PART SEVEN
Macroeconomic Models and Fiscal Policy

27 BASIC MACROECONOMIC RELATIONSHIPS
28 THE AGGREGATE EXPENDITURES MODEL
29 AGGREGATE DEMAND AND AGGREGATE SUPPLY
30 FISCAL POLICY, DEFICITS, AND DEBT
IN THIS CHAPTER YOU WILL LEARN:

1 How changes in income affect consumption (and saving).
2 About factors other than income that can affect consumption.
3 How changes in real interest rates affect investment.
4 About factors other than the real interest rate that can affect investment.
5 Why changes in investment increase or decrease real GDP by a multiple amount.

Basic Macroeconomic Relationships*

In Chapter 26 we discussed the business cycle, unemployment, and inflation. Our eventual goal is to build economic models that can explain these phenomena. This chapter begins that process by examining the basic relationships that exist between three different pairs of economic aggregates. (Recall that to economists “aggregate” means “total” or “combined.”) Specifically, this chapter looks at the relationships between:

- income and consumption (and income and saving).
- the interest rate and investment.
- changes in spending and changes in output.

*Note to the Instructor: If you wish to bypass the aggregate expenditures model (Keynesian cross model) covered in full in Chapter 28, assigning the present chapter will provide a seamless transition to the AD-AS model of Chapter 29 and the chapters beyond. If you want to cover the aggregate expenditure model, this present chapter provides the necessary building blocks.
What explains the trends in consumption (consumer spending) and saving reported in the news? How do changes in interest rates affect investment? How can initial changes in spending ultimately produce multiplied changes in GDP? The basic macroeconomic relationships discussed in this chapter answer these questions.

The Income-Consumption and Income-Saving Relationships

The other-things-equal relationship between income and consumption is one of the best-established relationships in macroeconomics. In examining that relationship, we are also exploring the relationship between income and saving. Recall that economists define personal saving as “not spending” or as “that part of disposable (after-tax) income not consumed.” Saving (S) equals disposable income (DI) minus consumption (C).

Many factors determine a nation’s levels of consumption and saving, but the most significant is disposable income. Consider some recent historical data for the United States. In Figure 27.1 each dot represents consumption and disposable income for 1 year since 1985. The line C that is loosely fitted to these points shows that consumption is directly (positively) related to disposable income; moreover, households spend most of their income.

But we can say more. The 45° (degree) line is a reference line. Because it bisects the 90° angle formed by the two axes of the graph, each point on it is equidistant from the two axes. At each point on the 45° line, consumption would equal disposable income, or C = DI. Therefore, the vertical distance between the 45° line and any point on the horizontal axis measures either consumption or disposable income. If we let it measure disposable income, the vertical distance between it and the consumption line labeled C represents

![Figure 27.1 Consumption and disposable income, 1985–2007.](image-url)

the amount of saving \((S)\) in that year. Saving is the amount by which actual consumption in any year falls short of the 45° line—\((S = DI - C)\). For example, in 1992 disposable income was $4751 billion and consumption was $4385 billion, so saving was $366 billion. Observe that the vertical distance between the 45° line and line \(C\) increases as we move rightward along the horizontal axis and decreases as we move leftward. Like consumption, saving typically varies directly with the level of disposable income. That historical pattern, however, has temporarily broken down in recent years.

### The Consumption Schedule

The dots in Figure 27.1 represent historical data—the actual amounts of DI, \(C\), and \(S\) in the United States over a period of years. But, because we want to understand how the economy would behave under different possible scenarios, we need a schedule showing the various amounts that households would plan to consume at each of the various levels of disposable income that might prevail at some specific time. Columns 1 and 2 of Table 27.1, represented in Figure 27.2a (Key Graph), show the hypothetical consumption schedule that we require. This consumption schedule (or “consumption function”) reflects the direct consumption–disposable income relationship suggested by the data in Figure 27.1, and it is consistent with many household budget studies. In the aggregate, households increase their spending as their disposable income rises and spend a larger proportion of a small disposable income than of a large disposable income.

#### The Saving Schedule

It is relatively easy to derive a saving schedule (or “saving function”). Because saving equals disposable income less consumption (\(S = DI - C\)), we need only subtract consumption (Table 27.1, column 2) from disposable income (column 1) to find the amount saved (column 3) at each DI. Thus, columns 1 and 3 in Table 27.1 are the saving schedule, represented in Figure 27.2b. The graph shows that there is a direct relationship between saving and DI but that saving is a smaller proportion of a small DI than of a large DI. If households consume a smaller and smaller proportion of DI as DI increases, then they must be saving a larger and larger proportion.

Remembering that at each point on the 45° line consumption equals DI, we see that dissaving (consuming in excess of after-tax income) will occur at relatively low DIs. For example, at $370 billion (row 1, Table 27.1), consumption is $375 billion. Households can consume more than their current incomes by liquidating (selling for cash) accumulated wealth or by borrowing. Graphically, dissaving is shown as the vertical distance of the consumption schedule above the 45° line or as the vertical distance of the saving schedule below the horizontal axis. We have marked the dissaving at the $370 billion level of income in Figure 27.2a and 27.2b. Both vertical distances measure the $5 billion of dissaving that occurs at $370 billion of income.

In our example, the break-even income is $390 billion (row 2, Table 27.1). This is the income level at which

### Table 27.1 Consumption and Saving Schedules (in Billions) and Propensities to Consume and Save

<table>
<thead>
<tr>
<th>(1) Level of Output and Income (GDP = DI)</th>
<th>(2) Consumption (C)</th>
<th>(3) Saving ((S)), ((1 - (2)))</th>
<th>(4) Average Propensity to Consume ((APC)), ((2)/(1))</th>
<th>(5) Average Propensity to Save ((APS)), ((3)/(1))</th>
<th>(6) Marginal Propensity to Consume ((MPC)), (\Delta(2)/\Delta(1)^*)</th>
<th>(7) Marginal Propensity to Save ((MPS)), (\Delta(3)/\Delta(1)^*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) $370</td>
<td>$375</td>
<td>$-5</td>
<td>1.01</td>
<td>-0.01</td>
<td>.75</td>
<td>.25</td>
</tr>
<tr>
<td>(2) 390</td>
<td>390</td>
<td>0</td>
<td>1.00</td>
<td>.00</td>
<td>.75</td>
<td>.25</td>
</tr>
<tr>
<td>(3) 410</td>
<td>405</td>
<td>5</td>
<td>.99</td>
<td>.01</td>
<td>.75</td>
<td>.25</td>
</tr>
<tr>
<td>(4) 430</td>
<td>420</td>
<td>10</td>
<td>.98</td>
<td>.02</td>
<td>.75</td>
<td>.25</td>
</tr>
<tr>
<td>(5) 450</td>
<td>435</td>
<td>15</td>
<td>.97</td>
<td>.03</td>
<td>.75</td>
<td>.25</td>
</tr>
<tr>
<td>(6) 470</td>
<td>450</td>
<td>20</td>
<td>.96</td>
<td>.04</td>
<td>.75</td>
<td>.25</td>
</tr>
<tr>
<td>(7) 490</td>
<td>465</td>
<td>25</td>
<td>.95</td>
<td>.05</td>
<td>.75</td>
<td>.25</td>
</tr>
<tr>
<td>(8) 510</td>
<td>480</td>
<td>30</td>
<td>.94</td>
<td>.06</td>
<td>.75</td>
<td>.25</td>
</tr>
<tr>
<td>(9) 530</td>
<td>495</td>
<td>35</td>
<td>.93</td>
<td>.07</td>
<td>.75</td>
<td>.25</td>
</tr>
<tr>
<td>(10) 550</td>
<td>510</td>
<td>40</td>
<td>.93</td>
<td>.07</td>
<td>.75</td>
<td>.25</td>
</tr>
</tbody>
</table>

*The Greek letter \(\Delta\), delta, means “the change in.”
The slope of the consumption schedule in this figure is .75. Thus, the:

- slope of the saving schedule is 1.33.
- marginal propensity to consume is .75.
- average propensity to consume is .25.
- slope of the saving schedule is also .75.

In this figure, when consumption is a positive amount, saving:

- must be a negative amount.
- must also be a positive amount.
- can be either a positive or a negative amount.
- is zero.

In this figure:

- the marginal propensity to consume is constant at all levels of income.
- the marginal propensity to save rises as disposable income rises.
- consumption is inversely (negatively) related to disposable income.
- saving is inversely (negatively) related to disposable income.

When consumption equals disposable income:

- the marginal propensity to consume is zero.
- the average propensity to consume is zero.
- consumption and saving must be equal.
- saving must be zero.

Answers: 1. b; 2. c; 3. a; 4. d
households plan to consume their entire incomes \((C = DI)\). Graphically, the consumption schedule cuts the 45° line, and the saving schedule cuts the horizontal axis (saving is zero) at the break-even income level.

At all higher incomes, households plan to save part of their incomes. Graphically, the vertical distance between the consumption schedule and the 45° line measures this saving (see Figure 27.2a), as does the vertical distance between the saving schedule and the horizontal axis (see Figure 27.2b). For example, at the \$410 billion level of income (row 3, Table 27.1), both these distances indicate \$5 billion of saving.

**Average and Marginal Propensities**

Columns 4 to 7 in Table 27.1 show additional characteristics of the consumption and saving schedules.

**APC and APS**
The fraction, or percentage, of total income that is consumed is the **average propensity to consume (APC)**. The fraction of total income that is saved is the **average propensity to save (APS)**. That is,

\[
APC = \frac{\text{consumption}}{\text{income}}
\]

and

\[
APS = \frac{\text{saving}}{\text{income}}
\]

For example, at \$470 billion of income (row 6 in Table 27.1), the APC is \(\frac{450}{470} = 0.96\), or about 96 percent, while the APS is \(\frac{20}{470} = 0.04\), or about 4 percent. Columns 4 and 5 in Table 27.1 show the APC and APS at each of the 10 levels of DI; note in the table that the APC falls and the APS rises as DI increases, as was implied in our previous comments.

Because disposable income is either consumed or saved, the fraction of any DI consumed plus the fraction saved (not consumed) must exhaust that income. Mathematically, \(APC + APS = 1\) at any level of disposable income, as columns 4 and 5 in Table 27.1 illustrate.

Global Perspective 27.1 shows APCs for several countries.

**MPC and MPS**
The fact that households consume a certain proportion of a particular total income, for example, \(\frac{2}{3}\) of a \$470 billion disposable income, does not guarantee they will consume the same proportion of any change in income they might receive. The proportion, or fraction, of any change in income consumed is called the **marginal propensity to consume (MPC)**, “marginal” meaning “extra” or “a change in.” Equivalently, the MPC is the ratio of a change in consumption to a change in the income that caused the consumption change:

\[
MPC = \frac{\text{change in consumption}}{\text{change in income}}
\]

Similarly, the fraction of any change in income saved is the **marginal propensity to save (MPS)**. The MPS is the ratio of a change in saving to the change in income that brought it about:

\[
MPS = \frac{\text{change in saving}}{\text{change in income}}
\]

If disposable income is \$470 billion (row 6 horizontally in Table 27.1) and household income rises by \$20 billion to \$490 billion (row 7), households will consume \(\frac{12}{20}\) or \(\frac{3}{5}\), and save \(\frac{8}{20}\) or \(\frac{2}{5}\), of that increase in income. In other words, the MPC is \(\frac{3}{5}\) or \(.6\), and the MPS is \(\frac{2}{5}\) or \(.25\), as shown in columns 6 and 7.

The sum of the MPC and the MPS for any change in disposable income must always be 1. Consuming or saving out of extra income is an either-or proposition; the fraction of any change in income not consumed is, by definition, saved. Therefore, the fraction consumed (MPC) plus the fraction saved (MPS) must exhaust the whole change in income:

\[
MPC + MPS = 1
\]

In our example, \(.6\) plus \(.25\) equals 1.
MPC and MPS as Slopes The MPC is the numerical value of the slope of the consumption schedule, and the MPS is the numerical value of the slope of the saving schedule. We know from the appendix to Chapter 1 that the slope of any line is the ratio of the vertical change to the horizontal change occasioned in moving from one point to another on that line.

Figure 27.3 measures the slopes of the consumption and saving lines, using enlarged portions of Figure 27.2a and 27.2b. Observe that consumption changes by $15 billion (the vertical change) for each $20 billion change in disposable income (the horizontal change). The slope of the consumption line is thus .75 (=$15/$20), which is the value of the MPC. Saving changes by $5 billion (shown as the vertical change) for every $20 billion change in disposable income (shown as the horizontal change).

The slope of the saving line therefore is .25 (= $5/$20), which is the value of the MPS. (Key Question 5)

Nonincome Determinants of Consumption and Saving

The amount of disposable income is the basic determinant of the amounts households will consume and save. But certain determinants other than income might prompt households to consume more or less at each possible level of income and thereby change the locations of the consumption and saving schedules. Those other determinants are wealth, borrowing, expectations, and interest rates.

Wealth A household’s wealth is the dollar amount of all the assets that it owns minus the dollar amount of its liabilities (all the debt that it owes). Households build wealth by saving money out of current income. The point of building wealth is to increase consumption possibilities. The larger the stock of wealth that a household can build up, the larger will be its present and future consumption possibilities.

Events sometimes suddenly boost the value of existing wealth. When this happens, households tend to increase their spending and reduce their saving. This so-called wealth effect shifts the consumption schedule upward and the saving schedule downward. They move in response to households taking advantage of the increased consumption possibilities afforded by the sudden increase in wealth. Examples: In the late 1990s, skyrocketing U.S. stock values expanded the value of household wealth by increasing the value of household assets. Predictably, households spent more and saved less. In contrast, a modest “reverse wealth effect” occurred in 2000 and 2001, when stock prices sharply fell.

Borrowing Household borrowing also affects consumption. When a household borrows, it can increase current consumption beyond what would be possible if its spending were limited to its disposable income. By allowing households to spend more, borrowing shifts the current consumption schedule upward.

But note that there is “no free lunch.” While borrowing in the present allows for higher consumption in the present, it necessitates lower consumption in the future when the debts that are incurred due to the borrowing must be repaid. Stated a bit differently, increased borrowing increases debt (liabilities), which in turn reduces household wealth (since wealth = assets – liabilities). This reduction in wealth reduces future consumption possibilities in much
the same way that a decline in asset values would. But note that the term “reverse wealth effect” is reserved for situations in which wealth unexpectedly changes because asset values unexpectedly change. It is not used to refer to situations such as the one being discussed here where wealth is intentionally reduced by households through borrowing and piling up debt in order to increase current consumption.

**Expectations** Household expectations about future prices and income may affect current spending and saving. For example, expectations of rising prices tomorrow may trigger more spending and less saving today. Thus, the current consumption schedule shifts up and the current saving schedule shifts down. Or expectations of a recession and thus lower income in the future may lead households to reduce consumption and save more today. If so, the consumption schedule will shift down and the saving schedule will shift up.

**Real Interest Rates** When real interest rates (those adjusted for inflation) fall, households tend to borrow more, consume more, and save less. A lower interest rate, for example, induces consumers to purchase automobiles and other goods bought on credit. A lower interest rate also diminishes the incentive to save because of the reduced interest “payment” to the saver. These effects on consumption and saving, however, are very modest. They mainly shift consumption toward some products (those bought on credit) and away from others. At best, lower interest rates shift the consumption schedule slightly upward and the saving schedule slightly downward. Higher interest rates do the opposite.

**Other Important Considerations**

There are several additional important points regarding the consumption and saving schedules:

- **Switching to real GDP** When developing macroeconomic models, economists change their focus from the relationship between consumption (and saving) and disposable income to the relationship between consumption (and saving) and real domestic output (real GDP). This modification is reflected in Figure 27.4a and 27.4b, where the horizontal axes measure real GDP.

- **Changes along schedules** The movement from one point to another on a consumption schedule (for example, from a to b on C1 in Figure 27.4a) is a change in the amount consumed and is solely caused by a change in real GDP. On the other hand, an upward or downward shift of the entire schedule, for example, a shift from C0 to C1 or C2 in Figure 27.4a, is a shift of the consumption schedule and is caused by changes in any one or more of the nonincome determinants of consumption just discussed.

  A similar distinction in terminology applies to the saving schedule in Figure 27.4b.

- **Schedule shifts** Changes in wealth, expectations, interest rates, and household debt will shift the consumption schedule in one direction and the saving schedule in the opposite direction. If households decide to consume more at each possible level of real GDP, they must save less, and vice versa. (Even when they spend more by borrowing, they are, in effect, reducing their current saving by the amount...
borrowed since borrowing is, effectively, “negative saving.”) Graphically, if the consumption schedule shifts upward from \( C_0 \) to \( C_1 \) in Figure 27.4a, the saving schedule shifts downward, from \( S_0 \) to \( S_1 \) in Figure 27.4b. Similarly, a downward shift of the consumption schedule from \( C_0 \) to \( C_1 \) means an upward shift of the saving schedule from \( S_0 \) to \( S_1 \).

- **Taxation** In contrast, a change in taxes shifts the consumption and saving schedules in the same direction. Taxes are paid partly at the expense of consumption and partly at the expense of saving. So an increase in taxes will reduce both consumption and saving, shifting the consumption schedule in Figure 27.4a and the saving schedule in Figure 27.4b downward. Conversely, households will partly consume and partly save any decrease in taxes. Both the consumption schedule and saving schedule will shift upward.

- **Stability** The consumption and saving schedules usually are relatively stable unless altered by major tax increases or decreases. Their stability may be because consumption-saving decisions are strongly influenced by long-term considerations such as saving to meet emergencies or saving for retirement. It may also be because changes in the nonincome determinants frequently work in opposite directions and therefore may be self-canceling.

### INTERACTIVE GRAPHS

**G 27.1**
Consumption and saving schedules

### QUICK REVIEW 27.1

- Both consumption spending and saving rise when disposable income increases; both fall when disposable income decreases.
- The average propensity to consume (APC) is the fraction of any specific level of disposable income that is spent on consumer goods; the average propensity to save (APS) is the fraction of any specific level of disposable income that is saved. The APC falls and the APS rises as disposable income increases.
- The marginal propensity to consume (MPC) is the fraction of a change in disposable income that is consumed and it is the slope of the consumption schedule; the marginal propensity to save (MPS) is the fraction of a change in disposable income that is saved and it is the slope of the saving schedule.
- Changes in consumer wealth, consumer expectations, interest rates, household debt, and taxes can shift the consumption and saving schedules (as they relate to real GDP).

### CONSIDER THIS . . .

**What Wealth Effect?**

The consumption schedule is relatively stable even during rather extraordinary times. Between March 2000 and July 2002, the U.S. stock market lost a staggering $3.7 trillion of value (yes, trillion). Yet consumption spending was greater at the end of that period than at the beginning. How can that be? Why didn’t a “reverse wealth effect” reduce consumption?

There are a number of reasons. Of greatest importance, the amount of consumption spending in the economy depends mainly on the flow of income, not the stock of wealth. Disposable income (DI) in the United States is about $10 trillion annually and consumers spend a large portion of it. Even though there was a mild recession in 2001, DI and consumption spending were both greater in July 2002 than in March 2000. Second, the Federal government cut personal income tax rates during this period and that bolstered consumption spending. Third, household wealth did not fall by the full amount of the $3.7 trillion stock market loss because the market value of houses increased dramatically over this period. Finally, lower interest rates during this period enabled many households to refinance their mortgages, reduce monthly loan payments, and increase their current consumption.

For all these offsetting reasons, the general consumption-income relationship of Figure 27.2 held steady in the face of the extraordinary loss of stock market value.

### The Interest-Rate–Investment Relationship

In our consideration of major macro relationships, we next turn to the relationship between the real interest rate and investment. Recall that investment consists of expenditures on new plants, capital equipment, machinery, inventories, and so on. The investment decision is a marginal-benefit–marginal-cost decision: The marginal benefit from investment is the expected rate of return businesses hope to realize. The marginal cost is the interest rate that must be paid for borrowed funds. Businesses will invest in all projects for which the expected rate of return exceeds the interest rate. Expected returns (profits) and the interest rate therefore are the two basic determinants of investment spending.
Expected Rate of Return
Investment spending is guided by the profit motive; businesses buy capital goods only when they think such purchases will be profitable. Suppose the owner of a small cabinetmaking shop is considering whether to invest in a new sanding machine that costs $1000 and has a useful life of only 1 year. (Extending the life of the machine beyond 1 year complicates the economic decision but does not change the fundamental analysis. We discuss the valuation of returns beyond 1 year in Chapter 34.) The new machine will increase the firm’s output and sales revenue. Suppose the net expected revenue from the machine (that is, after such operating costs as power, lumber, labor, and certain taxes have been subtracted) is $1100. Then, after the $1000 cost of the machine is subtracted from the net expected revenue of $1100, the firm will have an expected profit of $100. Dividing this $100 profit by the $1000 cost of the machine, we find that the expected rate of return, \( r \), on the machine is 10 percent (= $100/$1000). It is important to note that this is an expected rate of return, not a guaranteed rate of return. The investment may or may not generate as much revenue or as much profit as anticipated. Investment involves risk.

The Real Interest Rate
One important cost associated with investing that our example has ignored is interest, which is the financial cost of borrowing the $1000 of money “capital” to purchase the $1000 of real capital (the sanding machine).

The interest cost of the investment is computed by multiplying the interest rate, \( i \), by the $1000 borrowed to buy the machine. If the interest rate is, say, 7 percent, the total interest cost will be $70. This compares favorably with the net expected return of $100, which produced the 10 percent expected rate of return. If the investment works out as expected, it will add $30 to the firm’s profit. We can generalize as follows: If the expected rate of return (10 percent) exceeds the interest rate (here, 7 percent), the investment should be undertaken. The firm expects the investment to be profitable. But if the interest rate (say, 12 percent) exceeds the expected rate of return (10 percent), the investment should not be undertaken. The firm expects the investment to be unprofitable. The firm should undertake all investment projects it thinks will be profitable. That means it should invest up to the point where \( r = i \) because then it has undertaken all investment for which \( r \) exceeds \( i \).

This guideline applies even if a firm finances the investment internally out of funds saved from past profit rather than borrowing the funds. The role of the interest rate in the investment decision does not change. When the firm uses money from savings to invest in the sander, it incurs an opportunity cost because it forgoes the interest income it could have earned by lending the funds to someone else. That interest cost, converted to percentage terms, needs to be weighed against the expected rate of return.

The real rate of interest, rather than the nominal rate, is crucial in making investment decisions. Recall from Chapter 26 that the nominal interest rate is expressed in dollars of current value, while the real interest rate is stated in dollars of constant or inflation-adjusted value. Recall that the real interest rate is the nominal rate less the rate of inflation. In our sanding machine illustration, our implicit assumption of a constant price level ensures that all our data, including the interest rate, are in real terms.

But what if inflation is occurring? Suppose a $1000 investment is expected to yield a real (inflation-adjusted) rate of return of 10 percent and the nominal interest rate is 15 percent. At first, we would say the investment would be unprofitable. But assume there is ongoing inflation of 10 percent per year. This means the investing firm will pay back dollars with approximately 10 percent less in purchasing power. While the nominal interest rate is 15 percent, the real rate is only 5 percent (= 15 percent – 10 percent). By comparing this 5 percent real interest rate with the 10 percent expected real rate of return, we find that the investment is potentially profitable and should be undertaken. (Key Question 7)

Investment Demand Curve
We now move from a single firm’s investment decision to total demand for investment goods by the entire business sector. Assume that every firm has estimated the expected rates of return from all investment projects and has recorded those data. We can cumulate (successively sum) these data by asking: How many dollars’ worth of investment projects have an expected rate of return of, say, 16 percent or more? How many have 14 percent or more? How many have 12 percent or more? And so on.

Suppose no prospective investments yield an expected return of 16 percent or more. But suppose there are $5 billion of investment opportunities with expected rates of return between 14 and 16 percent; an additional $5 billion yielding between 12 and 14 percent; still an additional $5 billion yielding between 10 and 12 percent; and an additional $5 billion in each successive 2 percent range of yield down to and including the 0 to 2 percent range.
FIGURE 27.5 The investment demand curve. The investment demand curve is constructed by arraying all potential investment projects in descending order of their expected rates of return. The curve slopes downward, reflecting an inverse relationship between the real interest rate (the financial “price” of each dollar of investing) and the quantity of investment demanded.

QUICK QUIZ FOR FIGURE 27.5

1. The investment demand curve:
   a. reflects a direct (positive) relationship between the real interest rate and investment.
   b. reflects an inverse (negative) relationship between the real interest rate and investment.
   c. shifts to the right when the real interest rate rises.
   d. shifts to the left when the real interest rate rises.

2. In this figure:
   a. greater cumulative amounts of investment are associated with lower expected rates of return on investment.
   b. lesser cumulative amounts of investment are associated with lower expected rates of return on investment.
   c. higher interest rates are associated with higher expected rates of return on investment, and therefore greater amounts of investment.
   d. interest rates and investment move in the same direction.

3. In this figure, if the real interest rate falls from 6 to 4 percent:
   a. investment will increase from 0 to $30 billion.
   b. investment will decrease by $5 billion.
   c. the expected rate of return will rise by $5 billion.
   d. investment will increase from $25 billion to $30 billion.

4. In this figure, investment will be:
   a. zero if the real interest rate is zero.
   b. $40 billion if the real interest rate is 16 percent.
   c. $30 billion if the real interest rate is 4 percent.
   d. $20 billion if the real interest rate is 12 percent.

To cumulate these figures for each rate of return, \( r \); we add the amounts of investment that will yield each particular rate of return \( r \) or higher. This provides the data in Table 27.2, shown graphically in Figure 27.5 (Key Graph). In Table 27.2 the number opposite 12 percent, for example, means there are $10 billion of investment opportunities that will yield an expected rate of return of 12 percent or more. The $10 billion includes the $5 billion of investment expected to yield a return of 14 percent or more plus the $5 billion expected to yield between 12 and 14 percent.

We know from our example of the sanding machine that an investment project will be undertaken if its expected rate of return, \( r \); exceeds the real interest rate, \( i \). Let's first suppose \( i \) is 12 percent. Businesses will undertake all investments for which \( r \) exceeds 12 percent. That is, they will invest until the 12 percent rate of return equals the 12 percent interest rate. Figure 27.5 reveals that $10 billion of investment spending will be undertaken at a 12 percent interest rate; that means $10 billion of investment projects have an expected rate of return of 12 percent or more.
TABLE 27.2 Expected Rate of Return and Investment

<table>
<thead>
<tr>
<th>Expected Rate of Return (r)</th>
<th>Cumulative Amount of Investment Having This Rate of Return or Higher, Billions Per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>16%</td>
<td>$0</td>
</tr>
<tr>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
</tr>
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</tr>
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<td>0</td>
<td>40</td>
</tr>
</tbody>
</table>

Put another way: At a financial “price” of 12 percent, $10 billion of investment goods will be demanded. If the interest rate is lower, say, 8 percent, the amount of investment for which \( r \) equals or exceeds \( i \) is $20 billion. Thus, firms will demand $20 billion of investment goods at an 8 percent real interest rate. At 6 percent, they will demand $25 billion of investment goods.

By applying the marginal-benefit–marginal-cost rule that investment projects should be undertaken up to the point where \( r = i \), we see that we can add the real interest rate to the vertical axis in Figure 27.5. The curve in Figure 27.5 not only shows rates of return; it shows the quantity of investment demanded at each “price” \( i \) (interest rate) of investment. The vertical axis in Figure 27.5 shows the various possible real interest rates, and the horizontal axis shows the corresponding quantities of investment demanded. The inverse (downsloping) relationship between the interest rate (price) and dollar quantity of investment demanded conforms to the law of demand discussed in Chapter 3. The curve \( ID \) in Figure 27.5 is the economy’s investment demand curve. It shows the amount of investment forthcoming at each real interest rate. The level of investment depends on the expected rate of return and the real interest rate. (Key Question 8)

Shifts of the Investment Demand Curve

Figure 27.5 shows the relationship between the interest rate and the amount of investment demanded, other things equal. When other things change, the investment demand curve shifts. In general, any factor that leads businesses collectively to expect greater rates of return on their investments increases investment demand. That factor shifts the investment demand curve to the right, as from \( ID_0 \) to \( ID_1 \) in Figure 27.6. Any factor that leads businesses collectively to expect lower rates of return on their investments shifts the curve to the left, as from \( ID_0 \) to \( ID_2 \). What are those non-interest-rate determinants of investment demand?

Acquisition, Maintenance, and Operating Costs The initial costs of capital goods, and the estimated costs of operating and maintaining those goods, affect the expected rate of return on investment. When these costs rise, the expected rate of return from prospective investment projects falls and the investment demand curve shifts to the left. Example: Higher electricity costs associated with operating tools and machinery shifts the investment demand curve to the left. Lower costs, in contrast, shift it to the right.

Business Taxes When government is considered, firms look to expected returns after taxes in making their investment decisions. An increase in business taxes lowers the expected profitability of investments and shifts the investment demand curve to the left; a reduction of business taxes shifts it to the right.

Technological Change Technological progress—the development of new products, improvements in existing...
products, and the creation of new machinery and production processes—stimulates investment. The development of a more efficient machine, for example, lowers production costs or improves product quality and increases the expected rate of return from investing in the machine. Profitable new products (cholesterol medications, Internet services, high-definition televisions, cellular phones, and so on) induce a flurry of investment as businesses tool up for expanded production. A rapid rate of technological progress shifts the investment demand curve to the right.

**Stock of Capital Goods on Hand** The stock of capital goods on hand, relative to output and sales, influences investment decisions by firms. When the economy is overstocked with production facilities and when firms have excessive inventories of finished goods, the expected rate of return on new investment declines. Firms with excess production capacity have little incentive to invest in new capital. Therefore, less investment is forthcoming at each real interest rate; the investment demand curve shifts leftward.

When the economy is understocked with production facilities and when firms are selling their output as fast as they can produce it, the expected rate of return on new investment increases and the investment demand curve shifts rightward.

**Planned Inventory Changes** Recall from Chapter 24 that the definition of investment includes changes in inventories of unsold goods. An increase in inventories is counted as positive investment while a decrease in inventories is counted as negative investment. It is important to remember that some inventory changes are planned, while others are unplanned. Since the investment demand curve deals only with planned investment, it is only affected by planned changes that firms desire to make to their inventory levels. If firms are planning to increase their inventories, the investment demand curve shifts to the right. If firms are planning on decreasing their inventories, the investment demand curve shifts to the left.

Firms make planned changes to their inventory levels mostly because they are expecting either faster or slower sales. A firm that expects its sales to double in the next year will want to keep more inventory in stock, thereby increasing its investment demand. By contrast, a firm that is expecting slower sales will plan on reducing its inventory, thereby reducing its overall investment demand. But because life often does not turn out as expected, firms often find that the actual amount of inventory investment that they end up making is either greater or less than what they had planned. The size of the gap is, naturally, the dollar amount of their unplanned inventory changes. These unplanned inventory adjustments will play a large role in the aggregate expenditures model studied in Chapter 28.

**Expectations** We noted that business investment is based on expected returns (expected additions to profit). Most capital goods are durable, with a life expectancy of 10 or 20 years. Thus, the expected rate of return on capital investment depends on the firm’s expectations of future sales, future operating costs, and future profitability of the product that the capital helps produce. These expectations are based on forecasts of future business conditions as well as on such elusive and difficult-to-predict factors as changes in the domestic political climate, international relations, population growth, and consumer tastes. If executives become more optimistic about future sales, costs, and profits, the investment demand curve will shift to the right; a pessimistic outlook will shift the curve to the left.

Global Perspective 27.2 compares investment spending relative to GDP for several nations in a recent year. Domestic real interest rates and investment demand determine the levels of investment relative to GDP.

**Instability of Investment** In contrast to consumption, investment is unstable; it rises and falls quite often. Investment, in fact, is the most volatile component of total spending—so much so that most of the fluctuations in output and employment that happen over
the course of the business cycle can be attributed to increases and decreases in investment. Figure 27.7 shows just how volatile investment in the United States has been. Note that its swings are much greater than those of GDP. Several factors explain the variability of investment.

**Durability** Because of their durability, capital goods have indefinite useful lifespans. Within limits, purchases of capital goods are discretionary and therefore can be postponed. Firms can scrap or replace older equipment and buildings, or they can patch them up and use them for a few more years. Optimism about the future may prompt firms to replace their older facilities and such modernizing will call for a high level of investment. A less optimistic view, however, may lead to smaller amounts of investment as firms repair older facilities and keep them in use.

**Irregularity of Innovation** We know that technological progress is a major determinant of investment. New products and processes stimulate investment. But history suggests that major innovations such as railroads, electricity, automobiles, fiber optics, and computers occur quite irregularly. When they do happen, they induce a vast upsurge or “wave” of investment spending that in time recedes.

A contemporary example is the tremendous popularity of the personal computer and Internet, which has caused a wave of investment in those industries and in many related industries such as computer software and electronic commerce. Some time in the future, this particular surge of investment undoubtedly will level off.

**Variability of Profits** When evaluating whether or not to undertake a given investment, a firm’s expectations about the potential profitability of that potential investment are influenced to some degree by the size of the profits currently being earned by other firms that have made similar investments. Current profits, however, are themselves highly variable. Thus, the variability of profits contributes to the volatile nature of the incentive to invest.

The instability of profits may cause investment fluctuations in a second way. Profits are a major source of funds for business investment. U.S. businesses sometimes prefer this internal source of financing to increases in external debt or stock issue.

In short, expanding profits give firms both greater incentives and greater means to invest; declining profits have the reverse effects. The fact that actual profits are variable thus adds doubly to the instability of investment.

**Variability of Expectations** Firms tend to project current business conditions into the future. But their expectations can change quickly when some event suggests a significant possible change in future business conditions.

---

**FIGURE 27.7 The volatility of investment.** Annual percentage changes in investment spending are often several times greater than the percentage changes in GDP (Data are in real terms.)

Changes in exchange rates, changes in the outlook for international peace, court decisions in key labor or antitrust cases, legislative actions, changes in trade barriers, changes in governmental economic policies, and a host of similar considerations may cause substantial shifts in business expectations.

The stock market also can influence business expectations because firms look to it as one of several indicators of society’s overall confidence in future business conditions. Rising stock prices tend to signify public confidence in the business future, while falling stock prices may imply a lack of confidence. The stock market, however, is often driven by “herd behavior” in which financial investors follow the lead of others rather than think independently. When stock prices rise because others are buying, they also buy; when stock prices are falling because others are selling, they also sell. This behavior can greatly magnify the volatility of stock prices that otherwise would be much more stable. Business can easily confuse these large swings in stock prices for real changes in society’s optimism or pessimism about future business conditions. If they do, businesses are likely to respond by overadjusting their investment plans in one direction or the other. In this way, stock market volatility can add to the instability of investment spending.

For all these reasons, changes in investment cause most of the fluctuations in output and employment that occur over the course of the business cycle. In terms of Figures 27.5 and 27.6, we would represent volatility of investment as occasional and substantial shifts in the investment demand curve.

**Quick Review 27.2**

- A specific investment will be undertaken if the expected rate of return, \( r \), equals or exceeds the real interest rate, \( i \).
- The investment demand curve shows the total monetary amounts that will be invested by an economy at various possible real interest rates.
- The investment demand curve shifts when changes occur in (a) the costs of acquiring, operating, and maintaining capital goods, (b) business taxes, (c) technology, (d) the stock of capital goods on hand, and (e) business expectations.

**The Multiplier Effect**

A final basic relationship that requires discussion is the relationship between changes in spending and changes in real GDP. Assuming that the economy has room to expand—so that increases in spending do not lead to increases in prices—there is a direct relationship between these two aggregates. More spending results in a higher GDP; less spending results in a lower GDP. But there is much more to this relationship. A change in spending, say, investment, ultimately changes output and income by more than the initial change in investment spending. That surprising result is called the *multiplier effect*: a change in a component of total spending leads to a larger change in GDP. The multiplier determines how much larger that change will be; it is the ratio of a change in GDP to the initial change in spending (in this case, investment). Stated generally,

\[
\text{Multiplier} = \frac{\text{change in real GDP}}{\text{initial change in spending}}
\]

By rearranging this equation, we can also say that

\[
\text{Change in GDP} = \text{multiplier} \times \text{initial change in spending}
\]

So if investment in an economy rises by $30 billion and GDP increases by $90 billion as a result, we then know from our first equation that the multiplier is 3 (\( = \$90/\$30 \)).

Note these three points about the multiplier:

- The “initial change in spending” is usually associated with investment spending because of investment’s volatility. But changes in consumption (unrelated to changes in income), net exports, and government purchases also lead to the multiplier effect.
- The “initial change in spending” associated with investment spending results from a change in the real interest rate and/or a shift of the investment demand curve.
- Implicit in the preceding point is that the multiplier works in both directions. An increase in initial spending will create a multiple increase in GDP, while a decrease in spending will create a multiple decrease in GDP.

**Rationale**

The multiplier effect follows from two facts. First, the economy supports repetitive, continuous flows of expenditures and income through which dollars spent by Smith are received as income by Chin and then spent by Chin and received as income by Gonzales, and so on. (This chapter’s Last Word presents this idea in a humorous way.) Second, any change in income will change both consumption and saving in the same direction as, and by a fraction of, the change in income.

It follows that an initial change in spending will set off a spending chain throughout the economy. That chain of
spending, although of diminishing importance at each successive step, will cumulate to a multiple change in GDP. Initial changes in spending produce magnified changes in output and income.

Table 27.3 illustrates the rationale underlying the multiplier effect. Suppose that a $5 billion increase in investment spending occurs. We assume that the MPC is .75, the MPS is .25, and prices remain constant. That is, neither the initial increase in spending nor any of the subsequent increases in spending will cause prices to rise.

The initial $5 billion increase in investment generates an equal amount of wage, rent, interest, and profit income because spending and receiving income are two sides of the same transaction. How much consumption will be induced by this $5 billion increase in the incomes of households? We find the answer by applying the marginal propensity to consume of .75 to this change in income. Thus, the $5 billion increase in income initially raises consumption by $3.75 (=.75 × $5) billion and saving by $1.25 (=.25 × $5) billion, as shown in columns 2 and 3 in Table 27.3.

Other households receive as income (second round) the $3.75 billion of consumption spending. Those households consume .75 of this $3.75 billion, or $2.81 billion, and save .25 of it, or $.94 billion. The $2.81 billion that is consumed flows to still other households as income to be spent or saved (third round). And the process continues, with the added consumption and income becoming less in each round. The process ends when there is no more additional income to spend.

Figure 27.8 shows several rounds of the multiplier process of Table 27.3 graphically. As shown by rounds 1 to 5, each round adds a smaller and smaller violet block to national income and GDP. The process, of course, continues beyond the five rounds shown (for convenience we have simply cumulated the subsequent declining blocks into a single block labeled “All other”). The accumulation of the additional income in each round—the sum of the violet blocks—is the total change in income or GDP resulting from the initial $5 billion change in spending. Because the spending and respending effects of the increase in investment diminish with each successive round of spending, the cumulative increase in output and income eventually ends. In this case, the ending occurs when $20 billion of additional income accumulates. Thus, the multiplier is 4 (= $20 billion/$5 billion).

**TABLE 27.3** The Multiplier: A Tabular Illustration (in Billions)

<table>
<thead>
<tr>
<th></th>
<th>(1) Change in Income</th>
<th>(2) Change in Consumption (MPC = .75)</th>
<th>(3) Change in Saving (MPS = .25)</th>
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<tr>
<td>Increase in investment of $5.00</td>
<td>$5.00</td>
<td>$3.75</td>
<td>$1.25</td>
</tr>
<tr>
<td>Second round</td>
<td>3.75</td>
<td>2.81</td>
<td>.94</td>
</tr>
<tr>
<td>Third round</td>
<td>2.81</td>
<td>2.11</td>
<td>.70</td>
</tr>
<tr>
<td>Fourth round</td>
<td>2.11</td>
<td>1.58</td>
<td>.53</td>
</tr>
<tr>
<td>Fifth round</td>
<td>1.58</td>
<td>1.19</td>
<td>.39</td>
</tr>
<tr>
<td>All other rounds</td>
<td>4.75</td>
<td>3.56</td>
<td>1.19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$20.00</strong></td>
<td><strong>$15.00</strong></td>
<td><strong>$5.00</strong></td>
</tr>
</tbody>
</table>
The Multiplier and the Marginal Propensities

You may have sensed from Table 27.3 that the fractions of an increase in income consumed (MPC) and saved (MPS) determine the cumulative responding effects of any initial change in spending and therefore determine the size of the multiplier. The MPC and the multiplier are directly related and the MPS and the multiplier are inversely related. The precise formulas are as shown in the next two equations:

\[ \text{Multiplier} = \frac{1}{1 - \text{MPC}} \]

Recall, too, that \( \text{MPC} + \text{MPS} = 1 \). Therefore \( \text{MPS} = 1 - \text{MPC} \), which means we can also write the multiplier formula as

\[ \text{Multiplier} = \frac{1}{\text{MPS}} \]

This latter formula is a quick way to determine the multiplier. All you need to know is the MPS.

The smaller the fraction of any change in income saved, the greater the responding at each round and, therefore, the greater the multiplier. When the MPS is .25, as in our example, the multiplier is 4. If the MPS were .2, the multiplier would be 5. If the MPS were .33, the multiplier would be 3. Let’s see why.

Suppose the MPS is .2 and businesses increase investment by $5 billion. In the first round of Table 27.3, consumption will rise by $4 billion (= MPC of .8 × $5 billion) rather than by $3.75 billion because saving will increase by $1 billion (= MPS of .2 × $5 billion) rather than $1.25 billion. The greater rise in consumption in round 1 will produce a greater increase in income in round 2. The same will be true for all successive rounds. If we worked through all rounds of the multiplier, we would find that the process ends when income has cumulatively increased by $25 billion, not the $20 billion shown in the table. When the MPS is .2 rather than .25, the multiplier is 5 (= $25 billion/$5 billion) as opposed to 4 (= $20 billion/$5 billion).

If the MPS were .33 rather than .25, the successive increases in consumption and income would be less than those in Table 27.3. We would discover that the process ended with a $15 billion increase in income rather than the $20 billion shown. When the MPS is .33, the multiplier is 3 (= $15 billion/$5 billion). The mathematics works such that the multiplier is equal to the reciprocal of the MPS. The reciprocal of any number is the quotient you obtain by dividing 1 by that number.

A large MPC (small MPS) means the succeeding rounds of consumption spending shown in Figure 27.8 diminish slowly and thereby cumulate to a large change in income. Conversely, a small MPC (large MPS) causes the increases in consumption to decline quickly, so the cumulative change in income is small. The relationship between the MPC (and thus the MPS) and the multiplier is summarized in Figure 27.9.

### WORKED PROBLEMS

**W 27.2**

Multiplier effects

### QUICK REVIEW 27.3

- The multiplier effect reveals that an initial change in spending can cause a larger change in domestic income and output. The multiplier is the factor by which the initial change is magnified: multiplier = change in real GDP/initial change in spending.
- The higher the marginal propensity to consume (the lower the marginal propensity to save), the larger the multiplier: multiplier = \(1/(1 - \text{MPC})\) or \(1/\text{MPS}\).

### How Large Is the Actual Multiplier Effect?

The multiplier we have just described is based on simplifying assumptions. Consumption of domestic output rises by the increases in income minus the increases in saving. But in reality, consumption of domestic output increases in each round by a lesser amount than implied by the MPS alone. In addition to saving, households use some of the extra income in each round to purchase additional goods from abroad (imports) and pay additional taxes. Buying imports and paying taxes drains off some of the additional...
Humorist Art Buchwald Examines the Multiplier

WASHINGTON—The recession hit so fast that nobody knows exactly how it happened. One day we were the land of milk and honey and the next day we were the land of sour cream and food stamps.

This is one explanation.

Hofberger, the Ford salesman in Tomcat, Va., a suburb of Washington, called up Littleton, of Littleton Menswear & Haberdashery, and said, “Good news, the new Fords have just come in and I’ve put one aside for you and your wife.”

Littleton said, “I can’t, Hofberger, my wife and I are getting a divorce.”

“I’m sorry,” Littleton said, “but I can’t afford a new car this year. After I settle with my wife, I’ll be lucky to buy a bicycle.”

Hofberger hung up. His phone rang a few minutes later.

“This is Bedcheck the painter,” the voice on the other end said. “When do you want us to start painting your house?”

“I changed my mind,” said Hofberger, “I’m not going to paint the house.”

“But I ordered the paint,” Bedcheck said. “Why did you change your mind?”

“Because Littleton is getting a divorce and he can’t afford a new car.”

That evening when Bedcheck came home his wife said, “The new color television set arrived from Gladstone’s TV Shop.”

“Take it back,” Bedcheck told his wife.

“Why?” she demanded.

“Because Hofberger isn’t going to have his house painted now that the Littletons are getting a divorce.”

The next day Mrs. Bedcheck dragged the TV set in its carton back to Gladstone. “We don’t want it.”

Gladstone’s face dropped. He immediately called his travel agent, Sandstorm. “You know that trip you had scheduled for me to the Virgin Islands?”

“Right, the tickets are all written up.”

“Cancel it. I can’t go. Bedcheck just sent back the color TV set because Hofberger didn’t sell a car to Littleton because they’re going to get a divorce and she wants all his money.”

Sandstorm tore up the airline tickets and went over to see his banker, Gripsholm. “I can’t pay back the loan this month because Gladstone isn’t going to the Virgin Islands.”

Gripsholm was furious. When Rudemaker came in to borrow money for a new kitchen he needed for his restaurant, Gripsholm turned him down cold. “How can I loan you money when Sandstorm hasn’t repaid the money he borrowed?”

Rudemaker called up the contractor, Eagleton, and said he couldn’t put in a new kitchen. Eagleton laid off eight men.

Meanwhile, Ford announced it was giving a rebate on its new models. Hofberger called up Littleton immediately. “Good news,” he said, “even if you are getting a divorce, you can afford a new car.”

“I’m not getting a divorce,” Littleton said. “It was all a misunderstanding and we’ve made up.”

“That’s great,” Hofberger said. “Now you can buy the Ford.”

“No way,” said Littleton. “My business has been so lousy I don’t know why I keep the doors open.”

“I didn’t realize that,” Hofberger said.

“Do you realize I haven’t seen Bedcheck, Gladstone, Sandstorm, Gripsholm, Rudemaker or Eagleton for more than a month? How can I stay in business if they don’t patronize my store?”

consumption spending (on domestic output) created by the increases in income. So the multiplier effect is reduced and the 1/MPS formula for the multiplier overstates the actual outcome. To correct that problem, we would need to change the multiplier equation to read “I divided by the fraction of the change in income that is not spent on domestic output.” Also, we will find in later chapters that an increase in spending may be partly dissipated as inflation rather than realized fully as an increase in real GDP. This happens when increases in spending drive up prices. The multiplier process still happens, but it induces a much smaller change in real output because, at higher prices, any given amount of spending buys less real output. The Council of Economic Advisers, which advises the U.S. president on economic matters, has estimated that the actual multiplier effect for the United States is about 2. So keep in mind throughout later discussions that the actual multiplier is less than the multipliers in our simple examples. (Key Question 9)

Summary

1. Other things equal, there is a direct (positive) relationship between income and consumption and income and saving. The consumption and saving schedules show the various amounts that households intend to consume and save at the various income and output levels, assuming a fixed price level.

2. The average propensities to consume and save show the fractions of any total income that are consumed and saved; APC + APS = 1. The marginal propensities to consume and save show the fractions of any change in total income that are consumed and saved; MPC + MPS = 1.

3. The locations of the consumption and saving schedules (as they relate to real GDP) are determined by (a) the amount of wealth owned by households, (b) expectations of future prices and incomes, (c) real interest rates, (d) household debt, and (e) tax levels. The consumption and saving schedules are relatively stable.

4. The immediate determinants of investment are (a) the expected rate of return and (b) the real rate of interest. The economy’s investment demand curve is found by cumulating investment projects, arraying them in descending order according to their expected rates of return, graphing the result, and applying the rule that investment should be undertaken up to the point at which the real interest rate, \( r \), equals the expected rate of return, \( r \). The investment demand curve reveals an inverse (negative) relationship between the interest rate and the level of aggregate investment.

5. Shifts of the investment demand curve can occur as the result of changes in (a) the acquisition, maintenance, and operating costs of capital goods; (b) business taxes; (c) technology; (d) the stocks of capital goods on hand; and (e) expectations.

6. Either changes in interest rates or shifts of the investment demand curve can change the level of investment.

7. The durability of capital goods, the irregular occurrence of major innovations, profit volatility, and the variability of expectations all contribute to the instability of investment spending.

8. Through the multiplier effect, an increase in investment spending (or consumption spending, government purchases, or net export spending) ripples through the economy, ultimately creating a magnified increase in real GDP. The multiplier is the ultimate change in GDP divided by the initiating change in investment or some other component of spending.

9. The multiplier is equal to the reciprocal of the marginal propensity to save: The greater is the marginal propensity to save, the smaller is the multiplier. Also, the greater is the marginal propensity to consume, the larger is the multiplier.

10. Economists estimate that the actual multiplier effect in the U.S. economy is about 2, which is less than the multiplier in the text examples.

Terms and Concepts

45° (degree) line  average propensity to consume (APC)  wealth effect
consumption schedule average propensity to save (APS)  expected rate of return
saving schedule marginal propensity to consume (MPC)  investment demand curve
break-even income marginal propensity to save (MPS)  multiplier
Study Questions

1. Very briefly summarize the relationships shown by (a) the consumption schedule, (b) the saving schedule, (c) the investment demand curve, and (d) the multiplier effect. Which of these relationships are direct (positive) relationships and which are inverse (negative) relationships? Why are consumption and saving in the United States greater today than they were a decade ago? LO1, LO3

2. Precisely how do the APC and the MPC differ? Why must the sum of the MPC and the MPS equal 1? What are the basic determinants of the consumption and saving schedules? Of your personal level of consumption? LO1

3. Explain how each of the following will affect the consumption and saving schedules (as they relate to GDP) or the investment schedule, other things equal: LO1, LO3
   a. A large increase in the value of real estate, including private houses.
   b. A decline in the real interest rate.
   c. A sharp, sustained decline in stock prices.
   d. An increase in the rate of population growth.
   e. The development of a cheaper method of manufacturing computer chips.
   f. A sizable increase in the retirement age for collecting Social Security benefits.
   g. An increase in the Federal personal income tax.

4. Explain why an upward shift of the consumption schedule typically involves an equal downshift of the saving schedule. What is the exception to this relationship? LO1

5. KEY QUESTION Complete the following table: LO1
   a. Show the consumption and saving schedules graphically.
   b. Find the break-even level of income. Explain how it is possible for households to disavow at very low income levels.
   c. If the proportion of total income consumed (APC) decreases and the proportion saved (APS) increases as income rises, explain both verbally and graphically how the MPC and MPS can be constant at various levels of income.

6. What are the basic determinants of investment? Explain the relationship between the real interest rate and the level of investment. Why is investment spending unstable? How is it possible for investment spending to increase even in a period in which the real interest rate rises? LO3, LO4

7. KEY QUESTION Suppose a handbill publisher can buy a new duplicating machine for $500 and the duplicator has a 1-year life. The machine is expected to contribute $550 to the year’s net revenue. What is the expected rate of return? If the real interest rate at which funds can be borrowed to purchase the machine is 8 percent, will the publisher choose to invest in the machine? Explain. LO3

8. KEY QUESTION Assume there are no investment projects in the economy that yield an expected rate of return of 25 percent or more. But suppose there are $10 billion of investment projects yielding expected returns of between 20 and 25 percent; another $10 billion yielding between 15 and 20 percent; another $10 billion between 10 and 15 percent; and so forth. Cumulate these data and present them graphically, putting the expected rate of return on the vertical axis and the amount of investment on the horizontal axis. What will be the equilibrium level of aggregate investment if the real interest rate is (a) 15 percent, (b) 10 percent, and (c) 5 percent? Explain why this curve is the investment demand curve. LO3, LO4

9. KEY QUESTION What is the multiplier effect? What relationship does the MPC bear to the size of the multiplier? The MPS? What will the multiplier be when the MPS is 0, .4, .6, and 1? What will it be when the MPC is 1, .90, .67, .50, and 0? How much of a change in GDP will result if firms increase their level of investment by $8 billion and the MPC is .80? If the MPC is .67? LO5

10. Why is the actual multiplier for the U.S. economy less than the multiplier in this chapter’s simple examples? LO5

11. ADVANCED ANALYSIS Linear equations for the consumption and saving schedules take the general form $C = a + bY$

### Table

<table>
<thead>
<tr>
<th>Level of Output and Income (GDP = DI)</th>
<th>Consumption</th>
<th>Saving</th>
<th>APC</th>
<th>APS</th>
<th>MPC</th>
<th>MPS</th>
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<td>___________</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
and \( S = -a + (1 - b)Y \), where \( C, S, \) and \( Y \) are consumption, saving, and national income, respectively. The constant \( a \) represents the vertical intercept, and \( b \) represents the slope of the consumption schedule. \( \text{LO1} \)

a. Use the following data to substitute numerical values for \( a \) and \( b \) in the consumption and saving equations.

b. What is the economic meaning of \( b \)? Of \( (1 - b) \)?

<table>
<thead>
<tr>
<th>National Income (( Y ))</th>
<th>Consumption (( C ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ 0</td>
<td>$ 80</td>
</tr>
<tr>
<td>100</td>
<td>140</td>
</tr>
<tr>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>300</td>
<td>260</td>
</tr>
<tr>
<td>400</td>
<td>320</td>
</tr>
</tbody>
</table>

c. Suppose that the amount of saving that occurs at each level of national income falls by $20 but that the values of \( b \) and \( (1 - b) \) remain unchanged. Restate the saving and consumption equations for the new numerical values, and cite a factor that might have caused the change.

12. \textbf{ADVANCED ANALYSIS} Suppose that the linear equation for consumption in a hypothetical economy is \( C = 40 + .8Y \). Also suppose that income (\( Y \)) is $400. Determine \( a \) the marginal propensity to consume, \( b \) the marginal propensity to save, \( c \) the level of consumption, \( d \) the average propensity to consume, \( e \) the level of saving, and \( f \) the average propensity to save. \( \text{LO1} \)

13. \textbf{LAST WORD} What is the central economic idea humorously illustrated in Art Buchwald’s piece, “Squaring the Economic Circle”? How does the central idea relate to recessions, on the one hand, and vigorous expansions, on the other?

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**Web-Based Questions**

1. **THE BEIGE BOOK AND CURRENT CONSUMER SPENDING**
   Go to the Federal Reserve Web site, [www.federalreserve.gov](http://www.federalreserve.gov), and select About the Fed, then The Federal Reserve System, and then Districts and Banks. Find your Federal Reserve District. Next, return to the Fed home page and select Monetary Policy, then Reports, and then Beige Book. What is the Beige Book? Locate the current Beige Book report and compare consumer spending for the entire U.S. economy with consumer spending in your Federal Reserve District. What are the economic strengths and weaknesses in both? Are retailers reporting that recent sales have met their expectations? What are their expectations for the future?

2. **INVESTMENT INSTABILITY—CHANGES IN REAL PRIVATE NONRESIDENTIAL FIXED INVESTMENT**
   The Bureau of Economic Analysis provides data for real private nonresidential fixed investment in table form at [www.bea.gov](http://www.bea.gov). Access the BEA interactively by first clicking on National, then Interactive Tables: National Income and Product Accounts Tables, and then “Choose a table from a list of All NIPA Tables.” Scroll down until you find Table 5.3.5, “Private Fixed Investment by Type (A) (Q).” Has recent real private nonresidential fixed investment been volatile (as measured by percentage change from previous quarters)? Which is the largest component of this type of investment, \( a \) structures or \( b \) equipment and software? Which of these two components has been more volatile? How do recent quarterly percentage changes compare with the previous years’ changes? Looking at the investment data, what investment forecast would you make for the upcoming year?

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**FURTHER TEST YOUR KNOWLEDGE AT**
[www.mcconnell18e.com](http://www.mcconnell18e.com)
IN THIS CHAPTER YOU WILL LEARN:

1. How economists combine consumption and investment to depict an aggregate expenditures schedule for a private closed economy.

2. The three characteristics of the equilibrium level of real GDP in a private closed economy: aggregate expenditures = output; saving = investment; and no unplanned changes in inventories.

3. How changes in equilibrium real GDP can occur and how those changes relate to the multiplier.

4. How economists integrate the international sector (exports and imports) and the public sector (government expenditures and taxes) into the aggregate expenditures model.

5. About the nature and causes of “recessionary expenditure gaps” and “inflationary expenditure gaps.”

The Aggregate Expenditures Model

Two of the most critical questions in macroeconomics are: (1) What determines the level of GDP, given a nation’s production capacity? (2) What causes real GDP to rise in one period and to fall in another? To answer these questions we construct the aggregate expenditures model, which has its origins in 1936 in the writings of British economist John Maynard Keynes (pronounced “Caines”). The basic premise of the aggregate expenditures model—also known as the “Keynesian cross” model—is that the amount of goods and services produced and therefore the level of employment depend directly on the level of aggregate expenditures (total spending). Businesses will produce only a level of output that they think they can profitably sell. They will idle their workers and machinery when there are no markets for their goods and services. When aggregate expenditures fall, total output and employment decrease; when aggregate expenditures rise, total output and employment increase.
**Assumptions and Simplifications**

The simplifying assumptions underpinning the aggregate expenditures model reflect the economic conditions that were prevalent during the Great Depression. As discussed in this chapter’s Last Word, Keynes created the model during the middle of the Great Depression in the hopes of understanding both why the Great Depression had happened as well as how it might be ended.

The most fundamental assumption behind the aggregate expenditures model is that prices in the economy are fixed. In the terminology of Chapter 23, the aggregate expenditures model is an extreme version of a sticky price model. In fact, it is a stuck-price model since prices cannot change at all.

Keynes made this assumption because the economy during the Great Depression was operating far below its potential output. Real GDP in the United States declined by 27 percent from 1929 to 1933 and the unemployment rate rose to 25 percent. Thousands of factories sat idle, gathering dust and producing nothing because nobody wanted to buy their output. To Keynes, this massive unemployment of labor and capital meant that even if a sudden increase in demand occurred, prices were unlikely to rise at all because the massive oversupply of productive resources would keep prices low. Consequently, he focused his attention on how the economy might reach an equilibrium in a situation in which prices were likely to be stuck for a while.

His solution involves realizing that even if prices are stuck, firms will still be able to receive feedback from the markets about how much they should produce. With prices stuck, this feedback obviously cannot come in the form of changing prices. Instead, it comes in the form of unplanned changes in firm inventory levels. As we will explain, these changes can guide firms to an equilibrium level of GDP. Crucially, this equilibrium level of GDP can be well below a nation’s potential output—meaning that the aggregate expenditures model can explain the situation of massive unemployment that the economy found itself in during the Great Depression.

But the aggregate expenditures model is not just of historical interest. It can be used fruitfully even today because, as we explained in Chapter 23, prices in the modern economy are very sticky and sometimes nearly stuck in the short run. As a result, the aggregate expenditures model can help us understand how the modern economy is likely to initially adjust to various economic shocks, including changes in things such as tax rates, government spending, consumption expenditures, and investment spending.

We will build up the aggregate expenditures model in simple stages. Let’s first look at aggregate expenditures and equilibrium GDP in a private closed economy—one without international trade or government. Then we will “open” the “closed” economy to exports and imports and also convert our “private” economy to a more realistic “mixed” economy that includes government purchases (or, more loosely, “government spending”) and taxes.

In addition, until we introduce taxes into the model, we will assume that real GDP equals disposable income (DI). For instance, if $500 billion of output is produced as GDP, households will receive exactly $500 billion of disposable income that they can then consume or save. And finally, unless specified otherwise, we will assume (as Keynes did) that the economy has excess production capacity and unemployed labor so that an increase in aggregate expenditures will increase real output and employment but not raise the price level.

**Consumption and Investment Schedules**

In the private closed economy, the two components of aggregate expenditures are consumption, $C$, and gross investment, $I_g$. Because we examined the consumption schedule (Figure 27.2a) in the previous chapter, there is no need to repeat that analysis here. But to add the investment decisions of businesses to the consumption plans of households, we need to construct an investment schedule showing the amounts business firms collectively intend to invest—their planned investment—at each possible level of GDP. Such a schedule represents the investment plans of businesses in the same way the consumption schedule represents the consumption plans of households. In developing the investment schedule, we will assume that this planned investment is independent of the level of current disposable income or real output.

Suppose the investment demand curve is as shown in Figure 28.1a and the current real interest rate is 8 percent. This means that firms will spend $20 billion on investment goods. Our assumption tells us that this $20 billion of investment will occur at both low and high levels of GDP. The line $I_g$ in Figure 28.1b shows this graphically; it is the economy’s investment schedule. You should not confuse this investment schedule $I_g$ with the investment demand curve $ID$ in Figure 28.1a. The investment schedule shows the amount of investment forthcoming at each level of GDP. As indicated in Figure 28.1b, the interest rate and investment demand curve together determine this amount ($20 billion). Table 28.1 shows the investment schedule in tabular form. Note that investment ($I_g$) in column 2 is $20 billion at all levels of real GDP.
Equilibrium GDP: \( C + I_g = GDP \)

Now let’s combine the consumption schedule of Chapter 27 and the investment schedule here to explain the equilibrium levels of output, income, and employment in the private closed economy.

Tabular Analysis

Columns 2 through 5 in Table 28.2 repeat the consumption and saving schedules of Table 27.1 and the investment schedule of Table 28.1.

Real Domestic Output

Column 2 in Table 28.2 lists the various possible levels of total output—of real GDP—that the private sector might produce. Producers are willing to offer any of these 10 levels of output if they can expect to receive an identical level of income from the sale of that output. For example, firms will produce $370 billion of output, incurring $370 billion of costs (wages, rents, interest, and normal profit costs) only if they believe they can sell that output for $370 billion. Firms will offer $390 billion of output if they think they can sell that output for $390 billion. And so it is for all the other possible levels of output.

Aggregate Expenditures

In the private closed economy of Table 28.2, aggregate expenditures consist of consumption (column 3) plus investment (column 5). Their sum is shown in column 6, which along with column 2 makes up the aggregate expenditures schedule for the private closed economy. This schedule shows the amount \((C + I_g)\) that will be spent at each possible output or income level.

At this point we are working with planned investment—the data in column 5, Table 28.2. These data show the amounts firms plan or intend to invest, not the amounts they actually will invest if there are unplanned changes in inventories. More about that shortly.
Table 28.2 Determination of the Equilibrium Levels of Employment, Output, and Income: A Closed Private Economy

<table>
<thead>
<tr>
<th>(1) Possible Levels of Employment, Millions</th>
<th>(2) Real Domestic Output (and Income) (GDP = DI)* Billions</th>
<th>(3) Consumption (C), Billions</th>
<th>(4) Saving (S), Billions</th>
<th>(5) Investment (I), Billions</th>
<th>(6) Aggregate Expenditures (C + I + G), Billions</th>
<th>(7) Unplanned Changes in Inventories, (+ or −)</th>
<th>(8) Tendency of Employment, Output, and Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) 40</td>
<td>$370</td>
<td>$375</td>
<td>$−5</td>
<td>$20</td>
<td>$395</td>
<td>$−25</td>
<td>Increase</td>
</tr>
<tr>
<td>(2) 45</td>
<td>390</td>
<td>390</td>
<td>0</td>
<td>20</td>
<td>410</td>
<td>−20</td>
<td>Increase</td>
</tr>
<tr>
<td>(3) 50</td>
<td>410</td>
<td>405</td>
<td>5</td>
<td>20</td>
<td>425</td>
<td>−15</td>
<td>Increase</td>
</tr>
<tr>
<td>(4) 55</td>
<td>430</td>
<td>420</td>
<td>10</td>
<td>20</td>
<td>440</td>
<td>−10</td>
<td>Increase</td>
</tr>
<tr>
<td>(5) 60</td>
<td>450</td>
<td>435</td>
<td>15</td>
<td>20</td>
<td>455</td>
<td>−5</td>
<td>Increase</td>
</tr>
<tr>
<td>(6) 65</td>
<td>470</td>
<td>450</td>
<td>20</td>
<td>20</td>
<td>470</td>
<td>0</td>
<td>Equilibrium</td>
</tr>
<tr>
<td>(7) 70</td>
<td>490</td>
<td>465</td>
<td>25</td>
<td>20</td>
<td>485</td>
<td>+5</td>
<td>Decrease</td>
</tr>
<tr>
<td>(8) 75</td>
<td>510</td>
<td>480</td>
<td>30</td>
<td>20</td>
<td>500</td>
<td>+10</td>
<td>Decrease</td>
</tr>
<tr>
<td>(9) 80</td>
<td>530</td>
<td>495</td>
<td>35</td>
<td>20</td>
<td>515</td>
<td>+15</td>
<td>Decrease</td>
</tr>
<tr>
<td>(10) 85</td>
<td>550</td>
<td>510</td>
<td>40</td>
<td>20</td>
<td>530</td>
<td>+20</td>
<td>Decrease</td>
</tr>
</tbody>
</table>

*If depreciation and net foreign factor income are zero, government is ignored and it is assumed that all saving occurs in the household sector of the economy, then GDP as a measure of domestic output is equal to NI, PI, and DI. This means that households receive a DI equal to the value of total output.

Equilibrium GDP Of the 10 possible levels of GDP in Table 28.2, which is the equilibrium level? Which total output is the economy capable of sustaining?

The equilibrium output is that output whose production creates total spending just sufficient to purchase that output. So the equilibrium level of GDP is the level at which the total quantity of goods produced (GDP) equals the total quantity of goods purchased (C + I + G). If you look at the domestic output levels in column 2 and the aggregate expenditures levels in column 6, you will see that this equality exists only at $470 billion of GDP (row 6). That is the only output at which economy-wide spending is precisely equal to the amount needed to move that output off the shelves. At $470 billion of GDP, the annual rates of production and spending are in balance. There is no overproduction, which would result in a piling up of unsold goods and consequently cutbacks in the production rate. Nor is there an excess of total spending, which would draw down inventories of goods and prompt increases in the rate of production. In short, there is no reason for businesses to alter this rate of production; $470 billion is the equilibrium GDP.

Disequilibrium No level of GDP other than the equilibrium level of GDP can be sustained. At levels of GDP less than equilibrium, spending always exceeds GDP. If, for example, firms produced $410 billion of GDP (row 3 in Table 28.2), they would find it would yield $405 billion in consumer spending. Supplemented by $20 billion of planned investment, aggregate expenditures (C + I) would be $425 billion, as shown in column 6. The economy would provide an annual rate of spending more than sufficient to purchase the $410 billion of annual production. Because buyers would be taking goods off the shelves faster than firms could produce them, an unplanned decline in business inventories of $15 billion would occur (column 7) if this situation continued. But businesses can adjust to such an imbalance between aggregate expenditures and total output by stepping up production. Greater output will increase employment and total income. This process will continue until the equilibrium level of GDP is reached ($470 billion).

The reverse is true at all levels of GDP greater than the $470 billion equilibrium level. Businesses will find that these total outputs fail to generate the spending needed to clear the shelves of goods. Being unable to recover their costs, businesses will cut back on production. To illustrate: At the $510 billion output (row 8), business managers would find spending is insufficient to permit the sale of all that output. Of the $510 billion of income that this output creates, $480 billion would be received back by businesses as consumption spending. Though supplemented by $20 billion of planned investment spending, total expenditures ($500 billion) would still be $10 billion below the $510 billion quantity produced. If this imbalance persisted, $10 billion of inventories would pile up (column 7). But businesses can adjust to this unintended accumulation of unsold goods by cutting back on the rate of production. The resulting decline in output would mean fewer jobs and a decline in total income.
1. In this figure, the slope of the aggregate expenditures schedule $C + I_s$:  
   a. increases as real GDP increases.  
   b. falls as real GDP increases.  
   c. is constant and equals the MPC.  
   d. is constant and equals the MPS.  
2. At all points on the 45° line:  
   a. equilibrium GDP is possible.  
   b. aggregate expenditures exceed real GDP.  
   c. consumption exceeds investment.  
   d. aggregate expenditures are less than real GDP.  
3. The $490 billion level of real GDP is not at equilibrium because:  
   a. investment exceeds consumption.  
   b. consumption exceeds investment.  
   c. planned $C + I_s$ exceeds real GDP.  
   d. planned $C + I_s$ is less than real GDP.  
4. The $430 billion level of real GDP is not at equilibrium because:  
   a. investment exceeds consumption.  
   b. consumption exceeds investment.  
   c. planned $C + I_s$ exceeds real GDP.  
   d. planned $C + I_s$ is less than real GDP.

Graphical Analysis

We can demonstrate the same analysis graphically. In Figure 28.2 (Key Graph) the 45° line developed in Chapter 27 now takes on increased significance. Recall that at any point on this line, the value of what is being measured on the horizontal axis (here, GDP) is equal to the value of what is being measured on the vertical axis (here, aggregate expenditures, or $C + I_s$). Having discovered in our tabular analysis that the equilibrium level of domestic output is determined where $C + I_s$ equals GDP, we can say that the 45° line in Figure 28.2 is a graphical statement of that equilibrium condition.

Now we must graph the aggregate expenditures schedule onto Figure 28.2. To do this, we duplicate the consumption schedule $C$ in Figure 27.2a and add to it vertically the constant $20$ billion amount of investment $I_s$ from Figure 28.1b. This $20$ billion is the amount we assumed firms plan to invest at all levels of GDP. Or, more directly, we can plot the $C + I_s$ data in column 6, Table 28.2.
Observe in Figure 28.2 that the aggregate expenditures line \( C + I_g \) shows that total spending rises with income and output (GDP), but not as much as income rises. That is true because the marginal propensity to consume—the slope of line \( C \)—is less than 1. A part of any increase in income will be saved rather than spent. And because the aggregate expenditures line \( C + I_g \) is parallel to the consumption line \( C \), the slope of the aggregate expenditures line also equals the MPC for the economy and is less than 1. For our particular data, aggregate expenditures rise by $15 billion for every $20 billion increase in real output and income because $5 billion of each $20 billion increment is saved. Therefore, the slope of the aggregate expenditures line is \( 0.75 = \Delta S/\Delta Y \).

The equilibrium level of GDP is determined by the intersection of the aggregate expenditures schedule and the 45° line. This intersection locates the only point at which aggregate expenditures (on the vertical axis) are equal to GDP (on the horizontal axis). Because Figure 28.2 is based on the data in Table 28.2, we once again find that equilibrium output is $470 billion. Observe that consumption at this output is $450 billion and investment is $20 billion.

It is evident from Figure 28.2 that no levels of GDP above the equilibrium level are sustainable because at those levels \( C + I_g \) falls short of GDP. Graphically, the aggregate expenditures schedule lies below the 45° line in those situations. At the $510 billion GDP level, for example, \( C + I_g \) is only $500 billion. This underspending causes inventories to rise, prompting firms to readjust production downward, in the direction of the $470 billion output level.

Conversely, at levels of GDP below $470 billion, the economy wants to spend in excess of what businesses are producing. Then \( C + I_g \) exceeds total output. Graphically, the aggregate expenditures schedule lies above the 45° line. At the $410 billion GDP level, for example, \( C + I_g \) totals $425 billion. This excess spending causes inventories to fall below their planned level, prompting firms to adjust production upward, in the direction of the $470 billion output level. Once production reaches that level, it will be sustained there indefinitely unless there is some change in the location of the aggregate expenditures line.

**Saving Equals Planned Investment**

As shown by row 6 in Table 28.2, saving and planned investment are both $20 billion at the $470 billion equilibrium level of GDP.

Saving is a leakage or withdrawal of spending from the economy’s circular flow of income and expenditures. Saving is what causes consumption to be less than total output or GDP. Because of saving, consumption by itself is insufficient to remove domestic output from the shelves, apparently setting the stage for a decline in total output.

However, firms do not intend to sell their entire output to consumers. Some of that output will be capital goods sold to other businesses. Investment—the purchases of capital goods—is therefore an injection of spending into the income-expenditures stream. As an adjunct to consumption, investment is thus a potential replacement for the leakage of saving.

If the leakage of saving at a certain level of GDP exceeds the injection of investment, then \( C + I_g \) will be less than GDP and that level of GDP cannot be sustained. Any GDP for which saving exceeds investment is an above-equilibrium GDP. Consider GDP of $510 billion (row 8 in Table 28.2). Households will save $30 billion, but firms will plan to invest only $20 billion. This $10 billion excess of saving over planned investment will reduce total spending to $10 billion below the value of total output. Specifically, aggregate expenditures will be $500 billion while real GDP is $510 billion. This spending deficiency will reduce real GDP.

Conversely, if the injection of investment exceeds the leakage of saving, then \( C + I_g \) will be greater than GDP and drive GDP upward. Any GDP for which investment exceeds saving is a below-equilibrium GDP. For example, at a GDP of $410 billion (row 3 in Table 28.2), households will save only $5 billion, but firms will invest $20 billion. So investment exceeds saving by $15 billion. The small leakage of saving at this relatively low GDP level is more than compensated for by the larger injection of investment spending. That causes \( C + I_g \) to exceed GDP and drives GDP higher.

Only where \( S = I_g \)—where the leakage of saving of $20 billion is exactly offset by the injection of planned investment of $20 billion—will aggregate expenditures \( (C + I_g) \) equal real output (GDP). That \( C + I_g = GDP \) equality is what defines the equilibrium GDP. (Key Question 2)

**Other Features of Equilibrium GDP**

We have seen that \( C + I_g = GDP \) at equilibrium in the private closed economy. A closer look at Table 28.2 reveals two more characteristics of equilibrium GDP:

- Saving and planned investment are equal.
- There are no unplanned changes in inventories.
Changes in Equilibrium GDP and the Multiplier

In the private closed economy, the equilibrium GDP will change in response to changes in either the investment schedule or the consumption schedule. Because changes in the investment schedule usually are the main source of instability, we will direct our attention toward them.

Figure 28.3 shows the effect of changes in investment spending on the equilibrium real GDP. Suppose that the expected rate of return on investment rises or that the real interest rate falls such that investment spending increases by $5 billion. That would be shown as an upward shift of the investment schedule in Figure 28.1b. In Figure 28.3, the $5 billion increase of investment spending will increase aggregate expenditures from \( (C + I_0) \) to \( (C + I_1) \) and raise equilibrium real GDP from $470 billion to $490 billion.

If the expected rate of return on investment decreases or if the real interest rate rises, investment spending will decline by, say, $5 billion. That would be shown as a downward shift of the investment schedule in Figure 28.1b and a downward shift of the aggregate expenditures schedule from \( (C + I_0) \) to \( (C + I_2) \) in Figure 28.3. Equilibrium GDP will fall from $470 billion to $450 billion.

In our examples, a $5 billion change in investment spending leads to a $20 billion change in output and income. So the multiplier is 4 (= $20/$5). The MPS is .25, meaning that for every $1 billion of new income, $.25 billion of new saving occurs. Therefore, $20 billion of new income is needed to generate $5 billion of new saving. Once that increase in income and saving occurs, the economy is back in equilibrium—\( C + I_s = GDP \); saving and investment are equal; and there are no unplanned changes in inventories. You can see, then, why the multiplier is equal to \( 1/MPS \) and that the multiplier process is an integral part of the aggregate expenditures model. (A brief review of Table 27.3 and Figure 27.8 will be helpful at this point.)

### QUICK REVIEW 28.1

- In a private closed economy, equilibrium GDP occurs where aggregate expenditures equal real domestic output \( (C + I_s = GDP) \).
- At equilibrium GDP, saving equals planned investment \( (S = I_f) \) and unplanned changes in inventories are zero.
- Actual investment consists of planned investment plus unplanned changes in inventories (+ or −) and is always equal to saving in a private closed economy.
- Through the multiplier effect, an initial change in investment spending can cause a magnified change in domestic output and income.
Adding International Trade

We next move from a closed economy to an open economy that incorporates exports \((X)\) and imports \((M)\). Our focus will be on net exports \((X)\) (exports minus imports), which may be either positive or negative.

Net Exports and Aggregate Expenditures

Like consumption and investment, exports create domestic production, income, and employment for a nation. Although U.S. goods and services produced for export are sent abroad, foreign spending on those goods and services increases production and creates jobs and incomes in the United States. We must therefore include exports as a component of U.S. aggregate expenditures.

Conversely, when an economy is open to international trade, it will spend part of its income on imports—goods and services produced abroad. To avoid overstating the value of domestic production, we must subtract the amount spent on imported goods because such spending generates production and income abroad rather than at home. So, to correctly measure aggregate expenditures for domestic goods and services, we must subtract expenditures on imports from total spending.

In short, for a private closed economy, aggregate expenditures are \(C + I\). But for an open economy, aggregate expenditures are \(C + I + X - M\). Or, recalling that net exports \((X)\) equal \((X - M)\), we can say that aggregate expenditures for a private open economy are \(C + I + X\).

The Net Export Schedule

A net export schedule lists the amount of net exports that will occur at each level of GDP. Table 28.3 shows two possible net export schedules for the hypothetical economy represented in Table 28.2. In net export schedule \(X_1\) (columns 1 and 2), exports exceed imports by $5 billion at each level of GDP. Perhaps exports are $15 billion while imports are $10 billion. In schedule \(X_2\) (columns 1 and 3), imports are $5 billion higher than exports. Perhaps imports are $20 billion while exports are $15 billion. To simplify our discussion, we assume in both schedules that net exports are independent of GDP.\footnote{In reality, although our exports depend on foreign incomes and are thus independent of U.S. GDP, our imports do vary directly with our own domestic national income. Just as our domestic consumption varies directly with our GDP, so do our purchases of foreign goods. As our GDP rises, U.S. households buy not only more Pontiacs and more Pepsi but also more Porsches and more Perrier. However, for now we will ignore the complications of the positive relationship between imports and U.S. GDP.}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure28.3}
\caption{Changes in the equilibrium GDP caused by shifts in the aggregate expenditures schedule and the investment schedule. An upward shift of the aggregate expenditures schedule from \((C + I)_0\) to \((C + I)_1\) will increase the equilibrium GDP. Conversely, a downward shift from \((C + I)_0\) to \((C + I)_2\) will lower the equilibrium GDP. The extent of the changes in equilibrium GDP will depend on the size of the multiplier, which in this case is 4 \((= 20/5)\). The multiplier is equal to \(1/\text{MPS}\) (here, \(4 - 1/25\)).}
\end{figure}
TABLE 28.3 Two Net Export Schedules (in Billions)

<table>
<thead>
<tr>
<th>Level of GDP</th>
<th>Net Exports, X₁ (X &gt; M)</th>
<th>Net Exports, X₂ (X &lt; M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$370</td>
<td>$5</td>
<td>$5</td>
</tr>
<tr>
<td>390</td>
<td>+5</td>
<td>5</td>
</tr>
<tr>
<td>410</td>
<td>+5</td>
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<td>430</td>
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</tbody>
</table>

Figure 28.4b represents the two net export schedules in Table 28.3. Schedule X₁ is above the horizontal axis and depicts positive net exports of $5 billion at all levels of GDP. Schedule X₂, which is below the horizontal axis, shows negative net exports of $5 billion at all levels of GDP.

**Net Exports and Equilibrium GDP**

The aggregate expenditures schedule labeled C + Iₙ in Figure 28.4a reflects the private closed economy. It shows the combined consumption and gross investment expenditures occurring at each level of GDP. With no foreign sector, the equilibrium GDP is $470 billion.

But in the private open economy, net exports can be either positive or negative. Let’s see how each of the net export schedules in Figure 28.4b affects equilibrium GDP.
**Positive Net Exports** Suppose the net export schedule is \(X_m\). The $5 billion of additional net export expenditures by the rest of the world is accounted for by adding that $5 billion to the \(C + I_g\) schedule in Figure 28.4a. Aggregate expenditures at each level of GDP are then $5 billion higher than \(C + I_g\) alone. The aggregate expenditures schedule for the open economy thus becomes \(C + I_g + X_m\). In this case, international trade increases equilibrium GDP from $470 billion in the private closed economy to $490 billion in the private open economy. Adding net exports of $5 billion has increased GDP by $20 billion, in this case implying a multiplier of 4.

Generalization: Other things equal, positive net exports increase aggregate expenditures and GDP beyond what they would be in a closed economy. Be careful to notice that this increase is the result of exports being larger than imports. This is true because exports and imports have opposite effects on the measurement of domestically produced output. Exports increase real GDP by increasing expenditures on domestically produced output. Imports, by contrast, must be subtracted when calculating real GDP because they are expenditures directed toward output produced abroad. It is only because net exports are positive in this example—so that the expansionary effect of exports outweighs the reductions caused by imports—that we get the overall increase in real GDP. As the next section shows, if net exports are negative, then the reductions caused by imports will outweigh the expansionary effect of exports so that domestic real GDP will decrease.

**Negative Net Exports** Suppose that net exports are a negative $5 billion as shown by \(X_m\) in Figure 28.4b. This means that our hypothetical economy is importing $5 billion more of goods than it is exporting. The aggregate expenditures schedule shown as \(C + I_g\) in Figure 28.4a therefore overstates the expenditures on domestic output at each level of GDP. We must reduce the sum of expenditures by the $5 billion net amount spent on imported goods. We do that by subtracting the $5 billion of net imports from \(C + I_g\).

The relevant aggregate expenditures schedule in Figure 28.4a becomes \(C + I_g + X_m\) and equilibrium GDP falls from $470 billion to $450 billion. Again, a change in net exports of $5 billion has produced a fourfold change in GDP, reminding us that the multiplier in this example is 4.

This gives us a corollary to our first generalization: Other things equal, negative net exports reduce aggregate expenditures and GDP below what they would be in a closed economy. When imports exceed exports, the contractionary effect of the larger amount of imports outweighs the expansionary effect of the smaller amount of exports, and equilibrium real GDP decreases.

Our generalizations of the effects of net exports on GDP mean that a decline in \(X_m\)—a decrease in exports or an increase in imports—reduces aggregate expenditures and contracts a nation’s GDP. Conversely, an increase in \(X_m\)—the result of either an increase in exports or a decrease in imports—increases aggregate expenditures and expands GDP.

As is shown in Global Perspective 28.1, net exports vary greatly among the major industrial nations. (Key Question 9)

**International Economic Linkages**

Our analysis of net exports and real GDP suggests how circumstances or policies abroad can affect U.S. GDP.

**Prosperity Abroad** A rising level of real output and income among U.S. foreign trading partners enables the United States to sell more goods abroad, thus raising U.S. net exports and increasing its real GDP (assuming initially there is excess capacity). There is good reason for Americans to be interested in the prosperity of our trading partners. Their good fortune enables them to buy more of our exports, increasing our income and enabling us in turn to buy more foreign imports. These imported goods are the ultimate benefit of international trade. Prosperity abroad transfers some of that prosperity to Americans.

**Tariffs** Suppose foreign trading partners impose high tariffs on U.S. goods to reduce their imports from the United States and thus increase production in their economies. Their imports, however, are U.S. exports. So when they restrict their imports to stimulate their economies, they are reducing U.S. exports and depressing our economy. We are likely to retaliate by imposing tariffs on their products. If so, their exports to us will decline and their net exports may
fall. It is not clear, then, whether tariffs increase or decrease a nation’s net exports. In the Great Depression of the 1930s various nations, including the United States, imposed trade barriers as a way of reducing domestic unemployment. But rounds of retaliation simply throttled world trade, worsened the Depression, and increased unemployment.

Exchange Rates Depreciation of the dollar relative to other currencies (discussed in Chapter 5) enables people abroad to obtain more dollars with each unit of their own currencies. The price of U.S. goods in terms of those currencies will fall, stimulating purchases of U.S. exports. Also, U.S. customers will find they need more dollars to buy foreign goods and, consequently, will reduce their spending on imports. The increased exports and decreased imports will increase U.S. net exports and thus expand the nation’s GDP.

Whether depreciation of the dollar will actually raise real GDP or produce inflation depends on the initial position of the economy relative to its full-employment output. If the economy is operating below its full-employment level, prices are likely to be sticky or even stuck due to a large oversupply of unemployed labor and capital. In such a situation, depreciation of the dollar and the resulting rise in net exports will increase aggregate expenditures and expand real GDP without increasing prices. But if the economy is already fully employed, then there will not be a huge oversupply of unemployed labor and capital keeping prices sticky. In such a situation, prices will be flexible and the increase in net exports and aggregate expenditures will cause demand-pull inflation. Because resources are already fully employed, the increased spending cannot expand real output; but it can and does increase the prices of the existing output. Having said this, however, we need to caution you that evidence from the actual economy suggests that, even at full employment, the inflationary consequences of dollar depreciation are very small.

This last example has been cast only in terms of depreciation of the dollar. You should think through the impact that appreciation of the dollar would have on net exports and equilibrium GDP.

Adding the Public Sector

Our final step in constructing the full aggregate expenditures model is to move the analysis from a private (no-government) open economy to an economy with a public sector (sometimes called a “mixed economy”). This means adding government purchases and taxes to the model.

For simplicity, we will assume that government purchases are independent of the level of GDP and do not alter the consumption and investment schedules. Also, government’s net tax revenues—total tax revenues less “negative taxes” in the form of transfer payments—are derived entirely from personal taxes. Finally, a fixed amount of taxes is collected regardless of the level of GDP.

Government Purchases and Equilibrium GDP

Suppose the government decides to purchase $20 billion of goods and services regardless of the level of GDP and tax collections.

Tabular Example Table 28.4 shows the impact of this purchase on the equilibrium GDP. Columns 1 through 4 are carried over from Table 28.2 for the private closed economy, in which the equilibrium GDP was $470 billion. The only new items are exports and imports in column 5 and government purchases in column 6. (Observe in column 5 that net exports are zero.) As shown in column 7, the addition of government purchases to private spending ($C + I_s + X_e$) yields a new, higher level of aggregate expenditures ($C + I_s + X_e + G$). Comparing columns 1 and 7, we find that aggregate expenditures and real output are equal at a higher level of GDP. Without government purchases, equilibrium GDP was $470 billion (row 6); with government purchases, aggregate expenditures and real output are equal at $550 billion (row 10). Increases in public spending, like increases in private spending, shift the aggregate expenditures schedule upward and produce a higher equilibrium GDP.

Note, too, that government spending is subject to the multiplier. A $20 billion increase in government purchases has increased equilibrium GDP by $80 billion (from $470 billion to $550 billion). The multiplier in this example is 4.

This $20 billion increase in government spending is not financed by increased taxes. Shortly, we will demonstrate that increased taxes reduce equilibrium GDP.

Graphical Analysis In Figure 28.5, we vertically add $20 billion of government purchases, $G$, to the level of private spending, $C + I_s + X_e$. That added $20 billion raises the aggregate expenditures schedule (private plus
public) to $C + I_g + X_n + G$, resulting in an $80$ billion increase in equilibrium GDP, from $470$ to $550$ billion.

A decline in government purchases $G$ will lower the aggregate expenditures schedule in Figure 28.5 and result in a multiplied decline in the equilibrium GDP. Verify in Table 28.4 that if government purchases were to decline from $20$ billion to $10$ billion, the equilibrium GDP would fall by $40$ billion.

**TABLE 28.4 The Impact of Government Purchases on Equilibrium GDP**

<table>
<thead>
<tr>
<th>(1) Real Domestic Output and Income (GDP = DI), Billions</th>
<th>(2) Consumption (C), Billions</th>
<th>(3) Savings (S), Billions</th>
<th>(4) Investment (I_g), Billions</th>
<th>(5) Net Exports (X^*), Billions</th>
<th>(6) Government Purchases (G), Billions</th>
<th>(7) Aggregate Expenditures (C + I_g + X_n + G), Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) $370$</td>
<td>$375$</td>
<td>$-5$</td>
<td>$20$</td>
<td>$10$</td>
<td>$10$</td>
<td>$20$</td>
</tr>
<tr>
<td>(2) $390$</td>
<td>$390$</td>
<td>$0$</td>
<td>$20$</td>
<td>$10$</td>
<td>$10$</td>
<td>$20$</td>
</tr>
<tr>
<td>(3) $410$</td>
<td>$405$</td>
<td>$5$</td>
<td>$20$</td>
<td>$10$</td>
<td>$10$</td>
<td>$20$</td>
</tr>
<tr>
<td>(4) $430$</td>
<td>$420$</td>
<td>$10$</td>
<td>$20$</td>
<td>$10$</td>
<td>$10$</td>
<td>$20$</td>
</tr>
<tr>
<td>(5) $450$</td>
<td>$435$</td>
<td>$15$</td>
<td>$20$</td>
<td>$10$</td>
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<td>$20$</td>
</tr>
<tr>
<td>(6) $470$</td>
<td>$450$</td>
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<td>$20$</td>
<td>$10$</td>
<td>$10$</td>
<td>$20$</td>
</tr>
<tr>
<td>(7) $490$</td>
<td>$465$</td>
<td>$25$</td>
<td>$20$</td>
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<td>$20$</td>
</tr>
<tr>
<td>(8) $510$</td>
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<td>$30$</td>
<td>$20$</td>
<td>$10$</td>
<td>$10$</td>
<td>$20$</td>
</tr>
<tr>
<td>(9) $530$</td>
<td>$495$</td>
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<td>$20$</td>
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<tr>
<td>(10) $550$</td>
<td>$510$</td>
<td>$40$</td>
<td>$20$</td>
<td>$10$</td>
<td>$10$</td>
<td>$20$</td>
</tr>
</tbody>
</table>

**Taxation and Equilibrium GDP**

The government not only spends but also collects taxes. Suppose it imposes a **lump-sum tax**, which is a tax of a constant amount or, more precisely, a tax yielding the same amount of tax revenue at each level of GDP. Let’s assume this tax is $20$ billion, so that the government obtains $20$ billion of tax revenue at each level of GDP regardless of the level of government purchases.

**FIGURE 28.5 Government spending and equilibrium GDP.** The addition of government expenditures of $G$ to our analysis raises the aggregate expenditures $(C + I_g + X_n + G)$ schedule and increases the equilibrium level of GDP by $45^\circ$, as would an increase in $C$, $I_g$, or $X_n$. 

Real domestic product, GDP (billions of dollars)
TABLE 28.5 Determination of the Equilibrium Levels of Employment, Output, and Income: Private and Public Sectors

<table>
<thead>
<tr>
<th>(1) Real Domestic Output and Income (GDP = NI = PI), Billions</th>
<th>(2) Taxes (T), Billions</th>
<th>(3) Disposable Income (DI), Billions</th>
<th>(4) Consumption (C), Billions</th>
<th>(5) Saving (S), Billions</th>
<th>(6) Investment (I), Billions</th>
<th>(7) Net Exports (X), Billions</th>
<th>(8) Government Purchases (G), Billions</th>
<th>(9) Aggregate Expenditures (C + I + X + G), Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) $370</td>
<td>$20</td>
<td>$350</td>
<td>$360</td>
<td>$-10</td>
<td>$20</td>
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<td>$10</td>
<td>$20</td>
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<tr>
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<td>370</td>
<td>375</td>
<td>-5</td>
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<td>(4) 430</td>
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<tr>
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<td>450</td>
<td>435</td>
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<tr>
<td>(7) 490</td>
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<td>470</td>
<td>450</td>
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<tr>
<td>(8) 510</td>
<td>20</td>
<td>490</td>
<td>465</td>
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<tr>
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<tr>
<td>(10) 550</td>
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<td>530</td>
<td>495</td>
<td>35</td>
<td>20</td>
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<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

Tabular Example In Table 28.5, which continues our example, we find taxes in column 2, and we see in column 3 that disposable (after-tax) income is lower than GDP (column 1) by the $20 billion amount of the tax. Because households use disposable income both to consume and to save, the tax lowers both consumption and saving. The MPC and MPS tell us how much consumption and saving will decline as a result of the $20 billion in taxes. Because the MPC is .75, the government tax collection of $20 billion will reduce consumption by $15 billion (= .75 × $20 billion). Since the MPS is .25, saving will drop by $5 billion (= .25 × $20 billion).

Columns 4 and 5 in Table 28.5 list the amounts of consumption and saving at each level of GDP. Note they are $15 billion and $5 billion smaller than those in Table 28.4. Taxes reduce disposable income relative to GDP by the amount of the taxes. This decline in DI reduces both consumption and saving at each level of GDP. The MPC and the MPS determine the declines in C and S.

To find the effect of taxes on equilibrium GDP, we calculate aggregate expenditures again, as shown in column 9, Table 28.5. Aggregate spending is $15 billion less at each level of GDP than it was in Table 28.4. The reason is that after-tax consumption, designated by Cₜ, is $15 billion less at each level of GDP. A comparison of real output and aggregate expenditures in columns 1 and 9 shows that the aggregate amounts produced and purchased are equal only at $490 billion of GDP (row 7). The $20 billion lump-sum tax has reduced equilibrium GDP by $60 billion, from $550 billion (row 10, Table 28.3) to $490 billion (row 7, Table 28.4).

Graphical Analysis In Figure 28.6 the $20 billion increase in taxes shows up as a $15 (not $20) billion decline in the aggregate expenditures (Cₜ + Iₜ + Xₜ + G) schedule. This decline in the schedule results solely from a decline in the consumption C component of aggregate expenditures. The equilibrium GDP falls from $550 billion to $490 billion because of this tax-caused drop in consumption. With no change in government expenditures, tax increases lower the aggregate expenditures schedule relative to the 45° line and reduce the equilibrium GDP.

In contrast to our previous case, a decrease in existing taxes will raise the aggregate expenditures schedule in Figure 28.6 as a result of an increase in consumption at all GDP levels. You should confirm that a tax reduction of $10 billion (from the present $20 billion to $10 billion) would increase the equilibrium GDP from $490 billion to $520 billion. (Key Question 12)

Differential Impacts You may have noted that equal changes in G and T do not have equivalent impacts on GDP. The $20 billion increase in G in our illustration, subject to the multiplier of 4, produced an $80 billion increase in real GDP. But the $20 billion increase in taxes reduced GDP by only $60 billion. Given an MPC of .75, the tax increase of $20 billion reduced consumption by only $15 billion (not $20 billion) because saving also fell by $5 billion. Subjecting the $15 billion decline in consumption to the multiplier of
4, we find the tax increase of $20 billion reduced GDP by $60 billion (not $80 billion).

Table 28.5 and Figure 28.6 constitute the complete aggregate expenditures model for an open economy with government. When total spending equals total production, the economy's output is in equilibrium. In the open mixed economy, equilibrium GDP occurs where

\[ C_a + I_s + X_a + G = GDP. \]

**Injections, Leakages, and Unplanned Changes in Inventories** The related characteristics of equilibrium noted for the private closed economy also apply to the full model. In particular, it is still the case that injections into the income-expenditures stream equal leakages from the income stream. For the private closed economy, \( S = I_s \). For the expanded economy, imports and taxes are added leakages. Saving, importing, and paying taxes are all uses of income that subtract from potential consumption. Consumption will now be less than GDP—creating a potential spending gap—in the amount of after-tax saving \( (S_a) \), imports \( (M) \), and taxes \( (T) \). But exports \( (X) \) and government purchases \( (G) \), along with investment \( (I_s) \), are injections into the income-expenditures stream. At the equilibrium GDP, the sum of the leakages equals the sum of injections. In symbols:

\[ S_a + M + T - I_s + X + G \]

You should use the data in Table 28.5 to confirm this equality between leakages and injections at the equilibrium GDP of $490 billion. Also, substantiate that a lack of such equality exists at all other possible levels of GDP.

Although not directly shown in Table 28.5, the equilibrium characteristic of “no unplanned changes in inventories” will also be fulfilled at the $490 billion GDP. Because aggregate expenditures equal GDP, all the goods and services produced will be purchased. There will be no unplanned increase in inventories, so firms will have no incentive to reduce their employment and production. Nor will they experience an unplanned decline in their inventories, which would prompt them to expand their employment and output in order to replenish their inventories.

**Equilibrium versus Full-Employment GDP**

A key point about the equilibrium GDP of the aggregate expenditures model is that it need not equal the economy’s full-employment GDP. In fact, Keynes specifically designed the model so that it could explain situations like the Great Depression, during which the economy was seem-
ingly stuck at a bad equilibrium in which real GDP was far below potential output. As we will show you in a moment, Keynes also used the model to suggest policy recommendations for moving the economy back toward potential output and full employment.

The fact that equilibrium and potential GDP in the aggregate expenditure model need not match also reveals critical insights about the causes of demand-pull inflation. We will first examine the “expenditure gaps” that give rise to differences between equilibrium and potential GDP and then see how the model helps to explain the recession of 2001 and the recent period in which the United States achieved potential output even while experiencing massive net export deficits.

**Recessionary Expenditure Gap**

Suppose in Figure 28.7 (Key Graph), panel (a), that the full-employment level of GDP is $510 billion and the aggregate expenditures schedule is $AE_e$. (For simplicity, we will now dispense with the $C_e + I_e + X_e + G$ labeling.) This schedule intersects the 45° line to the left of the economy’s full-employment output, so the economy’s equilibrium GDP of $490 billion is $20 billion short of its full-employment output of $510 billion. According to column 1 in Table 28.2, total employment at the full-employment GDP is 75 million workers. But the economy depicted in Figure 28.7a is employing only 70 million workers; 5 million available workers are not employed. For that reason, the economy is sacrificing $20 billion of output.

A **recessionary expenditure gap** is the amount by which aggregate expenditures at the full-employment GDP fall short of those required to achieve the full-employment GDP. Insufficient total spending contracts or depresses the economy. Table 28.5 shows that at the full-employment level of $510 billion (column 1), the corresponding level of aggregate expenditures is only $505 billion (column 9). The recessionary expenditure gap is thus $5 billion, the amount by which the aggregate expenditures curve would have to shift upward to realize equilibrium at the full-employment GDP. Graphically, the recessionary expenditure gap is the vertical distance (measured at the full-employment GDP) by which the actual aggregate expenditures schedule $AE_e$ lies below the hypothetical full-employment aggregate expenditures schedule $AE_{e^*}$. In Figure 28.7a, this recessionary expenditure gap is $5 billion. Because the multiplier is 4, there is a $20 billion differential (the recessionary expenditure gap of $5 billion times the multiplier of 4) between the equilibrium GDP and the full-employment GDP. This $20 billion difference is a negative GDP gap—an idea we first developed when discussing cyclical unemployment in Chapter 26.

**Keynes’ Solution to a Recessionary Expenditure Gap**

Keynes pointed to two different policies that a government might pursue to close a recessionary expenditure gap and achieve full employment. The first is to increase government spending. The second is to lower taxes. Both work by increasing aggregate expenditures.

Look back at Figure 28.5. There we showed how an increase in government expenditures $G$ will increase overall aggregate expenditures and, consequently, the equilibrium real GDP. Applying this strategy to the situation in Figure 28.7a, government could completely close the $20 billion negative GDP gap between the initial equilibrium of $490 billion and the economy’s potential output of $510 billion if it increased spending by the $5 billion amount of the recessionary expenditure gap. Given the economy’s multiplier of 4, the $5 billion increase in $G$ would create a $20 billion increase in equilibrium real GDP, thereby bringing the economy to full employment.

Government also could lower taxes to close the recessionary expenditure gap and thus eliminate the negative GDP gap. Look back at Figure 28.6 in which an increase in taxes resulted in lower after-tax consumption spending and a smaller equilibrium real GDP. Keynes simply suggested a reversal of this process: Since an increase in taxes lowers equilibrium real GDP, a decrease in taxes will raise equilibrium GDP. The decrease in taxes will leave consumers with higher after-tax income. That will lead to higher consumption expenditures and an increase in equilibrium real GDP.

But by how much should the government cut taxes? By exactly $6.67 billion. That is because the MPC is .75. The tax cut of $6.67 billion will increase consumers’ after-tax income by $6.67 billion. They will then increase consumption spending by .75 of that amount, or $5 billion. This will increase aggregate expenditures by the $5 billion needed to close the recessionary expenditure gap. The economy’s equilibrium real GDP will rise to its potential output of $510 billion.

But a big warning is needed here: As the economy moves closer to its potential output, it becomes harder to justify Keynes’ assumption that prices are stuck. As the economy closes its negative GDP gap, nearly all workers are employed and nearly all factories are operating at or near full capacity. In such a situation, there is no massive oversupply of productive resources to keep prices from rising. In fact, economists know from real-world experience that in such situations prices are not fully stuck. Instead, they become increasingly flexible as the economy moves nearer to potential output.
FIGURE 28.7 Recessionary and inflationary expenditure gaps. The equilibrium and full-employment GDPs may not coincide. (a) A recessionary expenditure gap is the amount by which aggregate expenditures at the full-employment GDP fall short of those needed to achieve the full-employment GDP. Here, the $5 billion recessionary expenditure gap causes a $20 billion negative GDP gap. (b) An inflationary expenditure gap is the amount by which aggregate expenditures at the full-employment GDP exceed those just sufficient to achieve the full-employment GDP. Here, the inflationary expenditure gap is $5 billion; this overspending produces demand-pull inflation.

QUICK QUIZ FOR FIGURE 28.7

1. In the economy depicted:
   a. the MPS is .50.
   b. the MPC is .75.
   c. the full-employment level of real GDP is $530 billion.
   d. nominal GDP always equals real GDP.

2. The inflationary expenditure gap depicted will cause:
   a. demand-pull inflation.
   b. cost-push inflation.
   c. cyclical unemployment.
   d. frictional unemployment.

3. The recessionary expenditure gap depicted will cause:
   a. demand-pull inflation.
   b. cost-push inflation.
   c. cyclical unemployment.
   d. frictional unemployment.

4. In the economy depicted, the $5 billion inflationary expenditure gap:
   a. expands real GDP to $530 billion.
   b. leaves real GDP at $510 billion but causes inflation.
   c. could be remedied by equal $5 billion increases in taxes and government spending.
   d. implies that real GDP exceeds nominal GDP.

This fact is one of the major limitations of the aggregate expenditures model and is the reason why we will develop a different model that can handle inflation in the next chapter. That being said, it is nevertheless true that the aggregate expenditures model is still very useful despite its inability to handle flexible prices. For instance, as we explained in Chapter 23, even an economy operating near full employment will show sticky or even stuck prices in the short run. In such situations, the intuitions of the aggregate expenditures model will still hold true. The benefit of the aggregate demand–aggregate supply model that we develop in the next chapter is that it also can show us what happens over longer periods, as prices (and wages) become more flexible and are increasingly able to adjust.

**Inflationary Expenditure Gap**

Economists use the term inflationary expenditure gap to describe the amount by which an economy’s aggregate expenditures at the full-employment GDP exceed those just
necessary to achieve the full-employment level of GDP. In Figure 28.7b, there is a $5 billion inflationary expenditure gap at the $510 billion full-employment GDP. This is shown by the vertical distance between the actual aggregate expenditures schedule \( AE_t \) and the hypothetical schedule \( AE_0 \), which would be just sufficient to achieve the $510 billion full-employment GDP. Thus, the inflationary expenditure gap is the amount by which the aggregate expenditures schedule would have to shift downward to realize equilibrium at the full-employment GDP.

But why does the name “inflationary expenditure gap” contain the word inflationary? In particular, what does the situation depicted in Figure 28.7b have to do with inflation? The answer lies in the answer to a different question: Could the economy actually achieve and maintain an equilibrium real GDP that is substantially above the full-employment output level?

The unfortunate answer is no. It is unfortunate because if such a thing were possible, then the government could make real GDP as high as it wanted by simply increasing \( g \) to an arbitrarily high number. Graphically, it could raise the \( AE_t \) curve in Figure 28.7b as far up as it wanted, thereby raising equilibrium real GDP up as high as it wanted. Living standards would skyrocket! But this is not possible because, by definition, all the workers in the economy are fully employed at the full-employment output level. Producing a bit more than the full-employment output level for a few months might be possible if you could convince all the workers to work overtime day after day. But there simply isn’t enough labor to have the economy produce at much more than potential output for any extended period of time.

So what does happen in situations in which aggregate expenditures are so high that the model predicts an equilibrium level of GDP beyond potential output? The answer is twofold. First, the economy ends up producing either at potential output or just above potential output due to the limited supply of labor. Second, the economy experiences demand-pull inflation. With the supply of output limited by the supply of labor, high levels of aggregate expenditures simply act to drive up prices. Nominal GDP will increase because of the higher price level, but real GDP will not. (Key Question 13)

**Application: The U.S. Recession of 2001**

The U.S. economy grew briskly in the last half of the 1990s, with real GDP expanding at about 4 percent annually and the unemployment rate averaging roughly 4.5 percent. The economic boom and low rates of unemployment, however, did not spark inflation, as had been the case in prior business cycles. Exceptionally strong productivity growth in the late 1990s increased the economy’s production capacity and enabled aggregate expenditures to expand without causing inflation. In terms of Figure 28.7b, it was as if the full-employment level of real GDP expanded from $510 billion to $530 billion at the same time the aggregate expenditures curve rose from \( AE_0 \) to \( AE_2 \). So the inflationary expenditure gap of $5 billion never materialized. Between 1995 and 1999, inflation averaged less than 2.5 percent annually.

But the booming economy of the second half of the 1990s produced notable excesses. A large number of ill-conceived Internet-related firms were born, attracting billions of investment dollars. Investment spending surged throughout the economy and eventually added too much production capacity. A stock market “bubble” developed as stock market investing became a national pastime. Consumers increased their household debt to expand their consumption. Some unscrupulous executives engaged in fraudulent business practices to further their own personal interests.

The boom ended in the early 2000s. Hundreds of Internet-related start-up firms folded. Many firms, particularly those in telecommunications and aircraft manufacturing, began to experience severe overcapacity. The stock market bubble burst, erasing billions of dollars of “paper” wealth. Firms significantly reduced their investment spending because of lower estimates of rates of return. In March 2001 aggregate expenditures declined sufficiently to push the economy into its ninth recession since 1950. The unemployment rate rose from 4.2 percent in February 2001 to 5.8 percent in December 2001. In terms of Figure 28.7a, a recessionary expenditure gap emerged. The terrorist attacks of September 11, 2001, damaged consumer confidence and prolonged the recession through 2001. In 2002 the economy resumed economic growth, but the unemployment rate remained a stubbornly high 6 percent at the end of 2002. Even so, the recession of 2001 was relatively mild by historical standards and in view of the unusual set of circumstances.

**Application: Full-Employment Output, with Large Negative Net Exports**

In 2007 the United States had negative net exports of $560 billion in real (2000) dollar terms, yet its actual (real) GDP of $11,567 billion roughly matched its potential (real) GDP of $11,687. The economy experienced neither a recessionary expenditure gap nor an inflationary expenditure
The Aggregate Expenditure Theory Emerged as a Critique of Classical Economics and as a Response to the Great Depression.

Until the Great Depression of the 1930s, many prominent economists, including David Ricardo (1772–1823) and John Stuart Mill (1806–1873), believed that the market system would ensure full employment of an economy’s resources. These so-called classical economists acknowledged that now and then abnormal circumstances such as wars, political upheavals, droughts, speculative crises, and gold rushes would occur, reflecting the economy from full-employment status. But when such deviations occurred, the economy would automatically adjust and soon return to full-employment output. For example, a slump in output and employment would result in lower prices, wages, and interest rates, which in turn would increase consumer spending, employment, and investment spending. Any excess supply of goods and workers would soon be eliminated.

Classical macroeconomists denied that the level of spending in an economy could be too low to bring about the purchase of the entire full-employment output. They based their denial of inadequate spending in part on Say’s law, attributed to the nineteenth-century French economist J. B. Say (1767–1832). This law is the disarmingly simple idea that the very act of producing goods generates income equal to the value of the goods produced. The production of any output automatically provides the income needed to buy that output. More succinctly stated, supply creates its own demand.

Say’s law can best be understood in terms of a barter economy. A woodworker, for example, produces or supplies furniture as a means of buying or demanding the food and clothing produced by other workers. The woodworker’s supply of furniture is the income that he will “spend” to satisfy his demand for other goods. The goods he buys (demands) will have a total value exactly equal to the goods he produces (supplies). And so it is for other producers and for the entire economy. Demand must be the same as supply!

Assuming that the composition of output is in accord with consumer preferences, all markets would be cleared of their outputs. It would seem that all firms need to do to sell a full-employment output is to produce that level of output. Say’s law guarantees there will be sufficient spending to purchase it all.

The Great Depression of the 1930s called into question the theory that supply creates its own demand (Say’s law). In the United States, real GDP declined by 27 percent and the unemployment rate rocketed to nearly 25 percent. Other nations experienced similar impacts. And cyclical unemployment lingered for a decade. An obvious inconsistency exists between a theory that says that unemployment is virtually impossible and the actual occurrence of a 10-year siege of substantial unemployment.

In 1936 British economist John Maynard Keynes (1883–1946) explained why cyclical unemployment could occur in a market economy. In his General Theory of Employment, Interest, and Money, Keynes attacked the foundations of classical theory and developed the ideas underlying the aggregate expenditures model. Keynes disputed Say’s law, pointing out that not all income need be spent in the same period that it is produced. Investment spending, in particular, is volatile, said Keynes. A substantial decline in investment will lead to insufficient total spending. Unsold goods will accumulate in producers’ warehouses, and producers will respond by reducing their output and discharging workers. A recession or depression will result, and widespread cyclical unemployment will occur. Moreover, said Keynes, recessions or depressions are not likely to correct themselves. In contrast to the more laissez-faire view of the classical economists, Keynes argued that government should play an active role in stabilizing the economy.
gap. It was fully employed, with an unemployment rate of 4.6 percent.

How could this outcome be? Doesn’t the aggregate expenditure model suggest that large negative net exports reduce aggregate expenditures and therefore decrease equilibrium GDP, presumably to below its potential level? That undesirable outcome is possible, other things equal. But in 2007 large domestic consumption, investment, and government expenditures fully made up for the $560 billion of negative net exports. In 2007, U.S. consumers spent (in real terms) $8267 billion. Businesses invested $1831 billion, even though total U.S. saving was negative. The Federal government spent $2022 billion, financing more than one-fourth of that amount through borrowing.

Negative net exports—even large ones—do not preclude achieving full-employment output. Aggregate expenditures in total were sufficient in 2007 to purchase the potential output, with no unplanned changes in inventories. The $C + I_s + G$ expenditures were financed, in part, by foreigners whose large trade surpluses with the United States left them with equally large quantities of U.S. dollars. People and business abroad willingly lent many of those dollars to the United States in anticipation of high returns. That foreign lending in turn helped finance the high U.S. domestic spending.

**QUICK REVIEW 28.3**

- Government purchases shift the aggregate expenditures schedule upward and raise the equilibrium GDP.
- Taxes reduce disposable income, lower consumption spending and saving, shift the aggregate expenditures schedule downward, and reduce the equilibrium GDP.
- A recessionary expenditure gap is the amount by which an economy’s aggregate expenditures schedule must shift upward to achieve the full-employment GDP; an inflationary expenditure gap is the amount by which the economy’s aggregate expenditures schedule must shift downward to achieve full-employment GDP and eliminate demand-pull inflation.

**Summary**

1. The aggregate expenditures model views the total amount of spending in the economy as the primary factor determining the level of real GDP that the economy will produce. The model assumes that prices are fixed. Keynes made this assumption to reflect the general circumstances of the Great Depression and the fact that there existed such huge over-supplies of labor and other productive resources that increases in spending were unlikely to drive up prices.

2. For a private closed economy the equilibrium level of GDP occurs when aggregate expenditures and real output are equal or, graphically, where the $C + I_s$ line intersects the 45° line. At any GDP greater than equilibrium GDP, real output will exceed aggregate spending, resulting in unplanned investment in inventories and eventual declines in output and income (GDP). At any below-equilibrium GDP, aggregate expenditures will exceed real output, resulting in unplanned disinvestment in inventories and eventual increases in GDP.

3. At equilibrium GDP, the amount households save (leakages) and the amount businesses plan to invest (injections) are equal. Any excess of saving over planned investment will cause a shortage of total spending, forcing GDP to fall. Any excess of planned investment over saving will cause an excess of total spending, inducing GDP to rise. The change in GDP will in both cases correct the discrepancy between saving and planned investment.

4. At equilibrium GDP, there are no unplanned changes in inventories. When aggregate expenditures diverge from real GDP, an unplanned change in inventories occurs. Unplanned increases in inventories are followed by a cutback in production and a decline of real GDP. Unplanned decreases in inventories result in an increase in production and a rise of GDP.

5. Actual investment consists of planned investment plus unplanned changes in inventories and is always equal to saving.

6. A shift in the investment schedule (caused by changes in expected rates of return or changes in interest rates) shifts the aggregate expenditures curve and causes a new equilibrium level of real GDP. Real GDP changes by more than the amount of the initial change in investment. This multiplier effect ($\Delta GDP/\Delta I$) accompanies both increases and decreases in aggregate expenditures and also applies to changes in net exports ($X$) and government purchases ($G$).

7. The net export schedule in the model of the open economy relates net exports (exports minus imports) to levels of real GDP. For simplicity, we assume that the level of net exports is the same at all levels of real GDP.
8. Positive net exports increase aggregate expenditures to a higher level than they would if the economy were “closed” to international trade. Negative net exports decrease aggregate expenditures relative to those in a closed economy, decreasing equilibrium real GDP by a multiple of their amount. Increases in exports or decreases in imports have an expansionary effect on real GDP, while decreases in exports or increases in imports have a contractionary effect.

9. Government purchases in the model of the mixed economy shift the aggregate expenditures schedule upward and raise GDP.

10. Taxation reduces disposable income, lowers consumption and saving, shifts the aggregate expenditures curve downward, and reduces equilibrium GDP.

11. In the complete aggregate expenditures model, equilibrium GDP occurs where \( C_s + I^s + X_s + G = GDP \). At the equilibrium GDP, leakages of after-tax saving (\( S_s \)), imports (\( M \)), and taxes (\( T \)) equal injections of investment (\( I^s \)), exports (\( X \)), and government purchases (\( G \)): \( S_s + M + T = I^s + X_s + G \). Also, there are no unplanned changes in inventories.

12. The equilibrium GDP and the full-employment GDP may differ. A recessionary expenditure gap is the amount by which aggregate expenditures at the full-employment GDP fall short of those needed to achieve the full-employment GDP. This gap produces a negative GDP gap (actual GDP minus potential GDP). An inflationary expenditure gap is the amount by which aggregate expenditures at the full-employment GDP exceed those just sufficient to achieve the full-employment GDP. This gap causes demand-pull inflation.

13. Keynes believed that prices during the Great Depression were relatively inflexible at low levels due to high unemployment. In such a situation, the government could increase real GDP (by increasing government expenditures or lowering taxes) without having to worry about inflation. By contrast, if an economy’s GDP gap is more moderate so that there are not such high rates of unemployment, then it is less likely that prices will be sticky. The closer an economy is to its full-employment output level, the more likely it is that any increase in aggregate expenditures will lead to inflation along with any increase in real GDP.

Terms and Concepts

planned investment
investment schedule
aggregate expenditures schedule
equilibrium GDP

leakage
injection
unplanned changes in inventories
net exports

lump-sum tax
recessionary expenditure gap
inflationary expenditure gap

Study Questions

1. What is an investment schedule and how does it differ from an investment demand curve? LO1

2. KEY QUESTION Assuming the level of investment is $16 billion and independent of the level of total output, complete the accompanying table and determine the equilibrium levels of output and employment in this private closed economy. What are the sizes of the MPC and MPS? LO1

<table>
<thead>
<tr>
<th>Possible Levels of Employment, Millions</th>
<th>Real Domestic Output (( GDP = DI ), Billions)</th>
<th>Consumption, Billions</th>
<th>Saving, Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>$240</td>
<td>$244</td>
<td>$____</td>
</tr>
<tr>
<td>45</td>
<td>260</td>
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<td>324</td>
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<td>340</td>
<td>____</td>
</tr>
<tr>
<td>75</td>
<td>380</td>
<td>356</td>
<td>____</td>
</tr>
<tr>
<td>80</td>
<td>400</td>
<td>372</td>
<td>____</td>
</tr>
</tbody>
</table>

3. Using the consumption and saving data in question 2 and assuming investment is $16 billion, what are saving and planned investment at the $380 billion level of domestic output? What are saving and actual investment at that level? What are saving and planned investment at the $300 billion level of domestic output? What are the levels of saving and actual investment? Use the concept of unplanned investment to explain adjustments toward equilibrium from both the $380 billion and the $300 billion levels of domestic output. LO1

4. Why is saving called a leakage? Why is planned investment called an injection? Why must saving equal planned investment at equilibrium GDP in the private closed economy? Are unplanned changes in inventories rising, falling, or constant at equilibrium GDP? Explain. LO2

5. What effect will each of the changes listed in Study Question 3 of Chapter 27 have on the equilibrium level of GDP in the private closed economy? Explain your answers. LO3

6. By how much will GDP change if firms increase their investment by $8 billion and the MPC is .80? If the MPC is .67? LO3

7. Depict graphically the aggregate expenditures model for a private closed economy. Now show a decrease in the aggregate
8. Suppose that a certain country has an MPC of .9 and a real GDP of $400 billion. If its investment spending decreases by $4 billion, what will be its new level of real GDP? LO3

9. **KEY QUESTION** The data in columns 1 and 2 in the accompanying table are for a private closed economy: LO4
   a. Use columns 1 and 2 to determine the equilibrium GDP for this hypothetical economy.

<table>
<thead>
<tr>
<th>(1) Real Domestic Output (GDP = DI), Billions</th>
<th>(2) Aggregate Expenditures, Private Closed Economy, Billions</th>
<th>(3) Exports, Billions</th>
<th>(4) Imports, Billions</th>
<th>(5) Net Exports, Billions</th>
<th>(6) Aggregate Expenditures, Private Open Economy, Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$200</td>
<td>$240</td>
<td>$20</td>
<td>$30</td>
<td>$____</td>
<td>$____</td>
</tr>
<tr>
<td>250</td>
<td>280</td>
<td>20</td>
<td>30</td>
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<td>______</td>
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<td>300</td>
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<tr>
<td>400</td>
<td>400</td>
<td>20</td>
<td>30</td>
<td>______</td>
<td>______</td>
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<tr>
<td>450</td>
<td>440</td>
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<td>30</td>
<td>______</td>
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</tr>
<tr>
<td>500</td>
<td>480</td>
<td>20</td>
<td>30</td>
<td>______</td>
<td>______</td>
</tr>
<tr>
<td>550</td>
<td>520</td>
<td>20</td>
<td>30</td>
<td>______</td>
<td>______</td>
</tr>
</tbody>
</table>

10. Assume that, without taxes, the consumption schedule of an economy is as follows: LO4

<table>
<thead>
<tr>
<th>GDP, Billions</th>
<th>Consumption, Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100</td>
<td>$120</td>
</tr>
<tr>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>300</td>
<td>280</td>
</tr>
<tr>
<td>400</td>
<td>360</td>
</tr>
<tr>
<td>500</td>
<td>440</td>
</tr>
<tr>
<td>600</td>
<td>520</td>
</tr>
<tr>
<td>700</td>
<td>600</td>
</tr>
</tbody>
</table>

   a. Graph this consumption schedule and determine the MPC.
   b. Assume now that a lump-sum tax is imposed such that the government collects $10 billion in taxes at all levels of GDP. Graph the resulting consumption schedule and compare the MPC and the multiplier with those of the pretax consumption schedule.

11. Explain graphically the determination of equilibrium GDP for a private economy through the aggregate expenditures model. Now add government purchases (any amount you choose) to your graph, showing its impact on equilibrium GDP. Finally, add taxation (any amount of lump-sum tax that you choose) to your graph and show its effect on equilibrium GDP. Looking at your graph, determine whether equilibrium GDP has increased, decreased, or stayed the same given the sizes of the government purchases and taxes that you selected. LO4

12. **KEY QUESTION** Refer to columns 1 and 6 in the table for question 9. Incorporate government into the table by assuming that it plans to tax and spend $20 billion at each level of GDP. Also assume that the tax is a personal tax and that government spending does not induce a shift in the private aggregate expenditures schedule. Compute and explain the change in equilibrium GDP caused by the addition of government. LO4

13. **KEY QUESTION** Refer to the table on the next page in answering the questions that follow: LO5
   a. If full employment in this economy is 130 million, will there be an inflationary expenditure gap or a recessionary expenditure gap? What will be the consequence of this gap? By how much would aggregate expenditures in column 3 have to change at each level of GDP to eliminate the inflationary expenditure gap or the recessionary expenditure gap? Explain. What is the multiplier in this example?
   b. Will there be an inflationary expenditure gap or a recessionary expenditure gap if the full-employment level of output is $500 billion? Explain the consequences. By
how much would aggregate expenditures in column 3 have to change at each level of GDP to eliminate the gap? What is the multiplier in this example?
c. Assuming that investment, net exports, and government expenditures do not change with changes in real GDP, what are the sizes of the MPC, the MPS, and the multiplier?

<table>
<thead>
<tr>
<th>(1) Possible Levels of Employment, Millions</th>
<th>(2) Real Domestic Output, Billions</th>
<th>(3) Aggregate Expenditures $(C_a + I_g + X_n + G)$, Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>$500</td>
<td>$520</td>
</tr>
<tr>
<td>100</td>
<td>550</td>
<td>560</td>
</tr>
<tr>
<td>110</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>120</td>
<td>650</td>
<td>640</td>
</tr>
<tr>
<td>130</td>
<td>700</td>
<td>680</td>
</tr>
</tbody>
</table>

14. ADVANCED ANALYSIS Assume that the consumption schedule for a private open economy is such that consumption $C = 50 + 0.8Y$. Assume further that planned investment $I_g$ and net exports $X_n$ are independent of the level of real GDP and constant at $I_g = 30$ and $X_n = 10$. Recall also that, in equilibrium, the real output produced ($Y$) is equal to aggregate expenditures: $Y = C + I_g + X_n$. **LO4**
   a. Calculate the equilibrium level of income or real GDP for this economy.
   b. What happens to equilibrium $Y$ if $I_g$ changes to 10? What does this outcome reveal about the size of the multiplier?

15. Answer the following questions, which relate to the aggregate expenditures model: **LO4, LO5**
   a. If $C_a$ is $100, I_g$ is $50, X_n$ is $−10$, and $G$ is $30$, what is the economy’s equilibrium GDP?
   b. If real GDP in an economy is currently $200, C_a$ is $100, I_g$ is $50, X_n$ is $−10$, and $G$ is $30$, will the economy’s real GDP rise, fall, or stay the same?
   c. Suppose that full-employment (and full-capacity) output in an economy is $200$. If $C_a$ is $150, I_g$ is $50, X_n$ is $−10$, and $G$ is $30$, what will be the macroeconomic result?

16. LAST WORD What is Say’s law? How does it relate to the view held by classical economists that the economy generally will operate at a position on its production possibilities curve (Chapter 1)? Use production possibilities analysis to demonstrate Keynes’ view on this matter.

Web-Based Questions

1. **THE MULTIPLIER—CALCULATING HYPOTHETICAL CHANGES IN GDP** Go to the Bureau of Economic Analysis at www.bea.gov, and select Interactive Data Tables, which is listed under Publications. On that page, select National Income and Product Accounts. Go to the List of All NIPA Tables and then find Table 1.1.3, which contains the most recent values for nominal GDP $− C_a + I_g + G + (X − M)$. Assume that the MPC is .75 and that, for each of the following, the values of the initial variables are those you just discovered. Determine the new value of GDP if, other things equal, (a) investment increased by 5 percent, (b) imports increased by 5 percent while exports increased by 5 percent, (c) consumption increased by 5 percent, and (d) government spending increased by 5 percent. Which of the changes, (a) through (d), caused the greatest change in GDP in absolute dollars?

2. **GDP GAP AND EXPENDITURE GAP** The St. Louis Federal Reserve Bank at www.research.stlouisfed.org/fred2 provides data on both real GDP (chained 2000 dollars) and real potential GDP for the United States. To get to the data, first click on Gross Domestic Product (GDP) and Components. Then click on GDP/GNP. What was potential GDP for the third quarter of 2001? What was the actual level of real GDP for that quarter? What was the size difference between the two—the negative GDP gap? If the multiplier was 2 in that period, what was the size of the economy’s recessionary expenditure gap?
IN THIS CHAPTER YOU WILL LEARN:

1 About aggregate demand (AD) and the factors that cause it to change.
2 About aggregate supply (AS) and the factors that cause it to change.
3 How AD and AS determine an economy’s equilibrium price level and level of real GDP.
4 How the AD-AS model explains periods of demand-pull inflation, cost-push inflation, and recession.
5 (Appendix) How the aggregate demand curve relates to the aggregate expenditures model.

Aggregate Demand and Aggregate Supply

In early 2000, Alan Greenspan, then chair of the Federal Reserve, made the following statement:

Through the so-called wealth effect, [recent stock market gains] have tended to foster increases in aggregate demand beyond the increases in supply. It is this imbalance . . . that contains the potential seeds of rising inflationary . . . pressures that could undermine the current expansion. Our goal [at the Federal Reserve] is to extend the expansion by containing its imbalances and avoiding the very recession that would complete the business cycle.¹

Although the Federal Reserve held inflation in check, it did not accomplish its goal of extending the decade-long economic expansion. In March 2001 the U.S. economy experienced a recession and the

expansionary phase of the business cycle ended. Recovery and economic expansion resumed in 2002 and picked up considerable strength over the next couple of years so that the economy was again operating at full employment by late 2004. Full employment continued through 2007.

We will say more about recession and expansion later. Our immediate focus is the terminology in the Greenspan quotation, which is precisely the language of the aggregate demand–aggregate supply model (AD-AS model). The AD-AS model—the subject of this chapter—enables us to analyze changes in real GDP and the price level simultaneously. The AD-AS model thus provides keen insights on inflation, recession, and unemployment. In later chapters, we will see that it also nicely depicts macroeconomic stabilization policies, such as those used in 2008 to try to prevent recession.

Aggregate Demand

Aggregate demand is a schedule or curve that shows the amounts of real output (real GDP) that buyers collectively desire to purchase at each possible price level. The relationship between the price level (as measured by the GDP price index) and the amount of real GDP demanded is inverse or negative: When the price level rises, the quantity of real GDP demanded decreases; when the price level falls, the quantity of real GDP demanded increases.

Aggregate Demand Curve

The inverse relationship between the price level and real GDP is shown in Figure 29.1, where the aggregate demand curve AD slopes downward, as does the demand curve for an individual product.

Why the downward slope? The explanation is not the same as that for why the demand for a single product slopes downward. That explanation centered on the income effect and the substitution effect. When the price of an individual product falls, the consumer’s (constant) nominal income allows a larger purchase of the product (the income effect). And, as price falls, the consumer wants to buy more of the product because it becomes relatively less expensive than other goods (the substitution effect).

But these explanations do not work for aggregates. In Figure 29.1, when the economy moves down its aggregate demand curve, it moves to a lower general price level. But our circular flow model tells us that when consumers pay lower prices for goods and services, less nominal income flows to resource suppliers in the form of wages, rents, interest, and profits. As a result, a decline in the price level does not necessarily mean an increase in the nominal income of the economy as a whole. Thus, a decline in the price level need not produce an income effect, where more output is purchased because lower nominal prices leave buyers with greater real income.

Similarly, in Figure 29.1, prices in general are falling as we move down the aggregate demand curve, so the rationale for the substitution effect (where more of a specific product is purchased because it becomes cheaper relative to all other products) is not applicable. There is no overall substitution effect among domestically produced goods when the price level falls.

If the conventional substitution and income effects do not explain the downward slope of the aggregate demand curve, what does? The explanation rests on three effects of a price-level change.

Real-Balances Effect A change in the price level produces a real-balances effect. Here is how it works: A higher price level reduces the real value or purchasing power of the public’s accumulated savings balances. In particular, the real value of assets with fixed money values, such as savings accounts or bonds, diminishes. Because a higher price level erodes the purchasing power of such assets, the
Changes in Aggregate Demand

Other things equal, a change in the price level will change the amount of aggregate spending and therefore change the amount of real GDP demanded by the economy. Movements along a fixed aggregate demand curve represent these changes in real GDP. However, if one or more of those “other things” change, the entire aggregate demand curve will shift. We call these other things determinants of aggregate demand or, less formally, aggregate demand shifters. They are listed in Figure 29.2.

Changes in aggregate demand involve two components:

- A change in one of the determinants of aggregate demand that directly changes the amount of real GDP demanded.
- A multiplier effect that produces a greater ultimate change in aggregate demand than the initiating change in spending.

In Figure 29.2, the full rightward shift of the curve from \( AD_1 \) to \( AD_2 \) shows an increase in aggregate demand, separated into these two components. The horizontal distance between \( AD_1 \) and the broken curve to its right illustrates an initial increase in spending, say, $5 billion of added investment. If the economy’s MPC is .75, for example, then the simple multiplier is 4. So the aggregate demand curve shifts rightward from \( AD_1 \) to \( AD_7 \)—four times the distance between \( AD_1 \) and the broken line. The multiplier process magnifies the initial change in spending into successive rounds of new consumption spending. After the shift, $20 billion (= $5 \times 4) of additional real goods and services are demanded at each price level.

Similarly, the leftward shift of the curve from \( AD_1 \) to \( AD_3 \) shows a decrease in aggregate demand, the lesser amount of real GDP demanded at each price level. It also involves the initial decline in spending (shown as the horizontal distance between \( AD_1 \) and the dashed line to its left), followed by multiplied declines in consumption spending and the ultimate leftward shift to \( AD_3 \).

Let’s examine each of the determinants of aggregate demand listed in Figure 29.2.

Consumer Spending

Even when the U.S. price level is constant, domestic consumers may alter their purchases of U.S.-produced real output. If those consumers decide to buy more output at each price level, the aggregate demand curve will shift to the right, as from \( AD_1 \) to \( AD_2 \) in Figure 29.2. If they decide to buy less output, the aggregate demand curve will shift to the left, as from \( AD_1 \) to \( AD_3 \).

Several factors other than a change in the price level may change consumer spending and therefore shift the...
aggregate demand curve. As Figure 29.2 shows, those factors are real consumer wealth, consumer expectations, household debt, and taxes. Because our discussion here parallels that of Chapter 27, we will be brief.

**Consumer Wealth** Consumer wealth is the total dollar value of all assets owned by consumers in the economy less the dollar value of their liabilities (depts). Assets include stocks, bonds, and real estate. Liabilities include mortgages, car loans, and credit card balances.

Consumer wealth sometimes changes suddenly and unexpectedly due to surprising changes in asset values. An unforeseen increase in the stock market is a good example. The increase in wealth prompts pleasantly surprised consumers to save less and buy more out of their current incomes than they had previously been planning. The resulting increase in consumer spending—the so-called wealth effect—shifts the aggregate demand curve to the right. In contrast, an unexpected decline in asset values will cause an unanticipated reduction in consumer wealth at each price level. As consumers tighten their belts in response to the bad news, a “reverse wealth effect” sets in. Unpleasantly surprised consumers increase savings and reduce consumption, thereby shifting the aggregate demand curve to the left.

**Household Borrowing** Consumers can increase their consumption spending by borrowing. Doing so shifts the aggregate demand curve to the right. By contrast, a decrease in borrowing for consumption purposes shifts the aggregate demand curve to the left. The aggregate demand curve will also shift to the left if consumers increase their savings rates in order to pay off their debts. With more money flowing to debt repayment, consumption expenditures decline and the AD curve shifts left.

**Consumer Expectations** Changes in expectations about the future may alter consumer spending. When people expect their future real incomes to rise, they tend to spend more of their current incomes. Thus, current consumption spending increases (current saving falls) and the aggregate demand curve shifts to the right. Similarly, a widely held expectation of surging inflation in the near future may increase aggregate demand today because consumers will want to buy products before their prices escalate. Conversely, expectations of lower future income or lower future prices may reduce current consumption and shift the aggregate demand curve to the left.

**Personal Taxes** A reduction in personal income tax rates raises take-home income and increases consumer purchases at each possible price level. Tax cuts shift the aggregate demand curve to the right. Tax increases reduce consumption spending and shift the curve to the left.
Investment Spending
Investment spending (the purchase of capital goods) is a second major determinant of aggregate demand. A decline in investment spending at each price level will shift the aggregate demand curve to the left. An increase in investment spending will shift it to the right. In Chapter 27 we saw that investment spending depends on the real interest rate and the expected return from investment.

Real Interest Rates
Other things equal, an increase in real interest rates will lower investment spending and reduce aggregate demand. We are not referring here to the “interest-rate effect” that results from a change in the price level. Instead, we are identifying a change in the real interest rate resulting from, say, a change in a nation’s money supply. An increase in the money supply lowers the interest rate, thereby increasing investment and aggregate demand. A decrease in the money supply raises the interest rate, reducing investment and decreasing aggregate demand.

Expected Returns
Higher expected returns on investment projects will increase the demand for capital goods and shift the aggregate demand curve to the right. Alternatively, declines in expected returns will decrease investment and shift the curve to the left. Expected returns, in turn, are influenced by several factors:

- **Expectations about future business conditions** If firms are optimistic about future business conditions, they are more likely to forecast high rates of return on current investment and therefore may invest more today. On the other hand, if they think the economy will deteriorate in the future, they will forecast low rates of return and perhaps will invest less today.

- **Technology** New and improved technologies enhance expected returns on investment and thus increase aggregate demand. For example, recent advances in microbiology have motivated pharmaceutical companies to establish new labs and production facilities.

- **Degree of excess capacity** A rise in excess capacity—unused capital—will reduce the expected return on new investment and hence decrease aggregate demand. Other things equal, firms operating factories at well below capacity have little incentive to build new factories. But when firms discover that their excess capacity is dwindling or has completely disappeared, their expected returns on new investment in factories and capital equipment rise. Thus, they increase their investment spending, and the aggregate demand curve shifts to the right.

- **Business taxes** An increase in business taxes will reduce after-tax profits from capital investment and lower expected returns. So investment and aggregate demand will decline. A decrease in business taxes will have the opposite effects.

The variability of interest rates and expected returns makes investment highly volatile. In contrast to consumption, investment spending rises and falls often, independent of changes in total income. Investment, in fact, is the least stable component of aggregate demand.

Government Spending
Government purchases are the third determinant of aggregate demand. An increase in government purchases (for example, more military equipment) will shift the aggregate demand curve to the right, as long as tax collections and interest rates do not change as a result. In contrast, a reduction in government spending (for example, fewer transportation projects) will shift the curve to the left.

Net Export Spending
The final determinant of aggregate demand is net export spending. Other things equal, higher U.S. exports mean an increased foreign demand for U.S. goods. So a rise in net exports (higher exports relative to imports) shifts the aggregate demand curve to the right. In contrast, a decrease in U.S. net exports shifts the aggregate demand curve leftward. (These changes in net exports are not those prompted by a change in the U.S. price level—those associated with the foreign purchases effect. The changes here are shifts of the AD curve, not movements along the AD curve.)

What might cause net exports to change, other than the price level? Two possibilities are changes in national income abroad and changes in exchange rates.

National Income Abroad
Rising national income abroad encourages foreigners to buy more products, some of which are made in the United States. U.S. net exports thus rise, and the U.S. aggregate demand curve shifts to the right. Declines in national income abroad do the opposite: They reduce U.S. net exports and shift the U.S. aggregate demand curve to the left.

Exchange Rates
Changes in the dollar’s exchange rate—the price of foreign currencies in terms of the U.S. dollar—may affect U.S. exports and therefore aggregate demand. Suppose the dollar depreciates in terms of the euro (meaning the euro appreciates in terms of the dollar). The new, relatively lower value of dollars and higher value of euros enables European consumers to obtain more dollars
with each euro. From their perspective, U.S. goods are now less expensive; it takes fewer euros to obtain them. So European consumers buy more U.S. goods, and U.S. exports rise. But American consumers can now obtain fewer euros for each dollar. Because they must pay more dollars to buy European goods, Americans reduce their imports. U.S. exports rise and U.S. imports fall. Conclusion: Dollar depreciation increases net exports (imports go down; exports go up) and therefore increases aggregate demand.

Dollar appreciation has the opposite effects: Net exports fall (imports go up; exports go down) and aggregate demand declines.

### QUICK REVIEW 29.1

- Aggregate demand reflects an inverse relationship between the price level and the amount of real output demanded.
- Changes in the price level create real-balances, interest-rate, and foreign purchases effects that explain the downward slope of the aggregate demand curve.
- Changes in one or more of the determinants of aggregate demand (Figure 29.2) alter the amounts of real GDP demanded at each price level; they shift the aggregate demand curve. The multiplier effect magnifies initial changes in spending into larger changes in aggregate demand.
- An increase in aggregate demand is shown as a rightward shift of the aggregate demand curve; a decrease, as a leftward shift of the curve.

### Aggregate Supply

**Aggregate supply** is a schedule or curve showing the relationship between the price level and the amount of real domestic output that firms in the economy produce. This relationship varies depending on the time horizon and how quickly output prices and input prices can change. We will define three time horizons:

- In the **immediate short run**, both input prices as well as output prices are fixed.
- In the **short run**, input prices are fixed, but output prices can vary.
- In the **long run**, input prices as well as output prices can vary.

In Chapter 23, we discussed both the immediate short run and the long run in terms of how an automobile maker named Bizzler Auto responds to changes in the demand for its new car, the Prion. Here we extend the logic of that chapter to the economy as a whole in order to discuss how total output varies with the price level in the immediate short run, the short run, and the long run. As you will see, the relationship between the price level and total output is different in each of the three time horizons because input prices are stickier than output prices. While both become more flexible as time passes, output prices usually adjust more rapidly.

### Aggregate Supply in the Immediate Short Run

Depending on the type of firm, the immediate short run can last anywhere from a few days to a few months. It lasts as long as both input prices and output prices stay fixed. Input prices are fixed in both the immediate short run and the short run by contractual agreements. In particular, 75 percent of the average firm’s costs are wages and salaries—and these are almost always fixed by labor contracts for months or years at a time. As a result, they are usually fixed for a much longer duration than output prices, which can begin to change within a few days or a few months depending upon the type of firm.

That being said, output prices are also typically fixed in the immediate short run. This is most often caused by firms setting fixed prices for their customers and then agreeing to supply whatever quantity demanded results at those fixed prices. For instance, once an appliance manufacturer sets its annual list prices for refrigerators, stoves, ovens, and microwaves, it is obligated to supply however many or few appliances customers want to buy at those prices. Similarly, a catalogue company is obliged to sell however much customers want to buy of its products at the prices listed in its current catalogue. And it is obligated to supply those quantities demanded until it sends out its next catalogue.

With output prices fixed and firms selling however much customers want to purchase at those fixed prices, the immediate-short-run aggregate supply curve $\text{AS}_{\text{ISR}}$ is a horizontal line, as shown in Figure 29.3. The $\text{AS}_{\text{ISR}}$ curve is horizontal at the overall price level $P_1$, which is calculated from all of the individual prices set by the various firms in the economy. Its horizontal shape implies that the total amount of output supplied in the economy depends directly on the volume of spending that results at price level $P_1$. If total spending is low at price level $P_1$, firms will supply a small amount to match the low level of spending. If total spending is high at price level $P_1$, they will supply a high level of output to match the high level of spending. The amount of output that results may be higher than or lower than the economy’s full-employment output level $Q_\text{f}$. Notice, however, that firms will respond in this manner to changes in total spending only as long as output
prices remain fixed. As soon as firms are able to change their product prices, they can respond to changes in aggregate spending not only by increasing or decreasing output but also by raising or lowering prices. This is the situation that leads to the upward-sloping short-run aggregate supply curve that we discuss next.

Aggregate Supply in the Short Run
The short run begins after the immediate short run ends. As it relates to macroeconomics, the short run is a period of time during which output prices are flexible, but input prices are either totally fixed or highly inflexible.

These assumptions about output prices and input prices are general—they relate to the economy in the aggregate. Naturally, some input prices are more flexible than others. Since gasoline prices are quite flexible, a package delivery firm like UPS that uses gasoline as an input will have at least one very flexible input price. On the other hand, wages at UPS are set by five-year labor contracts negotiated with its drivers’ union, the Teamsters. Because wages are the firm’s largest and most important input cost, it is the case that, overall, UPS faces input prices that are inflexible for several years at a time. Thus, its “short run”—during which it can change the shipping prices that it charges its customers but during which it must deal with substantially fixed input prices—is actually quite long. Keep this in mind as we derive the short-run aggregate supply for the entire economy. Its applicability does not depend on some arbitrary definition of how long the “short run” should be. Instead, the short-run for which the model is relevant is any period of time during which output prices are flexible, but input prices are fixed or nearly fixed.

As illustrated in Figure 29.4, the short-run aggregate supply curve AS slopes upward because, with input prices fixed, changes in the price level will raise or lower real firm profits. To see how this works, consider an economy that has only a single multiproduct firm called Mega Buzzer and in which the firm’s owners must receive a real profit of $20 in order to produce the full-employment output of 100 units. Assume the owner’s only input (aside from entrepreneurial talent) is 10 units of hired labor at $8 per worker, for a total wage cost of $80. Also, assume that the 100 units of output sell for $1 per unit, so total revenue is $100. Mega Buzzer’s nominal profit is $20 (= $100 − $80), and using the $1 price to designate the base-price index of 100, its real profit is also $20 (= $20/1.00). Well and good; the full-employment output is produced.

Next consider what will happen if the price of Mega Buzzer’s output doubles. The doubling of the price level will boost total revenue from $100 to $200, but since we are discussing the short run during which input prices are fixed, the $8 nominal wage for each of the 10 workers will remain unchanged so that total costs stay at $80. Nominal profit will rise from $20 (= $100 − $80) to

FIGURE 29.4 The aggregate supply curve (short run). The up-sloping aggregate supply curve AS indicates a direct (or positive) relationship between the price level and the amount of real output that firms will offer for sale. The AS curve is relatively flat below the full-employment output because unemployed resources and unused capacity allow firms to respond to price-level rises with large increases in real output. It is relatively steep beyond the full-employment output because resource shortages and capacity limitations make it difficult to expand real output as the price level rises.
$120 (= $200 − $80). Dividing that $120 profit by the new price index of 200 (= 2.0 in hundredths), we find that Mega Buzzer’s real profit is now $60. The rise in the real reward from $20 to $60 prompts the firm (economy) to produce more output. Conversely, price-level declines reduce real profits and cause the firm (economy) to reduce its output. So, in the short run, there is a direct, or positive, relationship between the price level and real output. When the price level rises, real output rises and when the price level falls, real output falls. The result is an upward-sloping short-run aggregate supply curve.

Notice, however, that the slope of the short-run aggregate supply curve is not constant. It is relatively flat at outputs below the full-employment output level $Q_f$ and relatively steep at outputs above it. This has to do with the fact that per-unit production costs underlie the short-run aggregate supply curve. Recall from Chapter 26 that

$$\text{Per-unit production cost} = \frac{\text{total input cost}}{\text{units of output}}$$

The per-unit production cost of any specific level of output establishes that output’s price level because the associated price level must cover all the costs of production, including profit “costs.”

As the economy expands in the short run, per-unit production costs generally rise because of reduced efficiency. But the extent of that rise depends on where the economy is operating relative to its capacity. When the economy is operating below its full-employment output, it has large amounts of unused machinery and equipment and large numbers of unemployed workers. Firms can put these idle human and property resources back to work with little upward pressure on per-unit production costs. And as output expands, few if any shortages of inputs or production bottlenecks will arise to raise per-unit production costs. That is why the slope of the short-run aggregate supply curve increases only slowly at output levels below the full-employment output level $Q_f$.

On the other hand, when the economy is operating beyond $Q_f$, the vast majority of its available resources are already employed. Adding more workers to a relatively fixed number of highly used capital resources such as plant and equipment creates congestion in the workplace and reduces the efficiency (on average) of workers. Adding more capital, given the limited number of available workers, leaves equipment idle and reduces the efficiency of capital. Adding more land resources when capital and labor are highly constrained reduces the efficiency of land resources. Under these circumstances, total input costs rise more rapidly than total output. The result is rapidly rising per-unit production costs that give the short-run aggregate supply curve its rapidly increasing slope at output levels beyond $Q_f$.

**Aggregate Supply in the Long Run**

In macroeconomics, the long run is the time horizon over which both input prices as well as output prices are flexible. It begins after the short run ends. Depending on the type of firm and industry, this may be from a couple of weeks to several years in the future. But for the economy as a whole, it is the time horizon over which all output and input prices—including wage rates—are fully flexible.

The long-run aggregate supply curve $AS_{LR}$ is vertical at the economy’s full-employment output $Q_f$, as shown in Figure 29.5. The vertical curve means that in the long run the economy will produce the full-employment output level no matter what the price level is. How can this be? Shouldn’t higher prices cause firms to increase output? The explanation lies in the fact that in the long run when both input prices as well as output prices are flexible, profit levels will always adjust so as to give firms exactly the right profit incentive to produce exactly the full-employment output level, $Q_f$.

To see why this is true, look back at the short-run aggregate supply curve $AS$ shown in Figure 29.4. Suppose that the economy starts out producing at the full-employment output level $Q_f$ and that the price level at that moment has an index value of 100. Now suppose that output prices double, so that the price index goes to 200. We
previously demonstrated for our single-firm economy that
this doubling of the price level would cause profits to rise in
the short run and that the higher profits would motivate
the firm to increase output.

This outcome, however, is totally dependent upon the
fact that input prices are fixed in the short run. Consider
what will happen in the long run when they are free to
change. Firms can only produce beyond the full-
employment output level by running factories and busi-
nesses at extremely high rates. This creates a great deal of
demand for the economy’s limited supply of productive
resources. In particular, labor is in great demand because
the only way to produce beyond full employment is if work-
ners are working overtime.

As time passes and input prices are free to change, the
high demand will start to raise input prices. In particular,
overworked employees will demand and receive raises as
employers scramble to deal with the labor shortages that
arise when the economy is producing at above its full-
employment output level. As input prices increase, firm
profits will begin to fall. And as they decline, so does the
motive firms have to produce more than the full-
employment output level. This process of rising input
prices and falling profits continues until the rise in input
prices exactly matches the initial change in output prices (in
our example, they both double). When that happens, firm
profits in real terms return to their original level so that
firms are once again motivated to produce at exactly the
full-employment output level. This adjustment process
means that in the long run the economy will produce at full
employment regardless of the price level (in our example, at
either $P = 100$ or $P = 200$). That is why the long-run aggre-
gate supply curve $AS_{L,R}$ is vertical above the full-employment
output level. Every possible price level on the vertical axis is
associated with the economy producing at the full-
employment output level in the long run once input prices
adjust to exactly match changes in output prices.

**Focusing on the Short Run**
The immediate-short-run aggregate supply curve, the
short-run aggregate supply curve, and the long-run aggre-
gate supply curve are all important. Each curve is appropri-
ate to situations that match their respective assumptions
about the flexibility of input and output prices. In the re-
mainder of the book, we will have several different opportu-
nities to refer to each curve. But our focus in the rest of this
chapter and the several chapters that immediately follow
will be on short-run aggregate supply curves, such as the AS
curve shown in Figure 29.4. Indeed, unless explicitly stated
otherwise, all references to “aggregate supply” are to the AS
curve and to aggregate supply in the short run.

Our emphasis on the short-run aggregate supply curve
AS stems from our interest in understanding the business
cycle in the simplest possible way. It is a fact that real-world
economies typically manifest simultaneous changes in both
their price levels and their levels of real output. The upward-
sloping short-run AS curve is the only version of aggregate
supply that can handle simultaneous movements in both of
these variables. By contrast, the price level is assumed fixed
in the immediate-short-run version of aggregate supply
illustrated in Figure 29.3 and the economy’s output is always
equal to the full-employment output level in the long-run
version of aggregate supply shown in Figure 29.5. This ren-
ders these versions of the aggregate supply curve less useful
as part of a core model for analyzing business cycles and
demonstrating the short-run government policies designed
to deal with them. In our current discussion, we will reserve
use of the immediate short run and long run for specific,
readily identified situations. Later in the book we will
explore how the short-run and long-run AS curves are
linked, and how that linkage adds several additional insights
about business cycles and policy.

**Changes in Aggregate Supply**
An existing aggregate supply curve identifies the relation-
ship between the price level and real output, other things
equal. But when one or more of these other things change,
the curve itself shifts. The rightward shift of the curve
from AS$_1$ to AS$_2$ in Figure 29.6 represents an increase in
aggregate supply, indicating that firms are willing to pro-
duce and sell more real output at each price level. The
leftward shift of the curve from AS$_1$ to AS$_3$ represents a
decrease in aggregate supply. At each price level, firms
produce less output than before.

Figure 29.6 lists the other things that cause a shift of the
aggregate supply curve. Called the **determinants of aggre-
gate supply** or **aggregate supply shifters**, they collectively
position the aggregate supply curve and shift the curve when
they change. Changes in these determinants raise or lower
per-unit production costs at each price level (or each level of
output). These changes in per-unit production cost affect
profits, thereby leading firms to alter the amount of output
they are willing to produce at each price level. For example,
firms may collectively offer $9$ trillion of real output at a
price level of $1.0$ ($100$ in index value), rather than $8.8$ tri-
illion. Or they may offer $7.5$ trillion rather than $8$ trillion.
The point is that when one of the determinants listed in
Figure 29.6 changes, the aggregate supply curve shifts to the
right or left. Changes that reduce per-unit production costs
shift the aggregate supply curve to the right, as from $AS_1$ to
$AS_2$; changes that increase per-unit production costs shift it
FIGURE 29.6 Changes in aggregate supply. A change in one or more of the listed determinants of aggregate supply will shift the aggregate supply curve. The rightward shift of the aggregate supply curve from $AS_1$ to $AS_2$ represents an increase in aggregate supply; the leftward shift of the curve from $AS_1$ to $AS_3$ shows a decrease in aggregate supply.

**Determinants of Aggregate Supply: Factors That Shift the Aggregate Supply Curve**

1. Change in input prices
   a. Domestic resource prices
   b. Prices of imported resources
2. Change in productivity
3. Change in legal-institutional environment
   a. Business taxes and subsidies
   b. Government regulations

Components. Per-unit production costs decline, and the AS curve shifts to the right.

- The supply of available land resources expands through discoveries of mineral deposits, irrigation of land, or technical innovations that transform “nonresources” (say, vast desert lands) into valuable resources (productive lands). The price of land declines, per-unit production costs fall, and the AS curve shifts to the right.

**Input Prices**

Input or resource prices—to be distinguished from the output prices that make up the price level—are a major ingredient of per-unit production costs and therefore a key determinant of aggregate supply. These resources can either be domestic or imported.

**Domestic Resource Prices** As stated earlier, wages and salaries make up about 75 percent of all business costs. Other things equal, decreases in wages reduce per-unit production costs. So the aggregate supply curve shifts to the right. Increases in wages shift the curve to the left. Examples:

- Labor supply increases because of substantial immigration. Wages and per-unit production costs fall, shifting the AS curve to the right.
- Labor supply decreases because a rapid increase in pension income causes many older workers to opt for early retirement. Wage rates and per-unit production costs rise, shifting the AS curve to the left.

Similarly, the aggregate supply curve shifts when the prices of land and capital inputs change. Examples:

- The price of machinery and equipment falls because of declines in the prices of steel and electronic
to the left, as from $AS_1$ to $AS_3$. When per-unit production costs change for reasons other than changes in real output, the aggregate supply curve shifts.

The three aggregate supply determinants listed in Figure 29.6 require more discussion.

**Prices of Imported Resources** Just as foreign demand for U.S. goods contributes to U.S. aggregate demand, resources imported from abroad (such as oil, tin, and copper) add to U.S. aggregate supply. Added supplies of resources—whether domestic or imported—typically reduce per-unit production costs. A decrease in the price of imported resources increases U.S. aggregate supply, while an increase in their price reduces U.S. aggregate supply.

A good example of the major effect that changing resource prices can have on aggregate supply is the oil price hikes of the 1970s. At that time, a group of oil-producing nations called the Organization of Petroleum Exporting Countries (OPEC) worked in concert to decrease oil production in order to raise the price of oil. The 10-fold increase in the price of oil that OPEC achieved during the 1970s drove up per-unit production costs and jolted the U.S. aggregate supply curve leftward. By contrast, a sharp decline in oil prices in the mid-1980s resulted in a rightward shift of the U.S. aggregate supply curve. In 1999 OPEC again reasserted itself, raising oil prices and therefore per-unit production costs for some U.S. producers including
airlines and shipping companies like FedEx and UPS. More recent increases in the price of oil have been mostly due to increases in demand rather than changes in supply caused by OPEC. But keep in mind that no matter what their cause, increases in the price of oil and other resources raise production costs and decrease aggregate supply.

Exchange-rate fluctuations are one factor that may alter the price of imported resources. Suppose that the dollar appreciates, enabling U.S. firms to obtain more foreign currency with each dollar. This means that domestic producers face a lower dollar price of imported resources. U.S. firms will respond by increasing their imports of foreign resources, thereby lowering their per-unit production costs at each level of output. Falling per-unit production costs will shift the U.S. aggregate supply curve to the right.

A depreciation of the dollar will have the opposite set of effects and will shift the aggregate supply curve to the left.

Productivity

The second major determinant of aggregate supply is productivity, which is a measure of the relationship between a nation’s level of real output and the amount of resources used to produce that output. Productivity is a measure of average real output, or of real output per unit of input:

\[
\text{Productivity} = \frac{\text{total output}}{\text{total inputs}}
\]

An increase in productivity enables the economy to obtain more real output from its limited resources. It does this by reducing the per-unit cost of output (per-unit production cost). Suppose, for example, that real output is 10 units, that 5 units of input are needed to produce that quantity, and that the price of each input unit is $2. Then

\[
\text{Productivity} = \frac{\text{total output}}{\text{total inputs}} = \frac{10}{5} = 2
\]

and

\[
\text{Per-unit production cost} = \frac{\text{total input cost}}{\text{total output}} = \frac{2 \times 5}{10} = 1
\]

Note that we obtain the total input cost by multiplying the unit input cost by the number of inputs used.

Now suppose productivity increases so that real output doubles to 20 units, while the price and quantity of the input remain constant at $2 and 5 units. Using the above equations, we see that productivity rises from 2 to 4 and that the per-unit production cost of the output falls from $1 to $.50. The doubled productivity has reduced the per-unit production cost by half.

By reducing the per-unit production cost, an increase in productivity shifts the aggregate supply curve to the right. The main source of productivity advance is improved production technology, often embodied within new plant and equipment that replaces old plant and equipment. Other sources of productivity increases are a better-educated and better-trained workforce, improved forms of business enterprises, and the reallocation of labor resources from lower-productivity to higher-productivity uses.

Much rarer, decreases in productivity increase per-unit production costs and therefore reduce aggregate supply (shift the curve to the left).

Legal-Institutional Environment

Changes in the legal-institutional setting in which businesses operate are the final determinant of aggregate supply. Such changes may alter the per-unit costs of output and, if so, shift the aggregate supply curve. Two changes of this type are (1) changes in taxes and subsidies and (2) changes in the extent of regulation.

Business Taxes and Subsidies

Higher business taxes, such as sales, excise, and payroll taxes, increase per-unit costs and reduce short-run aggregate supply in much the same way as a wage increase does. An increase in such taxes paid by businesses will increase per-unit production costs and shift aggregate supply to the left.

Similarly, a business subsidy—a payment or tax break by government to producers—lowers production costs and increases short-run aggregate supply. For example, the Federal government subsidizes firms that blend ethanol (derived from corn) with gasoline to increase the U.S. gasoline supply. This reduces the per-unit production cost of making blended gasoline. To the extent that this and other subsidies are successful, the aggregate supply curve shifts rightward.

Government Regulation

It is usually costly for businesses to comply with government regulations. More regulation therefore tends to increase per-unit production costs and shift the aggregate supply curve to the left. “Supply-side” proponents of deregulation of the economy have argued forcefully that, by increasing efficiency and reducing the paperwork associated with complex regulations, deregulation will reduce per-unit costs and shift the
aggregate supply curve to the right. Other economists are less certain. Deregulation that results in accounting manipulations, monopolization, and business failures is likely to shift the AS curve to the left rather than to the right.

QUICK REVIEW 29.2

- The immediate-short-run aggregate supply curve is horizontal at the economy’s current price level to reflect the fact that in the immediate short run input and output prices are fixed so that producers will supply whatever quantity of real output is demanded at the current output prices.
- The short-run aggregate supply curve (or simply the “aggregate supply curve”) is upward-sloping because it reflects the fact that in the short run wages and other input prices remain fixed while output prices vary. Given fixed resource costs, higher output prices raise firm profits and encourage them to increase their output levels. The curve’s upward slope reflects rising per-unit production costs as output expands.
- The long-run aggregate supply curve is vertical because, given sufficient time, wages and other input prices rise and fall to match price-level changes; because price-level changes do not change real rewards, they do not change production decisions.
- By altering per-unit production costs independent of changes in the level of output, changes in one or more of the determinants of aggregate supply (Figure 29.6) shift the aggregate supply curve.
- An increase in short-run aggregate supply is shown as a rightward shift of the aggregate supply curve; a decrease is shown as a leftward shift of the curve.

Equilibrium and Changes in Equilibrium

Of all the possible combinations of price levels and levels of real GDP, which combination will the economy gravitate toward, at least in the short run? Figure 29.7 (Key Graph) and its accompanying table provide the answer. Equilibrium occurs at the price level that equalizes the amounts of real output demanded and supplied. The intersection of the aggregate demand curve AD and the aggregate supply curve AS establishes the economy’s equilibrium price level and equilibrium real output. So aggregate demand and aggregate supply jointly establish the price level and level of real GDP.

In Figure 29.7 the equilibrium price level and level of real output are 100 and $510 billion, respectively. To illustrate why, suppose the price level is 92 rather than 100. We see from the table that the lower price level will encourage businesses to produce real output of $502 billion. This is shown by point a on the AS curve in the graph. But, as revealed by the table and point b on the aggregate demand curve, buyers will want to purchase $514 billion of real output at price level 92. Competition among buyers to purchase the lesser available real output of $502 billion will eliminate the $12 billion (= $514 billion – $502 billion) shortage and pull up the price level to 100.

As the table and graph show, the rise in the price level from 92 to 100 encourages producers to increase their real output from $502 billion to $510 billion and causes buyers to scale back their purchases from $514 billion to $510 billion. When equality occurs between the amounts of real output produced and purchased, as it does at price level 100, the economy has achieved equilibrium (here, at $510 billion of real GDP).

Now let’s apply the AD-AS model to various situations that can confront the economy. For simplicity we will use P and Q symbols, rather than actual numbers. Remember that these symbols represent, respectively, price index values and amounts of real GDP.

Increases in AD: Demand-Pull Inflation

Suppose the economy is operating at its full-employment output and businesses and government decide to increase their spending—actions that shift the aggregate demand curve to the right. Our list of determinants of aggregate demand (Figure 29.2) provides several reasons why this shift might occur. Perhaps firms boost their investment spending because they anticipate higher future profits from investments in new capital. Those profits are predicated on having new equipment and facilities that incorporate a number of new technologies. And perhaps government increases spending to expand national defense.

As shown by the rise in the price level from $P_1$ to $P_2$ in Figure 29.8, the increase in aggregate demand beyond the full-employment level of output causes inflation. This is demand-pull inflation because the price level is being pulled up by the increase in aggregate demand. Also, observe that the increase in demand expands real output from the full-employment level $Q_1$ to $Q_2$. The distance between $Q_1$ and $Q_2$ is a positive, or “inflationary,” GDP gap. Actual GDP exceeds potential GDP.

The classic American example of demand-pull inflation occurred in the late 1960s. The escalation of the war in Vietnam resulted in a 40 percent increase in defense
The increase in 1968. The rise in spending between 1965 and 1967 and another 15 percent increase in 1968. The rise in government spending, imposed on an already growing economy, shifted the economy's aggregate demand curve to the right, producing the worst inflation in two decades. Actual GDP exceeded potential GDP, thereby creating an inflationary GDP gap.

Inflation jumped from 1.6 percent in 1965 to 5.7 percent by 1970. (Key Question 4) A careful examination of Figure 29.8 reveals an interesting point concerning the multiplier effect. The increase in aggregate demand from $A_D_1$ to $A_D_2$ increases real output only to $Q_1$, not to $Q_2$, because part of the
An increase in aggregate demand that causes demand-pull inflation. The increase in aggregate demand from $\text{AD}_1$ to $\text{AD}_2$ causes demand-pull inflation, shown as the rise in the price level from $P_1$ to $P_2$. It also causes an inflationary GDP gap of $Q_1$ minus $Q_f$. The rise of the price level reduces the size of the multiplier effect. If the price level had remained at $P_1$, the increase in aggregate demand from $\text{AD}_1$ to $\text{AD}_2$ would increase output from $Q_1$ to $Q_2$, and the multiplier would have been at full strength. But because of the increase in the price level, real output increases only from $Q_1$ to $Q_f$ and the multiplier effect is reduced.

Increases in AD: Recession and Cyclical Unemployment

Decreases in aggregate demand describe the opposite end of the business cycle: recession and cyclical unemployment (rather than above-full employment and demand-pull inflation). For example, in 2000 investment spending substantially declined in the wake of an overexpansion of capital during the second half of the 1990s. In Figure 29.9 we show the resulting decline in aggregate demand as a leftward shift from $\text{AD}_1$ to $\text{AD}_2$.

But now we add an important twist to the analysis—a twist that makes use of the fact that fixed prices lead to horizontal aggregate supply curves (a fact explained earlier in this chapter in the section on the immediate-short-run aggregate supply curve). What goes up—the price level—does not always go down. Deflation—a decline in the price level—is a rarity in the American economy. Suppose, for example, that the economy represented by Figure 29.9 moves from $a$ to $b$, rather than from $a$ to $c$. The outcome is a decline of real output from $Q_f$ to $Q_1$, with no change in the price level. In this case, it is as if the aggregate supply curve in Figure 29.9 is horizontal at $P_1$, to the left of $Q_f$, as indicated by the dashed line. This decline of real output from $Q_f$ to $Q_1$ constitutes a recession, and since fewer workers are needed to produce the lower output, cyclical unemployment arises. The distance between $Q_1$ and $Q_f$ is a negative, or "recessionary," GDP gap—the amount by which actual output falls short of potential output.

Close inspection of Figure 29.9 also reveals that without a fall in the price level, the multiplier is at full strength. With the price level stuck at $P_1$, real GDP decreases by $Q_f - Q_1$, which matches the full leftward shift of the AD curve. The multiplier of Chapters 27 and 28 is at full strength when changes in aggregate demand occur along what, in effect, is a horizontal segment of the AS curve. This full-strength multiplier would also exist for an increase in aggregate demand from $\text{AD}_2$ to $\text{AD}_1$ along this broken line, since none of the increase in output would be dissipated as inflation. We will say more about that in Chapter 30.
All recent recessions in the United States have mimicked the “GDP gap but no deflation” scenario shown in Figure 29.9. Consider the recession of 2001, which resulted from a significant decline in investment spending. Because of the resulting decline in aggregate demand, GDP fell short of potential GDP by an average $67 billion for each of the last three quarters of the year. Between February 2001 and December 2001, unemployment increased by 1.8 million workers, and the nation’s unemployment rate rose from 4.2 percent to 5.8 percent. Although the rate of inflation fell—an outcome called disinflation—the price level did not decline. That is, deflation did not occur.

Real output takes the brunt of declines in aggregate demand in the U.S. economy because the price level tends to be inflexible in a downward direction. There are numerous reasons for this.

- **Fear of price wars** Some large firms may be concerned that if they reduce their prices, rivals not only will match their price cuts but may retaliate by making even deeper cuts. An initial price cut may touch off an unwanted price war: successively deeper and deeper rounds of price cuts. In such a situation, each firm eventually ends up with far less profit or higher losses than would be the case if each had simply maintained its prices. For this reason, each firm may resist making the initial price cut, choosing instead to reduce production and lay off workers.

- **Menu costs** Firms that think a recession will be relatively short-lived may be reluctant to cut their prices. One reason is what economists metaphorically call menu costs, named after their most obvious example: the cost of printing new menus when a restaurant decides to reduce its prices. But lowering prices also creates other costs. Additional costs derive from (1) estimating the magnitude and duration of the shift in demand to determine whether prices should be lowered, (2) repricing items held in inventory, (3) printing and mailing new catalogs, and (4) communicating new prices to customers, perhaps through advertising. When menu costs are present, firms may choose to avoid them by retaining current prices. That is, they may wait to see if the decline in aggregate demand is permanent.

- **Wage contracts** Firms rarely profit from cutting their product prices if they cannot also cut their wage rates. Wages are usually inflexible downward because large parts of the labor force work under contracts prohibiting wage cuts for the duration of the contract. (Collective bargaining agreements in major industries frequently run for 3 years.) Similarly, the wages and salaries of nonunion workers are usually adjusted once a year, rather than quarterly or monthly.

- **Morale, effort, and productivity** Wage inflexibility downward is reinforced by the reluctance of many employers to reduce wage rates. Some current wages may be so-called efficiency wages—wages that elicit maximum work effort and thus minimize labor costs per unit of output. If worker productivity (output per hour of work) remains constant, lower wages do reduce labor costs per unit of output. But lower wages might impair worker morale and work effort, thereby reducing productivity. Considered alone, lower productivity raises labor costs per unit of output because less output is produced. If the higher labor costs resulting from reduced productivity exceed the cost savings from the lower wage, then wage cuts will increase rather than reduce labor costs per unit of output. In such situations, firms will resist lowering wages when they are faced with a decline in aggregate demand.

- **Minimum wage** The minimum wage imposes a legal floor under the wages of the least-skilled workers. Firms paying those wages cannot reduce that wage rate when aggregate demand declines.

But a major “caution” is needed here: Although most economists agree that prices and wages tend to be inflexible downward in the short run, prices and wages are more flexible than in the past. Intense foreign competition and the declining power of unions in the United States have undermined the ability of workers and firms to resist price and wage cuts when faced with falling aggregate demand. This increased flexibility may be one reason the recession of 2001 was relatively mild. The U.S. auto manufacturers, for example, maintained output in the face of falling demand by offering zero-interest loans on auto purchases. This, in effect, was a disguised price cut. But our description in Figure 29.9 remains valid. In the 2001 recession, the overall price level did not decline although output fell by .5 percent and unemployment rose by 1.8 million workers.

### Decreases in AS: Cost-Push Inflation

Suppose that a major terrorist attack on oil facilities severely disrupts world oil supplies and drives up oil prices by, say, 300 percent. Higher energy prices would spread through the economy, driving up production and distribution costs on a wide variety of goods. The U.S. aggregate supply curve would shift to the left, say, from AS₁ to AS₂ in Figure 29.10. The resulting increase in the price level would be cost-push inflation.

The effects of a leftward shift in aggregate supply are doubly bad. When aggregate supply shifts from AS₁ to AS₂, the economy moves from a to b. The price level rises from...
FIGURE 29.10 A decrease in aggregate supply that causes cost-push inflation. A leftward shift of aggregate supply from AS₁ to AS₂ raises the price level from $P₁$ to $P₂$ and produces cost-push inflation. Real output declines and a recessionary GDP gap (of $Q_1$ minus $Q_f$) occurs.

### CONSIDER THIS . . .

**Ratchet Effect**

A ratchet analogy is a good way to think about the effects of changes in aggregate demand on the price level. A ratchet is a tool or mechanism such as a winch, car jack, or socket wrench that cranks a wheel forward but does not allow it to go backward. Properly set, each allows the operator to move an object (boat, car, or nut) in one direction while preventing it from moving in the opposite direction.

Product prices, wage rates, and per-unit production costs are highly flexible upward when aggregate demand increases along the aggregate supply curve. In the United States, the price level has increased in 57 of the 58 years since 1950.

But when aggregate demand decreases, product prices, wage rates, and per-unit production costs are inflexible downward. The U.S. price level has declined in only a single year (1955) since 1950, even though aggregate demand and real output have declined in a number of years.

In terms of our analogy, increases in aggregate demand ratchet the U.S. price level upward. Once in place, the higher price level remains until it is ratcheted up again. The higher price level tends to remain even with declines in aggregate demand.

$P_1$ to $P_2$ and real output declines from $Q_f$ to $Q_1$. Along with the cost-push inflation, a recession (and negative GDP gap) occurs. That is exactly what happened in the United States in the mid-1970s when the price of oil rocketed upward. Then, oil expenditures were about 10 percent of U.S. GDP, compared to only 3 percent today. So, as indicated in this chapter’s Last Word, the U.S. economy is now less vulnerable to cost-push inflation arising from such “aggregate supply shocks.” That said, it is not immune from such shocks.

### Increases in AS: Full Employment with Price-Level Stability

Between 1996 and 2000, the United States experienced a combination of full employment, strong economic growth, and very low inflation. Specifically, the unemployment rate fell to 4 percent and real GDP grew nearly 4 percent annually, without igniting inflation. At first thought, this “macro-economic bliss” seems to be incompatible with the AD-AS model. The aggregate supply curve suggests that increases in aggregate demand that are sufficient for over-full employment will raise the price level (see Figure 29.8). Higher inflation, so it would seem, is the inevitable price paid for expanding output beyond the full-employment level.

But inflation remained very mild in the late 1990s. Figure 29.11 helps explain why. Let’s first suppose that aggregate demand increased from AD₁ to AD₂ along $P_1$ to $P_3$ and real output declines from $Q_f$ to $Q_1$. Along with the cost-push inflation, a recession (and negative GDP gap) occurs. That is exactly what happened in the United States in the mid-1970s when the price of oil rocketed upward. Then, oil expenditures were about 10 percent of U.S. GDP, compared to only 3 percent today. So, as indicated in this chapter’s Last Word, the U.S. economy is now less vulnerable to cost-push inflation arising from such “aggregate supply shocks.” That said, it is not immune from such shocks.

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But inflation remained very mild in the late 1990s. Figure 29.11 helps explain why. Let’s first suppose that aggregate demand increased from AD₁ to AD₂ along...
Significant Changes in Oil Prices Historically Have Shifted the Aggregate Supply Curve and Greatly Affected the U.S. Economy. Have the Effects of Such Changes Weakened?

The United States has experienced several aggregate supply shocks—abrupt shifts of the aggregate supply curve—caused by significant changes in oil prices. In the mid-1970s the price of oil rose from $4 to $12 per barrel, and then again in the late 1970s it increased to $24 per barrel and eventually to $35. These oil price increases shifted the aggregate supply curve leftward, causing rapid cost-push inflation and ultimately rising unemployment and a negative GDP gap.

In the late 1980s and through most of the 1990s, oil prices fell, sinking to a low of $11 per barrel in late 1998. This decline created a positive aggregate supply shock beneficial to the U.S. economy. But in response to those low oil prices, in late 1999 OPEC teamed with Mexico, Norway, and Russia to restrict oil output and thus boost prices. That action, along with a rapidly growing international demand for oil, sent oil prices upward once again. By March 2000 the price of a barrel of oil reached $34, before settling back to about $25 to $28 in 2001 and 2002.

Some economists feared that the rising price of oil would increase energy prices by so much that the U.S. aggregate supply curve would shift to the left, creating cost-push inflation. But inflation in the United States remained modest.

Then came a greater test: A “perfect storm”—continuing conflict in Iraq, the rising demand for oil in India and China, a pickup of economic growth in several industrial nations, disruption of oil production by hurricanes, and concern about political developments in Venezuela—pushed the price of oil to over $60 a barrel in 2005. (You can find the current daily price of oil at OPEC’s Web site, www.opec.org.) The U.S. inflation rate rose in 2005, but core inflation (the inflation rate after subtracting changes in the prices of food and energy) remained steady. Why have rises in oil prices not been as inflationary as in the past?

In the early 2000s, other determinants of aggregate supply swamped the potential inflationary impacts of the oil price increases. Lower production costs resulting from rapid productivity advance and lower input prices from global competition more than compensated for the rise in oil prices. Put simply, aggregate supply did not decline as it had in earlier periods.

Perhaps of greater importance, oil prices are a less significant factor in the U.S. economy than they were in the 1970s. Prior to 1980, changes in oil prices greatly affected core inflation in the United States. But since 1980 they have had very little effect on core inflation.* The main reason has been a significant decline in the amount of oil and gas used in producing each dollar of U.S. output. In 2005 producing a dollar of real GDP required about 7000 Btus of oil and gas, compared to 14,000 Btus in 1970. (A Btu, or British thermal unit, is the amount of energy required to heat one pound of water by one degree Fahrenheit.) Part of this decline resulted from new production techniques spawned by the higher oil and energy prices. But equally important has been the changing relative composition of GDP, away from larger, heavier items (such as earth-moving equipment) that are energy-intensive to make and transport and toward smaller, lighter items (such as microchips and software). Experts on energy economics estimate that the U.S. economy is about 33 percent less sensitive to oil price fluctuations than it was in the early 1980s and 50 percent less sensitive than in the mid-1970s.†

A final reason why changes in oil prices seem to have lost their inflationary punch is that the Federal Reserve has become more vigilant and adept at maintaining price stability through monetary policy. The Fed did not let the oil price increases of 1999–2000 become generalized as core inflation. The same turned out to be true with the dramatic rise in oil prices that resulted from the “perfect storm” of 2005. It remains to be seen whether the Fed can do the same with the dramatic demand-driven rise in oil prices that happened in 2007–2008, when the price of oil rose from just over $50 per barrel in January 2007 to over $140 per barrel in July 2008. (We will discuss monetary policy in depth in Chapter 33.)

aggregate supply curve AS1. Taken alone, that increase in aggregate demand would move the economy from \( a \) to \( b \). Real output would rise from full-employment output \( Q_1 \) to beyond-full-employment output \( Q_2 \). The economy would experience inflation, as shown by the increase in the price level from \( P_1 \) to \( P_2 \). Such inflation had occurred at the end of previous vigorous expansions of aggregate demand, including the expansion of the late 1980s.

Between 1990 and 2000, however, larger-than-usual increases in productivity occurred because of a burst of new technology relating to computers, the Internet, inventory management systems, electronic commerce, and so on. We represent this higher-than-usual productivity growth as the rightward shift from \( AS_1 \) to \( AS_2 \) in Figure 29.11. The relevant aggregate demand and aggregate supply curves thus became \( AD_2 \) and \( AS_2 \), not \( AD_1 \) and \( AS_1 \). Instead of moving from \( a \) to \( b \), the economy moved from \( a \) to \( c \). Real output increased from \( Q_1 \) to \( Q_2 \), and the price level rose only modestly (from \( P_1 \) to \( P_2 \)). The shift of the aggregate supply curve from \( AS_1 \) to \( AS_2 \) accommodated the rapid increase in aggregate demand and kept inflation mild. This remarkable combination of rapid productivity growth, rapid real GDP growth, full employment, and relative price-level stability led some observers to proclaim that the United States was experiencing a “new era” or a New Economy.

But in 2001 the New Economy came face-to-face with the old economic principles. Aggregate demand declined because of a substantial fall in investment spending, and in March 2001 the economy experienced a recession. The terrorist attacks of September 11, 2001, further dampened private spending and prolonged the recession throughout 2001. The unemployment rate rose from 4.2 percent in January 2001 to 6 percent in December 2002.


We will examine stabilization policies, such as those carried out by the Federal government and the Federal Reserve, in chapters that follow. (Key Questions 5, 6, and 7)

### QUICK REVIEW 29.3

- The equilibrium price level and amount of real output are determined at the intersection of the aggregate demand curve and the aggregate supply curve.
- Increases in aggregate demand beyond the full-employment level of real GDP cause demand-pull inflation.
- Decreases in aggregate demand cause recessions and cyclical unemployment, partly because the price level and wages tend to be inflexible in a downward direction.
- Decreases in aggregate supply cause cost-push inflation.
- Full employment, high economic growth, and price stability are compatible with one another if productivity-driven increases in aggregate supply are sufficient to balance growing aggregate demand.

### Summary

1. The aggregate demand–aggregate supply model (AD–AS model) is a variable-price model that enables analysis of simultaneous changes of real GDP and the price level.
2. The aggregate demand curve shows the level of real output that the economy will purchase at each price level.
3. The aggregate demand curve is downsloping because of the real-balances effect, the interest-rate effect, and the foreign purchases effect. The real-balances effect indicates that inflation reduces the real value or purchasing power of fixed-value financial assets held by households, causing cutbacks in consumer spending. The interest-rate effect means that, with a specific supply of money, a higher price level increases the demand for money, thereby raising the interest rate and reducing investment purchases. The foreign purchases effect suggests that an increase in one country’s price level relative to the price levels in other countries reduces the net export component of that nation’s aggregate demand.
4. The determinants of aggregate demand consist of spending by domestic consumers, by businesses, by government, and by foreign buyers. Changes in the factors listed in Figure 29.2 alter the spending by these groups and shift the aggregate demand curve. The extent of the shift is determined by the size of the initial change in spending and the strength of the economy’s multiplier.
5. The aggregate supply curve shows the levels of real output that businesses will produce at various possible price levels. The slope of the aggregate supply curve depends upon the flexibility of input and output prices. Since these vary over time, aggregate supply curves are categorized into three time horizons,
each having different underlying assumptions about the flexibility of input and output prices.

6. The immediate-short-run aggregate supply curve assumes that both input prices and output prices are fixed. With output prices fixed, the aggregate supply curve is a horizontal line at the current price level. The short-run aggregate supply curve assumes nominal wages and other input prices remain fixed while output prices vary. The aggregate supply curve is generally upsloping because per-unit production costs, and hence the prices that firms must receive, rise as real output expands. The aggregate supply curve is relatively steep to the right of the full-employment output level and relatively flat to the left of it. The long-run aggregate supply curve assumes that nominal wages and other input prices fully match any change in the price level. The curve is vertical at the full-employment output level.

7. Because the short-run aggregate supply curve is the only version of aggregate supply that can handle simultaneous changes in the price level and real output, it serves well as the core aggregate supply curve for analyzing the business cycle and economic policy. Unless stated otherwise, all references to “aggregate supply” refer to short-run aggregate supply and the short-run aggregate supply curve.

8. Figure 29.6 lists the determinants of aggregate supply: input prices, productivity, and the legal-institutional environment. A change in any one of these factors will change per-unit production costs at each level of output and therefore will shift the aggregate supply curve.

9. The intersection of the aggregate demand and aggregate supply curves determines an economy’s equilibrium price level and real GDP. At the intersection, the quantity of real GDP demanded equals the quantity of real GDP supplied.

10. Increases in aggregate demand to the right of the full-employment output cause inflation and positive GDP gaps (actual GDP exceeds potential GDP). An upsloping aggregate supply curve weakens the multiplier effect of an increase in aggregate demand because a portion of the increase in aggregate demand is dissipated in inflation.

11. Shifts of the aggregate demand curve to the left of the full-employment output cause recession, negative GDP gaps, and cyclical unemployment. The price level may not fall during recessions because of downwardly inflexible prices and wages. This inflexibility results from fear of price wars, menu costs, wage contracts, efficiency wages, and minimum wages. When the price level is fixed, full multiplier effects occur along what, in essence, is an immediate-short-run aggregate supply curve.

12. Leftward shifts of the aggregate supply curve reflect increases in per-unit production costs and cause cost-push inflation, with accompanying negative GDP gaps.


Terms and Concepts

aggregate demand–aggregate supply (AD-AS) model
aggregate supply
aggregate demand curve
real-balances effect
interest-rate effect
foreign purchases effect
determinants of aggregate demand
immediate–short-run aggregate supply curve
short-run aggregate supply curve
long-run aggregate supply curve
determinants of aggregate supply
productivity
equilibrium price level
equilibrium real output
menu costs
efficiency wages

Study Questions

1. Why is the aggregate demand curve downsloping? Specify how your explanation differs from the explanation for the downsloping demand curve for a single product. What role does the multiplier play in shifts of the aggregate demand curve? LO1

2. Distinguish between “real-balances effect” and “wealth effect,” as the terms are used in this chapter. How does each relate to the aggregate demand curve? LO1

3. What assumptions cause the immediate–short-run aggregate supply curve to be horizontal? Why is the long-run aggregate supply curve vertical? Explain the shape of the short-run aggregate supply curve. Why is the short-run curve relatively flat to the left of the full-employment output and relatively steep to the right? LO2
4. **KEY QUESTION** Suppose that the aggregate demand and aggregate supply schedules for a hypothetical economy are as shown below: LO3

<table>
<thead>
<tr>
<th>Amount of Real GDP Demanded, Billions</th>
<th>Price Level (Price Index)</th>
<th>Amount of Real GDP Supplied, Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100</td>
<td>300</td>
<td>$450</td>
</tr>
<tr>
<td>200</td>
<td>250</td>
<td>400</td>
</tr>
<tr>
<td>300</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>400</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>500</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

a. Use these sets of data to graph the aggregate demand and aggregate supply curves. What is the equilibrium price level and the equilibrium level of real output in this hypothetical economy? Is the equilibrium real output also necessarily the full-employment real output? Explain.

b. Why will a price level of 150 not be an equilibrium price level in this economy? Why not 250?

c. Suppose that buyers desire to purchase $200 billion of extra real output at each price level. Sketch in the new aggregate demand curve as AD1. What factors might cause this change in aggregate demand? What is the new equilibrium price level and level of real output?

5. **KEY QUESTION** Suppose that a hypothetical economy has the following relationship between its real output and the input quantities necessary for producing that output: LO3

<table>
<thead>
<tr>
<th>Input Quantity</th>
<th>Real GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>150.0</td>
<td>$400</td>
</tr>
<tr>
<td>112.5</td>
<td>300</td>
</tr>
<tr>
<td>75.0</td>
<td>200</td>
</tr>
</tbody>
</table>

a. What is productivity in this economy?

b. What is the per-unit cost of production if the price of each input unit is $2?

c. Assume that the input price increases from $2 to $3 with no accompanying change in productivity. What is the new per-unit cost of production? In what direction would the $1 increase in input price push the economy’s aggregate supply curve? What effect would this shift of aggregate supply have on the price level and the level of real output?

d. Suppose that the increase in input price does not occur but, instead, that productivity increases by 100 percent. What would be the new per-unit cost of production? What effect would this change in per-unit production cost have on the economy’s aggregate supply curve? What effect would this shift of aggregate supply have on the price level and the level of real output?

6. **KEY QUESTION** What effects would each of the following have on aggregate demand or aggregate supply? In each case use a diagram to show the expected effects on the equilibrium price level and the level of real output. Assume all other things remain constant. LO3

a. A widespread fear of depression on the part of consumers.

b. A $2 increase in the excise tax on a pack of cigarettes.

c. A reduction in interest rates at each price level.

d. A major increase in Federal spending for health care.

e. The expectation of rapid inflation.

f. The complete disintegration of OPEC, causing oil prices to fall by one-half.

G. A 10 percent reduction in personal income tax rates.

h. A sizable increase in labor productivity (with no change in nominal wages).

i. A 12 percent increase in nominal wages (with no change in productivity).

j. Depreciation in the international value of the dollar.

7. **KEY QUESTION** Assume that (a) the price level is flexible upward but not downward and (b) the economy is currently operating at its full-employment output. Other things equal, how will each of the following affect the equilibrium price level and equilibrium level of real output in the short run? LO3

a. An increase in aggregate demand.

b. A decrease in aggregate supply, with no change in aggregate demand.

c. Equal increases in aggregate supply and aggregate demand.

d. A decrease in aggregate demand.

e. An increase in aggregate demand that exceeds an increase in aggregate supply.

8. Explain how an upsloping aggregate supply curve weakens the realized multiplier effect. LO3

9. Why does a reduction in aggregate demand reduce real output, rather than the price level? Why might a full-strength multiplier apply to a decrease in aggregate demand? LO3

10. Explain: “Unemployment can be caused by a decrease of aggregate demand or a decrease of aggregate supply.” In each case, specify the price-level outcomes. LO4

11. Use shifts of the AD and AS curves to explain (a) the U.S. experience of strong economic growth, full employment, and price stability in the late 1990s and early 2000s and (b) how a strong negative wealth effect from, say, a precipitous drop in the stock market could cause a recession even though productivity is surging. LO4

12. In early 2001 investment spending sharply declined in the United States. In the 2 months following the September 11, 2001, attacks on the United States, consumption also declined. Use AD–AS analysis to show the two impacts on real GDP. LO4

13. **LAST WORD** Go to the OPEC Web site, www.opec.org, and find the current “OPEC basket price” of oil. By clicking on that amount, you will find the annual prices of oil for the past 5 years. By what percentage is the current price higher
or lower than 5 years ago? Next, go to the Bureau of Economic Analysis Web site, www.bea.gov, and use the interactive feature to find U.S. real GDP for the past years. By what percentage is real GDP higher or lower than it was 5 years ago? What if, anything, can you conclude about the relationship between the price of oil and the level of real GDP in the United States?

Web-Based Questions

1. **FEELING WEALTHIER; SPENDING MORE?** Access the Bureau of Economic Analysis Web site, www.bea.gov, interactively. Select Interactive Data Tables, which is listed under Publications. On that page, select National Income and Product Accounts. Go to the List of All NIPA Tables and then find Table 1.1.6, which will give you access to real GDP figures for the U.S. economy. Find the annual levels of real GDP and real consumption for 1996 and 1999. Did consumption increase more rapidly or less rapidly in percentage terms than real GDP? At www.dowjones.com in sequence select DJIA, Index Data, and Historical Values to find the level of the Dow Jones Industrial Average (DJIA) stock market index on June 1, 1996, and June 1, 1999. What was the percentage change in the DJIA over that period? How might that change help explain your findings about the growth of consumption versus real GDP between 1996 and 1999?

2. **THE RECESSION OF 2001—WHICH COMPONENT OF AD DECLINED THE MOST?** Use the interactive feature of the Bureau of Economic Analysis Web site, www.bea.gov, to access the National Income and Product Account Tables. Select Interactive Data Tables, which is listed under Publications. On that page, select National Income and Product Accounts. Go to the List of All NIPA Tables and then find Table 1.1.6, which will give you access to real GDP figures for the U.S. economy. From Table 1.1.6 find the levels of real GDP, personal consumption expenditures (C), gross private investment (I), net exports (X), and government consumption expenditures and gross investment (G) in the first and third quarters of 2001. By what percentage did real GDP decline over this period? Which of the four broad components of aggregate demand decreased by the largest percentage amount?
The Relationship of the Aggregate Demand Curve to the Aggregate Expenditures Model*

The aggregate demand curve of this chapter and the aggregate expenditures model of Chapter 28 are intricately related.

Derivation of the Aggregate Demand Curve from the Aggregate Expenditures Model

We can directly connect the downward-sloping aggregate demand curve to the aggregate expenditures model by relating various possible price levels to corresponding equilibrium GDPs. In Figure 1 we have stacked the aggregate expenditures model (Figure 1a) and the aggregate demand curve (Figure 1b) vertically. This is possible because the horizontal axes of both models measure real GDP. Now let’s derive the AD curve in three distinct steps. (Throughout this discussion, keep in mind that price level \( P_1 \) is lower than price level \( P_2 \), which is lower than price level \( P_3 \).)

- First suppose that the economy’s price level is \( P_1 \) and its aggregate expenditures schedule is \( AE_1 \), the top schedule in Figure 1a. The equilibrium GDP is then \( Q_1 \) at point 3. So in Figure 1b we can plot the equilibrium real output \( Q_1 \) and the corresponding price level \( P_1 \). This gives us one point 1’ in Figure 1b.

- Now assume the price level rises from \( P_1 \) to \( P_2 \). Other things equal, this higher price level will (1) decrease the value of real balances (wealth), decreasing consumption expenditures; (2) increase the interest rate, reducing investment and interest-sensitive consumption expenditures; and (3) increase imports and decrease exports, reducing net export expenditures. The aggregate expenditures schedule will fall from \( AE_1 \) to, say, \( AE_2 \) in Figure 1a, giving us equilibrium \( Q_2 \) at point 2. In Figure 1b we plot this new price-level–real-output combination, \( P_2 \) and \( Q_2 \), as point 2’.

*This appendix presumes knowledge of the aggregate expenditures model discussed in Chapter 28 and should be skipped if Chapter 28 was not assigned.
Finally, suppose the price level rises from \( P_1 \) to \( P_3 \). The value of real balances falls, the interest rate rises, exports fall, and imports rise. Consequently, the consumption, investment, and net export schedules fall, shifting the aggregate expenditures schedule downward from \( AE_2 \) to \( AE_3 \), which gives us equilibrium \( Q_3 \) at point 3. In Figure 1b, this enables us to locate point 3’, where the price level is \( P_3 \) and real output is \( Q_3 \).

In summary, increases in the economy’s price level will successively shift its aggregate expenditures schedule downward and will reduce real GDP. The resulting price-level–real-GDP combinations will yield various points such as 1’, 2’, and 3’ in Figure 1b. Together, such points locate the downward-sloping aggregate demand curve for the economy.

**Aggregate Demand Shifts and the Aggregate Expenditures Model**

The determinants of aggregate demand listed in Figure 29.2 are the components of the aggregate expenditures model discussed in Chapter 28. When there is a change in one of the determinants of aggregate demand, the aggregate expenditures schedule shifts upward or downward. We can easily link such shifts of the aggregate expenditures schedule to shifts of the aggregate demand curve.

Let’s suppose that the price level is constant. In Figure 2 we begin with the aggregate expenditures schedule at \( AE_1 \) in the top diagram, yielding real output of \( Q_1 \). Assume now that investment increases in response to more optimistic business expectations, so the aggregate expenditures schedule rises from \( AE_1 \) to \( AE_2 \). (The notation “at \( P_1 \)” reminds us that the price level is assumed constant.) The result will be a multiplied increase in real output from \( Q_1 \) to \( Q_2 \).

In Figure 2b the increase in investment spending is reflected in the horizontal distance between \( AD_1 \) and the broken curve to its right. The immediate effect of the increase in investment is an increase in aggregate demand by the exact amount of the new spending. But then the multiplier process magnifies the initial increase in investment into successive rounds of consumption spending and an ultimate multiplied increase in aggregate demand from \( AD_1 \) to \( AD_2 \). Equilibrium real output rises from \( Q_1 \) to \( Q_2 \), the same multiplied increase in real GDP as that in the top graph. The initial increase in investment in the top graph has shifted the AD curve in the lower graph by a horizontal distance equal to the change in investment times the multiplier. This particular change in real GDP is still associated with the constant price level \( P_1 \). To generalize,

\[
\text{Shift of AD curve} = \text{initial change in spending} \times \text{multiplier}
\]
Appendix Summary

1. A change in the price level alters the location of the aggregate expenditures schedule through the real-balances, interest-rate, and foreign purchases effects. The aggregate demand curve is derived from the aggregate expenditures model by allowing the price level to change and observing the effect on the aggregate expenditures schedule and thus on equilibrium GDP.

2. With the price level held constant, increases in consumption, investment, government, and net export expenditures shift the aggregate expenditures schedule upward and the aggregate demand curve to the right. Decreases in these spending components produce the opposite effects.

Appendix Study Questions

1. Explain carefully: “A change in the price level shifts the aggregate expenditures curve but not the aggregate demand curve.” LO5

2. Suppose that the price level is constant and that investment decreases sharply. How would you show this decrease in the aggregate expenditures model? What would be the outcome for real GDP? How would you show this fall in investment in the aggregate demand–aggregate supply model, assuming the economy is operating in what, in effect, is a horizontal section of the aggregate supply curve? LO5
Fiscal Policy, Deficits, and Debt

In the previous chapter we saw that an excessive increase in aggregate demand can cause demand-pull inflation and that a significant decline in aggregate demand can cause recession and cyclical unemployment. For these reasons, the Federal government sometimes uses budgetary actions to try to “stimulate the economy” or “rein in inflation.” Such countercyclical fiscal policy consists of deliberate changes in government spending and tax collections designed to achieve full employment, control inflation, and encourage economic growth. (The adjective “fiscal” simply means “financial.”)

We begin this chapter by examining the logic behind fiscal policy, its current status, and its limitations. Then we examine a closely related topic: the U.S. public debt.
Fiscal Policy and the AD-AS Model

The fiscal policy defined above is discretionary (or “active”). It is often initiated on the advice of the president’s Council of Economic Advisers (CEA), a group of three economists appointed by the president to provide expertise and assistance on economic matters. Discretionary changes in government spending and taxes are at the option of the Federal government. They do not occur automatically. Changes that occur without congressional action are non-discretionary (or “passive” or “automatic”), and we will examine them later in this chapter.

Expansionary Fiscal Policy

When recession occurs, an expansionary fiscal policy may be in order. Consider Figure 30.1, where we suppose that a sharp decline in investment spending has shifted the economy’s aggregate demand curve to the left from AD₁ to AD₂. (Disregard the arrows and dashed downsloping line for now.) The cause of the recession may be that profit expectations on investment projects have dimmed, curtailing investment spending and reducing aggregate demand.

Suppose the economy’s potential or full-employment output is $510 billion in Figure 30.1. If the price level is inflexible downward at P₁, the broken horizontal line in effect becomes the relevant aggregate supply curve. The aggregate demand curve moves leftward and reduces real GDP from $510 billion to $490 billion. A negative GDP gap of $20 billion (= $490 billion − $510 billion) arises. An increase in unemployment accompanies this negative GDP gap because fewer workers are needed to produce the reduced output. In short, the economy depicted is suffering both recession and cyclical unemployment.

What fiscal policy should the Federal government adopt to try to stimulate the economy? It has three main options: (1) increase government spending, (2) reduce taxes, or (3) use some combination of the two. If the Federal budget is balanced at the outset, expansionary fiscal policy will create a government budget deficit—government spending in excess of tax revenues.

Increased Government Spending Other things equal, a sufficient increase in government spending will shift an economy’s aggregate demand curve to the right, from AD₂ to AD₁ in Figure 30.1. To see why, suppose that the recession prompts the government to initiate $5 billion of new spending on highways, education, and health care. We represent this new $5 billion of government spending as the horizontal distance between AD₁ and the dashed line immediately to its right. At each price level, the amount of real output that is demanded is now $5 billion greater than that demanded before the expansion of government spending.

But the initial increase in aggregate demand is not the end of the story. Through the multiplier effect, the aggregate demand curve shifts to AD₂, a distance that exceeds that represented by the originating $5 billion increase in government purchases. This greater shift occurs because the multiplier process magnifies the initial change in spending into successive rounds of new consumption spending. If the economy’s MPC is .75, then the simple multiplier is 4. So the aggregate demand curve shifts rightward by four times the distance between AD₂ and the broken line.

**FIGURE 30.1 Expansionary fiscal policy.** Expansionary fiscal policy uses increases in government spending or tax cuts to push the economy out of recession. In an economy with an MPC of .75, a $5 billion increase in government spending or a $6.67 billion decrease in personal taxes (producing a $5 billion initial increase in consumption) expands aggregate demand from AD₂ to the downsloping dashed curve. The multiplier then magnifies this initial increase in spending to AD₁. So real GDP rises along the broken horizontal aggregate supply line by $20 billion.
Because this particular increase in aggregate demand occurs along the horizontal broken-line segment of aggregate supply, real output rises by the full extent of the multiplier. Observe that real output rises to $510 billion, up $20 billion from its recessionary level of $490 billion. Concurrently, unemployment falls as firms increase their employment to the full-employment level that existed before the recession.

**Tax Reductions** Alternatively, the government could reduce taxes to shift the aggregate demand curve rightward, as from AD$_2$ to AD$_1$. Suppose the government cuts personal income taxes by $6.67 billion, which increases disposable income by the same amount. Consumption will rise by $5 billion (= MPC of .75 × $6.67 billion) and saving will go up by $1.67 billion (= MPS of .25 × $6.67 billion). In this case the horizontal distance between AD$_2$ and the dashed downsloping line in Figure 30.1 represents only the $5 billion initial increase in consumption spending. Again, we call it “initial” consumption spending because the multiplier process yields successive rounds of increased consumption spending. The aggregate demand curve eventually shifts rightward by four times the $5 billion initial increase in consumption produced by the tax cut. Real GDP rises by $20 billion, from $490 billion to $510 billion, implying a multiplier of 4. Employment increases accordingly.

You may have noted that a tax cut must be somewhat larger than the proposed increase in government spending if it is to achieve the same amount of rightward shift in the aggregate demand curve. This is because part of a tax reduction increases saving, rather than consumption. To increase initial consumption by a specific amount, the government must reduce taxes by more than that amount. With an MPC of .75, taxes must fall by $6.67 billion for $5 billion of new consumption to be forthcoming because $1.67 billion is saved (not consumed). If the MPC had instead been, say, .6, an $8.33 billion reduction in tax collections would have been necessary to increase initial consumption by $5 billion. The smaller the MPC, the greater the tax cut needed to accomplish a specific initial increase in consumption and a specific shift in the aggregate demand curve.

**Combined Government Spending Increases and Tax Reductions** The government may combine spending increases and tax cuts to produce the desired initial increase in spending and the eventual increase in aggregate demand and real GDP. In the economy depicted in Figure 30.1, the government might increase its spending by $1.25 billion while reducing taxes by $5 billion. As an exercise, you should explain why this combination will produce the targeted $5 billion initial increase in new spending.

If you were assigned Chapter 28, think through these three fiscal policy options in terms of the recessionary-expenditure-gap analysis associated with the aggregate expenditures model (Figure 28.7). And recall from the appendix to Chapter 29 that rightward shifts of the aggregate demand curve relate directly to upward shifts of the aggregate expenditures schedule. (Key Question 2)

**Contractionary Fiscal Policy** When demand-pull inflation occurs, a restrictive or contractionary fiscal policy may help control it. Look at Figure 30.2, where the full-employment level of real GDP is $510 billion. The economy starts at equilibrium at point a, where the initial aggregate demand curve AD$_3$ intersects...
aggregate supply curve AS. Suppose that after going through the multiplier process, a $5 billion initial increase in investment and net export spending shifts the aggregate demand curve to the right by $20 billion, from AD_3 to AD_4. (Ignore the downsloping dashed line for now.) Given the upward-sloping AS curve, however, the equilibrium GDP does not rise by the full $20 billion. It only rises by $12 billion, to $522 billion, thereby creating an inflationary GDP gap of $12 billion ($522 billion – $510 billion). The upward slope of the AS curve means that some of the rightward movement of the AD curve ends up causing demand-pull inflation rather than increased output. As a result, the price level rises from P_1 to P_2 and the equilibrium moves to point b.

Without a government response, the inflationary GDP gap will cause further inflation (as input prices rise in the long run to meet the increase in output prices). If the government looks to fiscal policy to eliminate the inflationary GDP gap, its options are the opposite of those used to combat recession. It can (1) decrease government spending, (2) raise taxes, or (3) use some combination of those two policies. When the economy faces demand-pull inflation, fiscal policy should move toward a government budget surplus—tax revenues in excess of government spending.

But before discussing how the government can either decrease government spending or increase taxes to move toward a government budget surplus and control inflation, we have to keep in mind that the price level is like a ratchet. While increases in aggregate demand that expand real output beyond the full-employment level tend to ratchet the price level upward, declines in aggregate demand do not seem to push the price level downward. This means that stopping inflation is a matter of halting the rise of the price level, not trying to lower it to the previous level. It also means that the government must take the ratchet effect into account when deciding how big a cut in spending or an increase in taxes it should undertake.

**Decreased Government Spending** Reduced government spending shifts the aggregate demand curve leftward to control demand-pull inflation. To see why the ratchet effect matters so much, look at Figure 30.2 and consider what would happen if the government ignored the ratchet effect and attempted to design a spending-reduction policy to eliminate the inflationary GDP gap. Since the $12 billion gap was caused by the $20 billion rightward movement of the aggregate demand curve from AD_3 to AD_4, the government might naively think that it could solve the problem by causing a $20 billion leftward shift of the aggregate demand curve to move it back to where it originally was. It could attempt to do so by reducing government spending by $5 billion and then allowing the multiplier effect to expand that initial decrease into a $20 billion decline in aggregate demand. That would shift the aggregate demand curve leftward by $20 billion, putting it back at AD_3.

This policy would work fine if there were no ratchet effect and if prices were flexible. The economy’s equilibrium would move back from point b to point a, with equilibrium GDP returning to the full-employment level of $510 billion and the price level falling from P_2 back to P_1.

But because there is a ratchet effect, this scenario is not what will actually happen. Instead, the ratchet effect implies that the price level is stuck at P_2, so that the broken horizontal line at price level P_2 becomes the relevant aggregate supply curve. This means that when the government reduces spending by $5 billion in order to shift the aggregate demand curve back to AD_3, it will actually cause a recession! The new equilibrium will not be at point a. It will be at point d, where aggregate demand curve AD_3 crosses the broken horizontal line. At point d, real GDP is only $502 billion, $8 billion below the full-employment level of $510 billion.

The problem is that with what in essence is an immediate-short-run AS curve, the multiplier is at full effect. With the price level fixed and the aggregate supply curve horizontal, the $20 billion leftward shift of the aggregate demand curve causes a full $20 billion decline in real GDP. None of the change in aggregate demand can be dissipated as a change in the price level (as it can be when aggregate supply is upward-sloping). As a result, equilibrium GDP declines by the full $20 billion, falling from $522 billion to $502 billion and putting it $8 billion below potential output. By not taking the ratchet effect into account, the government has overdone the decrease in government spending, replacing a $12 billion inflationary GDP gap with an $8 billion recessionary GDP gap. This is clearly not what it had in mind.

Here’s how it can avoid this scenario. First, the government takes account of the size of the inflationary GDP gap. It is $12 billion. Second, it knows that with the price level fixed, aggregate supply will be horizontal so that the multiplier will be in full effect. Thus, it knows that any decline in government spending will be multiplied by a factor of 4. It then reasons that government spending will have to decline by only $3 billion rather than $5 billion. Why? Because the $3 billion initial decline in government spending will be multiplied by 4, creating a $12 billion decline in aggregate demand. Under the circumstances, a $3 billion decline in government spending is the correct amount to exactly offset the $12 billion GDP gap. This inflationary GDP gap is the
problem that government wants to eliminate. To succeed, it need not undo the full increase in aggregate demand that caused the inflation in the first place.

Graphically, the horizontal distance between AD₄ and the dashed line to its left represents the $3 billion decrease in government spending. Once the multiplier process is complete, this spending cut will shift the aggregate demand curve leftward from AD₄ to AD₃. With the price level fixed at $P$, and aggregate supply in this area represented by the horizontal dashed line, the economy will come to equilibrium at point c. The economy will operate at its potential output of $510 billion. The inflationary GDP gap will be eliminated. And because the government took the ratchet effect correctly into account, the government will not accidentally push the economy into a recession by making an overly large initial decrease in government spending.

Increased Taxes Just as government can use tax cuts to increase consumption spending, it can use tax increases to reduce consumption spending. If the economy in Figure 30.2 has an MPC of .75, the government must raise taxes by $4 billion. The $4 billion tax increase reduces saving by $1 billion (= the MPS of .25 × $4 billion). This $1 billion reduction in saving, by definition, is not a reduction in spending. But the $4 billion tax increase also reduces consumption spending by $3 billion (= the MPC of .75 × $4 billion), as shown by the distance between AD₄ and the dashed line to its left in Figure 30.2. After the multiplier process is complete, this initial $3 billion decline in consumption will cause aggregate demand to shift leftward by $12 billion at each price level (multiplier of 4 × $3 billion). With the economy moving to point c, the inflationary GDP gap will be closed and the inflation will be halted.

Combined Government Spending Decreases and Tax Increases The government may choose to combine spending decreases and tax increases in order to reduce aggregate demand and check inflation. To check your understanding, determine why a $1.5 billion decline in government spending combined with a $2 billion increase in taxes would shift the aggregate demand curve from AD₄ to AD₃. Also, if you were assigned Chapter 28, explain the three fiscal policy options for fighting inflation by referring to the inflationary-expenditure-gap concept developed with the aggregate expenditures model (Figure 28.7). And recall from the appendix to Chapter 29 that leftward shifts of the aggregate demand curve are associated with downshifts of the aggregate expenditures schedule.

Policy Options: G or T?
Which is preferable as a means of eliminating recession and inflation? The use of government spending or the use of taxes? The answer depends largely on one’s view as to whether the government is too large or too small.

Economists who believe there are many unmet social and infrastructure needs usually recommend that government spending be increased during recessions. In times of demand-pull inflation, they usually recommend tax increases. Both actions either expand or preserve the size of government.

Economists who think that the government is too large and inefficient usually advocate tax cuts during recessions and cuts in government spending during times of demand-pull inflation. Both actions either restrain the growth of government or reduce its size.

The point is that discretionary fiscal policy designed to stabilize the economy can be associated with either an expanding government or a contracting government. (Key Question 3)

Quick Review 30.1
- Discretionary fiscal policy is the purposeful change of government expenditures and tax collections by government to promote full employment, price stability, and economic growth.
- The government uses expansionary fiscal policy to shift the aggregate demand curve rightward in order to expand real output. This policy entails increases in government spending, reductions in taxes, or some combination of the two.
- The government uses contractionary fiscal policy to shift the aggregate demand curve leftward in an effort to halt demand-pull inflation. This policy entails reductions in government spending, tax increases, or some combination of the two.
- To be implemented correctly, contractionary fiscal policy must properly account for the ratchet effect and the fact that prices will not fall as the government shifts the aggregate demand curve leftward.

Built-In Stability
To some degree, government tax revenues change automatically over the course of the business cycle and in ways that stabilize the economy. This automatic response, or built-in stability, constitutes nondiscretionary (or “passive” or “automatic”) budgetary policy and results from the makeup of most tax systems. We did not include this built-in stability in our discussion of fiscal policy because we implicitly assumed that the same amount of tax revenue was being collected at
each level of GDP. But the actual U.S. tax system is such that net tax revenues vary directly with GDP. (Net taxes are tax revenues less transfers and subsidies. From here on, we will use the simpler “taxes” to mean “net taxes.”)

Virtually any tax will yield more tax revenue as GDP rises. In particular, personal income taxes have progressive rates and thus generate more-than-proportionate increases in tax revenues as GDP expands. Furthermore, as GDP rises and more goods and services are purchased, revenues from corporate income taxes and from sales taxes and excise taxes also increase. And, similarly, revenues from payroll taxes rise as economic expansion creates more jobs. Conversely, when GDP declines, tax receipts from all these sources also decline.

Transfer payments (or “negative taxes”) behave in the opposite way from tax revenues. Unemployment compensation payments and welfare payments decrease during economic expansion and increase during economic contraction.

**Automatic or Built-In Stabilizers**

A **built-in stabilizer** is anything that increases the government’s budget deficit (or reduces its budget surplus) during a recession and increases its budget surplus (or reduces its budget deficit) during an expansion without requiring explicit action by policymakers. As Figure 30.3 reveals, this is precisely what the U.S. tax system does. Government expenditures $G$ are fixed and assumed to be independent of the level of GDP. Congress decides on a particular level of spending, but it does not determine the magnitude of tax revenues. Instead, it establishes tax rates, and the tax revenues then vary directly with the level of GDP that the economy achieves. Line $T$ represents that direct relationship between tax revenues and GDP.

**Economic Importance** The economic importance of the direct relationship between tax receipts and GDP becomes apparent when we consider that:

- Taxes reduce spending and aggregate demand.
- Reductions in spending are desirable when the economy is moving toward inflation, whereas increases in spending are desirable when the economy is slumping.

As shown in Figure 30.3, tax revenues automatically increase as GDP rises during prosperity, and since taxes reduce household and business spending, they restrain the economic expansion. That is, as the economy moves toward a higher GDP, tax revenues automatically rise and move the budget from deficit toward surplus. In Figure 30.3, observe that the high and perhaps inflationary income level GDP$_3$ automatically generates a contractionary budget surplus.

Conversely, as GDP falls during recession, tax revenues automatically decline, increasing spending and cushioning the economic contraction. With a falling GDP, tax receipts decline and move the government’s budget from surplus toward deficit. In Figure 30.3, the low level of income GDP$_1$ will automatically yield an expansionary budget deficit.

**Tax Progressivity** Figure 30.3 reveals that the size of the automatic budget deficits or surpluses—and therefore built-in stability—depends on the responsiveness of tax revenues to changes in GDP. If tax revenues change sharply as GDP changes, the slope of line $T$ in the figure will be steep and the vertical distances between $T$ and $G$ (the deficits or surpluses) will be large. If tax revenues change very little when GDP changes, the slope will be gentle and built-in stability will be low.

The steepness of $T$ in Figure 30.3 depends on the tax system itself. In a **progressive tax system**, the average tax rate ($= \text{tax revenue/GDP}$) rises with GDP. In a **proportional tax system**, the average tax rate remains constant as GDP rises. In a **regressive tax system**, the average tax rate falls as GDP rises. The progressive tax system has the steepest tax line $T$ of the three. However, tax revenues will rise with GDP under both the progressive and the proportional tax systems, and they may rise, fall, or stay the same under a regressive tax system. The main point is this: The more progressive the tax system, the greater the economy’s built-in stability.
The built-in stability provided by the U.S. tax system has reduced the severity of business fluctuations, perhaps by as much as 8 to 10 percent of the change in GDP that otherwise would have occurred. But built-in stabilizers can only diminish, not eliminate, swings in real GDP. Discretionary fiscal policy (changes in tax rates and expenditures) or monetary policy (central bank–caused changes in interest rates) will be needed to correct a recession or inflation of any appreciable magnitude.

Evaluating Fiscal Policy

How can we determine whether a government’s discretionary fiscal policy is expansionary, neutral, or contractionary? We cannot simply examine the actual budget deficits or surpluses that take place under the current policy because they will necessarily include the automatic changes in tax revenues that accompany every change in GDP. In addition, the expansionary or contractionary strength of any change in discretionary fiscal policy depends not on its absolute size but on how large it is relative to the size of the economy. So, in evaluating the status of fiscal policy, we must adjust deficits and surpluses to eliminate automatic changes in tax revenues and also compare the sizes of the adjusted budget deficits and surpluses to the level of potential GDP.

Standardized Budget

Economists use the standardized budget (also called the full-employment budget) to adjust actual Federal budget deficits and surpluses to account for the changes in tax revenues that happen automatically whenever GDP changes. The standardized budget measures what the Federal budget deficit or surplus would have been under existing tax rates and government spending levels if the economy had achieved its full-employment level of GDP (its potential output). The idea essentially is to compare actual government expenditures with the tax revenues that would have occurred if the economy had achieved full-employment GDP. That procedure removes budget deficits or surpluses that arise simply because of changes in GDP and thus tell us nothing about whether the government’s current discretionary fiscal policy is fundamentally expansionary, contractionary, or neutral.

Consider Figure 30.4a, where line $G$ represents government expenditures and line $T$ represents tax revenues. In full-employment year 1, government expenditures of $500$ billion equal tax revenues of $500$ billion, as indicated by the intersection of lines $G$ and $T$ at point $a$. The standardized budget deficit in year 1 is zero—government expenditures equal the tax revenues forthcoming at the full-employment output GDP,. Obviously, the full-employment deficit as a percentage of potential GDP is also zero. The government’s fiscal policy is neutral.

Now suppose that a recession occurs and GDP falls from GDP$_1$ to GDP$_2$, as shown in Figure 30.4a. Let’s also assume that the government takes no discretionary action, so lines $G$ and $T$ remain as shown in the figure. Tax revenues automatically fall to $450$ billion (point $c$) at GDP$_2$, while government spending remains unaltered at $500$ billion (point $b$). A $50$ billion budget deficit (represented by distance $bc$) arises. But this cyclical deficit is simply a by-product of the economy’s slide into recession, not the result of discretionary fiscal actions by the government. We would be wrong to conclude from this deficit that the government is engaging in an expansionary fiscal policy. The government’s fiscal policy has not changed. It is still neutral.

That fact is highlighted when we consider the standardized budget deficit for year 2 in Figure 30.4a. The $500$ billion of government expenditures in year 2 is shown by $b$ on line $G$. And, as shown by $a$ on line $T$, $500$ billion of tax revenues would have occurred if the economy had achieved its full-employment GDP. Because both $b$ and $a$ represent $500$ billion, the standardized budget deficit in year 2 is zero, as is this deficit as a percentage of potential GDP. Since the standardized deficits are zero in both years, we know that government did not change its discretionary fiscal policy, even though a recession occurred and an actual deficit of $50$ billion resulted.

Next, consider Figure 30.4b. Suppose that real output declined from full-employment GDP$_3$ to GDP$_4$. But also suppose that the Federal government responded to the recession by reducing tax rates in year 4, as represented by the downward shift of the tax line from $T_1$ to $T_2$. What has happened to the size of the standardized deficit? Government expenditures in year 4 are $500$ billion, as shown by $e$. We compare that amount with the $475$ billion of tax revenues that would occur if the economy achieved its full-employment GDP. That is, we compare position $e$ on line $G$ with position $b$ on line $T_2$. The $25$ billion of tax revenues by which $e$ exceeds $b$ is the standardized budget deficit for year 4. As a percentage of potential GDP, the standardized budget deficit has increased from zero in year 3 (before the tax-rate cut) to some positive percent $\left[\frac{25\text{ billion}}{\text{GDP}_4}\right] \times 100$ in year 4. This increase in the relative size of the full-employment deficit between the two years reveals that the new fiscal policy is expansionary.

In contrast, if we observed a standardized deficit (as a percentage of potential GDP) of zero in one year, followed

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Recent U.S. Fiscal Policy

Table 30.1 lists the actual Federal budget deficits and surpluses (column 2) and the standardized deficits and surpluses (column 3), as percentages of actual and potential GDP, respectively, for recent years. Observe that the standardized deficits are generally smaller than the actual deficits. This is because the actual deficits include cyclical deficits, whereas the standardized deficits do not. The latter deficits provide the information needed to assess discretionary fiscal policy and determine whether it is expansionary, contractionary, or neutral.

Column 3 shows that fiscal policy was expansionary in the early 1990s. Consider 1992, for example. From the table we see that the actual budget deficit was 4.5 percent

by a standardized budget surplus in the next, we could conclude that fiscal policy has changed from being neutral to being contractionary. Because the standardized budget adjusts for automatic changes in tax revenues, the increase in the standardized budget surplus reveals that government either decreased its spending (G) or increased tax rates such that tax revenues (T) increased. These changes in G and T are precisely the discretionary actions that we have identified as elements of a contractionary fiscal policy.

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Global Perspective 30.1

**Standardized Budget Deficits or Surpluses as a Percentage of Potential GDP, Selected Nations**

In 2007 some nations had standardized budget surpluses, while others had standardized budget deficits. These surpluses and deficits varied as a percentage of each nation’s potential GDP. Generally, the surpluses represented contractionary fiscal policy and the deficits expansionary fiscal policy.

![Graph showing standardized budget deficits or surpluses as a percentage of potential GDP, 2007.](Image)


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of GDP and the standardized budget deficit was 2.9 percent of potential GDP. The economy was recovering from the 1990–1991 recession, so tax revenues were relatively low. But even if the economy had been at full employment in 1992, with the greater tax revenues that would have implied, the Federal budget would have been in deficit by 2.9 percent. And that percentage was greater than the deficits in the prior 2 years. So the standardized budget deficit in 1992 clearly reflected expansionary fiscal policy.

But the large standardized budget deficits were projected to continue even when the economy fully recovered from the 1990–1991 recession. The concern was that the large actual and standardized deficits were inappropriate for a full-employment economy. In 1993 the Clinton administration and Congress increased personal income and corporate income tax rates to prevent these potential outcomes. Observe from column 3 of Table 30.1 that the standardized budget deficits shrunk each year and eventually gave way to surpluses in 1999, 2000, and 2001.

U.S. stock markets crashed in 2000 and the economy began to slow later that year, with the economy slipping into recession by March 2001. The Congress and the Bush administration responded by passing tax cuts of $44 billion in 2001 and $52 billion in 2002. This fiscal policy action helped to simulate the economy and offset the recession as well as the second economic blow that arrived with the September 11, 2001, terrorist attacks. Further tax cuts totaling $122 billion over two years as well as an extension of unemployment benefits were passed in March 2002.

As seen in Table 30.1, the standardized budget moved from a surplus of 1.1 percent of potential GDP in 2000 to a deficit of 1.2 percent in 2002. Clearly, fiscal policy had turned expansionary. Nevertheless, the economy remained very sluggish through 2002 and into 2003. In June of that year, Congress again cut taxes, this time by an enormous $350 billion over several years. Specifically, the tax legislation accelerated the reduction of marginal tax rates already scheduled for future years and slashed tax rates on income from dividends and capital gains. It also increased tax breaks for families and small businesses. This tax package increased the standardized budget deficit as a percentage of potential GDP to –2.5 percent in 2003. The economy strengthened and real output grew between 2003 and 2007. Full employment was restored. But starting in the summer of 2007, a crisis in the market for mortgage loans occurred and spread quickly to other financial markets. (We discuss this crisis in detail in Chapter 33.) Households in particular retrenched on their spending and in the last quarter of 2007 the economy slowed. With economists projecting a 50-50 prospect of a recession in 2008, Congress acted quickly to enact expansionary fiscal policy in the form of the Economic Stimulus Act of 2008. This law provided a total of $152 billion in stimulus. Some of it came in the form of tax breaks for businesses, but most of it arrived in the form of checks of up to $600 each that were mailed to taxpayers, veterans, and Social Security recipients in May of 2008. It was hoped that those receiving checks would spend the money, thereby boosting consumption and aggregate demand. We urge you to track the economy to see if it receded in 2008 by going to the Bureau of Economic Analysis Web site, [www.bea.gov](http://www.bea.gov), and checking changes in real GDP from quarter to quarter. (Key Question 6)

Global Perspective 30.1 shows the magnitudes of the standardized deficits or surpluses of a number of countries in a recent year.

**Budget Deficits and Projections**

Figure 30.5 shows the absolute magnitudes of recent U.S. budget surpluses and deficits. It also shows the projected
future deficits or surpluses as published by the Congressional Budget Office (CBO). The United States has been experiencing large budget deficits that are expected to continue for several years. But projected deficits and surpluses are subject to large and frequent changes, as government alters its fiscal policy and GDP growth accelerates or slows. So we suggest that you update this figure by going to the Congressional Budget Office Web site, www.cbo.gov, and selecting Budget Projections, which are listed under Budget and Economic Information. On that page, click on the “pdf” hyperlink to open an Adobe Acrobat file containing the CBO’s Baseline Budget Projections. The relevant numbers are in the row Deficit (−) or Surplus.

**Social Security Considerations**

The surpluses and deficits in Figure 30.5 include all tax revenues, even those obligated for future Social Security payments. Recall from the Last Word in Chapter 4 that Social Security is basically a “pay-as-you-go plan” in which the mandated benefits paid out each year are financed by the payroll tax revenues received each year. But current tax rates now bring in more revenue than current payouts, in partial preparation for the massive increase in payouts that the system will begin having to make as the baby boom generation enters retirement over the next two decades. The Federal government saves the excess revenues by purchasing U.S. securities and holding them in the Social Security trust fund.

Some economists argue that these present Social Security surpluses ($288 billion in 2007) should be subtracted from Federal government revenue when calculating present Federal deficits. Because these surpluses represent future government obligations on a dollar-for-dollar basis, they should not be considered revenue offsets to current government spending. Without the Social Security surpluses, the total budget deficit in 2007 would have been $450 billion rather than the $162 billion shown.

**Problems, Criticisms, and Complications**

Economists recognize that governments may encounter a number of significant problems in enacting and applying fiscal policy.
Problems of Timing

Several problems of timing may arise in connection with fiscal policy:

- **Recognition lag** The recognition lag is the time between the beginning of recession or inflation and the certain awareness that it is actually happening. This lag arises because the economy does not move smoothly through the business cycle. Even during good times, the economy has slow months interspersed with months of rapid growth and expansion. This makes recognizing a recession difficult since several slow months will have to happen in succession before people can conclude with any confidence that the good times are over and a recession has begun. The same is true with inflation. Even periods of moderate inflation have months of high inflation—so that several high-inflation months must come in sequence before people can confidently conclude that inflation has moved to a higher level. Attempts to get a jump on the recognition lag by attempting to predict the future course of the economy also have proven to be largely futile (see this chapter’s Last Word on the index of leading indicators). As a result, the economy is often 4 to 6 months into a recession or inflation before the situation is clearly discernible in the relevant statistics. Due to this recognition lag, the economic downslide or the inflation may become more serious than it would have if the situation had been identified and acted on sooner.

- **Administrative lag** The wheels of democratic government turn slowly. There will typically be a significant lag between the time the need for fiscal action is recognized and the time action is taken. Following the terrorist attacks of September 11, 2001, the U.S. Congress was stalemated for 5 months before passing a compromise economic stimulus law in March 2002. (In contrast, the Federal Reserve began lowering interest rates the week after the attacks.)

- **Operational lag** A lag also occurs between the time fiscal action is taken and the time that action affects output, employment, or the price level. Although changes in tax rates can be put into effect relatively quickly once new laws are passed, government spending on public works—new dams, interstate highways, and so on—requires long planning periods and even longer periods of construction. Such spending is of questionable use in offsetting short (for example, 6- to 12-month) periods of recession. Consequently, discretionary fiscal policy has increasingly relied on tax changes rather than on changes in spending as its main tool.

Political Considerations

Fiscal policy is conducted in a political arena. That reality not only may slow the enactment of fiscal policy but also may create the potential for political considerations swamping economic considerations in its formulation. It is a human trait to rationalize actions and policies that are in one’s self-interest. Politicians are very human—they want to get reelected. A strong economy at election time will certainly help them. So they may favor large tax cuts under the guise of expansionary fiscal policy even though that policy is economically inappropriate. Similarly, they may rationalize increased government spending on popular items such as farm subsidies, health care, highways, education, and homeland security.

At the extreme, elected officials and political parties might collectively “hijack” fiscal policy for political purposes, cause inappropriate changes in aggregate demand, and thereby cause (rather than avert) economic fluctuations. For instance, before an election, they may try to stimulate the economy to improve their reelection hopes. And then after the election, they may try to use contractionary fiscal policy to dampen the excessive aggregate demand that they caused with their preelection stimulus. In short, elected officials may cause so-called political business cycles. Such scenarios are difficult to document and prove, but there is little doubt that political considerations weigh heavily in the formulation of fiscal policy. The question is how often those political considerations run counter to “sound economics.”

Future Policy Reversals

Fiscal policy may fail to achieve its intended objectives if households expect future reversals of policy. Consider a tax cut, for example. If taxpayers believe the tax reduction is temporary, they may save a large portion of their tax cut, reasoning that rates will return to their previous level in the future. They save more now so that they will be able to draw on this extra savings to maintain their future consumption levels if taxes do indeed rise again in the future. So a tax reduction thought to be temporary may not increase present consumption spending and aggregate demand by as much as our simple model (Figure 30.1) suggests.

The opposite may be true for a tax increase. If taxpayers think it is temporary, they may reduce their saving to pay the tax while maintaining their present consumption. They may reason they can restore their saving when the tax rate again falls. So the tax increase may not reduce current consumption and aggregate demand by as much as policymakers intended.
To the extent that this so-called consumption smoothing occurs over time, fiscal policy will lose some of its strength. The lesson is that tax-rate changes that households view as permanent are more likely to alter consumption and aggregate demand than tax changes they view as temporary.

**Offsetting State and Local Finance**

The fiscal policies of state and local governments are frequently procyclical, meaning that they worsen rather than correct recession or inflation. Unlike the Federal government, most state and local governments face constitutional or other legal requirements to balance their budgets. Like households and private businesses, state and local governments increase their expenditures during prosperity and cut them during recession. During the Great Depression of the 1930s, most of the increase in Federal spending was offset by decreases in state and local spending. During and immediately following the recession of 2001, many state and local governments had to offset lower tax revenues resulting from the reduced personal income and spending of their citizens. They offset the decline in revenues by raising tax rates, imposing new taxes, and reducing spending.

**Crowding-Out Effect**

Another potential flaw of fiscal policy is the so-called crowding-out effect: An expansionary fiscal policy (deficit spending) may increase the interest rate and reduce investment spending, thereby weakening or canceling the stimulus of the expansionary policy. The rising interest rate might also potentially crowd out interest-sensitive consumption spending (such as purchasing automobiles on credit). But since investment is the most volatile component of GDP, the crowding-out effect focuses its attention on investment and whether the stimulus provided by deficit spending may be partly or even fully neutralized by an offsetting reduction in investment spending.

To see the potential problem, realize that whenever the government borrows money (as it must if it is deficit spending), it increases the overall demand for money. If the monetary authorities are holding the money supply constant, this increase in demand will raise the price paid for borrowing money: the interest rate. Because investment spending varies inversely with the interest rate, some investment will be choked off or “crowded out.”

Economists vary in their opinions about the strength of the crowding-out effect. An important thing to keep in mind is that crowding out is likely to be less of a problem when the economy is in recession. This is true because investment demand tends to be low during recessions. Why? Because sales are slow during recessions, so that most businesses end up with substantial amounts of excess capacity. As a result, they do not have much incentive to add new machinery or build new factories. After all, why should they add capacity when some of the capacity they already have is lying idle?

With investment demand low during a recession, the crowding-out effect is likely to be very small. Simply put, with investment demand at such a low level due to the recession, there is not as much investment for the government to crowd out. Even if deficit spending does increase the interest rate, the effect on investment may be fully offset by the improved investment prospects that businesses expect from the fiscal stimulus.

By contrast, when the economy is operating at or near full capacity, investment demand is likely to be quite high so that crowding out is likely to be a much more serious problem. When the economy is booming, factories will be running at or near full capacity and firms will have high investment demand for two reasons. First, equipment running at full capacity wears out fast, so firms will be doing a lot of investment just to replace machinery and equipment that wears out and depreciates. Second, the economy is likely to be growing overall so that firms will be investing not just to replace worn-out equipment in order to keep their productive capacity from deteriorating, but also so that they can make additions to their productive capacity.

**Current Thinking on Fiscal Policy**

Where do these complications leave us as to the advisability and effectiveness of discretionary fiscal policy? In view of the complications and uncertain outcomes of fiscal policy, some economists argue that it is better not to engage in it at all. Those holding that view point to the superiority of monetary policy (changes in interest rates engineered by the Federal Reserve) as a stabilizing device or believe that most economic fluctuations tend to be mild and self-correcting.

But most economists believe that fiscal policy remains an important, useful policy lever in the government’s macroeconomic toolkit. The current popular view is that fiscal policy can help push the economy in a particular direction but cannot fine-tune it to a precise macroeconomic outcome. Mainstream economists generally agree that monetary policy is the best month-to-month stabilization tool for the U.S. economy. If monetary policy is doing its job, the government should maintain a relatively neutral fiscal policy, with a standardized budget deficit or
surplus of no more than 2 percent of potential GDP. It should hold major discretionary fiscal policy in reserve to help counter situations where recession threatens to be deep and long-lasting or where a substantial reduction in aggregate demand might help to eliminate a large inflationary gap and aid the Federal Reserve in its efforts to quell the major bout of inflation caused by that large inflationary gap.

Finally, economists agree that proposed fiscal policy should be evaluated for its potential positive and negative impacts on long-run productivity growth. The short-run policy tools used for conducting active fiscal policy often have long-run impacts. Countercyclical fiscal policy should be shaped to strengthen, or at least not impede, the growth of long-run aggregate supply (shown as a rightward shift of the long-run aggregate supply curve in Figure 29.5). For example, a tax cut might be structured to enhance work effort, strengthen investment, and encourage innovation. Alternatively, an increase in government spending might center on preplanned projects for public capital (highways, mass transit, ports, airports), which are complementary to private investment and thus support long-term economic growth. (Key Question 8)

**Quick Review 30.2**

- Automatic changes in net taxes (taxes minus transfers) add a degree of built-in stability to the economy.
- The standardized budget compares government spending to the tax revenues that would accrue if there were full employment; changes in standardized budget deficits or surpluses (as percentages of potential GDP) reveal whether fiscal policy is expansionary, neutral, or contractionary.
- Standardized budget deficits are distinct from cyclical deficits, which simply reflect declines in tax revenues resulting from reduced GDP.
- Time lags, political problems, expectations, and state and local finances complicate fiscal policy.
- The crowding-out effect indicates that an expansionary fiscal policy may increase the interest rate and reduce investment spending.

### The Public Debt

The national or public debt is essentially the total accumulation of the deficits (minus the surpluses) the Federal government has incurred through time. These deficits have emerged mainly because of war financing, recessions, and fiscal policy. In 2007 the total public debt was $9.01 trillion—$4.27 trillion held by the public and $4.73 trillion held by Federal agencies and the Federal Reserve. (You can find the size of the public debt to the penny, at the Web site of the Department of Treasury, Bureau of the Public Debt, at [www.treasurydirect.gov/ NP/BPDL?application=np]).

#### Ownership

The total public debt of $9.01 trillion represents the total amount of money owed by the Federal government to the holders of U.S. securities: financial instruments issued by the Federal government to borrow money to finance expenditures that exceed tax revenues. These U.S. securities (loan instruments) are of four types: Treasury bills (short-term securities), Treasury notes (medium-term securities), Treasury bonds (long-term securities), and U.S. saving bonds (long-term, nonmarketable bonds).

Figure 30.6 shows that the public held 47 percent of the Federal debt in 2007 and that Federal government agencies and the Federal Reserve (the U.S. central bank) held the other 53 percent. In this case the “public” consists of individuals here and abroad, state and local governments, and U.S. financial institutions. Foreigners held

**Figure 30.6 Ownership of the total public debt, 2007.**
The total public debt can be divided into the proportion held by the public (47 percent) and the proportion held by Federal agencies and the Federal Reserve System (53 percent). Of the total debt, 25 percent is foreign-owned.

<table>
<thead>
<tr>
<th>Debit held outside the Federal government and Federal Reserve (47%)</th>
<th>Debt held by the Federal government and Federal Reserve (53%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Reserve</td>
<td>Other, including state and local governments</td>
</tr>
<tr>
<td>U.S. banks and other financial institutions</td>
<td>U.S. individuals</td>
</tr>
<tr>
<td>Foreign ownership</td>
<td>U.S. government agencies</td>
</tr>
</tbody>
</table>

FIGURE 30.7 Federal debt held by the public as a percentage of GDP, 1970–2007. As a percentage of GDP, the Federal debt held by the public (held outside the Federal Reserve and Federal government agencies) increased sharply over the 1980–1995 period and declined significantly between 1995 and 2001. Since 2001, the percentage has gone up again, but remains lower than it was in the 1990s.

![Graph showing Federal debt held by the public as a percentage of GDP from 1970 to 2010.](image)


about 25 percent of the total debt in 2007. So, most of the debt is held internally, not externally. Americans owe three-fourths of the debt to Americans.

**Debt and GDP**

A simple statement of the absolute size of the debt ignores the fact that the wealth and productive ability of the U.S. economy is also vast. A wealthy, highly productive nation can incur and carry a large public debt more easily than a poor nation can. A more meaningful measure of the public debt relates it to an economy’s GDP. Figure 30.7 shows the relative size of the Federal debt held by the public (as opposed to that held by the Federal Reserve and Federal agencies) over time. This percentage—30.6 percent in 2007—has increased since 2001 but remains well below the percentages in the 1990s.

**International Comparisons**

As shown in Global Perspective 30.2, it is not uncommon for countries to have public debts. The numbers shown are government debts held by the public, as a percentage of GDP.

### GLOBAL PERSPECTIVE 30.2

**Publicly Held Debt: International Comparisons**

Although the United States has the world’s largest public debt, a number of other nations have larger debts as percentages of their GDPs.

<table>
<thead>
<tr>
<th>Country</th>
<th>Public Sector Debt as Percentage of GDP, 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>40</td>
</tr>
<tr>
<td>Japan</td>
<td>60</td>
</tr>
<tr>
<td>Belgium</td>
<td>50</td>
</tr>
<tr>
<td>Hungary</td>
<td>40</td>
</tr>
<tr>
<td>Germany</td>
<td>30</td>
</tr>
<tr>
<td>United States</td>
<td>20</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>10</td>
</tr>
<tr>
<td>France</td>
<td>20</td>
</tr>
<tr>
<td>Netherlands</td>
<td>15</td>
</tr>
<tr>
<td>Canada</td>
<td>10</td>
</tr>
<tr>
<td>Spain</td>
<td>5</td>
</tr>
<tr>
<td>Poland</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Organization for Economic Cooperation and Development, OECD Economic Outlook, [www.oecd.org](http://www.oecd.org). These debt calculations included Federal, state, and local debt (not just Federal debt as in Figure 30.7).

**Interest Charges**

Many economists conclude that the primary burden of the debt is the annual interest charge accruing on the bonds sold to finance the debt. In 2007 interest on the total public debt was $237 billion, which is now the fourth-largest item in the Federal budget (behind income security, national defense, and health).

Interest payments were 1.7 percent of GDP in 2007. That percentage reflects the level of taxation (the average tax rate) required to pay the interest on the public debt. That is, in 2007 the Federal government had to collect taxes equal to 1.7 percent of GDP to service the total public debt. This percentage was down from 3.2 percent in 1990 and 2.3 percent in 2000 thanks to relatively low interest costs of borrowing and a smaller debt-to-GDP ratio.

**False Concerns**

You may wonder if the large public debt might bankrupt the United States or at least place a tremendous burden on
your children and grandchildren. Fortunately, these are false concerns. People were wondering the same things 50 years ago!

**Bankruptcy**

The large U.S. public debt does not threaten to bankrupt the Federal government, leaving it unable to meet its financial obligations. There are two main reasons: refinancing and taxation.

**Refinancing** The public debt is easily refinanced. As portions of the debt come due on maturing Treasury bills, notes, and bonds each month, the government does not cut expenditures or raise taxes to provide the funds required. Rather, it refinances the debt by selling new bonds and using the proceeds to pay holders of the maturing bonds. The new bonds are in strong demand because lenders can obtain a relatively good interest return with no risk of default by the Federal government.

**Taxation** The Federal government has the constitutional authority to levy and collect taxes. A tax increase is a government option for gaining sufficient revenue to pay interest and principal on the public debt. Financially distressed private households and corporations cannot extract themselves from their financial difficulties by taxing the public. If their incomes or sales revenues fall short of their expenses, they can indeed go bankrupt. But the Federal government does have the option to impose new taxes or increase existing tax rates if necessary to finance its debt.

**Burdening Future Generations**

In 2007 public debt per capita was $29,987. Was each child born in 2007 handed a $29,987 bill from the Federal government? Not really. The public debt does not impose as much of a burden on future generations as commonly thought.

The United States owes a substantial portion of the public debt to itself. U.S. citizens and institutions (banks, businesses, insurance companies, governmental agencies, and trust funds) own about 75 percent of the U.S. government securities. Although that part of the public debt is a liability to Americans (as taxpayers), it is simultaneously an asset to Americans (as holders of Treasury bills, Treasury notes, Treasury bonds, and U.S. savings bonds).

To eliminate the American-owned part of the public debt would require a gigantic transfer payment from Americans to Americans. Taxpayers would pay higher taxes, and holders of the debt would receive an equal amount for their U.S. securities. Purchasing power in the United States would not change. Only the repayment of the 25 percent of the public debt owned by foreigners would negatively impact U.S. purchasing power.

The public debt increased sharply during the Second World War. But the decision to finance military purchases through the sale of government bonds did not shift the economic burden of the war to future generations. The economic cost of the Second World War consisted of the civilian goods society had to forgo in shifting scarce resources to war goods production (recall production possibilities analysis). Regardless of whether society financed this reallocation through higher taxes or through borrowing, the real economic burden of the war would have been the same. That burden was borne almost entirely by those who lived during the war. They were the ones who did without a multitude of consumer goods to enable the United States to arm itself and its allies. The next generation inherited the debt from the war but also an equal amount of government bonds. It also inherited the enormous benefits from the victory—namely, preserved political and economic systems at home and the “export” of those systems to Germany, Italy, and Japan. Those outcomes enhanced postwar U.S. economic growth and helped raise the standard of living of future generations of Americans.

**Substantive Issues**

Although the preceding issues relating to the public debt are false concerns, a number of substantive issues are not. Economists, however, attach varying degrees of importance to them.

**Income Distribution**

The distribution of ownership of government securities is highly uneven. Some people own much more than the $29,987-per-person portion of government securities; other people own less or none at all. In general, the ownership of the public debt is concentrated among wealthier groups, who own a large percentage of all stocks and bonds. Because the overall Federal tax system is only slightly progressive, payment of interest on the public debt mildly increases income inequality. Income is transferred from people who, on average, have lower incomes to the higher-income bondholders. If greater income equality is one of society’s goals, then this redistribution is undesirable.

**Incentives**

The current public debt necessitates annual interest payments of $237 billion. With no increase in the size of the
debt, that interest charge must be paid out of tax revenues. Higher taxes may dampen incentives to bear risk, to innovate, to invest, and to work. So, in this indirect way, a large public debt may impair economic growth.

Foreign-Owned Public Debt
The 25 percent of the U.S. debt held by citizens and institutions of foreign countries is an economic burden to Americans. Because we do not owe that portion of the debt “to ourselves,” the payment of interest and principal on this external public debt enables foreigners to buy some of our output. In return for the benefits derived from the borrowed funds, the United States transfers goods and services to foreign lenders. Of course, Americans also own debt issued by foreign governments, so payment of principal and interest by those governments transfers some of their goods and services to Americans. (Key Question 10)

Crowding-Out Effect Revisited
A potentially more serious problem is the financing (and continual refinancing) of the large public debt, which can transfer a real economic burden to future generations by passing on to them a smaller stock of capital goods. This possibility involves the previously discussed crowding-out effect: the idea that public borrowing drives up real interest rates, which reduces private investment spending. As we mentioned earlier, if public borrowing only happened during recessions, crowding out would not likely be much of a problem. Because private investment demand tends to be low during recessions, any increase in interest rates caused by public borrowing will at most cause a small reduction in investment spending. By contrast, a large public debt may cause crowding-out problems because the need to continuously refinance the debt will entail large amounts of borrowing not just during recessions but also during times when the economy is at full employment and investment demand tends to be very high. In such situations, any increase in interest rates caused by the borrowing necessary to refinance the debt may result in a substantial decline in investment spending. If the amount of current investment crowded out is extensive, future generations will inherit an economy with a smaller production capacity and, other things equal, a lower standard of living.

A Graphical Look at Crowding Out We know from Chapter 27 that the real interest rate is inversely related to the amount of investment spending. When graphed, that relationship is shown as a downward-sloping investment demand curve, such as either $ID_1$ or $ID_2$ in Figure 30.8. Let’s first consider curve $ID_1$. (Ignore curve $ID_2$ for now.) Suppose that government borrowing increases the real interest rate from 6 percent to 10 percent. Investment spending will then fall from $25 billion to $15 billion, as shown by the economy’s move from $a$ to $b$. That is, the financing of the debt will compete with the financing of private investment projects and crowd out $10 billion of private investment. So the stock of private capital handed down to future generations will be $10 billion less than it would have been without the need to finance the public debt.

Public Investments and Public-Private Complementarities But even with crowding out, two factors could partly or fully offset the net economic burden shifted to future generations. First, just as private expenditures may involve either consumption or investment, so it is with public goods. Part of the government spending enabled by the public debt is for public investment outlays (for example, highways, mass transit systems, and electric power facilities) and “human capital” (for example, investments in education, job training, and health). Like private expenditures on machinery and equipment,
The Leading Indicators

One of Several Tools Policymakers Use to Develop Forecasts about the Future Direction of Real GDP Is a Monthly Index of 10 Variables That in the Past Have Sometimes Provided Correct Advance Notice of Changes in GDP.

The Conference Board’s index of leading indicators has often (but not always!) reached a peak or a trough in advance of corresponding turns in the business cycle.* Thus, changes in this composite index of 10 economic variables provide a rough guide to the future direction of the economy. Such advance warning helps policymakers formulate appropriate macroeconomic policy.

Here is how each of the 10 components of the index would change if it were predicting a decline in real GDP. The opposite changes would forecast a rise in real GDP.

1. Average workweek Decreases in the length of the average workweek of production workers in manufacturing foretell declines in future manufacturing output and possible declines in real GDP.

2. Initial claims for unemployment insurance Higher first-time claims for unemployment insurance are associated with falling employment and subsequently sagging real GDP.

3. New orders for consumer goods Decreases in the number of orders received by manufacturers for consumer goods portend reduced future production—a decline in real GDP.

4. Vendor performance Somewhat ironically, better on-time delivery by sellers of inputs indicates slackening business demand for final output and potentially falling real GDP.

5. New orders for capital goods A drop in orders for capital equipment and other investment goods implies reduced future spending by businesses and thus reduced aggregate demand and lower real GDP.

6. Building permits for houses Decreases in the number of building permits issued for new homes imply future declines in investment and therefore the possibility that real GDP will fall.

7. Stock prices Declines in stock prices often are reflections of expected declines in corporate sales and profits. Also, lower stock prices diminish consumer wealth, leading to possible cutbacks in consumer spending. Lower stock prices also make it less attractive for firms to issue new shares of stock as a way of raising funds for investment. Thus, declines in stock prices can mean declines in future aggregate demand and real GDP.

8. Money supply Decreases in the nation’s money supply are associated with falling real GDP.

9. Interest-rate spread Increases in short-term nominal interest rates typically reflect monetary policies designed to slow the economy. Such policies have much less effect on long-term interest rates, which usually are higher than short-term rates. So a smaller difference between short-term interest rates and long-term interest rates suggests restrictive monetary policies and potentially a future decline in GDP.

10. Consumer expectations Less favorable consumer attitudes about future economic conditions, measured by an index of consumer expectations, foreshadow lower consumption spending and potential future declines in GDP.

None of these factors alone consistently predicts the future course of the economy. It is not unusual in any month, for example, for one or two of the indicators to be decreasing while the other indicators are increasing. Rather, changes in the composite of the 10 components are what in the past have provided advance notice of a change in the direction of GDP. To the extent that the index has been successful, the rule of thumb is that three successive monthly declines or increases in the index indicate the economy will soon turn in that same direction.

But while that rule of thumb has correctly signaled business fluctuations on many occasions, it leaves a lot to be desired. At times the index has provided false warnings of recessions that never happened. In other instances, recessions have so closely followed the downturn in the index that policymakers have not had sufficient time to make use of the “early” warning. Moreover, changing structural features of the economy have, on occasion, rendered the existing index obsolete and necessitated its revision.

Given these caveats, the index of leading indicators can best be thought of as a helpful but rather unreliable signaling device that authorities must employ with considerable caution when formulating macroeconomic policy.

*The Conference Board is a private, nonprofit research and business membership group, with more than 2700 corporate and other members in 60 nations. See www.conferenceboard.org.
those public investments increase the economy’s future production capacity. Because of the financing through debt, the stock of public capital passed on to future generations may be higher than otherwise. That greater stock of public capital may offset the diminished stock of private capital resulting from the crowding-out effect, leaving overall production capacity unimpaired.

So-called public-private complementarities are a second factor that could reduce the crowding-out effect. Some public and private investments are complementary. Thus, the public investment financed through the debt could spur some private-sector investment by increasing its expected rate of return. For example, a Federal building in a city may encourage private investment in the form of nearby office buildings, shops, and restaurants. Through its complementary effect, the spending on public capital may shift the private investment demand curve to the right, as from $ID_1$ to $ID_2$ in Figure 30.8. Even though the government borrowing boosts the interest rate from 6 percent to 10 percent, total private investment need not fall. In the case shown as the move from $a$ to $c$ in Figure 30.8, it remains at $25$ billion. Of course, the increase in investment demand might be smaller than that shown. If it were smaller, the crowding-out effect would not be fully offset. But the point is that an increase in investment demand may counter the decline in investment that would otherwise result from the higher interest rate. (Key Question 13)

### QUICK REVIEW 30.3

- The U.S. public debt—$9.01 trillion in 2007—is essentially the total accumulation of Federal budget deficits minus surpluses over time; about 25 percent of the public debt is held by foreigners.
- As a percentage of GDP, the portion of the debt held by the public is lower today than it was in the mid-1990s and is in the middle range of such debts among major industrial nations.
- The Federal government is in no danger of going bankrupt because it needs only to refinance (not retire) the public debt and it can raise revenues, if needed, through higher taxes.
- The borrowing and interest payments associated with the public debt may (a) increase income inequality; (b) require higher taxes, which may dampen incentives; and (c) impede the growth of the nation’s stock of capital through crowding out of private investment.

### Summary

1. Fiscal policy consists of deliberate changes in government spending, taxes, or some combination of both to promote full employment, price-level stability, and economic growth. Fiscal policy requires increases in government spending, decreases in taxes, or both—a budget deficit—to increase aggregate demand and push an economy from a recession. Decreases in government spending, increases in taxes, or both—a budget surplus—are appropriate fiscal policy for dealing with demand-pull inflation.

2. Built-in stability arises from net tax revenues, which vary directly with the level of GDP. During recession, the Federal budget automatically moves toward a stabilizing deficit; during expansion, the budget automatically moves toward an anti-inflationary surplus. Built-in stability lessens, but does not fully correct, undesired changes in the real GDP.

3. The standardized budget measures the Federal budget deficit or surplus that would occur if the economy operated at full employment throughout the year. Cyclical deficits or surpluses are those that result from changes in GDP. Changes in the standardized deficit or surplus provide meaningful information as to whether the government’s fiscal policy is expansionary, neutral, or contractionary. Changes in the actual budget deficit or surplus do not, since such deficits or surpluses can include cyclical deficits or surpluses.

4. Certain problems complicate the enactment and implementation of fiscal policy. They include (a) timing problems associated with recognition, administrative, and operational lags; (b) the potential for misuse of fiscal policy for political rather than economic purposes; (c) the fact that state and local finances tend to be pro-cyclical; (d) potential ineffectiveness if households expect future policy reversals; and (e) the possibility of fiscal policy crowding out private investment.

5. Most economists believe that fiscal policy can help move the economy in a desired direction but cannot reliably be used to fine-tune the economy to a position of price stability and full employment. Nevertheless, fiscal policy is a valuable backup tool for aiding monetary policy in fighting significant recession or inflation.

6. The large Federal budget deficits of the 1980s and early 1990s prompted Congress in 1993 to increase tax rates and limit government spending. As a result of these policies, along with a very rapid and prolonged economic expansion, the deficits dwindled to $22 billion in 1997. Large budget surpluses occurred from 1998 through 2001. In 2001 the
Congressional Budget Office projected that $5 trillion of annual budget surpluses would accumulate between 2000 and 2010.

7. In 2001 the Bush administration and Congress chose to reduce marginal tax rates and phase out the Federal estate tax. A recession occurred in 2001, the stock market crashed, and Federal spending for the war on terrorism rocketed. The Federal budget swung from a surplus of $128 billion in 2001 to a deficit of $158 billion in 2002. In 2003 the Bush administration and Congress accelerated the tax reductions scheduled under the 2001 tax law and cut tax rates on capital gains and dividends. The purposes were to stimulate a sluggish economy. In 2007 the budget deficit was $162 billion and deficits are projected to continue through 2011 before surpluses again reemerge.

8. The public debt is the total accumulation of the government’s deficits (minus surpluses) over time and consists of Treasury bills, Treasury notes, Treasury bonds, and U.S. savings bonds. In 2007 the U.S. public debt was $9.01 trillion, or $29,987 per person. The public (which here includes banks and state and local governments) holds 47 percent of that Federal debt; the Federal Reserve and Federal agencies hold the other 53 percent. Foreigners hold 25 percent of the Federal debt. Interest payments as a percentage of GDP were about 1.7 percent in 2007. This is down from 3.2 percent in 1990.

9. The concern that a large public debt may bankrupt the government is a false worry because (a) the debt needs only to be refinanced rather than refunded and (b) the Federal government has the power to increase taxes to make interest payments on the debt.

10. In general, the public debt is not a vehicle for shifting economic burdens to future generations. Americans inherit not only most of the public debt (a liability) but also most of the U.S. securities (an asset) that finance the debt.

11. More substantive problems associated with public debt include the following: (a) Payment of interest on the debt may increase income inequality. (b) Interest payments on the debt require higher taxes, which may impair incentives. (c) Paying interest or principal on the portion of the debt held by foreigners means a transfer of real output abroad. (d) Government borrowing to refinance or pay interest on the debt may increase interest rates and crowd out private investment spending, leaving future generations with a smaller stock of capital than they would have otherwise.

12. The increase in investment in public capital that may result from debt financing may partly or wholly offset the crowding-out effect of the public debt on private investment. Also, the added public investment may stimulate private investment, where the two are complements.

Terms and Concepts

fiscal policy
Council of Economic Advisers (CEA)
expansionary fiscal policy
budget deficit
contractionary fiscal policy
budget surplus
built-in stabilizer
progressive tax system
proportional tax system
regressive tax system
standardized budget
cyclical deficit
political business cycle
crowding-out effect
public debt
U.S. securities
external public debt
public investments

Study Questions

1. What is the role of the Council of Economic Advisers (CEA) as it relates to fiscal policy? Class assignment: Determine the names and educational backgrounds of the present members of the CEA. LO1

2. KEY QUESTION Assume that a hypothetical economy with an MPC of .8 is experiencing severe recession. By how much would government spending have to increase to shift the aggregate demand curve rightward by $25 billion? How large a tax cut would be needed to achieve the same increase in aggregate demand? Why the difference? Determine one possible combination of government spending increases and tax decreases that would accomplish the same goal. LO1

3. KEY QUESTION What are government’s fiscal policy options for ending severe demand-pull inflation? Which of these fiscal options do you think might be favored by a person who wants to preserve the size of government? A person who thinks the public sector is too large? How does the “ratchet effect” affect anti-inflationary fiscal policy? LO1

4. (For students who were assigned Chapter 28) Use the aggregate expenditures model to show how government fiscal policy could eliminate either a recessionary expenditure gap or an inflationary expenditure gap (Figure 28.7). Explain how equal-size increases in G and T could eliminate a recessionary gap and how equal-size decreases in G and T could eliminate an inflationary gap. LO1
5. Explain how built-in (or automatic) stabilizers work. What are the differences between proportional, progressive, and regressive tax systems as they relate to an economy’s built-in stability? **LO2**

6. **KEY QUESTION** Define the standardized budget, explain its significance, and state why it may differ from the actual budget. Suppose the full-employment, noninflationary level of real output is GDP₁ (not GDP₂) in the economy depicted in Figure 30.3. If the economy is operating at GDP₁, instead of GDP₂, what is the status of its standardized budget? The status of its current fiscal policy? What change in fiscal policy would you recommend? How would you accomplish that in terms of the G and T lines in the figure? **LO3**

7. Some politicians have suggested that the United States enact a constitutional amendment requiring that the Federal government balance its budget annually. Explain why such an amendment, if strictly enforced, would force the government to enact a contractionary fiscal policy whenever the economy experienced a severe recession. **LO1**

8. **KEY QUESTION** Briefly state and evaluate the problem of time lags in enacting and applying fiscal policy. Explain the idea of a political business cycle. How might expectations of a near-term policy reversal weaken fiscal policy based on changes in tax rates? What is the crowding-out effect, and why might it be relevant to fiscal policy? In view of your answers, explain the following statement: “Although fiscal policy clearly is useful in combating the extremes of severe recession and demand-pull inflation, it is impossible to use fiscal policy to fine-tune the economy to the full-employment, noninflationary level of real GDP and keep the economy there indefinitely.” **LO1**

9. **ADVANCED ANALYSIS** (For students who were assigned Chapter 28) Assume that, without taxes, the consumption schedule for an economy is as shown below: **LO2**

<table>
<thead>
<tr>
<th>GDP, Billions</th>
<th>Consumption, Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100</td>
<td>$120</td>
</tr>
<tr>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>300</td>
<td>280</td>
</tr>
<tr>
<td>400</td>
<td>360</td>
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<tr>
<td>500</td>
<td>440</td>
</tr>
<tr>
<td>600</td>
<td>520</td>
</tr>
<tr>
<td>700</td>
<td>600</td>
</tr>
</tbody>
</table>

a. Graph this consumption schedule and determine the size of the MPC.
b. Assume that a lump-sum (regressive) tax of $10 billion is imposed at all levels of GDP. Calculate the tax rate at each level of GDP. Graph the resulting consumption schedule and compare the MPC and the multiplier with those of the pretax consumption schedule.
c. Now suppose a proportional tax with a 10 percent tax rate is imposed instead of the regressive tax. Calculate and graph the new consumption schedule and note the MPC and the multiplier.
d. Finally, impose a progressive tax such that the tax rate is 0 percent when GDP is $100, 5 percent at $200, 10 percent at $300, 15 percent at $400, and so forth. Determine and graph the new consumption schedule, noting the effect of this tax system on the MPC and the multiplier.
e. Explain why proportional and progressive taxes contribute to greater economic stability, while a regressive tax does not. Demonstrate, using a graph similar to Figure 30.3.

10. **KEY QUESTION** How do economists distinguish between the absolute and relative sizes of the public debt? Why is the distinction important? Distinguish between refinancing the debt and retiring the debt. How does an internally held public debt differ from an externally held public debt? Contrast the effects of retiring an internally held debt and retiring an externally held debt. **LO4**

11. True or false? If false, explain why. **LO4**

a. The total public debt is more relevant to an economy than the public debt as a percentage of GDP.
b. An internally held public debt is like a debt of the left hand owed to the right hand.
c. The Federal Reserve and Federal government agencies hold more than three-fourths of the public debt.
d. The portion of the U.S. debt held by the public (and not by government entities) was larger as a percentage of GDP in 2007 than it was in 1995.
e. In recent years, Social Security payments to retirees have exceeded Social Security tax revenues from workers and their employers.

12. Why might economists be quite concerned if the annual interest payments on the debt sharply increased as a percentage of GDP? **LO4**

13. **KEY QUESTION** Trace the cause-and-effect chain through which financing and refinancing of the public debt might affect real interest rates, private investment, the stock of capital, and economic growth. How might investment in public capital and complementarities between public capital and private capital alter the outcome of the cause-effect chain? **LO4**

14. What would happen to the stated sizes of Federal budget deficits or surpluses if the current annual additions or subtractions from the Social Security trust fund were excluded? **LO4**

15. **LAST WORD** What is the index of leading economic indicators, and how does it relate to discretionary fiscal policy?
Web-Based Questions

1. **LEADING ECONOMIC INDICATORS—HOW GOES THE ECONOMY?** The Conference Board, at [www.conference-board.org](http://www.conference-board.org), tracks the leading economic indicators. Check the summary of the index of leading indicators and its individual components for the latest month. Is the index up or down? Which specific components are up, and which are down? What has been the trend of the composite index over the past 3 months?

2. **TABLE 30.1—WHAT ARE THE LATEST NUMBERS?** Go to the Congressional Budget Office Web site, [www.cbo.gov](http://www.cbo.gov), and select Historical Budget Data. On that page, click on the “pdf” hyperlink to open up an Adobe Acrobat file containing the necessary data. Find the historical data for the actual budget deficit or surplus (total). Update column 2 of Table 30.1. Next, find the historical data for the standardized (full-employment) budget deficit or surplus as a percentage of potential GDP. Update column 3 of Table 30.1. Is fiscal policy more expansionary or less expansionary than it was in 2005?