *Economic Report of the President* (Washington, D.C.: Government Printing Office, 1970) pp. 7–8.

QUESTIONS

1. For each of the terms used in this report, identify a corresponding flow in Figure 5.4.
2. The report notes that in late 1969 Congress cut taxes by $3 billion more than the administration requested. Explain why the president, worried about the possibility of an overly rapid expansion that might lead to inflation, responded by making further decreases in government spending.
3. Are money or interest rates directly visible in the circular flow diagram? If not, which components of the circular flow do they affect, and how?

END NOTES

1. As we will see in the next chapter, establishing the equality of domestic income and product as measured in the official national income accounts requires a bit more detail than is shown here. Among other things, we will have to distinguish between *gross* and *net* domestic product, which are two ways of measuring this part of the circular flow, and also between *domestic* income and *national* income. However, these details of national income accounting are not critical to the discussion of macroeconomic theory in this and later chapters.

2. The version of the circular flow presented in Figure 5.2 shows households as the only source of saving and firms as the only borrowers. Reality is somewhat more complex. Later in the chapter we will see that federal, state, and local governments, as well as foreign firms and governments, participate in financial markets as savers or borrowers. In addition, it should be kept in mind that although households on the average are savers and firms on the average are borrowers, some households are borrowers and some firms are savers.

3. By *net* borrowing we mean new borrowing minus repayments of old loans. Similarly, we say *net* sales of U.S. assets to foreign buyers to allow for the possibility that foreign parties holding previously purchased U.S. assets will resell them to U.S. buyers. For example, suppose that Japanese pension fund A buys $100 million of U.S. bonds while Japanese pension fund B sells $10 million in previously purchased U.S. government bonds to a U.S. insurance company. In this case there is a *net* increase of $90 million in foreign holdings of U.S. government bonds.