

# CHAPTER 33

## Aggregate Demand and Aggregate Supply

Economic activity fluctuates from year to year. In most years, the production of goods and services rises. Because of increases in the labor force, increases in the capital stock, and advances in technological knowledge, the economy can produce more and more over time. This growth allows everyone to enjoy a higher standard of living. On average, over the past half century, the production of the U.S. economy as measured by real GDP has grown by about 3 percent per year.

In some years, however, instead of expanding, the economy contracts. Firms find themselves unable to sell all the goods and services they have to offer, so they reduce production. Workers are laid off, unemployment becomes widespread, and factories are left idle. With the economy producing fewer goods and services, real GDP and other measures of income decline. Such a period of falling



**recession**

a period of declining real incomes and rising unemployment

**depression**

a severe recession

incomes and rising unemployment is called a **recession** if it is relatively mild and a **depression** if it is more severe.

An example of such a downturn occurred in 2008 and 2009 in what is now referred to as “The Great Recession.” From the fourth quarter of 2007 to the second quarter of 2009, real GDP for the U.S. economy fell by 4.0 percent. The unemployment rate rose from 4.4 percent in May 2007 to 10.0 percent in October 2009—the highest level in more than a quarter century. Not surprisingly, for students graduating during this time, good jobs were hard to find.

What causes short-run fluctuations in economic activity? What, if anything, can public policy do to prevent periods of falling incomes and rising unemployment? When recessions and depressions occur, how can policymakers reduce their length and severity? We now take up these questions.

The variables at the center of our analysis are familiar from previous chapters. They include GDP, unemployment, interest rates, and the price level. Also familiar are the policy instruments of government spending, taxes, and the money supply. What differs from our earlier discussions is the time horizon. So far, our goal has been to explain the behavior of these variables in the long run. Our goal now is to explain their short-run deviations from long-run trends. In other words, instead of focusing on the forces that explain economic growth from generation to generation, we are now interested in the forces that explain economic fluctuations from year to year.

Economists still debate how best to explain short-run fluctuations, but most use the *model of aggregate demand and aggregate supply*. Learning how to use this model to analyze the short-run effects of various events and policies is the main task ahead. This chapter introduces the model’s two pieces: the aggregate-demand curve and the aggregate-supply curve. Before turning to the model, however, let’s look at some of the key facts that describe the ups and downs of the economy.

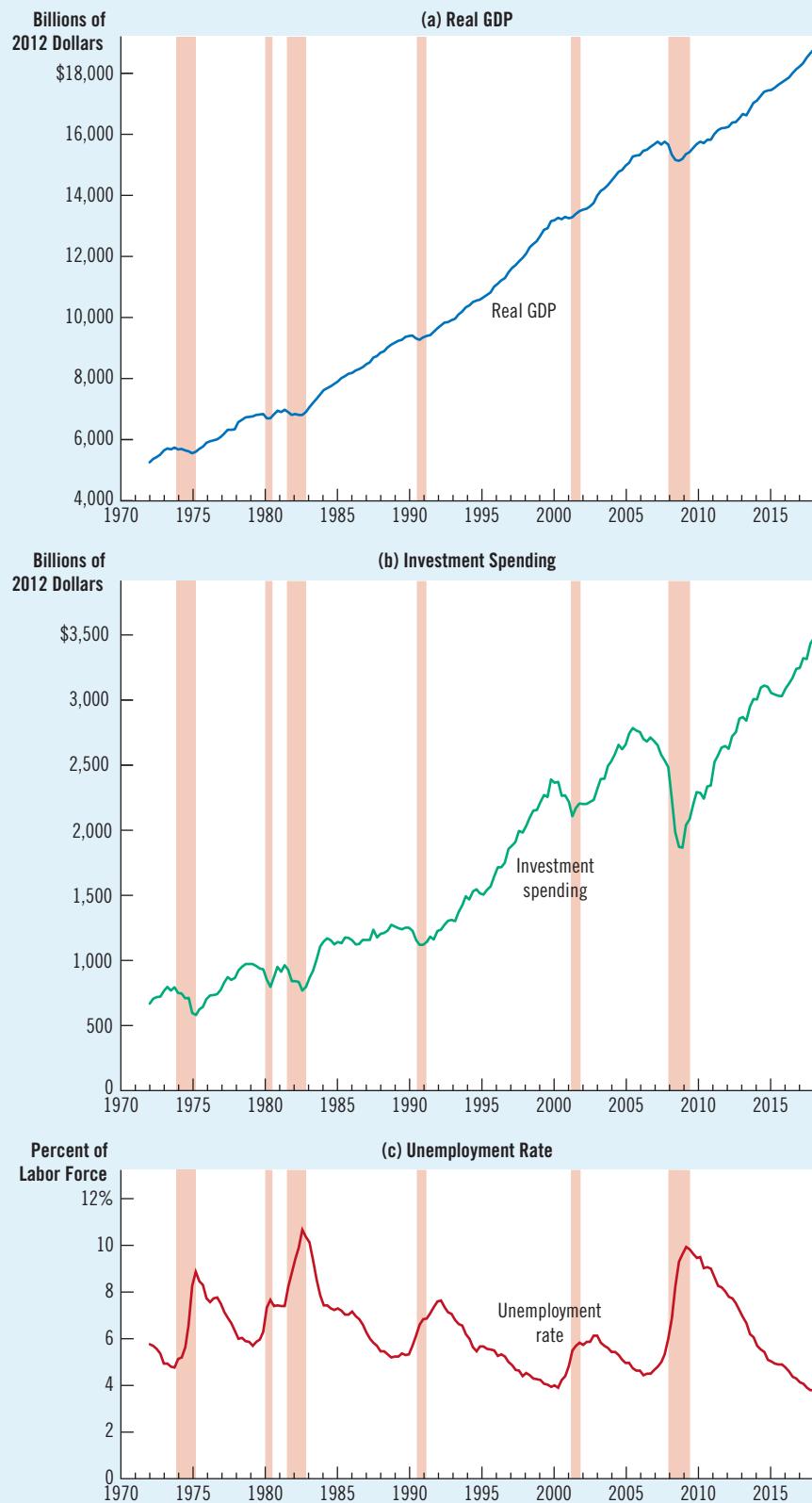
### 33-1 Three Key Facts about Economic Fluctuations

Short-run fluctuations in economic activity have occurred in all countries throughout history. As a starting point for understanding these year-to-year fluctuations, let’s discuss some of their most important properties.

#### 33-1a Fact 1: Economic Fluctuations Are Irregular and Unpredictable

Fluctuations in the economy are often called *the business cycle*. As this term suggests, economic fluctuations correspond to changes in business conditions. When real GDP grows rapidly, business is good. During such periods of economic expansion, most firms find that customers are plentiful and that profits are growing. When real GDP falls during recessions, businesses have trouble. During such periods of economic contraction, most firms experience declining sales and dwindling profits.

The term *business cycle* is somewhat misleading because it suggests that economic fluctuations follow a regular, predictable pattern. In fact, economic fluctuations are not at all regular, and they are almost impossible to predict with much accuracy. Panel (a) of Figure 1 shows the real GDP of the U.S. economy since 1972. The shaded areas represent times of recession. As the figure shows, recessions do not come at regular intervals. Sometimes recessions are close together, such as the recessions of 1980 and 1982. Sometimes the economy goes many years without a

**FIGURE 1**

### A Look at Short-Run Economic Fluctuations

This figure shows real GDP in panel (a), investment spending in panel (b), and unemployment in panel (c) for the U.S. economy. Recessions are shown as the shaded areas. Notice that real GDP and investment spending decline during recessions, while unemployment rises.

Source: U.S. Department of Commerce; U.S. Department of Labor.

recession. The longest period in U.S. history without a recession was the economic expansion from 1991 to 2001. The expansion underway as this book was going to press in early 2019 is also a long one. If a recession does not interrupt it, a new record for the longest expansion will be set in July 2019.

### 33-1b Fact 2: Most Macroeconomic Quantities Fluctuate Together

Real GDP is the variable most commonly used to monitor short-run changes in the economy because it is the most comprehensive measure of economic activity. Real GDP measures the value of all final goods and services produced within a given period of time. It also measures the total income (adjusted for inflation) of everyone in the economy.

It turns out, however, that for monitoring short-run fluctuations, it does not really matter which measure of economic activity one looks at. Most macroeconomic variables that measure some type of income, spending, or production fluctuate closely together. When real GDP falls in a recession, so do personal income, corporate profits, consumer spending, investment spending, industrial production, retail sales, home sales, auto sales, and so on. Because recessions are economy-wide phenomena, they show up in many sources of macroeconomic data.

Although many macroeconomic variables fluctuate together, they fluctuate by different amounts. In particular, as panel (b) of Figure 1 shows, investment spending varies greatly over the business cycle. Even though investment averages about one-sixth of GDP, declines in investment account for about two-thirds of the declines in GDP during recessions. In other words, when the economy contracts, much of the contraction is due to reduced spending on new factories, housing, and inventories.



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CARTOONSTOCK LTD

"You're fired. Pass it on."

### 33-1c Fact 3: As Output Falls, Unemployment Rises

Changes in the economy's output of goods and services are strongly correlated with changes in the economy's utilization of its labor force. In other words, when real GDP declines, the rate of unemployment rises. This fact is hardly surprising: When firms choose to produce a smaller quantity of goods and services, they lay off workers, expanding the pool of unemployed.

Panel (c) of Figure 1 shows the unemployment rate in the U.S. economy since 1972. Once again, the shaded areas in the figure indicate periods of recession. The figure shows clearly the impact of recessions on unemployment. In each recession, the unemployment rate rises substantially. When the recession ends and real GDP starts to expand, the unemployment rate gradually declines. Because there are always some workers between jobs, the unemployment rate is never zero. Instead, it fluctuates around its natural rate of about 5 percent.

#### QuickQuiz

1. When the economy goes into a recession, real GDP \_\_\_\_\_ and unemployment \_\_\_\_\_.  
 a. rises; rises  
 b. rises; falls  
 c. falls; rises  
 d. falls; falls
2. Recessions occur
  - a. regularly, about every 3 years.
  - b. regularly, about every 7 years.
  - c. regularly, about every 12 years.
  - d. irregularly.

*Answers at end of chapter.*

## 33-2 Explaining Short-Run Economic Fluctuations

Describing what happens to economies as they fluctuate over time is easy. Explaining what causes these fluctuations is more difficult. Indeed, compared to the topics we have studied in previous chapters, the theory of economic fluctuations remains controversial. In this chapter, we begin to develop the model that most economists use to explain short-run fluctuations in economic activity.

### 33-2a The Assumptions of Classical Economics

In previous chapters, we developed theories to explain what determines most important macroeconomic variables in the long run. Chapter 25 explained the level and growth of productivity and real GDP. Chapters 26 and 27 explained how the financial system works and how the real interest rate adjusts to balance saving and investment. Chapter 28 explained why there is always some unemployment in the economy. Chapters 29 and 30 explained the monetary system and how changes in the money supply affect the price level, the inflation rate, and the nominal interest rate. Chapters 31 and 32 extended this analysis to open economies to explain the trade balance and the exchange rate.

All of this previous analysis was based on two related ideas: the classical dichotomy and monetary neutrality. Recall that the classical dichotomy is the separation of variables into real variables (those that measure quantities or relative prices) and nominal variables (those measured in terms of money). According to classical macroeconomic theory, changes in the money supply affect nominal variables but not real variables. As a result of this monetary neutrality, Chapters 25 through 28 were able to examine the determinants of real variables (real GDP, the real interest rate, and unemployment) without introducing nominal variables (the money supply and the price level).

In a sense, money does not matter in a classical world. If the quantity of money in the economy were to double, everything would cost twice as much, and everyone's income would be twice as high. But so what? The change would be *nominal* (by the standard meaning of "nearly insignificant"). The things that people *really* care about—whether they have a job, how many goods and services they can afford, and so on—would be exactly the same.

This classical view is sometimes described by the saying, "Money is a veil." That is, nominal variables may be the first things we see when we observe an economy because economic variables are often expressed in units of money. But more important are the real variables and the forces that determine them. According to classical theory, to understand these real variables, we need to look behind the veil.

### 33-2b The Reality of Short-Run Fluctuations

Do these assumptions of classical macroeconomic theory apply to the world in which we live? The answer to this question is central to understanding how the economy works. *Most economists believe that classical theory describes the world in the long run but not in the short run.*

Consider again the impact of money on the economy. Most economists believe that, beyond a period of several years, changes in the money supply affect prices and other nominal variables but do not affect real GDP, unemployment, and other real variables—just as classical theory says. When studying year-to-year changes in the economy, however, the assumption of monetary neutrality is no longer appropriate. In the short run, real and nominal variables are highly intertwined, and changes in the money supply can temporarily push real GDP away from its long-run trend.

Even the classical economists themselves, such as David Hume, realized that classical economic theory did not hold in the short run. From his vantage point in 18th-century England, Hume observed that when the money supply expanded after gold discoveries, it took some time for prices to rise and that, in the meantime, the economy enjoyed higher employment and production.

To understand how the economy works in the short run, we need a new model. This new model can be built using many of the tools we developed in previous chapters, but it must abandon the classical dichotomy and the neutrality of money. We can no longer separate our analysis of real variables such as output and employment from our analysis of nominal variables such as money and the price level. Our new model focuses on how real and nominal variables interact.

### 33-2c The Model of Aggregate Demand and Aggregate Supply

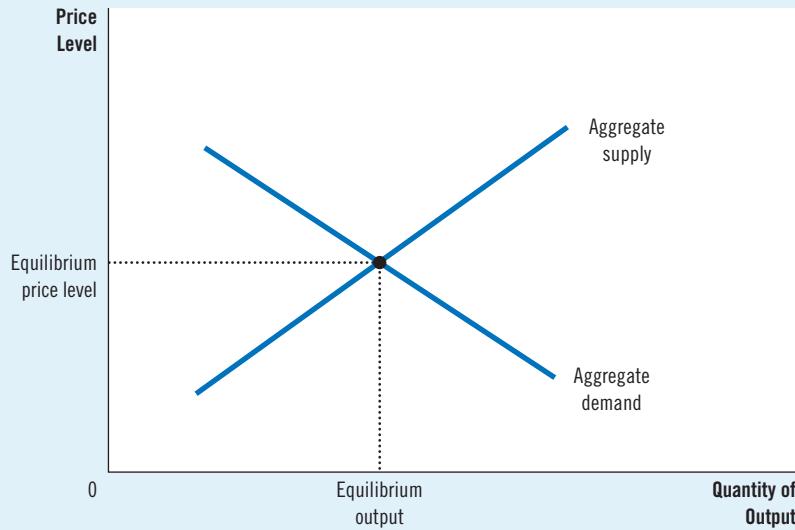
Our model of short-run economic fluctuations focuses on the behavior of two variables. The first variable is the economy's output of goods and services, as measured by real GDP. The second is the average level of prices, as measured by the CPI or the GDP deflator. Notice that output is a real variable, whereas the price level is a nominal variable. By focusing on the relationship between these two variables, we are departing from the classical assumption that real and nominal variables can be studied separately.

We analyze fluctuations in the economy as a whole using the **model of aggregate demand and aggregate supply**, which is illustrated in Figure 2. On the vertical axis is the overall price level in the economy. On the horizontal axis is the overall quantity of goods and services produced in the economy. The **aggregate-demand curve** shows the quantity of goods and services that households, firms, the government, and customers abroad want to buy at each price level. The **aggregate-supply curve** shows the quantity of goods and services that firms produce and sell at each price level. According to this model, the price level and the quantity of output adjust to bring aggregate demand and aggregate supply into balance.

**FIGURE 2**

#### Aggregate Demand and Aggregate Supply

Economists use the model of aggregate demand and aggregate supply to analyze economic fluctuations. On the vertical axis is the overall level of prices. On the horizontal axis is the economy's total output of goods and services. Output and the price level adjust to the point at which the aggregate-supply and aggregate-demand curves intersect.



It is tempting to view the model of aggregate demand and aggregate supply as nothing more than a large version of the model of market demand and market supply introduced in Chapter 4. But in fact, this model is quite different. When we consider demand and supply in the market for a specific good—ice cream, for instance—the behavior of buyers and sellers depends on the ability of resources to move from one market to another. When the price of ice cream rises, the quantity demanded falls because buyers will use their incomes to buy products other than ice cream. Similarly, a higher price of ice cream raises the quantity supplied because firms that produce ice cream can increase production by hiring workers away from other parts of the economy. This *microeconomic* substitution from one market to another is impossible for the economy as a whole. After all, the quantity that our model is trying to explain—real GDP—measures the *total* quantity of goods and services produced by *all* firms in *all* markets. To understand why the aggregate-demand curve slopes downward and why the aggregate-supply curve slopes upward, we need a *macroeconomic* theory that explains the total quantity of goods and services demanded and the total quantity of goods and services supplied. Developing such a theory is our next task.

### QuickQuiz

3. According to classical macroeconomic theory and monetary neutrality, changes in the money supply affect
  - a. the unemployment rate.
  - b. real GDP.
  - c. the GDP deflator.
  - d. none of the above.
4. Most economists believe that classical macroeconomic theory
  - a. is valid only in the long run.
  - b. is valid only in the short run.
  - c. is always valid.
  - d. is never valid.
5. In the model of aggregate demand and aggregate supply, the quantity of \_\_\_\_\_ is on the horizontal axis, and the \_\_\_\_\_ is on the vertical axis.
  - a. output; interest rate
  - b. output; price level
  - c. money; interest rate
  - d. money; price level

*Answers at end of chapter.*

## 33-3 The Aggregate-Demand Curve

The aggregate-demand curve tells us the quantity of all goods and services demanded in the economy at any given price level. As Figure 3 illustrates, the aggregate-demand curve slopes downward. Other things being equal, a decrease in the economy's overall level of prices (from, say,  $P_1$  to  $P_2$ ) raises the quantity of goods and services demanded (from  $Y_1$  to  $Y_2$ ). Conversely, an increase in the price level reduces the quantity of goods and services demanded.

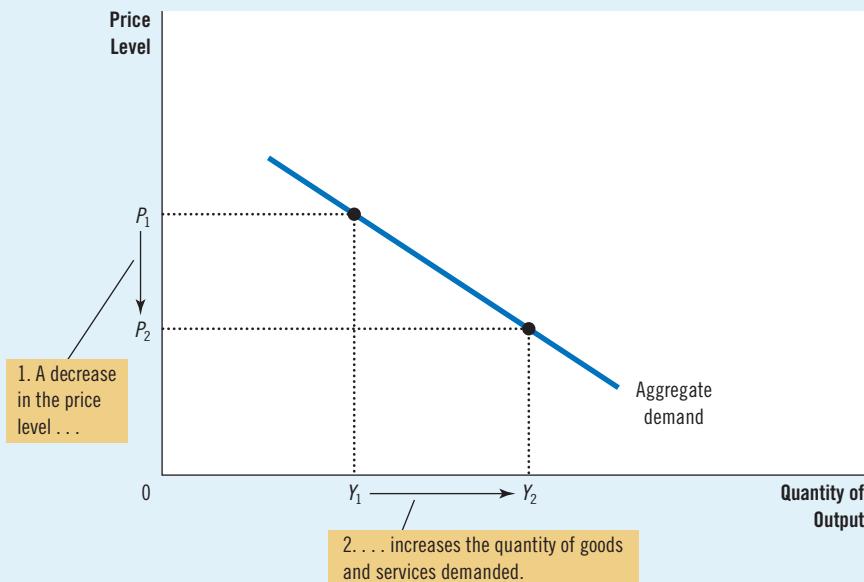
### 33-3a Why the Aggregate-Demand Curve Slopes Downward

Why does a change in the price level move the quantity of goods and services demanded in the opposite direction? To answer this question, it is useful to recall that an economy's GDP (which we denote as  $Y$ ) is the sum of its consumption ( $C$ ), investment ( $I$ ), government purchases ( $G$ ), and net exports ( $NX$ ):

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

**FIGURE 3****The Aggregate-Demand Curve**

A fall in the price level from  $P_1$  to  $P_2$  increases the quantity of goods and services demanded from  $Y_1$  to  $Y_2$ . There are three reasons for this negative relationship. As the price level falls, real wealth rises, interest rates fall, and the exchange rate depreciates. These effects stimulate spending on consumption, investment, and net exports. Increased spending on any or all of these components of output means a larger quantity of goods and services demanded.



Each of these four components contributes to the aggregate demand for goods and services. For now, we assume that government spending is fixed by policy. The other three components of spending—consumption, investment, and net exports—depend on economic conditions and, in particular, on the price level. Therefore, to understand the downward slope of the aggregate-demand curve, we must examine how the price level affects the quantity of goods and services demanded for consumption, investment, and net exports.

**The Price Level and Consumption: The Wealth Effect** Consider the money that you hold in your wallet and your bank account. The nominal value of this money is fixed: One dollar is always worth one dollar. Yet the *real* value of a dollar is not fixed. If a candy bar costs one dollar, then a dollar is worth one candy bar. If the price of a candy bar falls to 50 cents, then one dollar is worth two candy bars. Thus, when the price level falls, the dollars you hold rise in value, increasing your real wealth and your ability to buy goods and services.

This logic gives us the first reason the aggregate-demand curve slopes downward. *A decrease in the price level raises the real value of money and makes consumers wealthier, thereby encouraging them to spend more. The increase in consumer spending means a larger quantity of goods and services demanded. Conversely, an increase in the price level reduces the real value of money and makes consumers poorer, thereby reducing consumer spending and the quantity of goods and services demanded.*

**The Price Level and Investment: The Interest-Rate Effect** The price level is one determinant of the quantity of money demanded. When the price level is lower, households do not need to hold as much money to buy the goods and services they want. Therefore, when the price level falls, households try to reduce their holdings of money by lending some of it out. For instance, a household might use its excess money to buy interest-bearing bonds. Or it might deposit its excess money in an

interest-bearing savings account, and the bank would use these funds to make more loans. In either case, as households try to convert some of their money into interest-bearing assets, they drive down interest rates. (The next chapter analyzes this process in more detail.)

Interest rates, in turn, affect spending on goods and services. Because a lower interest rate makes borrowing less expensive, it encourages firms to borrow more to invest in new plants and equipment, and it encourages households to borrow more to invest in new housing. (A lower interest rate might also stimulate consumer spending, especially spending on large durable purchases such as cars, which are often bought on credit.) Thus, a lower interest rate increases the quantity of goods and services demanded.

This logic gives us the second reason the aggregate-demand curve slopes downward. *A lower price level reduces the interest rate, encourages greater spending on investment goods, and thereby increases the quantity of goods and services demanded. Conversely, a higher price level raises the interest rate, discourages investment spending, and decreases the quantity of goods and services demanded.*

**The Price Level and Net Exports: The Exchange-Rate Effect** As we have just discussed, a lower price level in the United States lowers the U.S. interest rate. In response to the lower interest rate, some U.S. investors will seek higher returns by investing abroad. For instance, as the interest rate on U.S. government bonds falls, a mutual fund might sell U.S. government bonds to buy German government bonds. As the mutual fund tries to convert its dollars into euros to buy the German bonds, it increases the supply of dollars in the market for foreign-currency exchange.

The increased supply of dollars to be exchanged for euros causes the dollar to depreciate relative to the euro. This alters the real exchange rate—the relative price of domestic and foreign goods. Because each dollar buys fewer units of foreign currencies, foreign goods become more expensive relative to domestic goods.

The change in relative prices affects spending, both at home and abroad. Because foreign goods are now more expensive, Americans buy less from other countries, causing U.S. imports of goods and services to decrease. At the same time, because U.S. goods are now cheaper, foreigners buy more from the United States, so U.S. exports increase. Net exports equal exports minus imports, so both of these changes cause U.S. net exports to increase. Thus, the depreciation of the dollar leads to an increase in the quantity of goods and services demanded.

This logic yields the third reason the aggregate-demand curve slopes downward. *When a fall in the U.S. price level causes U.S. interest rates to fall, the real value of the dollar declines in foreign exchange markets. This depreciation stimulates U.S. net exports and thereby increases the quantity of goods and services demanded. Conversely, when the U.S. price level rises and causes U.S. interest rates to rise, the real value of the dollar increases, and this appreciation reduces U.S. net exports and the quantity of goods and services demanded.*

**Summing Up** There are three distinct but related reasons a fall in the price level increases the quantity of goods and services demanded:

1. Consumers become wealthier, stimulating the demand for consumption goods.
2. Interest rates fall, stimulating the demand for investment goods.
3. The currency depreciates, stimulating the demand for net exports.

The same three effects work in reverse: When the price level rises, decreased wealth depresses consumer spending, higher interest rates depress investment spending, and a currency appreciation depresses net exports.

Here is a thought experiment to hone your intuition about these effects. Imagine that one day you wake up and notice that, for some mysterious reason, the prices of all goods and services have fallen by half, so the dollars you are holding are worth twice as much. In real terms, you now have twice as much money as you had when you went to bed the night before. What would you do with the extra money? You could spend it at your favorite restaurant, increasing consumer spending. You could lend it out (by buying a bond or depositing it in a bank), reducing interest rates and increasing investment spending. Or you could invest it overseas (by buying shares in an international mutual fund), reducing the real exchange value of the dollar and increasing net exports. Whichever of these three responses you choose, the fall in the price level leads to an increase in the quantity of goods and services demanded. This relationship is what the downward slope of the aggregate-demand curve represents.

It is important to keep in mind that the aggregate-demand curve (like all demand curves) is drawn holding “other things equal.” In particular, our three explanations of the downward-sloping aggregate-demand curve assume that the money supply is fixed. That is, we have been considering how a change in the price level affects the demand for goods and services, holding the amount of money in the economy constant. As we will see, a change in the quantity of money shifts the aggregate-demand curve. At this point, just keep in mind that the aggregate-demand curve is drawn for a given quantity of the money supply.

### 33-3b Why the Aggregate-Demand Curve Might Shift

The downward slope of the aggregate-demand curve shows that a fall in the price level raises the overall quantity of goods and services demanded. Many other factors, however, affect the quantity of goods and services demanded at a given price level. When one of these other factors changes, the quantity of goods and services demanded at every price level changes and the aggregate-demand curve shifts.

Let’s consider some examples of events that shift aggregate demand. We can categorize them according to the component of spending that is most directly affected.

**Shifts Arising from Changes in Consumption** Suppose Americans suddenly become more concerned about saving for retirement and, as a result, reduce their current consumption. Because the quantity of goods and services demanded at any price level is now lower, the aggregate-demand curve shifts to the left. Conversely, imagine that a stock market boom makes people wealthier and less concerned about saving. The resulting increase in consumer spending means a greater quantity of goods and services demanded at any given price level, so the aggregate-demand curve shifts to the right.

Thus, any event that changes how much people want to consume at a given price level shifts the aggregate-demand curve. One policy variable that has this effect is the level of taxation. When the government cuts taxes, it encourages people to spend more, so the aggregate-demand curve shifts to the right. When the government raises taxes, people cut back on their spending and the aggregate-demand curve shifts to the left.

**Shifts Arising from Changes in Investment** Any event that changes how much firms want to invest at a given price level also shifts the aggregate-demand curve. For instance, imagine that the computer industry introduces a faster line

of computers and many firms decide to invest in new computer systems. Because the quantity of goods and services demanded at any price level is now higher, the aggregate-demand curve shifts to the right. Conversely, if firms become pessimistic about future business conditions, they may cut back on investment spending, shifting the aggregate-demand curve to the left.

Tax policy can also influence aggregate demand through investment. For example, an investment tax credit (a tax rebate tied to a firm's investment spending) increases the quantity of investment goods that firms demand at any given interest rate and therefore shifts the aggregate-demand curve to the right. The repeal of an investment tax credit reduces investment and shifts the aggregate-demand curve to the left.

Another policy variable that can influence investment and aggregate demand is the money supply. As we discuss more fully in the next chapter, an increase in the money supply lowers the interest rate in the short run. This decrease in the interest rate makes borrowing less costly, stimulating investment spending and thereby shifting the aggregate-demand curve to the right. Conversely, a decrease in the money supply raises the interest rate, discourages investment spending, and thereby shifts the aggregate-demand curve to the left. Many economists believe that throughout U.S. history, changes in monetary policy have been an important source of shifts in aggregate demand.

**Shifts Arising from Changes in Government Purchases** The most direct way that policymakers shift the aggregate-demand curve is through government purchases. For example, suppose Congress decides to reduce purchases of new weapons systems. Because the quantity of goods and services demanded at any price level is now lower, the aggregate-demand curve shifts to the left. Conversely, if state governments start building more highways, the result is a greater quantity of goods and services demanded at any price level, so the aggregate-demand curve shifts to the right.

**Shifts Arising from Changes in Net Exports** Any event that changes net exports for a given price level also shifts aggregate demand. For instance, when Europe experiences a recession, it buys fewer goods from the United States. U.S. net exports decline at every price level, shifting the aggregate-demand curve for the U.S. economy to the left. When Europe recovers from its recession, it buys more U.S. goods and the aggregate-demand curve shifts to the right.

Net exports can also change because international speculators cause movements in the exchange rate. Suppose, for instance, that these speculators lose confidence in foreign economies and want to move some of their wealth into the U.S. economy. In doing so, they bid up the value of the U.S. dollar in the foreign exchange market. This appreciation of the dollar makes U.S. goods more expensive relative to foreign goods, depressing net exports and shifting the aggregate-demand curve to the left. Conversely, speculation that causes a depreciation of the dollar stimulates net exports and shifts the aggregate-demand curve to the right.

**Summing Up** In the next chapter, we analyze the aggregate-demand curve in more detail. There we examine more precisely how the tools of monetary and fiscal policy can shift aggregate demand and whether policymakers should use these tools for that purpose. At this point, however, you should have some idea about why the aggregate-demand curve slopes downward and what kinds of events and policies can shift this curve. Table 1 summarizes what we have learned so far.

**TABLE 1****The Aggregate-Demand Curve: Summary****Why Does the Aggregate-Demand Curve Slope Downward?**

1. *The Wealth Effect:* A lower price level increases real wealth, stimulating spending on consumption.
2. *The Interest-Rate Effect:* A lower price level reduces the interest rate, stimulating spending on investment.
3. *The Exchange-Rate Effect:* A lower price level causes the real exchange rate to depreciate, stimulating spending on net exports.

**Why Might the Aggregate-Demand Curve Shift?**

1. *Shifts Arising from Changes in Consumption:* An event that causes consumers to spend more at a given price level (a tax cut, a stock market boom) shifts the aggregate-demand curve to the right. An event that causes consumers to spend less at a given price level (a tax hike, a stock market decline) shifts the aggregate-demand curve to the left.
2. *Shifts Arising from Changes in Investment:* An event that causes firms to invest more at a given price level (optimism about the future, a fall in interest rates due to an increase in the money supply) shifts the aggregate-demand curve to the right. An event that causes firms to invest less at a given price level (pessimism about the future, a rise in interest rates due to a decrease in the money supply) shifts the aggregate-demand curve to the left.
3. *Shifts Arising from Changes in Government Purchases:* An increase in government purchases of goods and services (greater spending on defense or highway construction) shifts the aggregate-demand curve to the right. A decrease in government purchases on goods and services (a cutback in defense or highway spending) shifts the aggregate-demand curve to the left.
4. *Shifts Arising from Changes in Net Exports:* An event that raises spending on net exports at a given price level (a boom overseas, speculation that causes a currency depreciation) shifts the aggregate-demand curve to the right. An event that reduces spending on net exports at a given price level (a recession overseas, speculation that causes a currency appreciation) shifts the aggregate-demand curve to the left.

**QuickQuiz**

6. The aggregate-demand curve slopes downward because a fall in the price level causes
- a. real wealth to decrease.
  - b. the interest rate to decline.
  - c. the currency to appreciate.
  - d. all of the above.
7. Which of the following would shift the aggregate-demand curve to the left?
- a. A decline in the stock market.
  - b. An increase in taxes.
  - c. A decrease in government spending.
  - d. All of the above.

Answers at end of chapter.

## 33-4 The Aggregate-Supply Curve

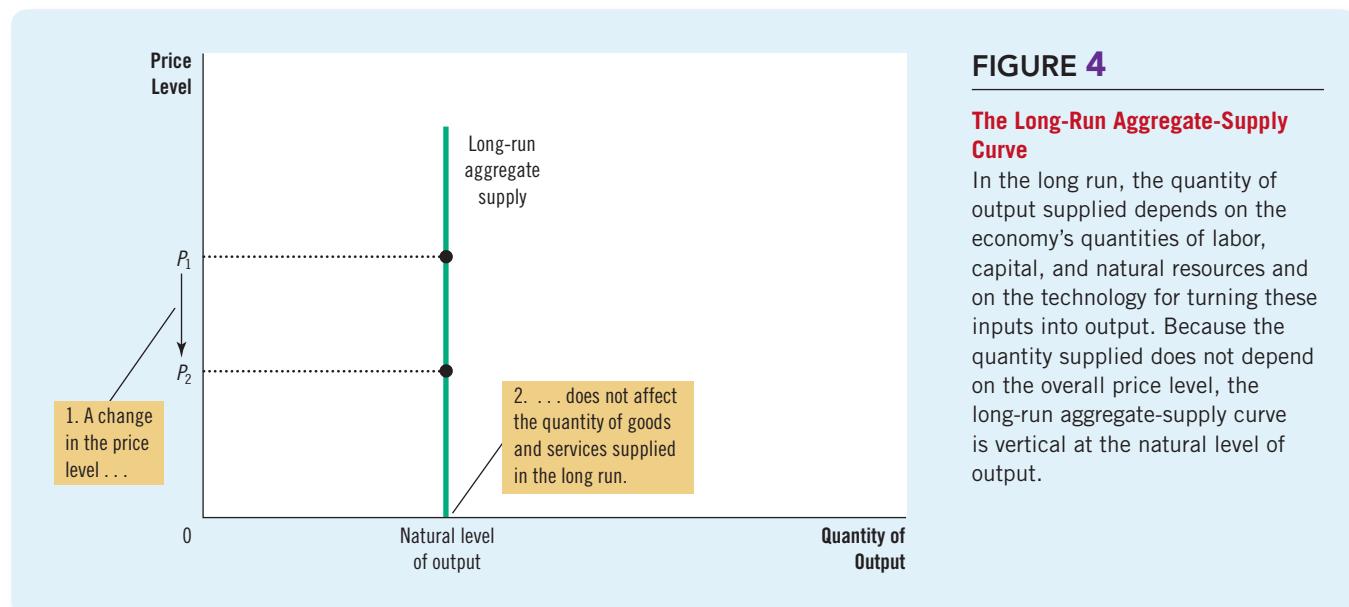
The aggregate-supply curve tells us the total quantity of goods and services that firms produce and sell at any given price level. Unlike the aggregate-demand curve, which always slopes downward, the aggregate-supply curve shows a relationship that depends crucially on the time horizon examined. *In the long run, the aggregate-supply curve is vertical, whereas in the short run, the aggregate-supply curve slopes upward.* To understand short-run economic fluctuations, and how the short-run behavior of the economy deviates from its long-run behavior, we need to examine both the long-run aggregate-supply curve and the short-run aggregate-supply curve.

### 33-4a Why the Aggregate-Supply Curve Is Vertical in the Long Run

What determines the quantity of goods and services supplied in the long run? We implicitly answered this question earlier in the book when we analyzed the process of economic growth. *In the long run, an economy's production of goods and services (its real GDP) depends on its supplies of labor, capital, and natural resources and on the available technology used to turn these factors of production into goods and services.*

When we analyzed these forces that govern long-run growth, we did not need to make any reference to the overall level of prices. We examined the price level in a separate chapter, where we saw that it was determined by the quantity of money. We learned that if two economies were identical in every way except that one had twice as much money in circulation as the other, the price level would be twice as high in the economy with more money. But since the amount of money does not affect technology or the supplies of labor, capital, and natural resources, the output of goods and services in the two economies would be the same.

Because the price level does not affect the long-run determinants of real GDP, the long-run aggregate-supply curve is vertical, as in Figure 4. In other words, in the long run, the economy's labor, capital, natural resources, and technology determine the



total quantity of goods and services supplied, and this quantity supplied is the same regardless of the price level.

The vertical long-run aggregate-supply curve is a graphical representation of the classical dichotomy and monetary neutrality. As we have already discussed, classical macroeconomic theory is based on the assumption that real variables do not depend on nominal variables. The long-run aggregate-supply curve is consistent with this idea because it implies that the quantity of output (a real variable) does not depend on the level of prices (a nominal variable). As noted earlier, most economists believe this principle works well when studying the economy over a period of many years but not when studying year-to-year changes. Thus, *the aggregate-supply curve is vertical only in the long run*.

### 33-4b Why the Long-Run Aggregate-Supply Curve Might Shift

#### natural level of output

the production of goods and services that an economy achieves in the long run when unemployment is at its normal rate

Because classical macroeconomic theory predicts the quantity of goods and services produced by an economy in the long run, it also explains the position of the long-run aggregate-supply curve. The long-run level of production is sometimes called *potential output* or *full-employment output*. To be more precise, we call it the **natural level of output** because it shows what the economy produces when unemployment is at its natural, or normal, rate. The natural level of output is the rate of production toward which the economy gravitates in the long run.

Any change in the economy that alters the natural level of output shifts the long-run aggregate-supply curve. Because output in the classical model depends on labor, capital, natural resources, and technological knowledge, we can categorize shifts in the long-run aggregate-supply curve as arising from these four sources.

**Shifts Arising from Changes in Labor** Imagine that an economy experiences an increase in immigration. Because increased immigration results in a greater number of workers, the quantity of goods and services supplied would increase. As a result, the long-run aggregate-supply curve would shift to the right. Conversely, if many workers left the economy to go abroad, the long-run aggregate-supply curve would shift to the left.

The position of the long-run aggregate-supply curve also depends on the natural rate of unemployment, so any change in the natural rate of unemployment shifts the long-run aggregate-supply curve. For example, if Congress made unemployment insurance substantially more generous, unemployed workers might search less hard for new jobs, increasing the natural rate of unemployment and reducing the economy's production of goods and services. As a result, the long-run aggregate-supply curve would shift to the left. Conversely, if Congress enacted a successful job training program for unemployed workers, the natural rate of unemployment would fall and the long-run aggregate-supply curve would shift to the right.

**Shifts Arising from Changes in Capital** An increase in the economy's capital stock increases productivity and thereby increases the quantity of goods and services supplied. As a result, the long-run aggregate-supply curve shifts to the right. Conversely, a decrease in the economy's capital stock decreases productivity and the quantity of goods and services supplied, shifting the long-run aggregate-supply curve to the left.

Notice that the same logic applies regardless of whether we are discussing physical capital such as machines and factories or human capital such as college degrees. An increase in either type of capital will raise the economy's ability to produce goods and services and, thus, shift the long-run aggregate-supply curve to the right.

**Shifts Arising from Changes in Natural Resources** An economy's production depends on its natural resources, including its land, minerals, and weather. The discovery of a new mineral deposit shifts the long-run aggregate-supply curve to the right. A change in weather patterns that makes farming more difficult shifts the long-run aggregate-supply curve to the left.

In many countries, crucial natural resources are imported. A change in the availability of these resources can also shift the aggregate-supply curve. For example, as we discuss later in this chapter, developments in the world oil market have historically been an important source of shifts in aggregate supply for the United States and other oil-importing nations.

**Shifts Arising from Changes in Technological Knowledge** Perhaps the most important reason that the economy today produces more than it did a generation ago is that our technological knowledge has advanced. The invention of the computer, for instance, has allowed us to produce more goods and services from any given amounts of labor, capital, and natural resources. As computer use has spread throughout the economy, it has shifted the long-run aggregate-supply curve to the right.

Although not literally technological, many other events act like changes in technology. For instance, opening up international trade has effects similar to inventing new production processes because it allows a country to specialize in higher-productivity industries; therefore, it also shifts the long-run aggregate-supply curve to the right. Conversely, if the government passes new regulations preventing firms from using some production methods, perhaps to address worker safety or environmental concerns, the result is a leftward shift in the long-run aggregate-supply curve.

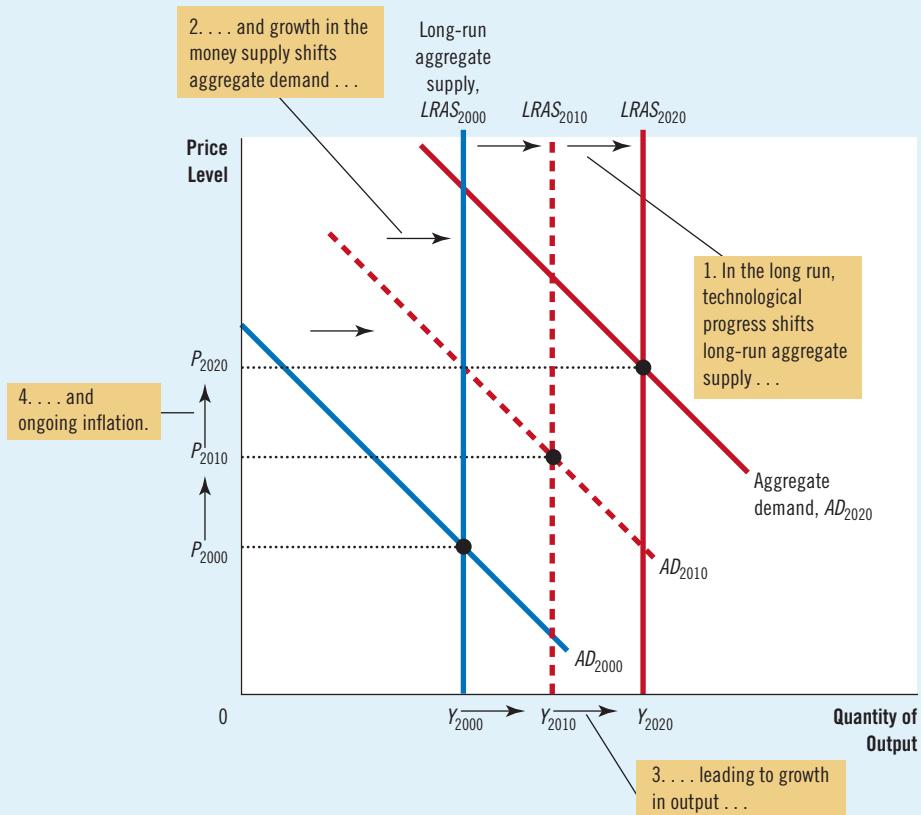
**Summing Up** Because the long-run aggregate-supply curve reflects the classical model of the economy we developed in previous chapters, it provides a new way to describe our earlier analysis. Any policy or event that raised real GDP in previous chapters can now be described as increasing the quantity of goods and services supplied and shifting the long-run aggregate-supply curve to the right. Any policy or event that lowered real GDP in previous chapters can now be described as decreasing the quantity of goods and services supplied and shifting the long-run aggregate-supply curve to the left.

### 33-4c Using Aggregate Demand and Aggregate Supply to Depict Long-Run Growth and Inflation

Having introduced the economy's aggregate-demand curve and the long-run aggregate-supply curve, we now have a new way to describe the economy's long-run trends. Figure 5 illustrates the changes that occur in an economy from decade to decade. Notice that both curves are shifting. Although many forces influence the economy in the long run and can in theory cause such shifts, the two most important forces in practice are technology and monetary policy. Technological progress enhances an economy's ability to produce goods and services, and the resulting

**FIGURE 5****Long-Run Growth and Inflation in the Model of Aggregate Demand and Aggregate Supply**

As the economy becomes better able to produce goods and services over time, primarily because of technological progress, the long-run aggregate-supply curve shifts to the right. At the same time, as the Fed increases the money supply, the aggregate-demand curve also shifts to the right. In this figure, output grows from  $Y_{2000}$  to  $Y_{2010}$  and then to  $Y_{2020}$ , and the price level rises from  $P_{2000}$  to  $P_{2010}$  and then to  $P_{2020}$ . Thus, the model of aggregate demand and aggregate supply offers a new way to describe the classical analysis of growth and inflation.



increases in output are reflected in continual shifts of the long-run aggregate-supply curve to the right. At the same time, because the Fed increases the money supply over time, the aggregate-demand curve also shifts to the right. As the figure illustrates, the result is continuing growth in output (as shown by increasing  $Y$ ) and continuing inflation (as shown by increasing  $P$ ). This is just another way of representing the classical analysis of growth and inflation we conducted in earlier chapters.

The purpose of developing the model of aggregate demand and aggregate supply, however, is not to dress our previous long-run conclusions in new clothing. Instead, it is to provide a framework for short-run analysis, as we will see in a moment. As we develop the short-run model, we keep the analysis simple by omitting the continuing growth and inflation shown by the shifts in Figure 5. But always remember that long-run trends are the background on which short-run fluctuations are superimposed. *The short-run fluctuations in output and the price level that we will be studying should be viewed as deviations from the long-run trends of output growth and inflation.*

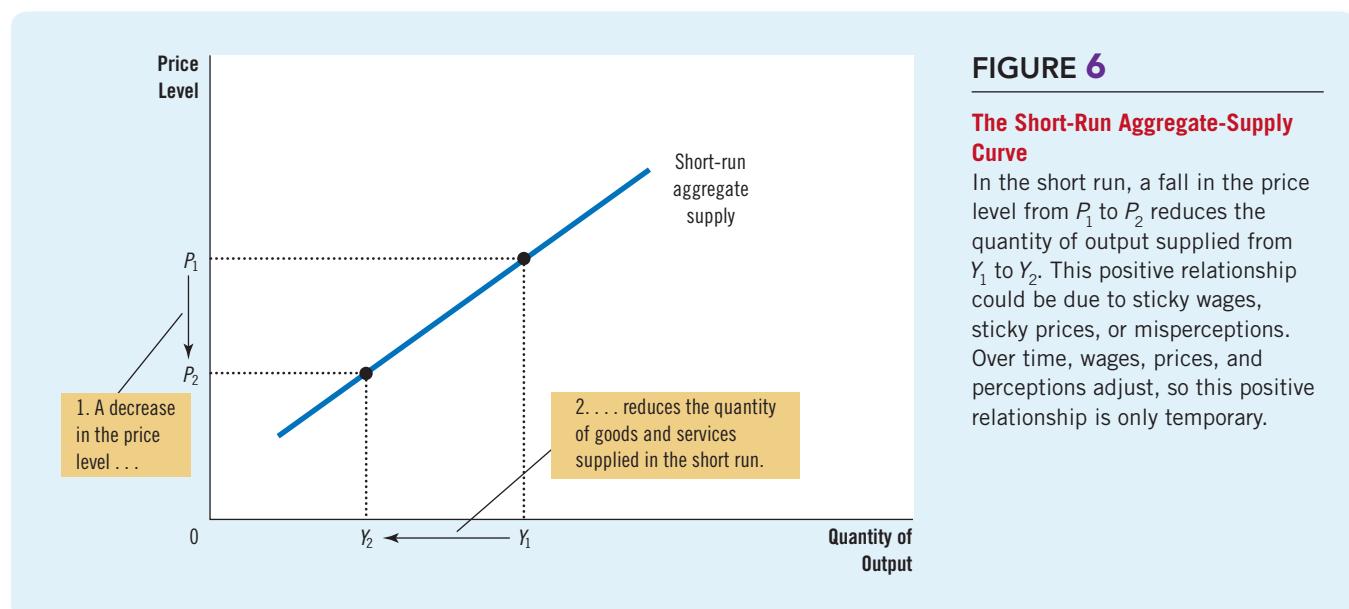
### 33-4d Why the Aggregate-Supply Curve Slopes Upward in the Short Run

The key difference between the economy in the short run and in the long run is the behavior of aggregate supply. The long-run aggregate-supply curve is vertical because, in the long run, the overall level of prices does not affect the economy's ability to produce goods and services. By contrast, in the short run, the price level *does* affect the economy's output. That is, over a period of a year or two, an increase in the overall level of prices in the economy tends to raise the quantity of goods and services supplied, and a decrease in the level of prices tends to reduce the quantity of goods and services supplied. As a result, the short-run aggregate-supply curve slopes upward, as shown in Figure 6.

Why do changes in the price level affect output in the short run? Macroeconomists have proposed three theories for the upward slope of the short-run aggregate-supply curve. In each theory, a specific market imperfection causes the supply side of the economy to behave differently in the short run than it does in the long run. The following theories differ in their details, but they share a common theme: *The quantity of output supplied deviates from its long-run, or natural, level when the actual price level in the economy deviates from the price level that people expected to prevail.* When the price level rises above the level that people expected, output rises above its natural level, and when the price level falls below the expected level, output falls below its natural level.

**The Sticky-Wage Theory** The first explanation of the upward slope of the short-run aggregate-supply curve is the sticky-wage theory. This theory is the simplest of the three approaches to aggregate supply, and some economists believe it highlights the most important reason why the economy in the short run differs from the economy in the long run. Therefore, it is the theory of short-run aggregate supply that we emphasize in this book.

According to this theory, the short-run aggregate-supply curve slopes upward because nominal wages are slow to adjust to changing economic conditions.



In other words, wages are “sticky” in the short run. To some extent, the slow adjustment of nominal wages is attributable to long-term contracts between workers and firms that fix nominal wages, sometimes for as long as three years. In addition, this prolonged adjustment may be attributable to slowly changing social norms and notions of fairness that influence wage setting.

An example can help explain how sticky nominal wages can result in a short-run aggregate-supply curve that slopes upward. Imagine that a year ago a firm expected the price level today to be 100, and based on this expectation, it signed a contract with its workers agreeing to pay them, say, \$20 an hour. In fact, the price level turns out to be only 95. Because prices have fallen below expectations, the firm gets 5 percent less than expected for each unit of its product that it sells. The cost of labor used to make the output, however, is stuck at \$20 per hour. Production is now less profitable, so the firm hires fewer workers and reduces the quantity of output supplied. Over time, the labor contract will expire, and the firm can renegotiate with its workers for a lower wage (which they may accept because prices are lower), but in the meantime, employment and production will remain below their long-run levels.

The same logic works in reverse. Suppose the price level turns out to be 105 and the wage remains stuck at \$20. The firm sees that the amount it is paid for each unit sold is up by 5 percent, while its labor costs are not. In response, it hires more workers and increases the quantity of output supplied. Eventually, the workers will demand higher nominal wages to compensate for the higher price level. But for a while, the firm can take advantage of the profit opportunity by increasing employment and production above their long-run levels.

In short, according to the sticky-wage theory, the short-run aggregate-supply curve slopes upward because nominal wages are based on expected prices and do not respond immediately when the actual price level turns out to be different from what was expected. This stickiness of wages gives firms an incentive to produce less output when the price level turns out lower than expected and to produce more when the price level turns out higher than expected.

**The Sticky-Price Theory** Some economists have advocated another approach to explaining the upward slope of the short-run aggregate-supply curve, called the sticky-price theory. As we just discussed, the sticky-wage theory emphasizes that nominal wages adjust slowly over time. The sticky-price theory emphasizes that the prices of some goods and services also adjust sluggishly in response to changing economic conditions. This slow adjustment of prices occurs in part because there are costs to adjusting prices, called *menu costs*. These menu costs include the cost of printing and distributing catalogs and the time required to change price tags. As a result of these costs, prices as well as wages may be sticky in the short run.

To see how sticky prices explain the aggregate-supply curve’s upward slope, suppose that each firm in the economy announces its prices in advance based on the economic conditions it expects to prevail over the coming year. Suppose further that after prices are announced, the economy experiences an unexpected contraction in the money supply, which (as we have learned) reduces the overall price level in the long run. What happens in the short run? Although some firms reduce their prices quickly in response to the unexpected change in economic conditions, many other firms want to avoid additional menu costs. As a result, they temporarily lag behind in cutting their prices. Because these lagging firms have prices that are too high, their sales decline. Declining sales, in turn, cause these firms to cut back on production and employment. In other words, because not all prices adjust immediately to changing conditions, an unexpected fall in the price level leaves some

firms with higher-than-desired prices, and these higher-than-desired prices depress sales and induce firms to reduce the quantity of goods and services they produce.

Similar reasoning applies when the money supply and price level turn out to be above what firms expected when they originally set their prices. While some firms raise their prices quickly in response to the new economic environment, other firms lag behind, keeping their prices at the lower-than-desired levels. These low prices attract customers, inducing these firms to increase employment and production. Thus, during the time these lagging firms are operating with outdated prices, there is a positive association between the overall price level and the quantity of output. This positive association is represented by the upward slope of the short-run aggregate-supply curve.

**The Misperceptions Theory** A third approach to explaining the upward slope of the short-run aggregate-supply curve is the misperceptions theory. According to this theory, changes in the overall price level can temporarily mislead suppliers about what is happening in the individual markets in which they sell their output. As a result of these short-run misperceptions, suppliers respond to changes in the level of prices, and this response leads to an upward-sloping aggregate-supply curve.

To see how this might work, suppose the overall price level falls below the level that suppliers expected. When suppliers see the prices of their products fall, they may mistakenly believe that their *relative* prices have fallen; that is, they may believe that their prices have fallen compared to other prices in the economy. For example, wheat farmers may notice a fall in the price of wheat before they notice a fall in the prices of the many items they buy as consumers. They may infer from this observation that the reward for producing wheat is temporarily low, and they may respond by reducing the quantity of wheat they supply. Similarly, workers may notice a fall in their nominal wages before they notice that the prices of the goods they buy are also falling. They may infer that the reward for working is temporarily low and respond by reducing the quantity of labor they supply. In both cases, a lower price level causes misperceptions about relative prices, and these misperceptions induce suppliers to respond to the lower price level by decreasing the quantity of goods and services supplied.

Similar misperceptions arise when the price level is above what was expected. Suppliers of goods and services may notice the price of their output rising and infer, mistakenly, that their relative prices are rising. They would conclude that it is a good time to produce. Until their misperceptions are corrected, they respond to the higher price level by increasing the quantity of goods and services supplied. This behavior results in a short-run aggregate-supply curve that slopes upward.

**Summing Up** There are three alternative explanations for the upward slope of the short-run aggregate-supply curve: (1) sticky wages, (2) sticky prices, and (3) misperceptions about relative prices. Economists debate which of these theories is correct, and it is possible that each contains an element of truth. For our purposes in this book, the similarities of the theories are more important than the differences. All three theories suggest that output deviates in the short run from its natural level when the actual price level deviates from the price level that people had expected to prevail. We can express this mathematically as follows:

$$\text{Quantity of output supplied} = \text{Natural level of output} + a \left( \begin{array}{l} \text{Actual price level} - \text{Expected price level} \\ \end{array} \right),$$

where  $a$  is a number that determines how much output responds to unexpected changes in the price level.

Notice that each of the three theories of short-run aggregate supply emphasizes a problem that is likely to be temporary. Whether the upward slope of the aggregate-supply curve is attributable to sticky wages, sticky prices, or misperceptions, these conditions will not persist forever. Over time, nominal wages will become unstuck, prices will become unstuck, and misperceptions about relative prices will be corrected. In the long run, it is reasonable to assume that wages and prices are flexible rather than sticky and that people are not confused about relative prices. Thus, while we have several good theories to explain why the short-run aggregate-supply curve slopes upward, they are all consistent with a long-run aggregate-supply curve that is vertical.

### 33-4e Why the Short-Run Aggregate-Supply Curve Might Shift

The short-run aggregate-supply curve tells us the quantity of goods and services supplied in the short run for any given level of prices. This curve is similar to the long-run aggregate-supply curve, but it is upward-sloping rather than vertical because of sticky wages, sticky prices, and misperceptions. Thus, when thinking about what shifts the short-run aggregate-supply curve, we have to consider all those variables that shift the long-run aggregate-supply curve. In addition, we have to consider a new variable—the expected price level—that influences the wages that are stuck, the prices that are stuck, and the perceptions about relative prices that may be flawed.

Let's start with what we know about the long-run aggregate-supply curve. As we discussed earlier, shifts in the long-run aggregate-supply curve normally arise from changes in labor, capital, natural resources, or technological knowledge. These same variables shift the short-run aggregate-supply curve. For example, when an increase in the economy's capital stock increases productivity, the economy is able to produce more output, so both the long-run and short-run aggregate-supply curves shift to the right. When an increase in the minimum wage raises the natural rate of unemployment, the economy has fewer employed workers and thus produces less output, so both the long-run and short-run aggregate-supply curves shift to the left.

The important new variable that affects the position of the short-run aggregate-supply curve is the price level that people expected to prevail. As we have discussed, the quantity of goods and services supplied depends, in the short run, on sticky wages, sticky prices, and misperceptions. Yet wages, prices, and perceptions are set based on the expected price level. So when people change their expectations of the price level, the short-run aggregate-supply curve shifts.

To make this idea more concrete, let's consider a specific theory of aggregate supply—the sticky-wage theory. According to this theory, when workers and firms expect the price level to be high, they are likely to reach a bargain with a higher level of nominal wages. Higher wages raise firms' costs, and for any given actual price level, higher costs reduce the quantity of goods and services supplied. Thus, when the expected price level rises, wages are higher, costs increase, and firms produce a smaller quantity of goods and services at any given actual price level. Thus, the short-run aggregate-supply curve shifts to the left. Conversely, when the expected price level falls, wages are lower, costs decline, firms increase output at any given price level, and the short-run aggregate-supply curve shifts to the right.

A similar logic applies in each theory of aggregate supply. The general lesson is the following: *An increase in the expected price level reduces the quantity of goods and services supplied and shifts the short-run aggregate-supply curve to the left.*

A decrease in the expected price level raises the quantity of goods and services supplied and shifts the short-run aggregate-supply curve to the right. As we will see in the next section, the influence of expectations on the position of the short-run aggregate-supply curve plays a key role in explaining how the economy makes the transition from the short run to the long run. In the short run, expectations are fixed and the economy finds itself at the intersection of the aggregate-demand curve and the short-run aggregate-supply curve. In the long run, if people observe that the price level is different from what they expected, their expectations adjust and the short-run aggregate-supply curve shifts. This shift ensures that the economy eventually finds itself at the intersection of the aggregate-demand curve and the long-run aggregate-supply curve.

You should now have some understanding about why the short-run aggregate-supply curve slopes upward and what events and policies can cause this curve to shift. Table 2 summarizes our discussion.

**TABLE 2**

**The Short-Run Aggregate-Supply Curve: Summary**

**Why Does the Short-Run Aggregate-Supply Curve Slope Upward?**

1. *The Sticky-Wage Theory:* An unexpectedly low price level raises the real wage, causing firms to hire fewer workers and produce a smaller quantity of goods and services.
2. *The Sticky-Price Theory:* An unexpectedly low price level leaves some firms with higher-than-desired prices, depressing their sales and leading them to cut back production.
3. *The Misperceptions Theory:* An unexpectedly low price level leads some suppliers to think their relative prices have fallen, inducing a fall in production.

**Why Might the Short-Run Aggregate-Supply Curve Shift?**

1. *Shifts Arising from Changes in Labor:* An increase in the quantity of labor available (perhaps due to a fall in the natural rate of unemployment) shifts the aggregate-supply curve to the right. A decrease in the quantity of labor available (perhaps due to a rise in the natural rate of unemployment) shifts the aggregate-supply curve to the left.
2. *Shifts Arising from Changes in Capital:* An increase in physical or human capital shifts the aggregate-supply curve to the right. A decrease in physical or human capital shifts the aggregate-supply curve to the left.
3. *Shifts Arising from Changes in Natural Resources:* An increase in the availability of natural resources shifts the aggregate-supply curve to the right. A decrease in the availability of natural resources shifts the aggregate-supply curve to the left.
4. *Shifts Arising from Changes in Technology:* An advance in technological knowledge shifts the aggregate-supply curve to the right. A decrease in the available technology (perhaps due to government regulation) shifts the aggregate-supply curve to the left.
5. *Shifts Arising from Changes in the Expected Price Level:* A decrease in the expected price level shifts the short-run aggregate-supply curve to the right. An increase in the expected price level shifts the short-run aggregate-supply curve to the left.

### QuickQuiz

8. One reason the short-run aggregate-supply curve slopes upward is that a higher price level
- raises nominal wages if real wages are sticky.
  - reduces nominal wages if real wages are sticky.
  - raises real wages if nominal wages are sticky.
  - reduces real wages if nominal wages are sticky.
9. A change in which of the following would shift the short-run aggregate-supply curve but not the long-run aggregate-supply curve?
- the labor force
  - the capital stock
  - the state of technology
  - the expected price level

*Answers at end of chapter.*

## 33-5 Two Causes of Economic Fluctuations

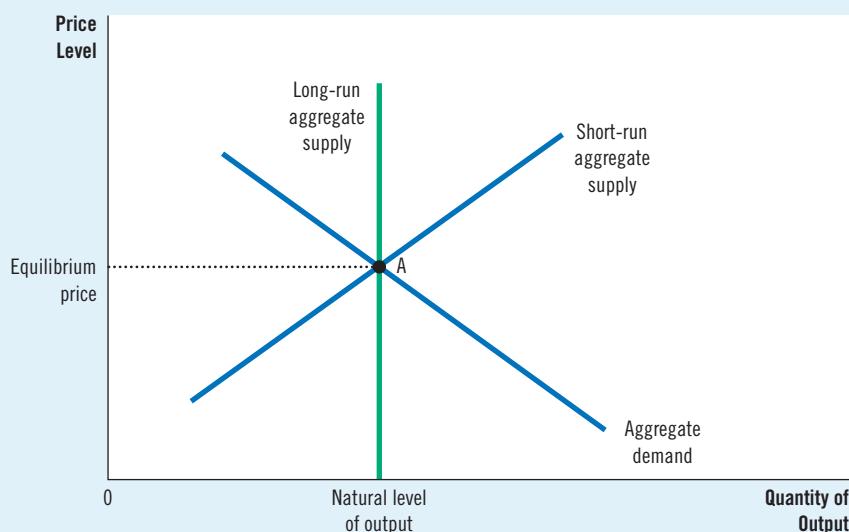
Now that we have introduced the model of aggregate demand and aggregate supply, we have the basic tools we need to analyze fluctuations in economic activity. In particular, we can use what we have learned about aggregate demand and aggregate supply to examine the two basic causes of short-run fluctuations: shifts in aggregate demand and shifts in aggregate supply.

To keep things simple, we assume the economy begins in long-run equilibrium, as shown in Figure 7. Output and the price level are determined in the long run by the intersection of the aggregate-demand curve and the long-run aggregate-supply curve, shown as point A in the figure. At this point, output is at its natural level. Because the economy is always in a short-run equilibrium, the short-run aggregate-supply curve passes through this point as well, indicating that the expected price level has adjusted to this long-run equilibrium. That is, when an economy is in its long-run equilibrium, the expected price level must equal the actual price level so that the intersection of aggregate demand with short-run aggregate supply is the same as the intersection of aggregate demand with long-run aggregate supply.

**FIGURE 7**

#### The Long-Run Equilibrium

The long-run equilibrium of the economy is found where the aggregate-demand curve crosses the long-run aggregate-supply curve (point A). When the economy reaches this long-run equilibrium, the expected price level will have adjusted to equal the actual price level. As a result, the short-run aggregate-supply curve crosses this point as well.



### 33-5a The Effects of a Shift in Aggregate Demand

Suppose that a wave of pessimism suddenly overtakes the economy. The cause might be a scandal in the White House, a crash in the stock market, or the outbreak of war overseas. Because of this event, many people lose confidence in the future and alter their plans. Households cut back on their spending and delay major purchases, and firms put off buying new equipment.

What is the macroeconomic impact of such a wave of pessimism? In answering this question, we can follow the three steps we used in Chapter 4 when analyzing supply and demand in specific markets. First, we determine whether the event affects aggregate demand or aggregate supply. Second, we determine the direction that the curve shifts. Third, we use the diagram of aggregate demand and aggregate supply to compare the initial and new equilibria. The new wrinkle is that we need to add a fourth step: We have to keep track of a new short-run equilibrium, a new long-run equilibrium, and the transition between them. Table 3 summarizes the four steps to analyzing economic fluctuations.

The first two steps are straightforward. First, because the wave of pessimism affects spending plans, it affects the aggregate-demand curve. Second, because households and firms now want to buy a smaller quantity of goods and services for any given price level, the event reduces aggregate demand. As Figure 8 shows, the aggregate-demand curve shifts to the left from  $AD_1$  to  $AD_2$ .

Using this figure, we can perform step three: By comparing the initial and new equilibria, we can see the effects of the fall in aggregate demand. In the short run, the economy moves along the initial short-run aggregate-supply curve,  $AS_1$ , going from point A to point B. As the economy moves between these two points, output falls from  $Y_1$  to  $Y_2$  and the price level falls from  $P_1$  to  $P_2$ . The falling level of output indicates that the economy is in a recession. Although not shown in the figure, firms respond to lower sales and production by reducing employment. Thus, the pessimism that caused the shift in aggregate demand is, to some extent, self-fulfilling: Pessimism about the future leads to falling incomes and rising unemployment.

Now comes step four—the transition from the short-run equilibrium to the new long-run equilibrium. Because of the reduction in aggregate demand, the price level initially falls from  $P_1$  to  $P_2$ . The price level is thus below the level that people were expecting ( $P_1$ ) before the sudden fall in aggregate demand. People can be surprised in the short run, but they will not remain surprised. Over time, their expectations catch up with this new reality, and the expected price level falls as well. The fall in

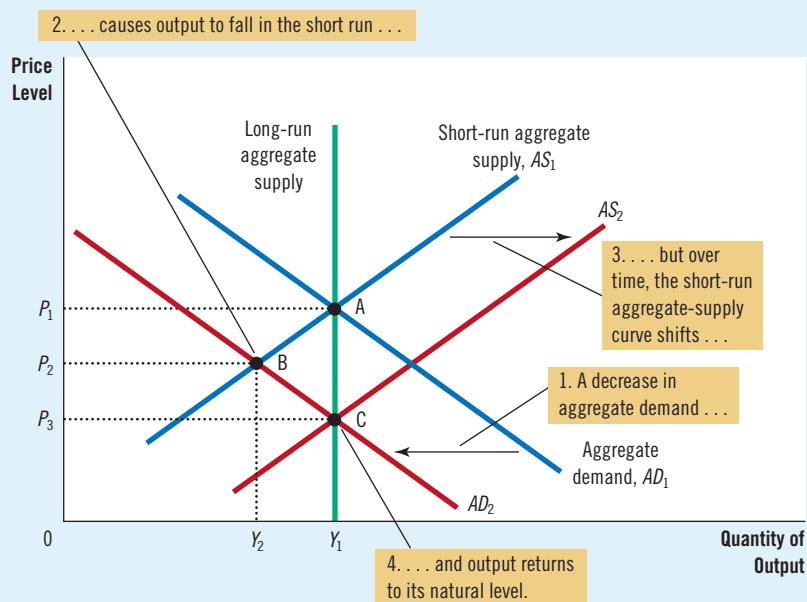
**TABLE 3**

**Four Steps for Analyzing  
Macroeconomic Fluctuations**

1. Decide whether the event shifts the aggregate-demand curve or the aggregate-supply curve (or perhaps both).
2. Decide the direction in which the curve shifts.
3. Use the diagram of aggregate demand and aggregate supply to determine the impact on output and the price level in the short run.
4. Use the diagram of aggregate demand and aggregate supply to analyze how the economy moves from its new short-run equilibrium to its new long-run equilibrium.

**FIGURE 8****A Contraction in Aggregate Demand**

A fall in aggregate demand is represented by a leftward shift in the aggregate-demand curve from  $AD_1$  to  $AD_2$ . In the short run, the economy moves from point A to point B. Output falls from  $Y_1$  to  $Y_2$ , and the price level falls from  $P_1$  to  $P_2$ . Over time, as the expected price level adjusts, the short-run aggregate-supply curve shifts to the right from  $AS_1$  to  $AS_2$ , and the economy reaches point C, where the new aggregate-demand curve crosses the long-run aggregate-supply curve. In the long run, the price level falls to  $P_3$ , and output returns to its natural level,  $Y_1$ .



the expected price level alters wages, prices, and perceptions, and these changes in turn affect the position of the short-run aggregate-supply curve. For example, according to the sticky-wage theory, once workers and firms come to expect a lower level of prices, they start to strike bargains for lower nominal wages; the reduction in labor costs encourages firms to hire more workers and expand production at any given level of prices. Thus, the fall in the expected price level shifts the short-run aggregate-supply curve to the right from  $AS_1$  to  $AS_2$  in Figure 8. This shift allows the economy to approach point C, where the new aggregate-demand curve ( $AD_2$ ) crosses the long-run aggregate-supply curve.

In the new long-run equilibrium, point C, output is back to its natural level. The economy has corrected itself: The decline in output is reversed in the long run, even without action by policymakers. Although the wave of pessimism has reduced aggregate demand, the price level has fallen sufficiently (to  $P_3$ ) to offset the shift in the aggregate-demand curve, and people have come to expect this new lower price level as well. Thus, in the long run, the shift in aggregate demand is reflected fully in the price level and not at all in the level of output. In other words, the long-run effect of a shift in aggregate demand is a nominal change (the price level is lower) but not a real change (output is the same).

What should policymakers do when faced with a sudden fall in aggregate demand? In this analysis, we assumed they did nothing. But another possibility is that, as soon as the economy heads into recession (moving from point A to point B), policymakers take action to increase aggregate demand. As we noted earlier, an increase in government spending or an increase in the money supply would increase the quantity of goods and services demanded at any price and thereby shift the aggregate-demand curve to the right. If policymakers act with sufficient speed and precision, they can offset the initial shift in aggregate demand, return the aggregate-demand curve to  $AD_1$ , and bring the economy back to point A. If the

**FYI**

## Monetary Neutrality Revisited

According to classical economic theory, money is neutral. That is, changes in the quantity of money affect nominal variables such as the price level but not real variables such as output. Earlier in this chapter, we noted that most economists accept this conclusion as a description of how the economy works in the long run but not in the short run. Using the model of aggregate demand and aggregate supply, we can illustrate this conclusion and explain it more fully.

Suppose that the Fed reduces the quantity of money in the economy. What effect does this change have? As we discussed, the money supply is one determinant of aggregate demand. The reduction in the money supply shifts the aggregate-demand curve to the left.

The analysis looks just like Figure 8. Even though the cause of the shift in aggregate demand is different, we would observe the same effects on

output and the price level. In the short run, both output and the price level fall. The economy experiences a recession. But over time, the expected price level falls as well. Firms and workers respond to their new expectations by, for instance, agreeing to lower nominal wages. As they do so, the short-run aggregate-supply curve shifts to the right. Eventually, the economy finds itself back on the long-run aggregate-supply curve.

Figure 8 shows when money matters for real variables and when it does not. In the long run, money is neutral, as represented by the movement of the economy from point A to point C. But in the short run, a change in the money supply has real effects, as represented by the movement of the economy from point A to point B. An old saying summarizes the analysis: “Money is a veil, but when the veil flutters, real output sputters.” ■

policy is successful, the painful period of depressed output and employment can be reduced in length and severity. The next chapter discusses in more detail the ways in which monetary and fiscal policy influence aggregate demand, as well as some of the practical difficulties in using these policy instruments.

To sum up, this story about shifts in aggregate demand has three important lessons:

- In the short run, shifts in aggregate demand cause fluctuations in the economy’s output of goods and services.
- In the long run, shifts in aggregate demand affect the overall price level but do not affect output.
- Because policymakers influence aggregate demand, they can potentially mitigate the severity of economic fluctuations.

**CASE STUDY**

### TWO BIG SHIFTS IN AGGREGATE DEMAND: THE GREAT DEPRESSION AND WORLD WAR II

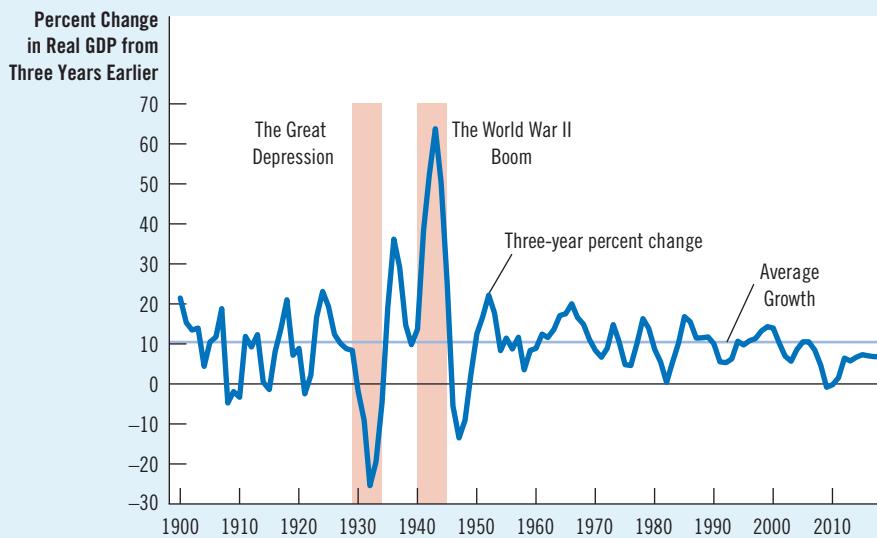
At the beginning of this chapter, we established three key facts about economic fluctuations by looking at data since 1972. Let’s now take a longer look at U.S. economic history. Figure 9 shows data since 1900 on the percentage change in real GDP over the previous three years. In an average three-year period, real GDP grows about 10 percent—a bit more than 3 percent per year. The business cycle, however, causes fluctuations around this average. Two episodes jump out as being particularly significant: the large drop in real GDP in the early 1930s and the large increase in real GDP in the early 1940s. Both of these events are attributable to shifts in aggregate demand.

The economic calamity of the early 1930s is called the *Great Depression*, and it is by far the largest economic downturn in U.S. history. Real GDP fell by 26 percent from 1929 to 1933, and unemployment rose from 3 percent to

**FIGURE 9****U.S. Real GDP Growth since 1900**

Over the course of U.S. economic history, two fluctuations stand out as especially large. During the early 1930s, the economy went through the Great Depression, when the production of goods and services plummeted. During the early 1940s, the United States entered World War II and the economy experienced rapidly rising production. Both of these events are usually explained by large shifts in aggregate demand.

**Source:** Louis D. Johnston and Samuel H. Williamson, "What Was GDP Then?" <http://www.measuringworth.com/usgdp/>; Department of Commerce.



25 percent. At the same time, the price level fell by 22 percent over these four years. Many other countries experienced similar declines in output and prices during this period.

Economic historians continue to debate the causes of the Great Depression, but most explanations center on a large decline in aggregate demand. What caused aggregate demand to contract? Here is where the disagreement arises.

Many economists place primary blame on the decline in the money supply: From 1929 to 1933, the money supply fell by 28 percent. As you may recall from our discussion of the monetary system, this decline in the money supply was due to problems in the banking system. As households withdrew their money from financially shaky banks and bankers became more cautious and started holding greater reserves, the process of money creation under fractional-reserve banking went into reverse. The Fed, meanwhile, failed to offset this fall in the money multiplier with expansionary open-market operations. As a result, the money supply declined. Many economists blame the Fed's failure to act for the Great Depression's severity.

Other economists have suggested alternative reasons for the collapse in aggregate demand. For example, stock prices fell about 90 percent during this period, depressing household wealth and consumer spending. In addition, the banking problems may have prevented some firms from obtaining the financing they wanted for new projects and business expansions, reducing investment spending. It is possible that all these forces may have acted together to contract aggregate demand during the Great Depression.

The second significant episode in Figure 9—the economic boom of the early 1940s—is easier to explain. The cause of this event was World War II. As the United States entered the war overseas, the federal government had to devote more resources to the military. Government purchases of goods and services increased almost fivefold from 1939 to 1944. This huge expansion in aggregate demand almost doubled the economy's production of goods and services and led to a 20 percent increase in the price level (although widespread government price controls limited the rise in prices). Unemployment fell from 17 percent in 1939 to about 1 percent in 1944—the lowest level in U.S. history. ●



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**CASE STUDY**

### THE GREAT RECESSION OF 2008–2009

In 2008 and 2009, the U.S. economy experienced a financial crisis and a severe downturn in economic activity. In many ways, it was the worst macroeconomic event in more than half a century.

The story of this downturn begins a few years earlier with a substantial boom in the housing market. The boom was, in part, fueled by low interest rates. In the aftermath of the recession of 2001, the Fed lowered interest rates to historically low levels. Low interest rates helped the economy recover, but by making it less expensive to get a mortgage and buy a home, they also contributed to a rise in house prices.

In addition to low interest rates, various developments in the mortgage market made it easier for *subprime borrowers*—borrowers with a higher risk of default based on their income and credit history—to get loans to buy homes. One development was *securitization*, the process by which a financial institution (specifically, a mortgage originator) makes loans and then (with the help of an investment bank) bundles them together into financial instruments called *mortgage-backed securities*. These mortgage-backed securities were then sold to other institutions (such as banks and insurance companies), which may not have fully appreciated the risks in these securities. Some economists blame inadequate regulation for these high-risk loans. Others blame misguided government policy: Certain policies encouraged this high-risk lending to make the goal of homeownership more attainable for low-income families. Together, these many forces drove up housing demand and house prices. From 1995 to 2006, average house prices in the United States more than doubled.

The high price of housing, however, proved unsustainable. From 2006 to 2009, house prices nationwide fell about 30 percent. Such price fluctuations should not necessarily be a problem in a market economy. After all, price movements are how markets equilibrate supply and demand. In this case, however, the price decline had two repercussions that led to a large fall in aggregate demand.

The first repercussion was a rise in mortgage defaults and home foreclosures. During the housing boom, many homeowners had bought their homes with mostly borrowed money and minimal down payments. When house prices declined, these homeowners were *underwater* (they owed more on their mortgages than their homes were worth). Many of these homeowners stopped repaying their loans. The banks servicing the mortgages responded to these defaults by taking the houses away in foreclosure procedures and then selling them off. The banks' goal was to recoup whatever they could from the bad loans. But the increase in the supply of

*The outcome of a massive decrease in aggregate demand*

houses for sale exacerbated the downward spiral of house prices. As house prices fell, spending on residential construction collapsed.

A second repercussion was that the various financial institutions that owned mortgage-backed securities suffered large losses. In essence, by borrowing large sums to buy high-risk mortgages, these companies had bet that house prices would keep rising; when this bet turned bad, they found themselves at or near the point of bankruptcy. Because of these losses, many financial institutions did not have funds to loan out, and the ability of the financial system to channel resources to those who could best use them was impaired. Even creditworthy customers found themselves unable to borrow to finance investment spending. Such an event is called a *credit crunch*.

As a result of the residential investment collapse and credit crunch, the economy experienced a contractionary shift in aggregate demand. Real GDP and employment both fell sharply. The figures cited in this chapter's introduction are worth repeating: Real GDP declined by 4.0 percent between the fourth quarter of 2007 and the second quarter of 2009, and the rate of unemployment rose from 4.4 percent in May 2007 to 10.0 percent in October 2009. This experience served as a vivid reminder that deep economic downturns and the personal hardship they cause are not a relic of history but a constant risk in the modern economy.

As the crisis unfolded, the U.S. government responded in various ways. Three policy actions—all aimed in part at returning aggregate demand to its previous level—are most noteworthy.

First, the Fed cut its target for the federal funds rate from 5.25 percent in September 2007 to about zero in December 2008. In addition, in a policy called *quantitative easing*, the Fed started buying mortgage-backed securities and other long-term debt in open-market operations. The goals of quantitative easing were to lower long-term interest rates and to provide the financial system with additional funds so that banks would make loans more readily available.

Second, in an even more unusual move in October 2008, Congress appropriated \$700 billion for the Treasury to use to rescue the financial system. Much of this money was used to inject capital into banks. That is, the Treasury put funds into the banking system, which the banks could use to make loans and otherwise continue their normal operations; in exchange for these funds, the U.S. government became a part owner of these banks, at least temporarily. The goal of this policy was to stem the crisis on Wall Street and make it easier for businesses and individuals to borrow.

Finally, when Barack Obama became president in January 2009, his first major initiative was a large increase in government spending. After brief congressional debate, he signed a \$787 billion stimulus bill on February 17, 2009. This policy move is discussed more fully in the next chapter when we consider the impact of fiscal policy on aggregate demand.

The recovery from this recession began in June 2009, but it was meager by historical standards. Over the next seven years, real GDP growth averaged only 2.2 percent per year, well below the average rate of growth over the past half century of about 3 percent. The unemployment rate did not fall below 5.0 percent until 2016.

Which, if any, of the many policy moves were most important for ending the recession? And what other policies might have promoted a more robust recovery? These are questions that macroeconomic historians continue to debate. ●

### 33-5b The Effects of a Shift in Aggregate Supply

Imagine once again an economy in its long-run equilibrium. Now suppose that suddenly some firms experience an increase in their costs of production. For example, bad weather in farm states might destroy some crops, driving up the cost of producing food products. Or a war in the Middle East might interrupt the shipping of crude oil, driving up the cost of producing oil products.

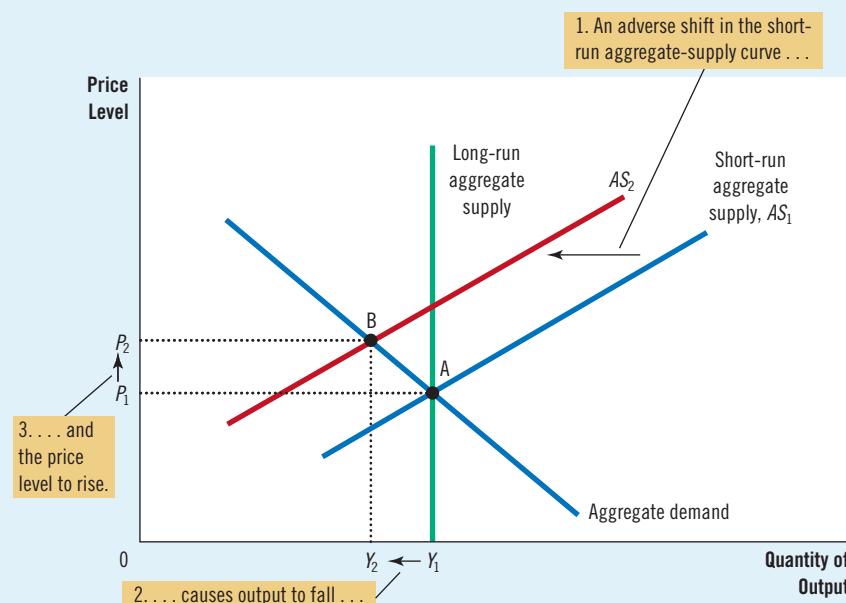
To analyze the macroeconomic impact of such an increase in production costs, we follow the same four steps as always. First, which curve is affected? Because production costs affect the firms that supply goods and services, changes in production costs alter the position of the aggregate-supply curve. Second, in which direction does the curve shift? Because higher production costs make selling goods and services less profitable, firms now supply a smaller quantity of output for any given price level. Thus, as Figure 10 shows, the short-run aggregate-supply curve shifts to the left, from  $AS_1$  to  $AS_2$ . (Depending on the event, the long-run aggregate-supply curve might also shift. To keep things simple, however, we will assume that it does not.)

The figure allows us to perform step three of comparing the initial and new equilibria. In the short run, the economy goes from point A to point B, moving along the existing aggregate-demand curve. The output of the economy falls from  $Y_1$  to  $Y_2$ , and the price level rises from  $P_1$  to  $P_2$ . Because the economy is experiencing both *stagnation* (falling output) and *inflation* (rising prices), such an event is sometimes called **stagflation**.

Now consider step four—the transition from the short-run equilibrium to the long-run equilibrium. According to the sticky-wage theory, the key issue is how stagflation affects nominal wages. Firms and workers may at first respond to

#### stagflation

a period of falling output and rising prices



**FIGURE 10**

#### An Adverse Shift in Aggregate Supply

When some event increases firms' costs, the short-run aggregate-supply curve shifts to the left from  $AS_1$  to  $AS_2$ . The economy moves from point A to point B. The result is stagflation: Output falls from  $Y_1$  to  $Y_2$ , and the price level rises from  $P_1$  to  $P_2$ .

the higher level of prices by raising their expectations of the price level and setting higher nominal wages. In this case, firms' costs will rise yet again, and the short-run aggregate-supply curve will shift farther to the left, making the problem of stagflation even worse. This phenomenon of higher prices leading to higher wages, in turn leading to even higher prices, is sometimes called a *wage-price spiral*.

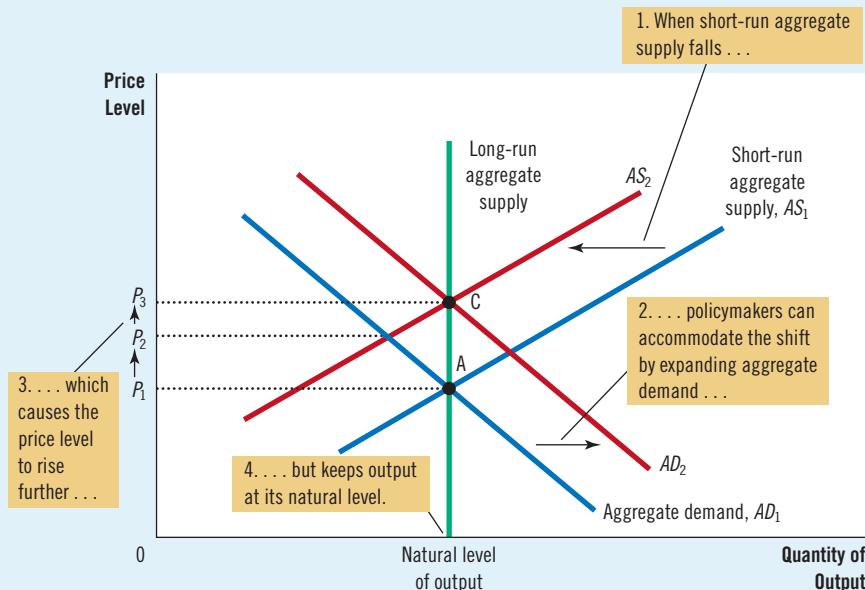
At some point, this spiral of ever-rising wages and prices will slow. The low level of output and employment will put downward pressure on workers' wages because workers have less bargaining power when unemployment is high. As nominal wages fall, producing goods and services becomes more profitable and the short-run aggregate-supply curve shifts to the right. As it shifts back toward  $AS_1$ , the price level falls and the quantity of output approaches its natural level. In the long run, the economy returns to point A, where the aggregate-demand curve crosses the long-run aggregate-supply curve.

This transition back to the initial equilibrium assumes, however, that aggregate demand is held constant throughout the process. In the real world, that may not be the case. Policymakers who control monetary and fiscal policy might attempt to offset some of the effects of the shift in the short-run aggregate-supply curve by shifting the aggregate-demand curve. This possibility is shown in Figure 11. In this case, changes in policy shift the aggregate-demand curve to the right, from  $AD_1$  to  $AD_2$ —exactly enough to prevent the shift in aggregate supply from affecting output. The economy moves directly from point A to point C. Output remains at its natural level, and the price level rises from  $P_1$  to  $P_3$ . In this case, policymakers are said to *accommodate* the shift in aggregate supply. An accommodative policy accepts a permanently higher level of prices to maintain a higher level of output and employment.

**FIGURE 11**

### Accommodating an Adverse Shift in Aggregate Supply

Faced with an adverse shift in aggregate supply from  $AS_1$  to  $AS_2$ , policymakers who can influence aggregate demand might try to shift the aggregate-demand curve to the right from  $AD_1$  to  $AD_2$ . The economy would move from point A to point C. This policy would prevent the supply shift from reducing output in the short run, but the price level would permanently rise from  $P_1$  to  $P_3$ .



To sum up, this story about shifts in aggregate supply has two important lessons:

- Shifts in aggregate supply can cause stagflation—a combination of recession (falling output) and inflation (rising prices).
- Policymakers who can influence aggregate demand can mitigate the adverse impact on output but only at the cost of exacerbating the problem of inflation.

### CASE STUDY

#### OIL AND THE ECONOMY

Some of the largest economic fluctuations in the U.S. economy since 1970 have originated in the oil fields of the Middle East. Crude oil is a key input into the production of many goods and services, and much of the world's oil comes from Saudi Arabia, Kuwait, and other Middle Eastern countries. When some event (usually political in origin) reduces the supply of crude oil flowing from this region, the price of oil rises around the world. Firms in the United States that produce gasoline, tires, and many other products experience rising costs, and they find it less profitable to supply their output of goods and services at any given price level. The result is a leftward shift in the aggregate-supply curve, which in turn leads to stagflation.

The first episode of this sort occurred in the mid-1970s. The countries with large oil reserves started to exert their influence on the world economy as members of OPEC, the Organization of the Petroleum Exporting Countries. OPEC is a *cartel*—a group of sellers that attempts to thwart competition and reduce production to raise prices. And indeed, oil prices rose substantially. From 1973 to 1975, oil approximately doubled in price. Oil-importing countries around the world experienced simultaneous inflation and recession. The U.S. inflation rate as measured by the CPI exceeded 10 percent for the first time in decades. Unemployment rose from 4.9 percent in 1973 to 8.5 percent in 1975.

Almost the same thing happened a few years later. In the late 1970s, the OPEC countries again restricted the supply of oil to raise the price. From 1978 to 1981, the price of oil more than doubled. Once again, the result was stagflation. Inflation, which had subsided somewhat after the first OPEC event, again rose above 10 percent per year. But because the Fed was not willing to accommodate such a large rise in inflation, a recession soon followed. Unemployment rose from about 6 percent in 1978 and 1979 to about 10 percent a few years later.

Developments in the world market for oil can also be a source of favorable shifts in aggregate supply. In 1986, squabbling broke out among members of OPEC. Member countries reneged on their agreements to restrict oil production. In the world market for crude oil, prices fell by about half. This fall in oil prices reduced costs to U.S. firms, which now found it more profitable to supply goods and services at any given price level. As a result, the aggregate-supply curve shifted to the right. The U.S. economy experienced the opposite of stagflation: Output grew rapidly, unemployment fell, and the inflation rate reached its lowest level in many years.

In recent years, developments in the world oil market have not been as important a source of fluctuations for the U.S. economy. One reason is that conservation efforts, changes in technology, and the availability of alternative energy sources have reduced the economy's dependence on oil. The amount of oil used to produce a unit of real GDP has declined by more than 50 percent since the OPEC shocks of the 1970s. As a result, the impact of any change in oil prices on the U.S. economy is smaller today than it was in the past. ●



YASSER AL-ZAYYAT/AFP/GETTY IMAGES

*Changes in Middle East oil production are one source of U.S. economic fluctuations.*

**FYI**

## The Origins of the Model of Aggregate Demand and Aggregate Supply

Now that we have a basic understanding of the model of aggregate demand and aggregate supply, it is worthwhile to step back and consider its history. How did this model of short-run fluctuations develop? The answer is that this model, to a large extent, is a by-product of the Great Depression of the 1930s. Economists and policymakers at the time were puzzled about what had caused this calamity and were uncertain about how to deal with it.

In 1936, economist John Maynard Keynes published a book titled *The General Theory of Employment, Interest, and Money*, which attempted to explain short-run economic fluctuations in general and the Great Depression in particular. Keynes's main message was that recessions and depressions can occur because of inadequate aggregate demand for goods and services.



KEYSTONE/GETTY IMAGES

John Maynard Keynes

Keynes had long been a critic of classical economic theory—the theory we examined earlier in the book—because it could explain only the long-run effects of policies. A few years before offering *The General Theory*, Keynes had written the following about classical economics:

*The long run is a misleading guide to current affairs. In the long run we are all dead. Economists set themselves too easy, too useless a task if in tempestuous seasons they can only tell us when the storm is long past, the ocean will be flat.*

Keynes's message was aimed at policymakers as well as economists. As the world's economies suffered with high unemployment, Keynes advocated policies to increase aggregate demand, including government spending on public works.

In the next chapter, we examine in detail how policymakers can use the tools of monetary and fiscal policy to influence aggregate demand. The analysis in the next chapter, as well as in this one, owes much to the legacy of John Maynard Keynes. ■

### QuickQuiz

10. A sudden increase in business pessimism shifts the aggregate-\_\_\_\_\_ curve, leading to \_\_\_\_\_ output.
  - a. supply; lower
  - b. supply; higher
  - c. demand; lower
  - d. demand; higher
11. An increase in the aggregate demand for goods and services has a larger impact on output \_\_\_\_\_ and a larger impact on the price level \_\_\_\_\_.
  - a. in the short run; in the long run
  - b. in the long run; in the short run
12. Stagflation is caused by a
  - a. leftward shift in the aggregate-demand curve.
  - b. rightward shift in the aggregate-demand curve.
  - c. leftward shift in the aggregate-supply curve.
  - d. rightward shift in the aggregate-supply curve.

Answers at end of chapter.

## 33-6 Conclusion

This chapter has achieved two goals. First, we have discussed some of the important facts about short-run fluctuations in economic activity. Second, we have introduced a basic model to explain those fluctuations, called the model of aggregate demand and aggregate supply. We continue our study of this model in the next chapter to understand more fully what causes fluctuations in the economy and how policymakers might respond to these fluctuations.

## CHAPTER IN A NUTSHELL

- All societies experience short-run economic fluctuations around long-run trends. These fluctuations are irregular and largely unpredictable. When recessions occur, real GDP and other measures of income, spending, and production fall, while unemployment rises.
- Classical economic theory is based on the assumption that nominal variables such as the money supply and the price level do not influence real variables such as output and employment. Most economists believe that this assumption is accurate in the long run but not in the short run. Economists analyze short-run economic fluctuations using the model of aggregate demand and aggregate supply. According to this model, the output of goods and services and the overall level of prices adjust to balance aggregate demand and aggregate supply.
- The aggregate-demand curve slopes downward for three reasons. The first is the wealth effect: A lower price level raises the real value of households' money holdings, stimulating consumer spending. The second is the interest-rate effect: A lower price level reduces the quantity of money households demand; as households try to convert money into interest-bearing assets, interest rates fall, stimulating investment spending. The third is the exchange-rate effect: As a lower price level reduces interest rates, the dollar depreciates in the market for foreign-currency exchange, stimulating net exports.
- Any event or policy that raises consumption, investment, government purchases, or net exports at any given price level increases aggregate demand. Any event or policy that reduces consumption, investment, government purchases, or net exports at any given price level decreases aggregate demand.
- The long-run aggregate-supply curve is vertical. In the long run, the quantity of goods and services supplied depends on the economy's labor, capital, natural resources, and technology but not on the overall level of prices.
- Three theories have been proposed to explain the upward slope of the short-run aggregate-supply curve. According to the sticky-wage theory, an unexpected fall in the price level temporarily raises real wages, inducing firms to reduce employment and production. According to the sticky-price theory, an unexpected fall in the price level leaves some firms with prices that are temporarily too high, reducing their sales and causing them to cut back production. According to the misperceptions theory, an unexpected fall in the price level leads suppliers to mistakenly believe that their relative prices have fallen, inducing them to reduce production. All three theories imply that output deviates from its natural level when the actual price level deviates from the price level that people expected.
- Events that alter the economy's ability to produce output, such as changes in labor, capital, natural resources, or technology, shift the short-run aggregate-supply curve (and may shift the long-run aggregate-supply curve as well). In addition, the position of the short-run aggregate-supply curve depends on the expected price level.
- One possible cause of economic fluctuations is a shift in aggregate demand. When the aggregate-demand curve shifts to the left, for instance, output and prices fall in the short run. Over time, as a change in the expected price level causes wages, prices, and perceptions to adjust, the short-run aggregate-supply curve shifts to the right. This shift returns the economy to its natural level of output at a new, lower price level.
- A second possible cause of economic fluctuations is a shift in aggregate supply. When the short-run aggregate-supply curve shifts to the left, the effect is falling output and rising prices—a combination called stagflation. Over time, as wages, prices, and perceptions adjust, the short-run aggregate-supply curve shifts back to the right, returning the price level and output to their original levels.

## KEY CONCEPTS

recession, p. 684  
depression, p. 684  
model of aggregate demand and aggregate supply, p. 688

aggregate-demand curve, p. 688  
aggregate-supply curve, p. 688

natural level of output, p. 696  
stagflation, p. 711

## QUESTIONS FOR REVIEW

1. Name two macroeconomic variables that decline when the economy goes into a recession. Name one macroeconomic variable that rises during a recession.
2. Draw a diagram showing aggregate demand, short-run aggregate supply, and long-run aggregate supply. Be careful to label the axes correctly.
3. List and explain the three reasons the aggregate-demand curve slopes downward.
4. Explain why the long-run aggregate-supply curve is vertical.
5. List and explain the three theories for why the short-run aggregate-supply curve slopes upward.
6. What might shift the aggregate-demand curve to the left? Use the model of aggregate demand and aggregate supply to trace the short-run and long-run effects of such a shift on output and the price level.
7. What might shift the aggregate-supply curve to the left? Use the model of aggregate demand and aggregate supply to trace the short-run and long-run effects of such a shift on output and the price level.

## PROBLEMS AND APPLICATIONS

1. Suppose the economy is in a long-run equilibrium.
  - a. Draw a diagram to illustrate the state of the economy. Be sure to show aggregate demand, short-run aggregate supply, and long-run aggregate supply.
  - b. Now suppose that a stock market crash causes aggregate demand to fall. Use your diagram to show what happens to output and the price level in the short run. What happens to the unemployment rate?
  - c. Use the sticky-wage theory of aggregate supply to explain what happens to output and the price level in the long run (assuming no change in policy). What role does the expected price level play in this adjustment? Be sure to illustrate your analysis in a graph.
2. Explain whether each of the following events increases, decreases, or has no effect on long-run aggregate supply.
  - a. The United States experiences a wave of immigration.
  - b. Congress raises the minimum wage to \$15 per hour.
  - c. Intel invents a new and more powerful computer chip.
  - d. A severe hurricane damages factories along the East Coast.
3. Suppose an economy is in long-run equilibrium.
  - a. Use the model of aggregate demand and aggregate supply to illustrate the initial equilibrium (call it point A). Be sure to include both short-run aggregate supply and long-run aggregate supply.
  - b. The central bank raises the money supply by 5 percent. Use your diagram to show what happens to output and the price level as the economy moves from the initial equilibrium to the new short-run equilibrium (call it point B).
  - c. Now show the new long-run equilibrium (call it point C). What causes the economy to move from point B to point C?
  - d. According to the sticky-wage theory of aggregate supply, how do nominal wages at point A compare with nominal wages at point B? How do nominal wages at point A compare with nominal wages at point C?
  - e. According to the sticky-wage theory of aggregate supply, how do real wages at point A compare with real wages at point B? How do real wages at point A compare with real wages at point C?
  - f. Judging by the impact of the money supply on nominal and real wages, is this analysis consistent with the proposition that money has real effects in the short run but is neutral in the long run?
4. In 1939, with the U.S. economy not yet fully recovered from the Great Depression, President Franklin Roosevelt proclaimed that Thanksgiving would fall a week earlier than usual so that the shopping period before Christmas would be longer. (The policy was dubbed “Franksgiving.”) Explain what President Roosevelt might have been trying to achieve, using the model of aggregate demand and aggregate supply.
5. Explain why the following statements are false.
  - a. “The aggregate-demand curve slopes downward because it is the horizontal sum of the demand curves for individual goods.”
  - b. “The long-run aggregate-supply curve is vertical because economic forces do not affect long-run aggregate supply.”

- c. "If firms adjusted their prices every day, then the short-run aggregate-supply curve would be horizontal."
- d. "Whenever the economy enters a recession, its long-run aggregate-supply curve shifts to the left."
6. For each of the three theories for the upward slope of the short-run aggregate-supply curve, carefully explain the following:
- how the economy recovers from a recession and returns to its long-run equilibrium without any policy intervention
  - what determines the speed of that recovery
7. The economy begins in long-run equilibrium. Then one day, the president appoints a new Fed chair. This new chair is well known for her view that inflation is not a major problem for an economy.
- How would this news affect the price level that people expect to prevail?
  - How would this change in the expected price level affect the nominal wage that workers and firms agree to in their new labor contracts?
  - How would this change in the nominal wage affect the profitability of producing goods and services at any given price level?
  - How would this change in profitability affect the short-run aggregate-supply curve?
  - If aggregate demand is held constant, how would this shift in the aggregate-supply curve affect the price level and the quantity of output produced?
  - Do you think appointing this Fed chair was a good decision?
8. Explain whether each of the following events shifts the short-run aggregate-supply curve, the aggregate-demand curve, both, or neither. For each event that does shift a curve, draw a diagram to illustrate the effect on the economy.
- Households decide to save a larger share of their income.
  - Florida orange groves suffer a prolonged period of below-freezing temperatures.
  - Increased job opportunities overseas cause many people to leave the country.
9. For each of the following events, explain the short-run and long-run effects on output and the price level, assuming policymakers take no action.
- The stock market declines sharply, reducing consumers' wealth.
  - The federal government increases spending on national defense.
  - A technological improvement raises productivity.
  - A recession overseas causes foreigners to buy fewer U.S. goods.
10. Suppose firms become optimistic about future business conditions and invest heavily in new capital equipment.
- Draw an aggregate-demand/aggregate-supply diagram to show the short-run effect of this optimism on the economy. Label the new levels of prices and real output. Explain in words why the aggregate quantity of output supplied changes.
  - Now use the diagram from part (a) to show the new long-run equilibrium of the economy. (For now, assume there is no change in the long-run aggregate-supply curve.) Explain in words why the aggregate quantity of output demanded changes between the short run and the long run.
  - How might the investment boom affect the long-run aggregate-supply curve? Explain.

### QuickQuiz Answers

1. c    2. d    3. c    4. a    5. b    6. b    7. d    8. d    9. d    10. c    11. a    12. c

## CHAPTER

# 34

# The Influence of Monetary and Fiscal Policy on Aggregate Demand

**I**magine that you are a member of the Federal Open Market Committee, the group at the Federal Reserve that sets monetary policy. You observe that the president and Congress have agreed to raise taxes. How should the Fed respond to this change in fiscal policy? Should it expand the money supply, contract the money supply, or leave it unchanged?

To answer this question, you need to consider the impact of monetary and fiscal policy on the economy. In the preceding chapter, we used the model of aggregate demand and aggregate supply to explain short-run economic fluctuations. We saw that shifts in the aggregate-demand curve or the aggregate-supply curve cause fluctuations in the economy's overall output of goods and services and its overall level of prices. As we noted in the previous chapter, both monetary and fiscal policy influence aggregate demand. Thus, a change in one of these policies can lead to short-run fluctuations in output and prices. Policymakers will want to anticipate this effect and, perhaps, adjust the other policy in response.

In this chapter, we examine in more detail how the government's policy tools influence the position of the



aggregate-demand curve. These tools include monetary policy (the supply of money set by the central bank) and fiscal policy (the levels of government spending and taxation set by the president and Congress). We have previously discussed the long-run effects of these policies. In Chapters 25 and 26, we saw how fiscal policy affects saving, investment, and long-run economic growth. In Chapters 29 and 30, we saw how monetary policy influences the price level in the long run. We now look at how these policy tools can shift the aggregate-demand curve and thereby affect macroeconomic variables in the short run.

As we have already learned, many factors influence aggregate demand besides monetary and fiscal policy. In particular, desired spending by households and firms determines the overall demand for goods and services. When desired spending changes, aggregate demand shifts. If policymakers do not respond, such shifts in aggregate demand cause short-run fluctuations in output and employment. As a result, monetary and fiscal policymakers sometimes use the policy levers at their disposal to try to offset these shifts in aggregate demand and stabilize the economy. Here we discuss the theory behind these policy actions and some of the difficulties that arise in using this theory in practice.

## 34-1 How Monetary Policy Influences Aggregate Demand

The aggregate-demand curve shows the total quantity of goods and services demanded in the economy for any price level. The preceding chapter discussed three reasons why the aggregate-demand curve slopes downward:

- *The wealth effect:* A lower price level raises the real value of households' money holdings, which are part of their wealth. Higher real wealth stimulates consumer spending and thus increases the quantity of goods and services demanded.
- *The interest-rate effect:* A lower price level reduces the amount of money people want to hold. As people try to lend out their excess money holdings, the interest rate falls. The lower interest rate stimulates investment spending and thus increases the quantity of goods and services demanded.
- *The exchange-rate effect:* When a lower price level reduces the interest rate, investors move some of their funds overseas in search of higher returns. This movement of funds causes the real value of the domestic currency to fall in the market for foreign-currency exchange. Domestic goods become less expensive relative to foreign goods. This change in the real exchange rate stimulates spending on net exports and thus increases the quantity of goods and services demanded.

These three effects occur simultaneously to increase the quantity of goods and services demanded when the price level falls and to decrease it when the price level rises.

Although all three effects work together to explain the downward slope of the aggregate-demand curve, they are not of equal importance. Because money holdings are a small part of household wealth, the wealth effect is the least important of the three. In addition, because exports and imports represent only a small fraction of U.S. GDP, the exchange-rate effect is not large for the U.S. economy. (This effect is more important for smaller countries, which typically export and import a higher

fraction of their GDP.) For the U.S. economy, the most important reason for the downward slope of the aggregate-demand curve is the interest-rate effect.

To better understand aggregate demand, we now examine the short-run determination of interest rates in more detail. Here we develop the **theory of liquidity preference**. This theory of interest rates helps explain the downward slope of the aggregate-demand curve, as well as how monetary and fiscal policy can shift this curve. By shedding new light on aggregate demand, the theory of liquidity preference expands our understanding of what causes short-run economic fluctuations and what policymakers can potentially do about them.

### theory of liquidity preference

Keynes's theory that the interest rate adjusts to bring money supply and money demand into balance

## 34-1a The Theory of Liquidity Preference

In his classic book *The General Theory of Employment, Interest, and Money*, John Maynard Keynes proposed the theory of liquidity preference to explain the factors that determine an economy's interest rate. The theory is, in essence, an application of supply and demand. According to Keynes, the interest rate adjusts to balance the supply of and demand for money.

You may recall that economists distinguish between two interest rates: The *nominal interest rate* is the interest rate as usually reported, and the *real interest rate* is the interest rate corrected for the effects of inflation. When there is no inflation, the two rates are the same. But when borrowers and lenders expect prices to rise over the term of the loan, they agree to a nominal interest rate that exceeds the real interest rate by the expected rate of inflation. The higher nominal interest rate compensates for the fact that they expect the loan to be repaid in less valuable dollars.

Which interest rate are we now trying to explain with the theory of liquidity preference? The answer is both. In the analysis that follows, we hold constant the expected rate of inflation. This assumption is reasonable for studying the economy in the short run, because expected inflation is typically stable over short periods of time. In this case, nominal and real interest rates differ by a constant: When the nominal interest rate rises or falls, the real interest rate that people expect to earn rises or falls by the same amount. For the rest of this chapter, when we discuss changes in the interest rate, these changes refer to both the real interest rate and the nominal interest rate.

Let's now develop the theory of liquidity preference by considering the supply and demand for money and how each depends on the interest rate.

**Money Supply** The first piece of the theory of liquidity preference is the supply of money. As we first discussed in Chapter 29, the money supply in the U.S. economy is controlled by the Federal Reserve. The Fed alters the money supply primarily by changing the quantity of reserves in the banking system through the purchase and sale of government bonds in open-market operations. When the Fed buys government bonds, the dollars it pays for the bonds are typically deposited in banks, and these dollars are added to bank reserves. When the Fed sells government bonds, the dollars it receives for the bonds are withdrawn from the banking system, and bank reserves fall. These changes in bank reserves, in turn, lead to changes in banks' ability to make loans and create money. Thus, by buying and selling bonds in open-market operations, the Fed alters the supply of money in the economy.

In addition to open-market operations, the Fed can influence the money supply using various other tools. One option is for the Fed to change how much it lends to banks. For example, a decrease in the discount rate (the interest rate at which banks can borrow reserves from the Fed) encourages banks to borrow, increasing

bank reserves and in turn the money supply. Conversely, an increase in the discount rate discourages banks from borrowing, decreasing bank reserves and the money supply. The Fed also alters the money supply by changing reserve requirements (the amount of reserves banks must hold against deposits) and by changing the interest rate it pays banks on the reserves they hold.

These details of monetary control are important for the implementation of Fed policy, but they are not crucial for the analysis in this chapter. Our goal here is to examine how changes in the money supply affect the aggregate demand for goods and services. For this purpose, we can ignore the details of how Fed policy is implemented and assume that the Fed controls the money supply directly. In other words, the quantity of money supplied in the economy is fixed at whatever level the Fed decides to set it.

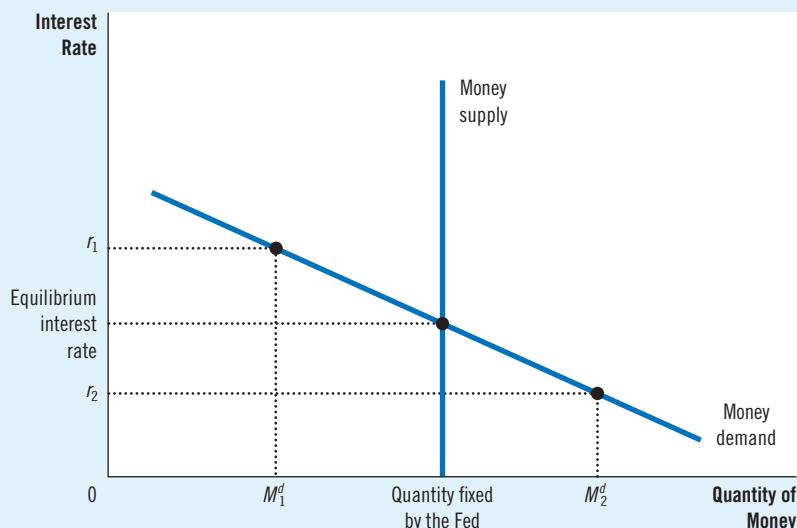
Because the quantity of money supplied is fixed by Fed policy, it does not depend on other economic variables. In particular, it does not depend on the interest rate. Once the Fed has made its policy decision, the quantity of money supplied is the same, regardless of the prevailing interest rate. We represent a fixed money supply with a vertical supply curve, as in Figure 1.

**Money Demand** The second piece of the theory of liquidity preference is the demand for money. To understand money demand, recall that an asset's *liquidity* refers to the ease with which that asset can be converted into the economy's

## FIGURE 1

### Equilibrium in the Money Market

According to the theory of liquidity preference, the interest rate adjusts to bring the quantity of money supplied and the quantity of money demanded into balance. If the interest rate is above the equilibrium level (such as at  $r_1$ ), the quantity of money people want to hold ( $M_1^d$ ) is less than the quantity the Fed has created, and this surplus of money puts downward pressure on the interest rate. Conversely, if the interest rate is below the equilibrium level (such as at  $r_2$ ), the quantity of money people want to hold ( $M_2^d$ ) exceeds the quantity the Fed has created, and this shortage of money puts upward pressure on the interest rate. Thus, the forces of supply and demand in the market for money push the interest rate toward the equilibrium interest rate, at which people are content holding the quantity of money the Fed has created.



medium of exchange. Because money is the economy's medium of exchange, it is by definition the most liquid asset available. The liquidity of money explains the demand for it: People choose to hold money instead of other assets that offer higher rates of return so they can use the money to buy goods and services.

Although many factors determine the quantity of money demanded, the theory of liquidity preference emphasizes the interest rate because it is the opportunity cost of holding money. That is, when you hold wealth as cash in your wallet, rather than as an interest-bearing bond or in an interest-bearing bank account, you lose the interest you could have earned. An increase in the interest rate raises the cost of holding money and, as a result, reduces the quantity of money demanded. A decrease in the interest rate reduces the cost of holding money and raises the quantity demanded. Thus, as shown in Figure 1, the money demand curve slopes downward.

**Equilibrium in the Money Market** According to the theory of liquidity preference, the interest rate adjusts to balance the supply and demand for money. There is one interest rate, called the *equilibrium interest rate*, at which the quantity of money demanded exactly balances the quantity of money supplied. If the interest rate is at any other level, people will try to adjust their portfolios of money and nonmonetary assets and, as a result, drive the interest rate toward the equilibrium.

For example, suppose that the interest rate is above the equilibrium level, such as  $r_1$  in Figure 1. In this case, the quantity of money that people want to hold,  $M_1^d$ , is less than the quantity of money that the Fed has supplied. Those people who are holding the surplus of money will try to get rid of it by buying interest-bearing bonds or by depositing it in interest-bearing bank accounts. Because bond issuers and banks prefer to pay lower interest rates, they respond to this surplus of money by lowering the interest rates they offer. As the interest rate falls, people become more willing to hold money until, at the equilibrium interest rate, people are happy to hold exactly the amount of money the Fed has supplied.

Conversely, at interest rates below the equilibrium level, such as  $r_2$  in Figure 1, the quantity of money that people want to hold,  $M_2^d$ , exceeds the quantity of money that the Fed has supplied. As a result, people try to increase their holdings of money by reducing their holdings of bonds and other interest-bearing assets. As people cut back on their holdings of bonds, bond issuers find that they have to offer higher interest rates to attract buyers. Thus, the interest rate rises until it reaches the equilibrium level.

### 34-1b The Downward Slope of the Aggregate-Demand Curve

Having seen how the theory of liquidity preference explains the economy's equilibrium interest rate, we now consider the theory's implications for the aggregate demand for goods and services. As a warm-up exercise, let's begin by using the theory to reexamine a topic we already understand—the interest-rate effect and the downward slope of the aggregate-demand curve. In particular, suppose that the overall level of prices in the economy rises. What happens to the interest rate that balances the supply and demand for money, and how does that change affect the quantity of goods and services demanded?

As we discussed in Chapter 30, the price level is one determinant of the quantity of money demanded. At higher prices, more money is exchanged every time a good or service is sold. As a result, people will choose to hold a larger quantity of money.

**FYI**

## Interest Rates in the Long Run and the Short Run

In an earlier chapter, we said that the interest rate adjusts to balance the supply of loanable funds (national saving) and the demand for loanable funds (desired investment). Here we just said that the interest rate adjusts to balance the supply of and demand for money. Can we reconcile these two theories?

To answer this question, we need to focus on three macroeconomic variables: the economy's output of goods and services, the interest rate, and the price level. According to the classical macroeconomic theory we developed earlier in the book, these variables are determined as follows:

1. *Output* is determined by the supplies of capital and labor and the available production technology for turning capital and labor into output. (We call this the natural level of output.)
2. For any given level of output, the *interest rate* adjusts to balance the supply and demand for loanable funds.
3. Given output and the interest rate, the *price level* adjusts to balance the supply and demand for money. Changes in the supply of money lead to proportionate changes in the price level.

These are three of the essential propositions of classical economic theory. Most economists believe that these propositions do a good job of describing how the economy works *in the long run*.

Yet these propositions do not hold in the short run. As we discussed in the preceding chapter, many prices are slow to adjust to changes in the money supply; this fact is reflected in a short-run aggregate-supply curve that is upward-sloping rather than vertical. As a result, *in the short run*, the overall price level cannot, by itself, move to balance the supply of and demand for money. This stickiness of the price level requires the interest

rate to move to bring the money market into equilibrium. These changes in the interest rate, in turn, affect the aggregate demand for goods and services. As aggregate demand fluctuates, the economy's output of goods and services moves away from the level determined by factor supplies and technology.

To think about the operation of the economy in the short run (day to day, week to week, month to month, or quarter to quarter), it is best to keep in mind the following logic:

1. The *price level* is stuck at some level (based on previously formed expectations) and, in the short run, is relatively unresponsive to changing economic conditions.
2. For any given (stuck) price level, the *interest rate* adjusts to balance the supply of and demand for money.
3. The interest rate that balances the money market influences the quantity of goods and services demanded and thus the level of output.

Notice that this logic precisely reverses the order of analysis used to study the economy in the long run.

The two different theories of the interest rate are useful for different purposes. When thinking about the long-run determinants of the interest rate, it is best to keep in mind the loanable-funds theory, which highlights the importance of an economy's saving propensities and investment opportunities. By contrast, when thinking about the short-run determinants of the interest rate, it is best to keep in mind the liquidity-preference theory, which highlights the importance of monetary policy. ■

That is, a higher price level increases the quantity of money demanded for any given interest rate. Thus, an increase in the price level from  $P_1$  to  $P_2$  shifts the money demand curve to the right from  $MD_1$  to  $MD_2$ , as shown in panel (a) of Figure 2.

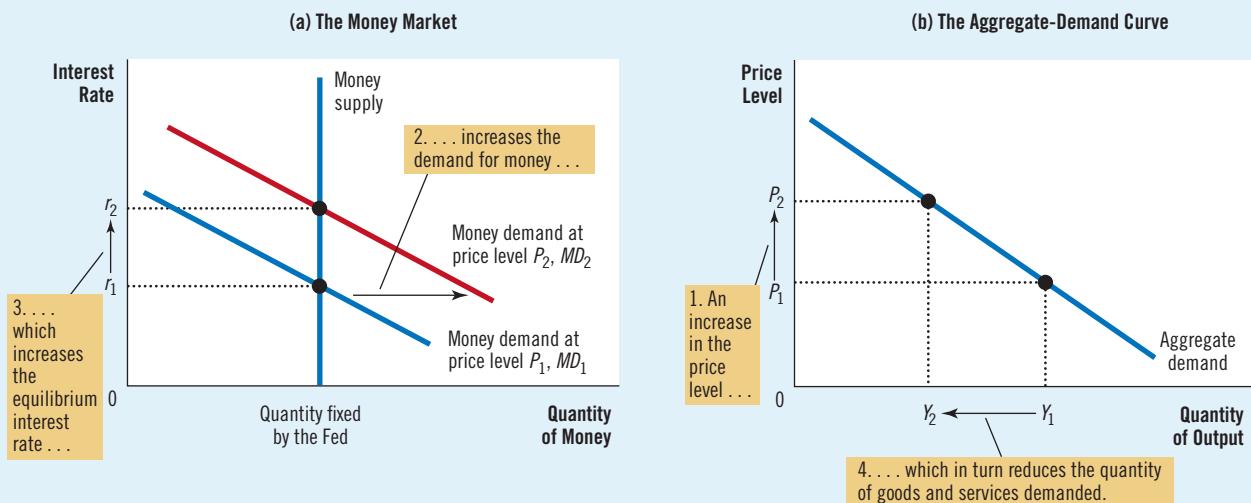
Notice how this shift in money demand affects the equilibrium in the money market. For a fixed money supply, the interest rate must rise to balance money supply and money demand. Because the higher price level has increased the amount of money people want to hold, it has shifted the money demand curve to the right. Yet the quantity of money supplied is unchanged, so the interest rate must rise from  $r_1$  to  $r_2$  to discourage the additional demand.

This increase in the interest rate has ramifications not only for the money market but also for the quantity of goods and services demanded, as shown in panel (b). At a higher interest rate, the cost of borrowing and the return to saving are greater. Fewer households choose to borrow to buy a new house, and those who do buy smaller houses, so the demand for residential investment falls. Fewer firms choose to borrow to build new factories and buy new equipment, so business investment falls. Thus, when the price level rises from  $P_1$  to  $P_2$ , increasing money demand from

An increase in the price level from  $P_1$  to  $P_2$  shifts the money demand curve to the right, as in panel (a). This increase in money demand causes the interest rate to rise from  $r_1$  to  $r_2$ . Because the interest rate is the cost of borrowing, the increase in the interest rate reduces the quantity of goods and services demanded from  $Y_1$  to  $Y_2$ . This negative relationship between the price level and quantity demanded is represented by a downward-sloping aggregate-demand curve, as in panel (b).

**FIGURE 2**

**The Money Market and the Slope of the Aggregate-Demand Curve**



$MD_1$  to  $MD_2$  and raising the interest rate from  $r_1$  to  $r_2$ , the quantity of goods and services demanded falls from  $Y_1$  to  $Y_2$ .

This analysis of the interest-rate effect can be summarized in three steps: (1) A higher price level raises money demand. (2) Higher money demand leads to a higher interest rate. (3) A higher interest rate reduces the quantity of goods and services demanded. The same logic works for a decline in the price level: A lower price level reduces money demand, leading to a lower interest rate and a larger quantity of goods and services demanded. The result of this analysis is a negative relationship between the price level and the quantity of goods and services demanded, as illustrated by a downward-sloping aggregate-demand curve.

### 34-1c Changes in the Money Supply

So far, we have used the theory of liquidity preference to explain more fully how the total quantity of goods and services demanded in the economy changes as the price level changes. That is, we have examined movements along a downward-sloping aggregate-demand curve. The theory also sheds light, however, on some of the other events that alter the quantity of goods and services demanded. Whenever the quantity of goods and services demanded changes for any given price level, the aggregate-demand curve shifts.

One important variable that shifts the aggregate-demand curve is monetary policy. To see how monetary policy affects the economy in the short run, suppose that the Fed increases the money supply by buying government bonds in open-market operations. (Why the Fed might do this will become clear

later, after we understand the effects of such a move.) Let's consider how this monetary injection influences the equilibrium interest rate for a given price level. This will tell us what the injection does to the position of the aggregate-demand curve.

As panel (a) of Figure 3 shows, an increase in the money supply shifts the money supply curve to the right from  $MS_1$  to  $MS_2$ . Because the money demand curve has not changed, the interest rate falls from  $r_1$  to  $r_2$  to balance money supply and money demand. That is, the interest rate must fall to induce people to hold the additional money the Fed has created, restoring equilibrium in the money market.

Once again, the interest rate influences the quantity of goods and services demanded, as shown in panel (b) of Figure 3. The lower interest rate reduces the cost of borrowing and the return to saving. Households spend more on new homes, stimulating the demand for residential investment. Firms spend more on new factories and new equipment, stimulating business investment. As a result, the quantity of goods and services demanded at a given price level,  $\bar{P}$ , rises from  $Y_1$  to  $Y_2$ . Of course, there is nothing special about  $\bar{P}$ : The monetary injection raises the quantity of goods and services demanded at every price level. Thus, the entire aggregate-demand curve shifts to the right.

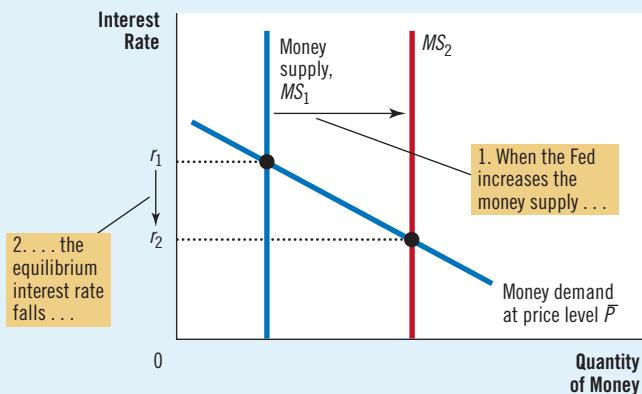
To sum up: *When the Fed increases the money supply, it lowers the interest rate and increases the quantity of goods and services demanded for any given price level, shifting the aggregate-demand curve to the right. Conversely, when the Fed contracts the money supply, it raises the interest rate and reduces the quantity of goods and services demanded for any given price level, shifting the aggregate-demand curve to the left.*

## FIGURE 3

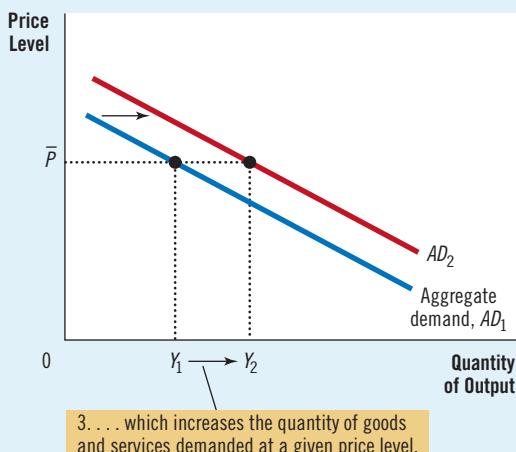
### A Monetary Injection

In panel (a), an increase in the money supply from  $MS_1$  to  $MS_2$  reduces the equilibrium interest rate from  $r_1$  to  $r_2$ . Because the interest rate is the cost of borrowing, the fall in the interest rate raises the quantity of goods and services demanded at a given price level from  $Y_1$  to  $Y_2$ . Thus, in panel (b), the aggregate-demand curve shifts to the right from  $AD_1$  to  $AD_2$ .

(a) The Money Market



(b) The Aggregate-Demand Curve



### 34-1d The Role of Interest-Rate Targets in Fed Policy

How does the Federal Reserve affect the economy? Our discussion here and earlier in the book has treated the money supply as the Fed's policy instrument. When the Fed buys government bonds in open-market operations, it increases the money supply and expands aggregate demand. When the Fed sells government bonds in open-market operations, it decreases the money supply and contracts aggregate demand.

Focusing on the money supply is a good starting point, but another perspective is useful when thinking about recent policy. In the past, the Fed has at times set a target for the money supply, but that is no longer the case. The Fed now conducts policy by setting a target for the *federal funds rate*—the interest rate that banks charge one another for short-term loans. This target is reevaluated every six weeks at meetings of the Federal Open Market Committee (FOMC).

There are several related reasons for the Fed's decision to use the federal funds rate as its target. One is that the money supply is hard to measure with sufficient precision. Another is that money demand fluctuates over time. For any given money supply, fluctuations in money demand lead to fluctuations in interest rates, aggregate demand, and output. By contrast, when the Fed announces a target for the federal funds rate, it essentially accommodates the day-to-day shifts in money demand by adjusting the money supply accordingly.

The Fed's decision to target an interest rate does not fundamentally alter our analysis of monetary policy. The theory of liquidity preference illustrates an important principle: *Monetary policy can be described either in terms of the money supply or in terms of the interest rate*. When the FOMC sets a target for the federal funds rate of, say, 4 percent, the Fed's bond traders are told: "Conduct whatever open-market operations are necessary to ensure that the equilibrium interest rate is 4 percent." In other words, when the Fed sets a target for the interest rate, it commits itself to adjusting the money supply to make the equilibrium in the money market hit that target.

As a result, changes in monetary policy can be viewed either in terms of changing the interest rate target or in terms of changing the money supply. When you read in the news that "the Fed has lowered the federal funds rate from 4 to 3 percent," you should understand that this occurs only because the Fed's bond traders are doing what it takes to make sure that the interest rate changes. To lower the federal funds rate, the Fed's bond traders buy government bonds, and this purchase increases the money supply and lowers the equilibrium interest rate (just as in Figure 3). Conversely, when the FOMC raises the target for the federal funds rate, the bond traders sell government bonds, and this sale decreases the money supply and raises the equilibrium interest rate.

The lessons from this analysis are simple: *Changes in monetary policy aimed at expanding aggregate demand can be described either as increasing the money supply or as lowering the interest rate. Changes in monetary policy aimed at contracting aggregate demand can be described either as decreasing the money supply or as raising the interest rate.*

CASE  
STUDY

#### WHY THE FED WATCHES THE STOCK MARKET (AND VICE VERSA)

"The stock market has predicted nine out of the past five recessions."

So quipped Paul Samuelson, the famed economist (and textbook author). Samuelson was right that the stock market is highly volatile and can give wrong signals about the economy. But fluctuations in stock prices are often a sign

of broader economic developments. The economic boom of the 1990s, for example, appeared not only in rapid GDP growth and falling unemployment but also in rising stock prices, which increased about fourfold during this decade. Similarly, the Great Recession of 2008 and 2009 was reflected in falling stock prices: From November 2007 to March 2009, the stock market lost about half its value.

How should the Fed respond to stock market fluctuations? The Fed has no reason to care about stock prices in themselves, but it does have the job of monitoring and responding to developments in the overall economy, and the stock market is a piece of that puzzle. When the stock market booms, households become wealthier, and this increased wealth stimulates consumer spending. In addition, a rise in stock prices makes it more attractive for firms to sell new shares of stock and thereby stimulates investment spending. For both reasons, a booming stock market expands the aggregate demand for goods and services.

As we discuss more fully later in the chapter, one of the Fed's goals is to stabilize aggregate demand, because greater stability in aggregate demand means greater stability in output and the price level. To promote stability, the Fed might respond to a stock market boom by keeping the money supply lower and interest rates higher than it otherwise would. The contractionary effects of higher interest rates would offset the expansionary effects of higher stock prices. In fact, this analysis does describe Fed behavior: Real interest rates were kept high by historical standards during the stock market boom of the late 1990s.

The opposite occurs when the stock market falls. Spending on consumption and investment tends to decline, depressing aggregate demand and pushing the economy toward recession. To stabilize aggregate demand, the Fed would increase the money supply and lower interest rates. And indeed, that is what it typically does. For example, on October 19, 1987, the stock market fell by 22.6 percent—one of the biggest one-day drops in history. The Fed responded to the market crash by increasing the money supply and lowering interest rates. The federal funds rate fell from 7.7 percent at the beginning of October to 6.6 percent at the end of the month. In part because of the Fed's quick action, the economy avoided a recession. Similarly, as we discussed in a case study in the preceding chapter, the Fed also reduced interest rates during the economic downturn and stock market decline of 2008 and 2009, but this time monetary policy was not sufficient to avert a deep recession.

While the Fed keeps an eye on the stock market, stock market participants also keep an eye on the Fed. Because the Fed can influence interest rates and economic activity, it can alter the value of stocks. For example, when the Fed raises interest rates by reducing the money supply, it makes owning stocks less attractive for two reasons. First, a higher interest rate means that bonds, an alternative to stocks, earn a higher return. Second, a tightening of monetary policy reduces the demand for goods and services and thereby reduces profits. As a result, stock prices often fall when the Fed raises interest rates. ●

### 34-1e The Zero Lower Bound

As we have just seen, monetary policy works through interest rates. This conclusion raises a question: What if the Fed's target interest rate has fallen as far as it can? In the Great Recession of 2008 and 2009, the federal funds rate fell to about zero. In this situation, what, if anything, can monetary policy do to stimulate the economy?

Some economists describe this situation as a *liquidity trap*. According to the theory of liquidity preference, expansionary monetary policy works by reducing interest

rates and stimulating investment spending. But if interest rates have already fallen to around zero, monetary policy may no longer be effective. Nominal interest rates cannot fall much below zero: Rather than making a loan at a negative nominal interest rate, a person would just hold cash. In this environment, expansionary monetary policy raises the supply of money, making the public's asset portfolio more liquid, but because interest rates can't fall any further, the extra liquidity might not have any effect. Aggregate demand, production, and employment may be "trapped" at low levels.

Other economists are skeptical about the relevance of liquidity traps and believe that a central bank continues to have tools to expand the economy, even after its interest rate target hits its lower bound of zero. One option is to have the central bank commit itself to keeping interest rates low for an extended period of time. Such a policy is sometimes called *forward guidance*. Even if the central bank's current target for the interest rate cannot fall any further, the promise that interest rates will remain low may help stimulate investment spending.

A second option is to have the central bank conduct expansionary open-market operations using a larger variety of financial instruments. Normally, the Fed conducts expansionary open-market operations by buying short-term government bonds. But it could also buy mortgage-backed securities and longer-term government bonds to lower the interest rates on these kinds of loans. This type of unconventional monetary policy is sometimes called *quantitative easing* because it increases the quantity of bank reserves. During the Great Recession, the Fed engaged in both forward guidance and quantitative easing.

Some economists have suggested that the possibility of hitting the zero lower bound for interest rates justifies setting the target rate of inflation well above zero. Under zero inflation, the real interest rate, like the nominal interest rate, can never fall below zero. But if the normal rate of inflation is, say, 4 percent, then the central bank can easily push the real interest rate to negative 4 percent by lowering the nominal interest rate to zero. Thus, a higher inflation target gives monetary policymakers more room to stimulate the economy when needed, reducing the risk of hitting the zero lower bound and having the economy fall into a liquidity trap.

### QuickQuiz

1. According to the theory of liquidity preference, an economy's interest rate adjusts
  - a. to balance the supply and demand for loanable funds.
  - b. to balance the supply and demand for money.
  - c. one-for-one to changes in expected inflation.
  - d. to equal the interest rate prevailing in world financial markets.
2. If the central bank wants to contract aggregate demand, it can \_\_\_\_\_ the money supply and thereby \_\_\_\_\_ the interest rate.
  - a. increase; increase
  - b. increase; decrease
3. The Fed's target for the federal funds rate
  - a. is an extra policy tool for the central bank, in addition to and independent of the money supply.
  - b. commits the Fed to set a particular money supply so that it hits the announced target.
  - c. is a goal that is rarely achieved because the Fed can determine only the money supply.
  - d. matters to banks that borrow and lend federal funds but does not influence aggregate demand.

*Answers at end of chapter.*

## 34-2 How Fiscal Policy Influences Aggregate Demand

### fiscal policy

the setting of the levels of government spending and taxation by government policymakers

The government can influence the behavior of the economy not only with monetary policy but also with fiscal policy. **Fiscal policy** refers to the government's choices regarding the overall levels of government purchases and taxes. Earlier in the book, we examined how fiscal policy influences saving, investment, and growth in the long run. In the short run, however, the primary effect of fiscal policy is on the aggregate demand for goods and services.

### 34-2a Changes in Government Purchases

When policymakers change the money supply or the level of taxes, they shift the aggregate-demand curve indirectly by influencing the spending decisions of firms or households. By contrast, when the government alters its own purchases of goods and services, it shifts the aggregate-demand curve directly.

Suppose, for instance, that the U.S. Department of Defense places a \$20 billion order for new fighter planes with Boeing, the large aircraft manufacturer. This order raises the demand for the output produced by Boeing, inducing the company to hire more workers and increase production. Because Boeing is part of the economy, the increase in the demand for Boeing planes means an increase in the total quantity of goods and services demanded at each price level. As a result, the aggregate-demand curve shifts to the right.

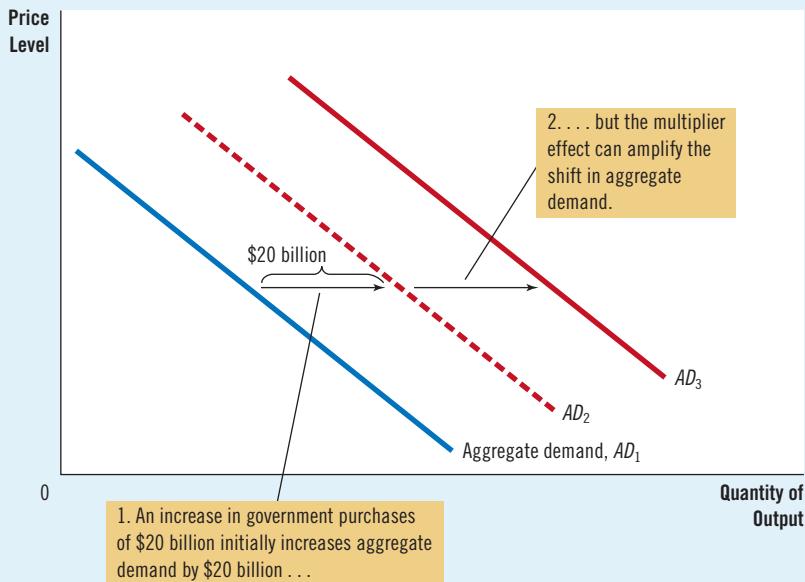
By how much does this \$20 billion order from the government shift the aggregate-demand curve? At first, one might guess that the aggregate-demand curve shifts to the right by exactly \$20 billion. It turns out, however, that this is not the case. There are two macroeconomic effects that cause the size of the shift in aggregate demand to differ from the change in government purchases. The first—the multiplier effect—suggests the shift in aggregate demand could be *larger* than \$20 billion. The second—the crowding-out effect—suggests the shift in aggregate demand could be *smaller* than \$20 billion. We discuss these two effects in turn.

### 34-2b The Multiplier Effect

When the government buys \$20 billion of goods from Boeing, that purchase has repercussions. The immediate impact of the higher demand from the government is to raise employment and profits at Boeing. Then, as the workers see higher earnings and the firm's owners see higher profits, they respond to this increase in income by raising their own spending on consumer goods. As a result, the government purchase from Boeing raises the demand for the products of many other firms in the economy. Because each dollar spent by the government can raise the aggregate demand for goods and services by more than a dollar, government purchases are said to have a **multiplier effect** on aggregate demand.

This multiplier effect continues even after this first round. When consumer spending rises, the firms that produce these consumer goods hire more people and experience higher profits. Higher earnings and profits stimulate consumer spending once again and so on. Thus, there is positive feedback as higher demand leads to higher income, which in turn leads to even higher demand. Once all these effects are added together, the total impact on the quantity of goods and services demanded can be much larger than the initial boost from higher government spending.

Figure 4 illustrates the multiplier effect. The increase in government purchases of \$20 billion initially shifts the aggregate-demand curve to the right from  $AD_1$  to  $AD_2$  by exactly \$20 billion. But once consumers respond by increasing their spending, the aggregate-demand curve shifts still further to  $AD_3$ .

**FIGURE 4****The Multiplier Effect**

An increase in government purchases of \$20 billion can shift the aggregate-demand curve to the right by more than \$20 billion. This multiplier effect arises because increases in aggregate income stimulate additional spending by consumers.

This multiplier effect arising from the response of consumer spending can be strengthened by the response of investment to higher levels of demand. For instance, Boeing might respond to the higher demand for planes by deciding to buy more equipment or build another plant. In this case, higher government demand spurs higher demand for investment goods. This positive feedback from demand to investment is sometimes called the *investment accelerator*.

### 34-2c A Formula for the Spending Multiplier

Some simple algebra allows us to derive a formula for the size of the multiplier effect that arises when an increase in government purchases induces increases in consumer spending. An important number in this formula is the *marginal propensity to consume (MPC)*—the fraction of extra income that a household consumes rather than saves. For example, suppose that the marginal propensity to consume is  $\frac{3}{4}$ . This means that for every extra dollar that a household earns, the household spends \$0.75 ( $\frac{3}{4}$  of the dollar) and saves \$0.25. With an *MPC* of  $\frac{3}{4}$ , when the workers and owners of Boeing earn \$20 billion from the government contract, they increase their consumer spending by  $\frac{3}{4} \times \$20$  billion, or \$15 billion.

To gauge the impact of a change in government purchases on aggregate demand, we follow the effects step-by-step. The process begins when the government spends \$20 billion and, as a result, increases national income (earnings and profits) by the same amount. With an extra \$20 billion of income, consumers increase spending by  $MPC \times \$20$  billion. This additional consumer spending raises the income for the workers and owners of the firms that produce the consumption goods by the same amount. With this second increase in income, consumers increase spending again, this time by  $MPC \times (MPC \times \$20 \text{ billion})$ . These feedback effects go on and on.

To determine the total impact on the demand for goods and services, we add up all these effects:

$$\begin{aligned}
 \text{Change in government purchases} &= \$20 \text{ billion} \\
 \text{First change in consumption} &= MPC \times \$20 \text{ billion} \\
 \text{Second change in consumption} &= MPC^2 \times \$20 \text{ billion} \\
 \text{Third change in consumption} &= MPC^3 \times \$20 \text{ billion} \\
 &\vdots && \vdots \\
 &\vdots && \vdots \\
 \hline
 \text{Total change in demand} & \\
 &= (1 + MPC + MPC^2 + MPC^3 + \dots) \times \$20 \text{ billion}.
 \end{aligned}$$

Here “...” represents an infinite number of similar terms. Thus, we can write the multiplier as follows:

$$\text{Multiplier} = 1 + MPC + MPC^2 + MPC^3 + \dots$$

This multiplier tells us the demand for goods and services that each dollar of government purchases generates.

To simplify this equation for the multiplier, recall from math class that this expression is an infinite geometric series. For  $x$  between  $-1$  and  $+1$ ,

$$1 + x + x^2 + x^3 + \dots = 1 / (1 - x).$$

In our case,  $x = MPC$ . Thus,

$$\text{Multiplier} = 1 / (1 - MPC).$$

For example, if  $MPC$  is  $\frac{3}{4}$ , the multiplier is  $1 / (1 - \frac{3}{4})$ , which is 4. In this case, the \$20 billion of government spending generates \$80 billion of demand for goods and services.

This formula for the multiplier shows that the size of the multiplier depends on the marginal propensity to consume. While an  $MPC$  of  $\frac{3}{4}$  leads to a multiplier of 4, an  $MPC$  of  $\frac{1}{2}$  leads to a multiplier of only 2. Thus, a higher  $MPC$  means a larger multiplier. To see why, remember that the multiplier arises because higher income induces greater consumer spending. The higher the  $MPC$ , the more consumption responds to a change in income, and the larger the multiplier.

### 34-2d Other Applications of the Multiplier Effect

Because of the multiplier effect, a dollar of government purchases can generate more than a dollar of aggregate demand. The logic of the multiplier effect, however, is not restricted to changes in government purchases. Instead, it applies to any event that alters spending on any component of GDP—consumption, investment, government purchases, or net exports.

For example, suppose that a recession overseas reduces the demand for U.S. net exports by \$10 billion. This reduced spending on U.S. goods and services depresses U.S. national income and in turn reduces spending by U.S. consumers.

If the marginal propensity to consume is  $\frac{3}{4}$  and the multiplier is 4, then the \$10 billion fall in net exports leads to a \$40 billion contraction in aggregate demand.

As another example, suppose that a stock market boom increases households' wealth and stimulates their spending on goods and services by \$20 billion. This extra consumer spending increases national income and in turn generates even more consumer spending. If the marginal propensity to consume is  $\frac{3}{4}$  and the multiplier is 4, then the initial increase of \$20 billion in consumer spending translates into an \$80 billion increase in aggregate demand.

The multiplier is an important concept in macroeconomics because it shows how the economy can amplify the impact of changes in spending. A small initial change in consumption, investment, government purchases, or net exports can end up having a large effect on aggregate demand and, therefore, the economy's production of goods and services.

### 34-2e The Crowding-Out Effect

The multiplier effect seems to suggest that when the government buys \$20 billion of planes from Boeing, the resulting expansion in aggregate demand is necessarily larger than \$20 billion. Yet another effect works in the opposite direction. While an increase in government purchases stimulates the aggregate demand for goods and services, it also causes the interest rate to rise, reducing investment spending and putting downward pressure on aggregate demand. The reduction in aggregate demand that results when a fiscal expansion raises the interest rate is called the **crowding-out effect**.

To see why crowding out occurs, let's consider what happens in the money market when the government buys planes from Boeing. As we have discussed, this increase in demand raises the incomes of the workers and owners of this firm (and, because of the multiplier effect, of other firms as well). As incomes rise, households plan to buy more goods and services and, as a result, choose to hold more of their wealth in liquid form. That is, the increase in income caused by the fiscal expansion raises the demand for money.

The effect of the increase in money demand is shown in panel (a) of Figure 5. Because the Fed has not changed the money supply, the vertical supply curve remains the same. When the higher level of income shifts the money demand curve to the right from  $MD_1$  to  $MD_2$ , the interest rate must rise from  $r_1$  to  $r_2$  to keep supply and demand in balance.

The increase in the interest rate, in turn, reduces the quantity of goods and services demanded. In particular, because borrowing is more expensive, the demand for residential and business investment goods declines. In other words, as the increase in government purchases increases the demand for goods and services, it may also crowd out investment. This crowding-out effect partially offsets the impact of government purchases on aggregate demand, as illustrated in panel (b) of Figure 5. The increase in government purchases initially shifts the aggregate-demand curve from  $AD_1$  to  $AD_2$ , but once crowding out takes place, the aggregate-demand curve drops back to  $AD_3$ .

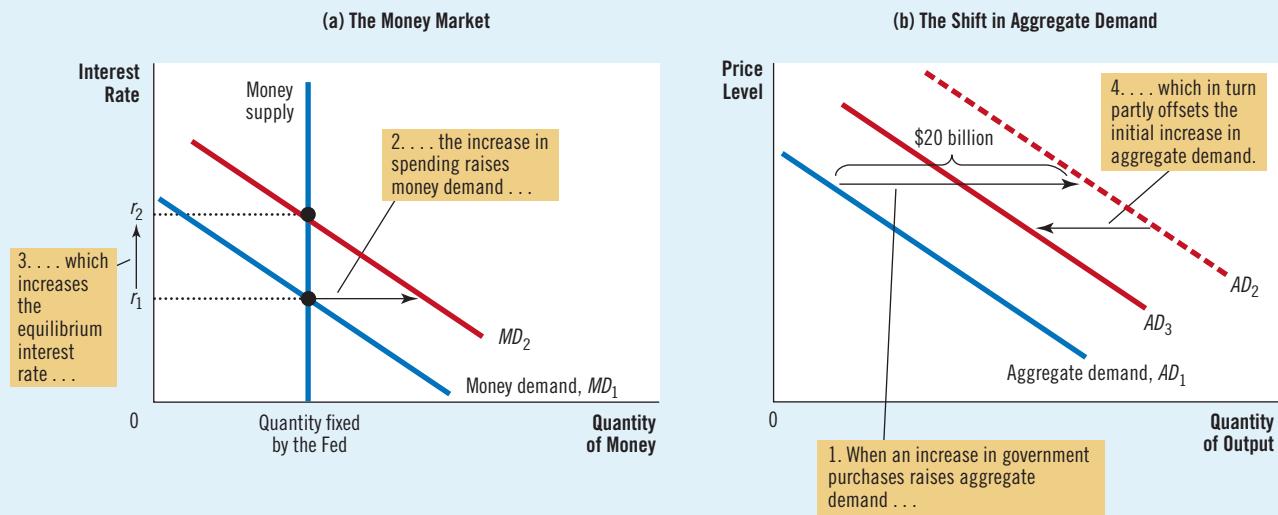
To sum up: *When the government increases its purchases by \$20 billion, the aggregate demand for goods and services could rise by more or less than \$20 billion depending on the sizes of the multiplier and crowding-out effects.* The multiplier effect makes the shift in aggregate demand greater than \$20 billion. The crowding-out effect pushes the aggregate-demand curve in the opposite direction and can, if large enough, result in an aggregate-demand shift of less than \$20 billion.

#### **crowding-out effect**

the offset in aggregate demand that results when expansionary fiscal policy raises the interest rate and thereby reduces investment spending

**FIGURE 5****The Crowding-Out Effect**

Panel (a) shows the money market. When the government increases its purchases of goods and services, income increases, raising the demand for money from  $MD_1$  to  $MD_2$  and thereby increasing the equilibrium interest rate from  $r_1$  to  $r_2$ . Panel (b) shows the effects on aggregate demand. The initial impact of the increase in government purchases shifts the aggregate-demand curve from  $AD_1$  to  $AD_2$ . Yet because the interest rate is the cost of borrowing, the increase in the interest rate tends to reduce the quantity of goods and services demanded, particularly for investment goods. This crowding out of investment partially offsets the impact of the fiscal expansion on aggregate demand. In the end, the aggregate-demand curve shifts only to  $AD_3$ .



### 34-2f Changes in Taxes

The other important instrument of fiscal policy, besides the level of government purchases, is the level of taxation. When the government cuts personal income taxes, for instance, it increases households' take-home pay. Households will save some of this additional income, but they will also spend some of it on consumer goods. Because it increases consumer spending, the tax cut shifts the aggregate-demand curve to the right. Similarly, a tax increase depresses consumer spending and shifts the aggregate-demand curve to the left.

The size of the shift in aggregate demand resulting from a tax change is also affected by the multiplier and crowding-out effects. When the government cuts taxes and stimulates consumer spending, earnings and profits rise, further stimulating consumer spending. This is the multiplier effect. At the same time, the increase in income raises money demand, increasing interest rates. Higher interest rates mean a higher cost of borrowing, which reduces investment spending. This is the crowding-out effect. Depending on the sizes of the multiplier and crowding-out effects, the shift in aggregate demand could be larger or smaller than the tax change that causes it.

In addition to the multiplier and crowding-out effects, there is another important determinant of the size of the shift in aggregate demand that results from a tax change: households' perceptions about whether the tax change is permanent or temporary. For example, suppose that the government announces a tax cut of \$1,000 per household. In deciding how much of this \$1,000 to spend, households must ask themselves how long this extra income will last. If they expect the tax cut to be permanent, they will view it as adding substantially to their financial resources and, therefore, increase their spending by a large amount. In this case, the tax cut will have a large impact on aggregate demand. By contrast, if households expect the tax change to be temporary, they will view it as adding only slightly to their financial resources and, therefore, increase their spending by only a small amount. In this case, the tax cut will have a small impact on aggregate demand.

An extreme example of a temporary tax cut was the one announced in 1992. In that year, President George H. W. Bush faced a lingering recession and an upcoming reelection campaign. He responded to these circumstances by announcing a reduction in the amount of income tax that the federal government would withhold from workers' paychecks. Because legislated income tax rates did not change, however, every dollar of reduced withholding in 1992 meant an extra dollar of taxes due on April 15, 1993, when income tax returns for 1992 were to be filed. Thus, this "tax cut" actually represented only a short-term loan from the government. Not surprisingly, the impact of the policy on consumer spending and aggregate demand was relatively small.

## FYI

### How Fiscal Policy Might Affect Aggregate Supply

So far, our discussion of fiscal policy has stressed how changes in government purchases and changes in taxes influence the quantity of goods and services demanded. Most economists believe that the short-run macroeconomic effects of fiscal policy work primarily through aggregate demand. Yet fiscal policy can potentially influence the quantity of goods and services supplied as well.

For instance, consider the effects of tax changes on aggregate supply. One of the *Ten Principles of Economics* in Chapter 1 is that people respond to incentives. When government policymakers cut tax rates, workers get to keep more of each dollar they earn, so they have a greater incentive to work and produce goods and services. If they respond to this incentive, the quantity of goods and services supplied will be greater at each price level, and the aggregate-supply curve will shift to the right.

Economists who stress the importance of tax policy for aggregate supply rather than aggregate demand are sometimes called *supply siders*. Supply-side economists have been particularly prominent as advisers to President Donald Trump, and they were instrumental in helping design the tax cut he signed into law at the end of 2017. The large cut in corporate tax rates aimed to promote capital accumulation and long-run growth.

At times, some supply siders have argued that the influence of taxes on aggregate supply is so large that a cut in tax rates will stimulate enough additional production and income to increase tax revenue. This outcome is a theoretical possibility, but most economists do not consider it the normal case. While the supply-side effects of taxes are important to consider, they are rarely large enough to cause tax revenue to rise when tax rates fall.

Like changes in taxes, changes in government purchases can also affect aggregate supply. Suppose, for instance, that the government increases expenditure on a form of government-provided capital, such as roads. Roads are used by private businesses to make deliveries to their customers, so an increase in the quantity or quality of roads increases these businesses' productivity. Hence, when the government spends more on roads, it increases the quantity of goods and services supplied at any given price level and thereby shifts the aggregate-supply curve to the right. This effect on aggregate supply is probably more important in the long run than in the short run, however, because it takes time for the government to build new roads and put them into use. ■

### QuickQuiz

4. If the government wants to expand aggregate demand, it can \_\_\_\_\_ government purchases or \_\_\_\_\_ taxes.
- increase; increase
  - increase; decrease
  - decrease; increase
  - decrease; decrease
5. With the economy in a recession due to inadequate aggregate demand, the government increases its purchases by \$1,200. Suppose the central bank adjusts the money supply to hold the interest rate constant, investment spending remains unchanged, and the marginal propensity to consume is  $\frac{2}{3}$ . How large is the increase in aggregate demand?
- \$400
  - \$800
  - \$1,800
  - \$3,600
6. If the central bank in the preceding question had instead held the money supply constant and allowed the interest rate to adjust, the change in aggregate demand resulting from the increase in government purchases would have been
- larger.
  - the same.
  - smaller but still positive.
  - negative.

*Answers at end of chapter.*

## 34-3 Using Policy to Stabilize the Economy

We have seen how monetary and fiscal policy can affect the economy's aggregate demand for goods and services. These theoretical insights raise some important policy questions: Should policymakers use these instruments to control aggregate demand and stabilize the economy? If so, when? If not, why not?

### 34-3a The Case for Active Stabilization Policy

Let's return to the question that began this chapter: When the president and Congress raise taxes, how should the Federal Reserve respond? As we have seen, the level of taxation is one determinant of the position of the aggregate-demand curve. When the government raises taxes, aggregate demand falls, depressing production and employment in the short run. If the Fed wants to prevent this adverse effect of the fiscal policy, it can expand aggregate demand by increasing the money supply. A monetary expansion would reduce interest rates, stimulate investment spending, and expand aggregate demand. If monetary policy is set appropriately, the combined changes in monetary and fiscal policy could leave the aggregate demand for goods and services unaffected.

This analysis is exactly the sort followed by members of the Federal Open Market Committee. They know that monetary policy is an important determinant of aggregate demand. They also know that there are other important determinants as well, including fiscal policy set by the president and Congress. As a result, the FOMC watches the debates over fiscal policy with a keen eye.

This response of monetary policy to the change in fiscal policy is an example of a more general phenomenon: the use of policy instruments to stabilize aggregate demand and, in turn, production and employment. Economic stabilization has been an explicit goal of U.S. policy since the Employment Act of 1946. This act states that "it is the continuing policy and responsibility of the federal government to

... promote full employment and production." In essence, the government has chosen to hold itself accountable for short-run macroeconomic performance.

The Employment Act has two implications. The first, more modest, implication is that the government should avoid being a cause of economic fluctuations. Thus, most economists advise against large and sudden changes in monetary and fiscal policy, for such changes are likely to cause fluctuations in aggregate demand. Moreover, when large changes do occur, it is important that monetary and fiscal policymakers be aware of and respond to each others' actions.

The second, more ambitious, implication of the Employment Act is that the government should respond to changes in the private economy to stabilize aggregate demand. The act was passed not long after the publication of Keynes's *The General Theory of Employment, Interest, and Money*, which has been one of the most influential books ever written about economics. In it, Keynes emphasized the key role of aggregate demand in explaining short-run economic fluctuations. Keynes claimed that the government should actively stimulate aggregate demand when aggregate demand appears insufficient to maintain production at its full-employment level.

Keynes (and his many followers) argued that aggregate demand fluctuates because of largely irrational waves of pessimism and optimism. He used the term "animal spirits" to refer to these arbitrary changes in attitude. When pessimism reigns, households reduce consumption spending and firms reduce investment spending. The result is reduced aggregate demand, lower production, and higher unemployment. Conversely, when optimism reigns, households and firms increase spending. The result is higher aggregate demand, higher production, and inflationary pressure. Notice that these changes in attitude are, to some extent, self-fulfilling.

In principle, the government can adjust its monetary and fiscal policy in response to these waves of optimism and pessimism and, thereby, stabilize the economy. For example, when people are excessively pessimistic, the Fed can expand the money supply to lower interest rates and expand aggregate demand. When they are excessively optimistic, it can contract the money supply to raise interest rates and dampen aggregate demand. Former Fed Chairman William McChesney Martin described this view of monetary policy very simply: "The Federal Reserve's job is to take away the punch bowl just as the party gets going."

### KEYNESIANS IN THE WHITE HOUSE

**CASE STUDY**

When a reporter in 1961 asked President John F. Kennedy why he advocated a tax cut, Kennedy replied, "To stimulate the economy. Don't you remember your Economics 101?" Kennedy's policy was, in fact, based on the analysis of fiscal policy we have developed in this chapter. His goal was to enact a tax cut, which would raise consumer spending, expand aggregate demand, and increase the economy's production and employment.

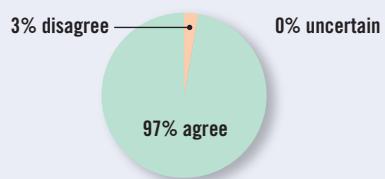
In choosing this policy, Kennedy was relying on his team of economic advisers. This team included such prominent

### ASK THE EXPERTS

### Economic Stimulus

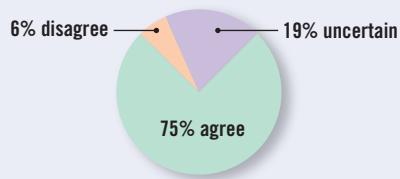
"Because of the American Recovery and Reinvestment Act of 2009, the U.S. unemployment rate was lower at the end of 2010 than it would have been without the stimulus bill."

#### What do economists say?



"Taking into account all of the ARRA's economic consequences—including the economic costs of raising taxes to pay for the spending, its effects on future spending, and any other likely future effects—the benefits of the stimulus will end up exceeding its costs."

#### What do economists say?



Source: IGM Economic Experts Panel, July 29, 2014.

economists as James Tobin and Robert Solow, both of whom would later win Nobel Prizes for their contributions to the field. As students in the 1940s, these economists had closely studied John Maynard Keynes's *General Theory*, which was then only a few years old. When the Kennedy advisers proposed tax cuts, they were putting Keynes's ideas into action.

Although tax changes have a potent influence on aggregate demand, they can also alter the aggregate supply of goods and services, as discussed earlier in an FYI box. Part of the Kennedy proposal was an investment tax credit that gave a tax break to firms that invested in new capital. Higher investment would not only stimulate aggregate demand immediately but also increase the economy's productive capacity over time. Thus, the short-run goal of increasing production through higher aggregate demand was coupled with a long-run goal of increasing production through higher aggregate supply. And indeed, when the tax cut Kennedy proposed was finally enacted in 1964, it helped usher in a period of robust economic growth.

Since the 1964 tax cut, policymakers have from time to time used fiscal policy as a tool for controlling aggregate demand. For example, when President

## IN THE NEWS

### How Large Is the Fiscal Policy Multiplier?

*During the Great Recession of 2008 and 2009, governments around the world turned to fiscal policy to prop up aggregate demand, hoping that large multipliers would make the policy highly effective. The size of multipliers, however, remains a topic of much debate.*

#### Much Ado about Multipliers

It is the biggest peacetime fiscal expansion in history. Across the globe countries have countered the recession by cutting taxes and by boosting government spending. The G20 group of economies, whose leaders meet this week in Pittsburgh, have introduced stimulus packages worth an average of 2% of GDP this year [2009] and 1.6% of GDP in 2010. Coordinated action on this scale might suggest a consensus about the effects of fiscal stimulus. But economists are in fact deeply divided about how well, or indeed whether, such stimulus works.

The debate hinges on the scale of the "fiscal multiplier." This measure, first formalized

in 1931 by Richard Kahn, a student of John Maynard Keynes, captures how effectively tax cuts or increases in government spending stimulate output. A multiplier of one means that a \$1 billion increase in government spending will increase a country's GDP by \$1 billion.

The size of the multiplier is bound to vary according to economic conditions. For an economy operating at full capacity, the fiscal multiplier should be zero. Since there are no spare resources, any increase in government demand would just replace spending elsewhere. But in a recession, when workers and factories lie idle, a fiscal boost can increase overall demand. And if the initial stimulus triggers a cascade of expenditure among consumers and businesses, the multiplier can be well above one.

The multiplier is also likely to vary according to the type of fiscal action. Government spending on building a bridge may have a bigger multiplier than a tax cut if consumers save a portion of their tax windfall. A tax cut targeted at poorer people may have a bigger impact on spending than one for the affluent, since poorer folk tend to spend a higher share of their income.

Crucially, the overall size of the fiscal multiplier also depends on how people react to higher government borrowing. If the government's actions bolster confidence and revive animal spirits, the multiplier could rise as demand goes up and private investment is "crowded in." But if interest rates climb in response to government borrowing then some private investment that would otherwise have occurred could get "crowded out." And if consumers expect higher future taxes in order to finance new government borrowing, they could spend less today. All that would reduce the fiscal multiplier, potentially to below zero.

Different assumptions about the impact of higher government borrowing on interest rates and private spending explain wild variations in the estimates of multipliers from today's stimulus spending. Economists in the Obama administration, who assume that the federal funds rate stays constant for a four-year period, expect a multiplier of 1.6 for government purchases and 1.0 for tax cuts from America's fiscal stimulus. An alternative assessment by John Cogan, Tobias Cwik, John Taylor and Volker Wieland uses models

Barack Obama moved into the Oval Office in 2009, he faced an economy in the midst of a recession. One of his first policy initiatives was a stimulus bill, called the American Recovery and Reinvestment Act (ARRA), which included substantial increases in government spending. The accompanying In the News box discusses some of the debate over this policy initiative. ●

### 34-3b The Case against Active Stabilization Policy

Some economists argue that the government should avoid active use of monetary and fiscal policy to try to stabilize the economy. They claim that these policy instruments should be set to achieve long-run goals, such as rapid economic growth and low inflation, and that the economy should be left to deal with short-run fluctuations on its own. These economists may admit that monetary and fiscal policy can stabilize the economy in theory, but they doubt whether it can do so in practice.

The main argument against active monetary and fiscal policy is that these policies affect the economy with a long lag. As we have seen, monetary policy works

in which interest rates and taxes rise more quickly in response to higher public borrowing. Their multipliers are much smaller. They think America's stimulus will boost GDP by only one-sixth as much as the Obama team expects.

When forward-looking models disagree so dramatically, careful analysis of previous fiscal stimuli ought to help settle the debate. Unfortunately, it is extremely tricky to isolate the impact of changes in fiscal policy. One approach is to use microeconomic case studies to examine consumer behavior in response to specific tax rebates and cuts. These studies, largely based on tax changes in America, find that permanent cuts have a bigger impact on consumer spending than temporary ones and that consumers who find it hard to borrow, such as those close to their credit-card limit, tend to spend more of their tax windfall. But case studies do not measure the overall impact of tax cuts or spending increases on output.

An alternative approach is to try to tease out the statistical impact of changes in government spending or tax cuts on GDP. The difficulty here is to isolate the effects of fiscal-stimulus measures from the rises

in social-security spending and falls in tax revenues that naturally accompany recessions. This empirical approach has narrowed the range of estimates in some areas. It has also yielded interesting cross-country comparisons. Multipliers are bigger in closed economies than open ones (because less of the stimulus leaks abroad via imports). They have traditionally been bigger in rich countries than emerging ones (where investors tend to take flight more quickly, pushing interest rates up). But overall economists find as big a range of multipliers from empirical estimates as they do from theoretical models.

To add to the confusion, the post-war experiences from which statistical analyses are drawn differ in vital respects from the current situation. Most of the evidence on multipliers for government spending is based on military outlays, but today's stimulus packages are heavily focused on infrastructure. Interest rates in many rich countries are now close to zero, which may increase the potency of, as well as the need for, fiscal stimulus. Because of the financial crisis relatively more people face borrowing constraints, which would increase the effectiveness of a tax cut. At the

same time, highly indebted consumers may now be keen to cut their borrowing, leading to a lower multiplier. And investors today have more reason to be worried about rich countries' fiscal positions than those of emerging markets.

Add all this together and the truth is that economists are flying blind. They can make relative judgments with some confidence. Temporary tax cuts pack less punch than permanent ones, for instance. Fiscal multipliers will probably be lower in heavily indebted economies than in prudent ones. But policymakers looking for precise estimates are deluding themselves. ■

#### Questions to Discuss

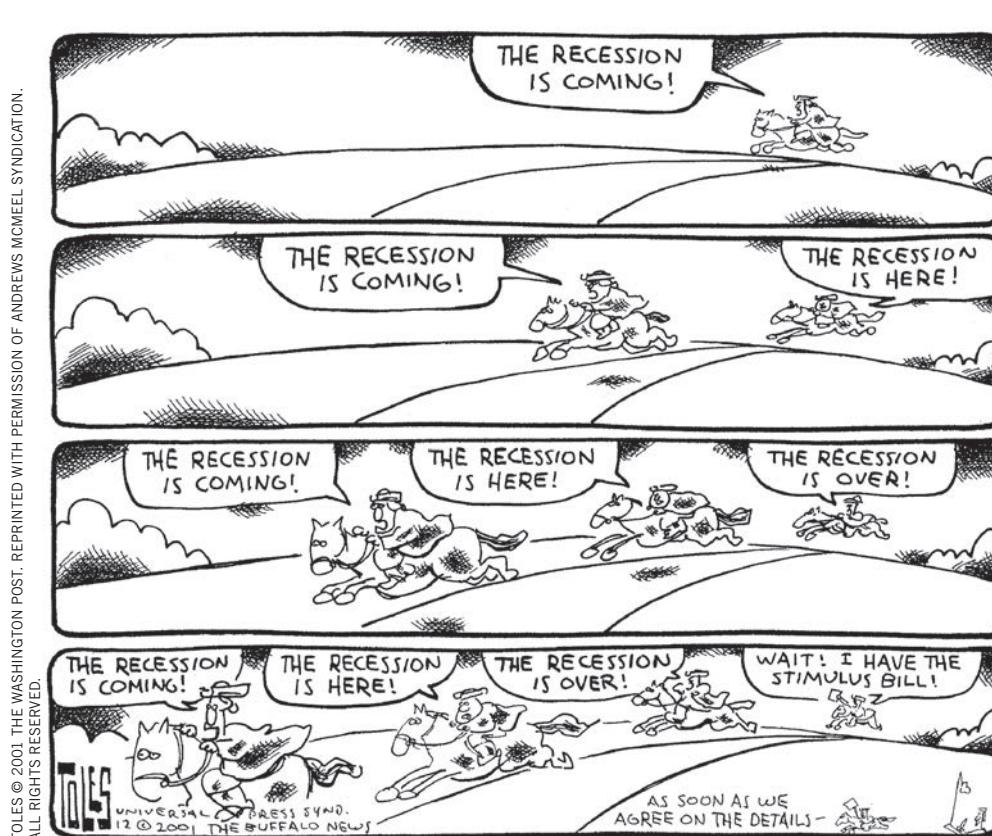
- How should uncertainty about the size of fiscal multipliers affect the reliance on monetary and fiscal policy as tools for stabilizing the economy?
- Do you think it is easier for governments to change taxes or spending plans? Why? What does your answer imply for policy?

**Source:** *The Economist*, September 24, 2009.

by changing interest rates, which in turn influence investment spending. But many firms make investment plans far in advance. Thus, most economists believe that it takes at least six months for changes in monetary policy to have much effect on output and employment. Moreover, once these effects occur, they can last for several years. Critics of stabilization policy argue that because of this lag, the Fed should not try to fine-tune the economy. They claim that the Fed often reacts too late to changing economic conditions and, as a result, ends up causing rather than curing economic fluctuations. These critics advocate a passive monetary policy, such as slow and steady growth in the money supply.

Fiscal policy also works with a lag, but unlike the lag in monetary policy, the lag in fiscal policy is largely attributable to the political process. In the United States, most changes in government spending and taxes must go through congressional committees in both the House and the Senate, be passed by both legislative bodies, and then be signed by the president. Completing this process can take months or, in some cases, years. By the time the change in fiscal policy is passed and ready to implement, the condition of the economy may have changed.

These lags in monetary and fiscal policy are a problem in part because economic forecasting is so imprecise. If forecasters could accurately predict the condition of the economy a year in advance, then monetary and fiscal policymakers could look ahead when making policy decisions. In this case, policymakers could stabilize the economy despite the lags they face. In practice, however, major recessions and depressions arrive without much advance warning. The best that policymakers can do is to respond to economic changes as they occur.



### 34-3c Automatic Stabilizers

All economists—both advocates and critics of stabilization policy—agree that the lags in implementation reduce the efficacy of policy as a tool for short-run stabilization. The economy would be more stable, therefore, if policymakers could find a way to avoid some of these lags. In fact, they have. **Automatic stabilizers** are changes in fiscal policy that stimulate aggregate demand when the economy goes into a recession but that occur without policymakers having to take any deliberate action.

The most important automatic stabilizer is the tax system. When the economy goes into a recession, the amount of taxes collected by the government falls automatically because almost all taxes are closely tied to economic activity. The personal income tax depends on households' incomes, the payroll tax depends on workers' earnings, and the corporate income tax depends on firms' profits. Because incomes, earnings, and profits all fall in a recession, the government's tax revenue falls as well. This automatic tax cut stimulates aggregate demand and, thereby, reduces the magnitude of economic fluctuations.

Some government spending also acts as an automatic stabilizer. In particular, when the economy goes into a recession and workers are laid off, more people become eligible for unemployment insurance benefits, welfare benefits, and other forms of income support. This automatic increase in government spending stimulates aggregate demand at exactly the time when aggregate demand is insufficient to maintain full employment. Indeed, when the unemployment insurance system was first enacted in the 1930s, economists who advocated this policy did so in part because they recognized its power as an automatic stabilizer.

The automatic stabilizers in the U.S. economy are not sufficiently strong to prevent recessions completely. Nonetheless, without these automatic stabilizers, output and employment would probably be more volatile than they are. For this reason, many economists oppose a constitutional amendment that would require the federal government to always run a balanced budget, as some politicians have proposed. When the economy goes into a recession, taxes fall, government spending rises, and the government's budget moves toward deficit. If the government faced a strict balanced-budget rule, it would be forced to look for ways to raise taxes or cut spending in a recession. In other words, a strict balanced-budget rule would eliminate the automatic stabilizers inherent in our current system of taxes and government spending.

#### automatic stabilizers

changes in fiscal policy that stimulate aggregate demand when the economy goes into a recession but that occur without policymakers having to take any deliberate action

#### QuickQuiz

7. Suppose a wave of negative "animal spirits" overruns the economy, and people become pessimistic about the future. To stabilize aggregate demand, the Fed could \_\_\_\_\_ its target for the federal funds rate or Congress could \_\_\_\_\_ taxes.
  - a. increase; increase
  - b. increase; decrease
  - c. decrease; increase
  - d. decrease; decrease
8. Monetary policy affects the economy with a lag mainly because it takes a long time
  - a. for central banks to make policy changes.
  - b. to change the money supply after a policy decision has been made.
9. Which of the following is an example of an automatic stabilizer? When the economy goes into a recession,
  - a. more people become eligible for unemployment insurance benefits.
  - b. stock prices decline, particularly for firms in cyclical industries.
  - c. Congress begins hearings about a possible stimulus package.
  - d. the Fed changes its target for the federal funds rate.

*Answers at end of chapter.*

## 34-4 Conclusion

Before policymakers make any change in policy, they need to consider all the effects of their decisions. Earlier in the book, we examined classical models of the economy, which describe the long-run effects of monetary and fiscal policy. There we saw how fiscal policy influences saving, investment, and long-run growth and how monetary policy influences the price level and the inflation rate.

In this chapter, we examined the short-run effects of monetary and fiscal policy. We saw how these policy instruments can change the aggregate demand for goods and services and alter the economy's production and employment in the short run. When Congress reduces government spending to balance the budget, it needs to consider both the long-run effects on saving and growth and the short-run effects on aggregate demand and employment. When the Fed reduces the growth rate of the money supply, it must take into account the long-run effect on inflation as well as the short-run effect on production. In all parts of government, policymakers must keep in mind both long-run and short-run goals.

## CHAPTER IN A NUTSHELL

- In developing a theory of short-run economic fluctuations, Keynes proposed the theory of liquidity preference to explain the determinants of the interest rate. According to this theory, the interest rate adjusts to balance the supply and demand for money.
- An increase in the price level raises money demand and increases the interest rate that brings the money market into equilibrium. Because the interest rate represents the cost of borrowing, a higher interest rate reduces investment spending and, thereby, reduces the quantity of goods and services demanded. The downward-sloping aggregate-demand curve expresses this negative relationship between the price level and the quantity demanded.
- Policymakers can influence aggregate demand using monetary policy. An increase in the money supply reduces the equilibrium interest rate for any given price level. Because a lower interest rate stimulates investment spending, the aggregate-demand curve shifts to the right. Conversely, a decrease in the money supply raises the equilibrium interest rate for any given price level and shifts the aggregate-demand curve to the left.
- Policymakers can also influence aggregate demand using fiscal policy. An increase in government purchases or a cut in taxes shifts the aggregate-demand curve to the right. A decrease in government purchases or an increase in taxes shifts the aggregate-demand curve to the left.
- When the government alters spending or taxes, the resulting shift in aggregate demand can be larger or smaller than the fiscal change. The multiplier effect tends to amplify the effects of fiscal policy on aggregate demand. The crowding-out effect tends to dampen the effects of fiscal policy on aggregate demand.
- Because monetary and fiscal policy can influence aggregate demand, the government sometimes uses these policy instruments in an attempt to stabilize the economy. Economists disagree about how active the government should be in this effort. According to advocates of active stabilization policy, changes in attitudes by households and firms shift aggregate demand; if the government does not respond, the result is undesirable and unnecessary fluctuations in output and employment. According to critics of active stabilization policy, monetary and fiscal policy work with such long lags that attempts at stabilizing the economy often end up being destabilizing.

## KEY CONCEPTS

theory of liquidity preference, p. 721  
fiscal policy, p. 730

multiplier effect, p. 730  
crowding-out effect, p. 733

automatic stabilizers, p. 741

## QUESTIONS FOR REVIEW

1. What is the theory of liquidity preference? How does it help explain the downward slope of the aggregate-demand curve?
2. Use the theory of liquidity preference to explain how a decrease in the money supply affects the aggregate-demand curve.
3. The government spends \$3 billion to buy police cars. Explain why aggregate demand might increase by more or less than \$3 billion.
4. Suppose that survey measures of consumer confidence indicate a wave of pessimism is sweeping the country. If policymakers do nothing, what will happen to aggregate demand? What should the Fed do if it wants to stabilize aggregate demand? If the Fed does nothing, what might Congress do to stabilize aggregate demand? Explain your reasoning.
5. Give an example of a government policy that acts as an automatic stabilizer. Explain why the policy has this effect.

## PROBLEMS AND APPLICATIONS

1. Explain how each of the following developments would affect the supply of money, the demand for money, and the interest rate. Use diagrams to illustrate your answers.
  - a. The Fed's bond traders buy bonds in open-market operations.
  - b. An increase in credit-card availability reduces the amount of cash people want to hold.
  - c. The Fed reduces reserve requirements.
  - d. Households decide to hold more money to use for holiday shopping.
  - e. A wave of optimism boosts business investment and expands aggregate demand.
2. The Fed expands the money supply by 5 percent.
  - a. Use the theory of liquidity preference to illustrate in a graph the impact of this policy on the interest rate.
  - b. Use the model of aggregate demand and aggregate supply to illustrate the impact of this change in the interest rate on output and the price level in the short run.
  - c. When the economy makes the transition from its short-run equilibrium to its new long-run equilibrium, what happens to the price level?
3. Suppose a computer virus disables the nation's automatic teller machines, making withdrawals from bank accounts less convenient. As a result, people want to keep more cash on hand, increasing the demand for money.
  - a. Assume the Fed does not change the money supply. According to the theory of liquidity preference, what happens to the interest rate? What happens to aggregate demand?
  - b. If instead the Fed wants to stabilize aggregate demand, how should it change the money supply?
  - c. If it wants to accomplish this change in the money supply using open-market operations, what should it do?
4. Consider two policies—a tax cut that lasts for only one year and a tax cut that is expected to be permanent. Which policy will stimulate greater

- spending by consumers? Which policy will have the greater impact on aggregate demand? Explain.
5. The economy is in a recession with high unemployment and low output.
    - a. Draw a graph of aggregate demand and aggregate supply to illustrate the current situation. Be sure to include the aggregate-demand curve, the short-run aggregate-supply curve, and the long-run aggregate-supply curve.
    - b. Identify an open-market operation that would restore the economy to its natural rate.
    - c. Draw a graph of the money market to illustrate the effect of this open-market operation. Show the resulting change in the interest rate.
    - d. Draw a graph similar to the one in part *a* to show the effect of the open-market operation on output and the price level. Explain in words why the policy has the effect that you have shown in the graph.
  6. In the early 1980s, new legislation allowed banks to pay interest on checking deposits, which they could not do previously.
    - a. If we define money to include checking deposits, what effect did this legislation have on money demand? Explain.
    - b. If the Fed had maintained a constant money supply in the face of this change, what would have happened to the interest rate? What would have happened to aggregate demand and aggregate output?
    - c. If the Fed had maintained a constant market interest rate (the interest rate on nonmonetary assets) in the face of this change, what change in the money supply would have been necessary? What would have happened to aggregate demand and aggregate output?
  7. Suppose economists observe that an increase in government spending of \$10 billion raises the total demand for goods and services by \$30 billion.
    - a. If these economists ignore the possibility of crowding out, what would they estimate the marginal propensity to consume (*MPC*) to be?
    - b. Now suppose the economists allow for crowding out. Would their new estimate of the *MPC* be larger or smaller than their initial one?
  8. An economy is producing output \$400 billion less than the natural level of output, and fiscal policymakers want to close this recessionary gap. The central bank agrees to adjust the money supply to hold the interest rate constant, so there is no crowding out. The marginal propensity to consume is  $\frac{4}{5}$ , and the price level is completely fixed in the short run. In what direction and by how much must government spending change to close the recessionary gap? Explain your thinking.
  9. Suppose government spending increases. Would the effect on aggregate demand be larger if the Fed held the money supply constant in response or if the Fed committed to maintaining a fixed interest rate? Explain.
  10. Is expansionary fiscal policy more likely to lead to a short-run increase in investment
    - a. when the investment accelerator is large or when it is small? Explain.
    - b. when the interest sensitivity of investment is large or when it is small? Explain.
  11. Consider an economy described by the following equations:
 
$$Y = C + I + G$$

$$C = 100 + 0.75(Y - T)$$

$$I = 500 - 50r$$

$$G = 125$$

$$T = 100$$

where  $Y$  is GDP,  $C$  is consumption,  $I$  is investment,  $G$  is government purchases,  $T$  is taxes, and  $r$  is the interest rate. If the economy were at full employment (that is, at its natural level of output), GDP would be 2,000.

    - a. Explain the meaning of each of these equations.
    - b. What is the marginal propensity to consume in this economy?
    - c. Suppose the central bank adjusts the money supply to maintain the interest rate at 4 percent, so  $r = 4$ . Solve for GDP. How does it compare to the full-employment level?
    - d. Assuming no change in monetary policy, what change in government purchases would restore full employment?
    - e. Assuming no change in fiscal policy, what change in the interest rate would restore full employment?

### QuickQuiz Answers

1. b    2. c    3. b    4. b    5. d    6. c    7. d    8. d    9. a

# CHAPTER 35

## The Short-Run Trade-Off between Inflation and Unemployment

Inflation and unemployment are two of the most closely watched indicators of economic performance. When the Bureau of Labor Statistics releases data on these variables each month, policymakers are eager to hear the news. Some commentators have added together the inflation rate and the unemployment rate to produce a *misery index*, which they use to gauge the health of the economy.

How are these two measures of economic performance related to each other? Earlier in the book, we discussed the long-run determinants of unemployment and the long-run determinants of inflation. We saw that the natural rate of unemployment depends on various features of the labor market, such as minimum-wage laws, the market power of unions, the role of efficiency wages, and the effectiveness of job search. By contrast, the inflation rate depends primarily on growth in the money supply, which a nation's central bank controls. In the long run, therefore, inflation and unemployment are largely unrelated problems.



In the short run, just the opposite is true. One of the *Ten Principles of Economics* in Chapter 1 is that society faces a short-run trade-off between inflation and unemployment. If monetary and fiscal policymakers expand aggregate demand and move the economy up along the short-run aggregate-supply curve, they can expand output and reduce unemployment for a while, but only at the cost of a more rapidly rising price level. If policymakers contract aggregate demand and move the economy down the short-run aggregate-supply curve, they can reduce inflation, but only at the cost of temporarily lower output and higher unemployment.

In this chapter, we examine the inflation–unemployment trade-off more closely. The relationship between inflation and unemployment has attracted the attention of some of the most brilliant economists of the last half century. The best way to understand this relationship is to see how economists’ thinking about it has evolved. As we will see, the history of thought regarding inflation and unemployment since the 1950s is inextricably connected to the history of the U.S. economy. These two histories will show why the trade-off between inflation and unemployment holds in the short run, why it does not hold in the long run, and what issues the trade-off raises for policymakers.

## 35-1 The Phillips Curve

### Phillips curve

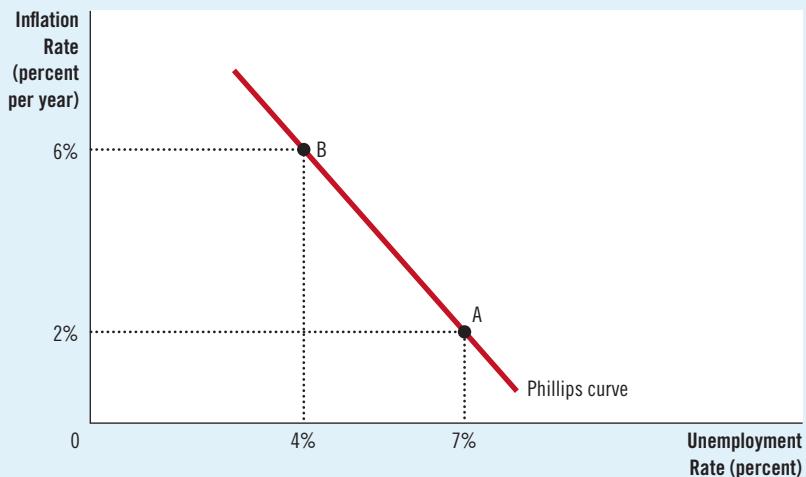
a curve that shows the short-run trade-off between inflation and unemployment

“Probably the single most important macroeconomic relationship is the Phillips curve.” These are the words of economist George Akerlof from the lecture he gave when he received the Nobel Prize in 2001. The **Phillips curve** is the short-run relationship between inflation and unemployment. We begin our story with the discovery of the Phillips curve and its migration to America.

### 35-1a Origins of the Phillips Curve

In 1958, economist A. W. Phillips published an article in the British journal *Economica* that would make him famous. The article was titled “The Relationship between Unemployment and the Rate of Change of Money Wages in the United Kingdom, 1861–1957.” In it, Phillips showed a negative correlation between the rate of unemployment and the rate of inflation. That is, Phillips showed that years with low unemployment tend to have high inflation, and years with high unemployment tend to have low inflation. (Phillips examined inflation in nominal wages rather than inflation in prices. For our purposes, the distinction is not important because these two measures of inflation usually move together.) Phillips concluded that two important macroeconomic variables—*inflation* and *unemployment*—were linked in a way that economists had not previously appreciated.

Although Phillips’s discovery was based on data for the United Kingdom, researchers quickly extended his finding to other countries. Two years after Phillips published his article, economists Paul Samuelson and Robert Solow published an article in the *American Economic Review* called “Analytics of Anti-Inflation Policy” in which they showed a similar negative correlation between inflation and unemployment in data for the United States. They reasoned that this correlation arose because low unemployment was associated with high aggregate demand, which in turn put upward pressure on wages and prices throughout the economy. Samuelson and Solow dubbed the negative association between inflation and unemployment the *Phillips curve*. Figure 1 shows an example of a Phillips curve like the one found by Samuelson and Solow.

**FIGURE 1****The Phillips Curve**

The Phillips curve illustrates a negative association between the inflation rate and the unemployment rate. At point A, inflation is low and unemployment is high. At point B, inflation is high and unemployment is low.

As the title of their paper suggests, Samuelson and Solow were interested in the Phillips curve because they believed it held important lessons for policymakers. In particular, they suggested that the Phillips curve offers policymakers a menu of possible economic outcomes. By altering monetary and fiscal policy to influence aggregate demand, policymakers could choose any point on this curve. Point A offers high unemployment and low inflation. Point B offers low unemployment and high inflation. Policymakers might prefer both low inflation and low unemployment, but the historical data as summarized by the Phillips curve indicate that this combination is impossible. According to Samuelson and Solow, policymakers face a trade-off between inflation and unemployment, and the Phillips curve illustrates that trade-off.

### 35-1b Aggregate Demand, Aggregate Supply, and the Phillips Curve

The model of aggregate demand and aggregate supply provides an easy explanation for the menu of possible outcomes described by the Phillips curve. *The Phillips curve shows the combinations of inflation and unemployment that arise in the short run as shifts in the aggregate-demand curve move the economy along the short-run aggregate-supply curve.* As we saw in the preceding two chapters, an increase in the aggregate demand for goods and services leads, in the short run, to a larger output of goods and services and a higher price level. Larger output means greater employment and, thus, a lower rate of unemployment. In addition, a higher price level translates into a higher rate of inflation. Thus, shifts in aggregate demand push inflation and unemployment in opposite directions in the short run—a relationship illustrated by the Phillips curve.

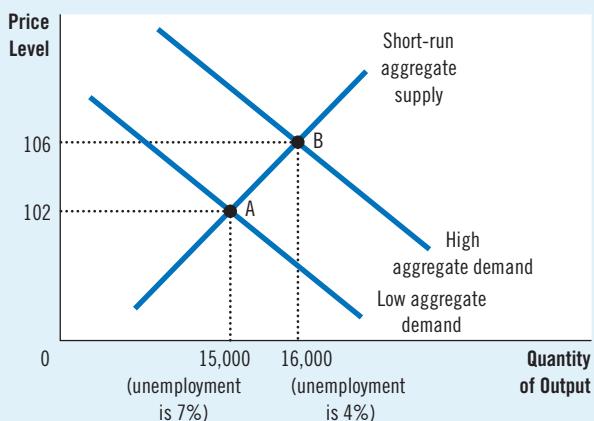
To see more fully how this works, let's consider an example. To keep the numbers simple, imagine that the price level (as measured, for instance, by the consumer price index) equals 100 in the year 2020. Figure 2 shows two possible outcomes that might occur in the year 2021 depending on the strength of aggregate demand. One outcome occurs if aggregate demand is high, and the other occurs if aggregate

**FIGURE 2**

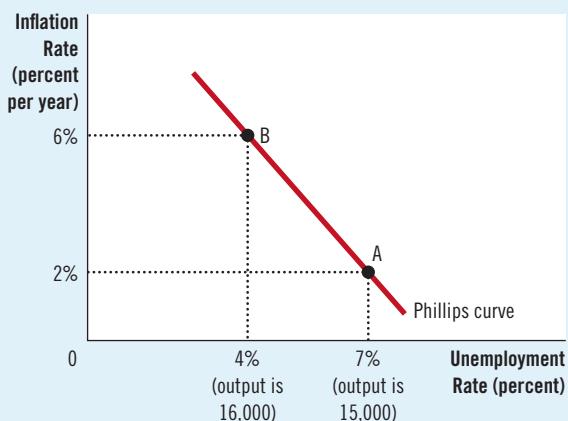
**How the Phillips Curve Is Related to the Model of Aggregate Demand and Aggregate Supply**

This figure assumes a price level of 100 for the year 2020 and charts possible outcomes for the year 2021. Panel (a) shows the model of aggregate demand and aggregate supply. If aggregate demand is low, the economy is at point A; output is low (15,000), and the price level is low (102). If aggregate demand is high, the economy is at point B; output is high (16,000), and the price level is high (106). Panel (b) shows the implications for the Phillips curve. Point A, which arises when aggregate demand is low, has high unemployment (7 percent) and low inflation (2 percent). Point B, which arises when aggregate demand is high, has low unemployment (4 percent) and high inflation (6 percent).

(a) The Model of Aggregate Demand and Aggregate Supply



(b) The Phillips Curve



demand is low. Panel (a) shows these two outcomes using the model of aggregate demand and aggregate supply. Panel (b) illustrates the same two outcomes using the Phillips curve.

Panel (a) of the figure shows what happens to output and the price level in the year 2021. If the aggregate demand for goods and services is low, the economy experiences outcome A. The economy produces output of 15,000, and the price level is 102. By contrast, if aggregate demand is high, the economy experiences outcome B. Output is 16,000, and the price level is 106. This is an example of a familiar conclusion: Higher aggregate demand moves the economy to an equilibrium with higher output and a higher price level.

Panel (b) shows what these two possible outcomes mean for unemployment and inflation. Because firms need more workers when they produce a greater output of goods and services, unemployment is lower in outcome B than in outcome A. In this example, when output rises from 15,000 to 16,000, unemployment falls from 7 percent to 4 percent. Moreover, because the price level is higher at outcome B than at outcome A, the inflation rate (the percentage change in the price level from the previous year) is also higher. In particular, since the price level was 100 in the year 2020, outcome A has an inflation rate of 2 percent and outcome B has an inflation rate of 6 percent. The two possible outcomes for the economy can be compared either in terms of output and the price level (using the model of aggregate demand and aggregate supply) or in terms of unemployment and inflation (using the Phillips curve).

Because monetary and fiscal policy can shift the aggregate-demand curve, they can move an economy along the Phillips curve. Increases in the money supply, increases in government spending, or cuts in taxes expand aggregate demand and move the economy to a point on the Phillips curve with higher inflation and lower unemployment. Decreases in the money supply, cuts in government spending, or increases in taxes contract aggregate demand and move the economy to a point on the Phillips curve with lower inflation and higher unemployment. In this sense, the Phillips curve offers policymakers a menu of combinations of inflation and unemployment.

### QuickQuiz

1. The Phillips curve started as an observed \_\_\_\_\_ correlation between the inflation rate and the \_\_\_\_\_.  
 a. positive; nominal interest rate  
 b. positive; unemployment rate  
 c. negative; nominal interest rate  
 d. negative; unemployment rate
2. When the Federal Reserve increases the money supply and expands aggregate demand, it moves the economy along the Phillips curve to a point with \_\_\_\_\_ inflation and \_\_\_\_\_ unemployment.  
 a. higher; higher  
 b. higher; lower  
 c. lower; higher  
 d. lower; lower

*Answers at end of chapter.*

## 35-2 Shifts in the Phillips Curve: The Role of Expectations

Although the Phillips curve seems to offer policymakers a menu of inflation–unemployment outcomes, it raises a crucial question: Does this set of possible choices remain the same over time? In other words, is the downward-sloping Phillips curve a stable relationship on which policymakers can rely? Economists took up this issue in the late 1960s, shortly after Samuelson and Solow had introduced the Phillips curve into the macroeconomic policy debate.

### 35-2a The Long-Run Phillips Curve

In 1968, economist Milton Friedman published a paper in the *American Economic Review* based on an address he had recently given as president of the American Economic Association. The paper, titled “The Role of Monetary Policy,” contained sections on “What Monetary Policy Can Do” and “What Monetary Policy Cannot Do.” Friedman argued that one thing monetary policy cannot do, other than for a short time, is lower unemployment by raising inflation. At about the same time, another economist, Edmund Phelps, reached the same conclusion. Like Friedman, Phelps published a paper denying the existence of a long-run trade-off between inflation and unemployment.

Both Friedman and Phelps based their conclusions on classical principles of macroeconomics. Classical theory points to growth in the money supply as the primary determinant of inflation. But classical theory also states that monetary growth does not affect real variables such as output and employment; it merely alters all prices and nominal incomes proportionately. In particular, monetary growth does not influence those factors that determine the economy’s unemployment rate, such as the market power of unions, the role of efficiency wages, and the process of job

search. As a result, Friedman and Phelps concluded that, in the long run, the rate of inflation and the rate of unemployment would not be related.

Here, in his own words, is Friedman's view about what the Federal Reserve can hope to accomplish for the economy in the long run:

The monetary authority controls nominal quantities—directly, the quantity of its own liabilities [currency plus bank reserves]. In principle, it can use this control to peg a nominal quantity—an exchange rate, the price level, the nominal level of national income, the quantity of money by one definition or another—or to peg the change in a nominal quantity—the rate of inflation or deflation, the rate of growth or decline in nominal national income, the rate of growth of the quantity of money. It cannot use its control over nominal quantities to peg a real quantity—the real rate of interest, the rate of unemployment, the level of real national income, the real quantity of money, the rate of growth of real national income, or the rate of growth of the real quantity of money.

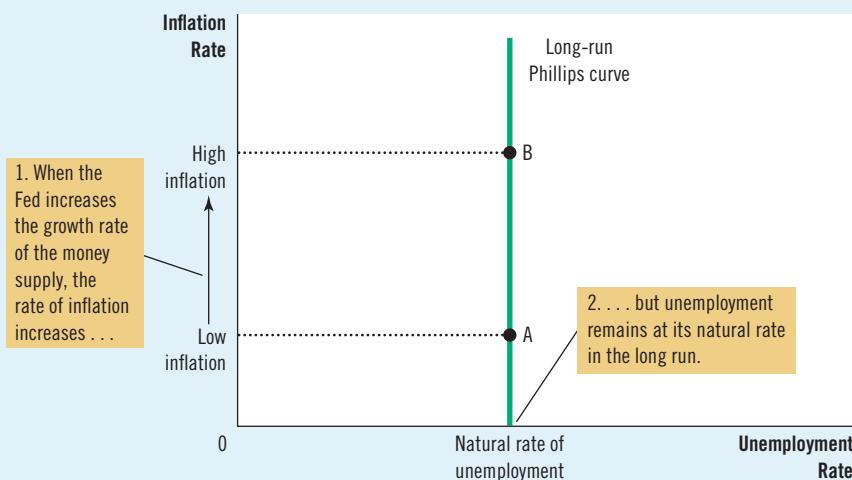
According to Friedman, monetary policymakers face a long-run Phillips curve that is vertical, as in Figure 3. If the Fed increases the money supply slowly, the inflation rate is low and the economy finds itself at point A. If the Fed increases the money supply quickly, the inflation rate is high and the economy finds itself at point B. In either case, the unemployment rate tends toward its normal level, called the *natural rate of unemployment*. The vertical long-run Phillips curve illustrates the conclusion that unemployment does not depend on money growth and inflation in the long run.

The vertical long-run Phillips curve is, in essence, one expression of the classical idea of monetary neutrality. Previously, we expressed monetary neutrality with a vertical long-run aggregate-supply curve. Figure 4 shows that the vertical long-run Phillips curve and the vertical long-run aggregate-supply curve are two sides of the same coin. In panel (a) of this figure, an increase in the money supply shifts the aggregate-demand curve to the right from  $AD_1$  to  $AD_2$ . As a result of this shift, the long-run equilibrium moves from point A to point B. The price level rises from  $P_1$  to  $P_2$ , but because the aggregate-supply curve is vertical, output remains the same. In panel (b), more rapid growth in the money supply raises the

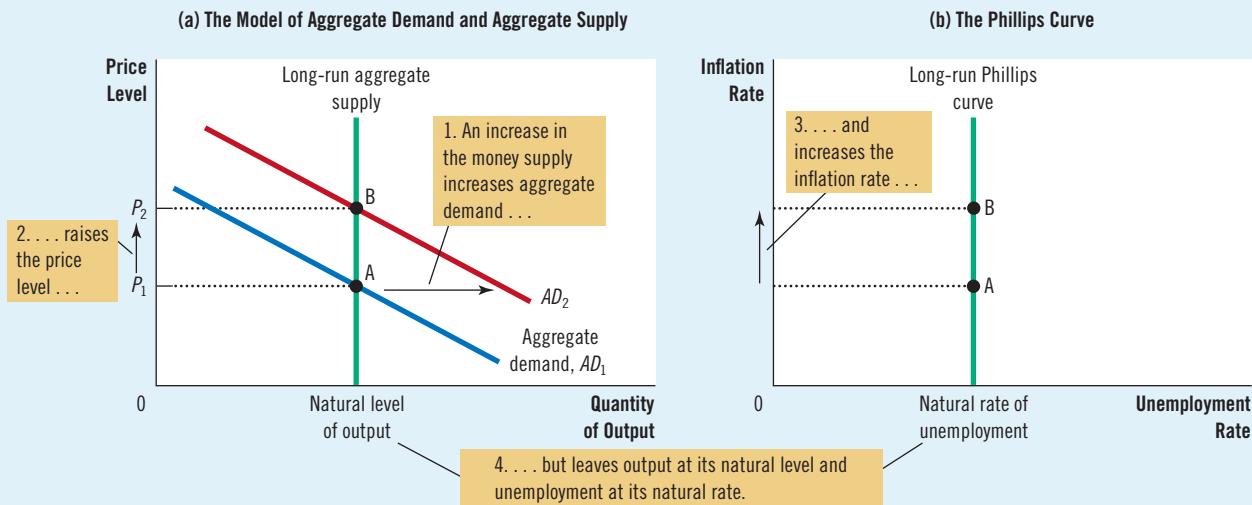
**FIGURE 3**

#### The Long-Run Phillips Curve

According to Friedman and Phelps, there is no trade-off between inflation and unemployment in the long run. Growth in the money supply determines the inflation rate. Regardless of the inflation rate, the unemployment rate gravitates toward its natural rate. As a result, the long-run Phillips curve is vertical.



Panel (a) shows the model of aggregate demand and aggregate supply with a vertical aggregate-supply curve. When expansionary monetary policy shifts the aggregate-demand curve to the right from  $AD_1$  to  $AD_2$ , the equilibrium moves from point A to point B. The price level rises from  $P_1$  to  $P_2$ , while output remains the same. Panel (b) shows the long-run Phillips curve, which is vertical at the natural rate of unemployment. In the long run, expansionary monetary policy moves the economy from lower inflation (point A) to higher inflation (point B) without changing the rate of unemployment.



inflation rate by moving the economy from point A to point B. But because the Phillips curve is vertical, the rate of unemployment is the same at these two points. Thus, the vertical long-run aggregate-supply curve and the vertical long-run Phillips curve both imply that monetary policy influences nominal variables (the price level and the inflation rate) but not real variables (output and unemployment). In the long run, regardless of the monetary policy pursued by the Fed, output is at its natural level and unemployment is at its natural rate.

### 35-2b The Meaning of “Natural”

What is so “natural” about the natural rate of unemployment? Friedman and Phelps used this adjective to describe the unemployment rate toward which the economy gravitates in the long run. Yet the natural rate of unemployment is not necessarily the socially desirable rate of unemployment. Nor is the natural rate of unemployment constant over time.

For example, suppose that a newly formed union uses its market power to raise the real wages of some workers above the equilibrium level. The result is an excess supply of workers and, therefore, a higher natural rate of unemployment. This unemployment is natural not because it is good but because it is beyond the influence of monetary policy. More rapid money growth would reduce neither the market power of the union nor the level of unemployment; it would lead only to more inflation.

**FIGURE 4**

**How the Long-Run Phillips Curve Is Related to the Model of Aggregate Demand and Aggregate Supply**

Although monetary policy cannot influence the natural rate of unemployment, other types of policy can. To reduce the natural rate of unemployment, policymakers should look to policies that improve the functioning of the labor market. Earlier in the book, we discussed how various labor-market policies, such as minimum-wage laws, collective-bargaining laws, unemployment insurance, and job-training programs, affect the natural rate of unemployment. A policy change that reduced the natural rate of unemployment would shift the long-run Phillips curve to the left. In addition, because lower unemployment means more workers are producing goods and services, the quantity of goods and services supplied would be larger at any given price level and the long-run aggregate-supply curve would shift to the right. The economy could then enjoy lower unemployment and higher output for any given rate of money growth and inflation.

### 35-2c Reconciling Theory and Evidence

At first, Friedman and Phelps's conclusion that there is no long-run trade-off between inflation and unemployment might not seem persuasive. Their argument was based on an appeal to *theory*, specifically classical theory's prediction of monetary neutrality. By contrast, the negative correlation between inflation and unemployment documented by Phillips, Samuelson, and Solow was based on actual *evidence* from the real world. Why should anyone believe that policymakers faced a vertical Phillips curve when the world seemed to offer a downward-sloping one? Shouldn't the findings of Phillips, Samuelson, and Solow lead us to reject monetary neutrality?

Friedman and Phelps were well aware of these questions, and they offered a way to reconcile classical macroeconomic theory with the finding of a downward-sloping Phillips curve in data from the United Kingdom and the United States. They claimed that a negative relationship between inflation and unemployment exists in the short run but that it cannot be used by policymakers as a menu of outcomes in the long run. Policymakers can pursue expansionary monetary policy to achieve lower unemployment for a while, but eventually, unemployment will return to its natural rate. In the long run, more expansionary monetary policy leads only to higher inflation.

Friedman and Phelps's work was the basis of our discussion of the difference between the short-run and long-run aggregate-supply curves in Chapter 33. As you may recall, the long-run aggregate-supply curve is vertical, indicating that the price level does not influence quantity supplied in the long run. But the short-run aggregate-supply curve slopes upward, indicating that an increase in the price level raises the quantity of goods and services that firms supply. According to the sticky-wage theory of aggregate supply, for instance, nominal wages are set in advance based on the price level that workers and firms expect to prevail. When prices turn out to be higher than expected, firms have an incentive to increase production and employment; when prices are lower than expected, firms reduce production and employment. Yet because the expected price level and nominal wages will eventually adjust, the positive relationship between the actual price level and quantity supplied exists only in the short run.

Friedman and Phelps applied this same logic to the Phillips curve. Just as the aggregate-supply curve slopes upward only in the short run, the trade-off between inflation and unemployment holds only in the short run. And just as the long-run aggregate-supply curve is vertical, the long-run Phillips curve is also vertical. Once again, expectations are the key to understanding how the short run and the long run are related.

Friedman and Phelps introduced a new variable into the analysis of the inflation–unemployment trade-off: *expected inflation*. Expected inflation measures how much people expect the overall price level to change. Because the expected price level affects nominal wages, expected inflation is one factor that determines the position of the short-run aggregate-supply curve. In the short run, the Fed can take expected inflation (and, thus, the short-run aggregate-supply curve) as already determined. When the money supply changes, the aggregate-demand curve shifts and the economy moves along a given short-run aggregate-supply curve. In the short run, therefore, monetary changes lead to unexpected fluctuations in output, prices, unemployment, and inflation. In this way, Friedman and Phelps explained the downward-sloping Phillips curve that Phillips, Samuelson, and Solow had documented.

The Fed's ability to create unexpected inflation by increasing the money supply exists only in the short run. In the long run, people come to expect whatever inflation rate the Fed chooses to produce and nominal wages will adjust to keep pace with inflation. As a result, the long-run aggregate-supply curve is vertical. Changes in aggregate demand, such as those due to changes in the money supply, affect neither the economy's output of goods and services nor the number of workers that firms need to hire to produce those goods and services. Friedman and Phelps concluded that unemployment returns to its natural rate in the long run.

### 35-2d The Short-Run Phillips Curve

The analysis of Friedman and Phelps can be summarized by the following equation:

$$\text{Unemployment rate} = \text{Natural rate of unemployment} - a \left( \frac{\text{Actual inflation}}{\text{Expected inflation}} - 1 \right).$$

This equation (which is, in essence, another expression of the aggregate-supply equation we have seen previously) relates the unemployment rate to the natural rate of unemployment, actual inflation, and expected inflation. In the short run, expected inflation is given, so higher actual inflation is associated with lower unemployment. (The variable  $a$  is a parameter that measures how much unemployment responds to unexpected inflation.) In the long run, people come to expect whatever inflation the Fed produces, so actual inflation equals expected inflation, and unemployment is at its natural rate.

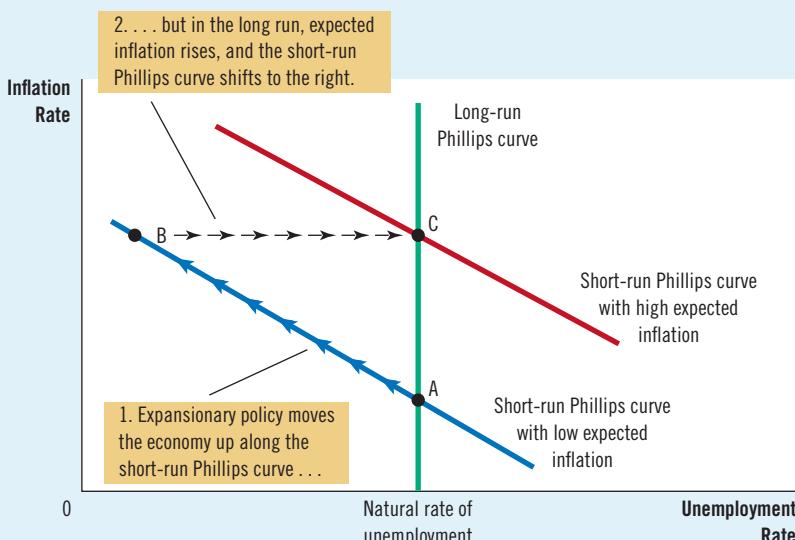
This equation implies there can be no stable short-run Phillips curve. Each short-run Phillips curve reflects a particular expected rate of inflation. (To be precise, if you graph the equation, you'll find that the downward-sloping short-run Phillips curve intersects the vertical long-run Phillips curve at the expected rate of inflation.) When expected inflation changes, the short-run Phillips curve shifts.

According to Friedman and Phelps, it is dangerous to view the Phillips curve as a menu of options available to policymakers. To see why, imagine an economy that starts with low inflation, with an equally low rate of expected inflation, and with unemployment at its natural rate. In Figure 5, the economy is at point A. Now suppose that policymakers try to take advantage of the trade-off between inflation and unemployment by using monetary or fiscal policy to expand aggregate demand. In the short run, when expected inflation is given, the economy goes from point A to point B. Unemployment falls below its natural rate, and the actual inflation rate rises above expected inflation. As the economy moves from point A to point B, policymakers might think they have achieved permanently lower unemployment at the cost of higher inflation—a bargain that, if possible, might be worth making.

**FIGURE 5**

### How Expected Inflation Shifts the Short-Run Phillips Curve

The higher the expected rate of inflation, the higher the curve representing the short-run trade-off between inflation and unemployment. At point A, expected inflation and actual inflation are equal at a low rate and unemployment is at its natural rate. If the Fed pursues an expansionary monetary policy, the economy moves from point A to point B in the short run. At point B, expected inflation is still low, but actual inflation is high. Unemployment is below its natural rate. In the long run, expected inflation rises, and the economy moves to point C. At point C, expected inflation and actual inflation are both high, and unemployment is back to its natural rate.



This situation, however, will not persist. Over time, people get used to this higher inflation rate, and they raise their expectations of inflation. When expected inflation rises, firms and workers start taking higher inflation into account when setting wages and prices. The short-run Phillips curve then shifts to the right, as shown in the figure. The economy ends up at point C, with higher inflation than at point A but with the same level of unemployment. Thus, Friedman and Phelps concluded that policymakers face only a temporary trade-off between inflation and unemployment. In the long run, expanding aggregate demand more rapidly will yield higher inflation without any reduction in unemployment.

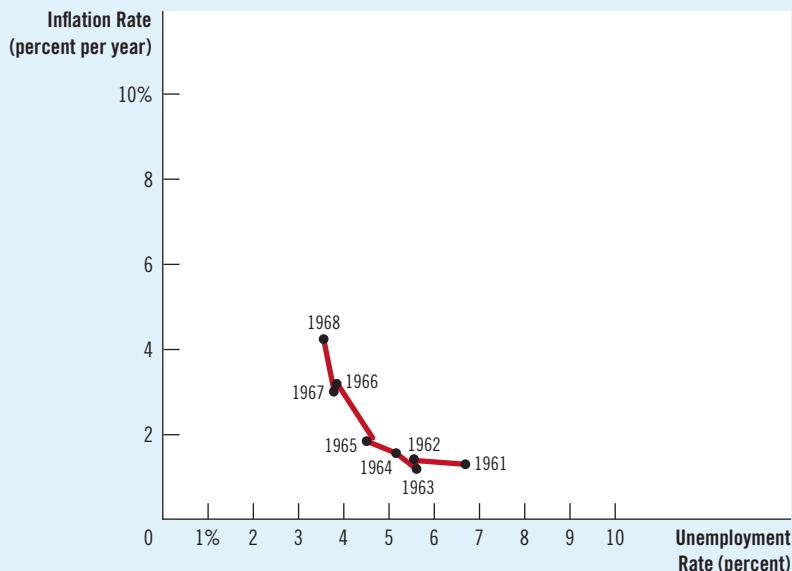
### 35-2e The Natural Experiment for the Natural-Rate Hypothesis

Friedman and Phelps had made a bold prediction in 1968: If policymakers try to take advantage of the Phillips curve by choosing higher inflation to reduce unemployment, they will succeed at reducing unemployment only temporarily. This view—that unemployment eventually returns to its natural rate, regardless of the rate of inflation—is called the **natural-rate hypothesis**. A few years after Friedman and Phelps proposed this hypothesis, monetary and fiscal policymakers inadvertently created a natural experiment to test it. Their laboratory was the U.S. economy.

Before we examine the outcome of this test, however, let's look at the data that Friedman and Phelps had when they made their prediction in 1968. Figure 6 shows the unemployment and inflation rates for the period from 1961 to 1968. These data trace out an almost perfect Phillips curve. As inflation rose over these eight years, unemployment fell. The economic data from this era seemed to confirm that policymakers faced a trade-off between inflation and unemployment.

#### natural-rate hypothesis

the claim that unemployment eventually returns to its normal, or natural, rate, regardless of the rate of inflation

**FIGURE 6****The Phillips Curve in the 1960s**

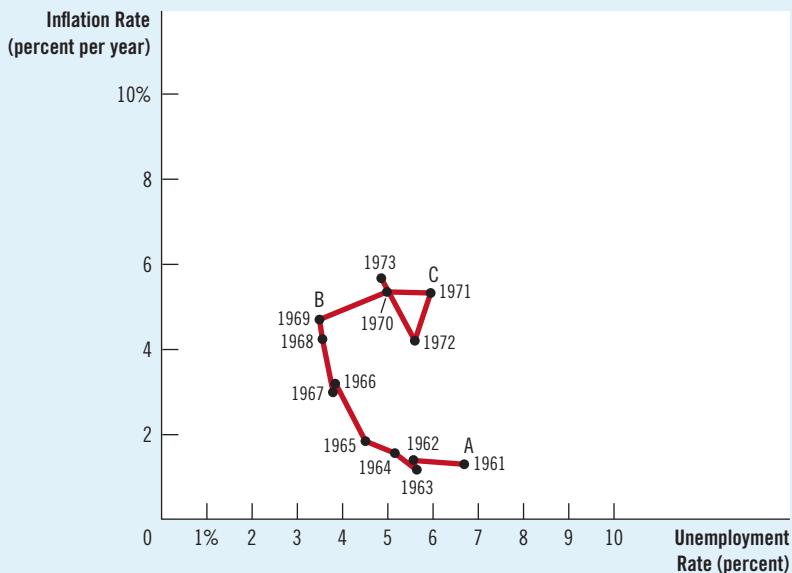
This figure uses annual data from 1961 to 1968 on the unemployment rate and on the inflation rate (as measured by the GDP deflator) to show the negative relationship between inflation and unemployment.

Source: U.S. Department of Labor; U.S. Department of Commerce.

The apparent success of the Phillips curve in the 1960s made the prediction of Friedman and Phelps all the bolder. In 1958, Phillips had suggested a negative association between inflation and unemployment. In 1960, Samuelson and Solow had shown that it existed in U.S. data. Another decade of data had confirmed the relationship. To some economists at the time, it seemed ridiculous to claim that the historically reliable Phillips curve would start shifting once policymakers tried to take advantage of it.

In fact, that is exactly what happened. Beginning in the late 1960s, the government followed policies that expanded the aggregate demand for goods and services. In part, this expansion was due to fiscal policy: Government spending rose as the Vietnam War heated up. In part, it was due to monetary policy: Because the Fed was trying to hold down interest rates in the face of expansionary fiscal policy, the money supply (as measured by M2) rose about 13 percent per year during the period from 1970 to 1972, compared with 7 percent per year in the early 1960s. As a result, inflation stayed high (about 5 to 6 percent per year in the late 1960s and early 1970s, compared with about 1 to 2 percent per year in the early 1960s). But as Friedman and Phelps had predicted, unemployment did not stay low.

Figure 7 displays the history of inflation and unemployment from 1961 to 1973. It shows that the simple negative relationship between these two variables started to break down around 1970. In particular, as inflation remained high in the early 1970s, people's expectations of inflation caught up with reality, and the unemployment rate reverted to the 5 percent to 6 percent range that had prevailed in the early 1960s. Notice that the history illustrated in Figure 7 resembles the theory of a shifting short-run Phillips curve shown in Figure 5. By 1973, policymakers had learned that Friedman and Phelps were right: There is no trade-off between inflation and unemployment in the long run.

**FIGURE 7****The Breakdown of the Phillips Curve**

This figure shows annual data from 1961 to 1973 on the unemployment rate and on the inflation rate (as measured by the GDP deflator). The Phillips curve of the 1960s breaks down in the early 1970s, just as Friedman and Phelps had predicted. Notice that the points labeled A, B, and C in this figure correspond roughly to the points in Figure 5.

**Source:** U.S. Department of Labor; U.S. Department of Commerce.

**QuickQuiz**

3. The natural rate of unemployment is
  - a. the socially optimal level of joblessness.
  - b. the level of joblessness the economy reaches in the short run.
  - c. the amount of joblessness that cannot be reduced by public policies.
  - d. the normal level of joblessness, regardless of inflation.
4. If the Federal Reserve reduces the rate of money growth and maintains it at the new lower rate, eventually expected inflation will \_\_\_\_\_ and the short-run Phillips curve will shift \_\_\_\_\_.
  - a. decrease; downward
  - b. decrease; upward
  - c. increase; downward
  - d. increase; upward

Answers at end of chapter.

### 35-3 Shifts in the Phillips Curve: The Role of Supply Shocks

Friedman and Phelps had suggested in 1968 that changes in expected inflation shift the short-run Phillips curve, and the experience of the early 1970s convinced most economists that Friedman and Phelps were right. Within a few years, however, the economics profession would turn its attention to a different source of shifts in the short-run Phillips curve: shocks to aggregate supply.

This time, the change in focus came not from two American economics professors but from a group of Arab sheiks. In 1974, the Organization of Petroleum Exporting Countries (OPEC) began to exert its market power as a cartel in the world oil market to increase its members' profits. The countries of OPEC, including Saudi Arabia, Kuwait, and Iraq, restricted the amount of crude oil they pumped and sold on world markets. Within a few years, this reduction in supply caused the world price of oil to almost double.

A large increase in the world price of oil is an example of a supply shock. A **supply shock** is an event that directly affects firms' costs of production and thus the prices they charge; it shifts the economy's aggregate-supply curve and, as a result, the Phillips curve. For example, when an oil price increase raises the cost of producing gasoline, heating oil, tires, and many other products, it reduces the quantity of goods and services supplied at any given price level. As panel (a) of Figure 8 shows, this reduction in supply is represented by the leftward shift in the aggregate-supply curve from  $AS_1$  to  $AS_2$ . Output falls from  $Y_1$  to  $Y_2$ , and the price level rises from  $P_1$  to  $P_2$ . The economy experiences *stagflation*—the combination of falling output (stagnation) and rising prices (inflation).

This shift in aggregate supply is associated with a similar shift in the short-run Phillips curve, shown in panel (b). Because firms need fewer workers to produce the smaller output, employment falls and unemployment rises. Because the price level is higher, the inflation rate—the percentage change in the price level from the previous year—is also higher. Thus, the shift in aggregate supply leads to higher unemployment and higher inflation. The short-run trade-off between inflation and unemployment shifts to the right from  $PC_1$  to  $PC_2$ .

Confronted with an adverse shift in aggregate supply, policymakers face a difficult choice between fighting inflation and fighting unemployment. If they contract aggregate demand to fight inflation, they will raise unemployment further. If they expand aggregate demand to fight unemployment, they will raise inflation further. In other words, policymakers face a less favorable trade-off between inflation and unemployment than they did before the shift in aggregate supply: They have to live with a higher rate of inflation for a given rate of unemployment, a higher

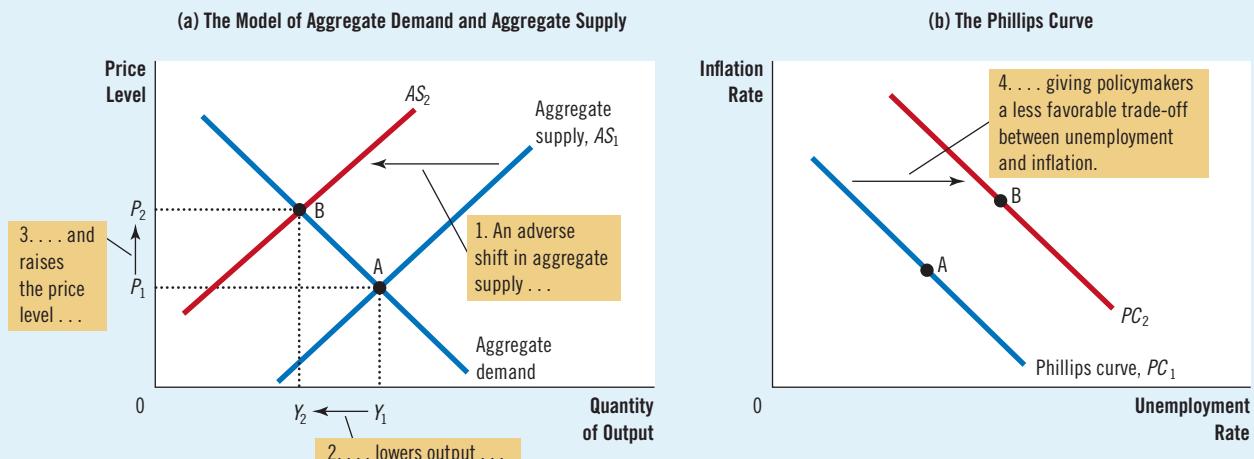
### supply shock

an event that directly alters firms' costs and prices, shifting the economy's aggregate-supply curve and thus the Phillips curve

Panel (a) shows the model of aggregate demand and aggregate supply. When the aggregate-supply curve shifts to the left from  $AS_1$  to  $AS_2$ , the equilibrium moves from point A to point B. Output falls from  $Y_1$  to  $Y_2$ , and the price level rises from  $P_1$  to  $P_2$ . Panel (b) shows the short-run trade-off between inflation and unemployment. The adverse shift in aggregate supply moves the economy from a point with lower unemployment and lower inflation (point A) to a point with higher unemployment and higher inflation (point B). The short-run Phillips curve shifts to the right from  $PC_1$  to  $PC_2$ . Policymakers now face a worse set of options for inflation and unemployment.

**FIGURE 8**

### An Adverse Shock to Aggregate Supply

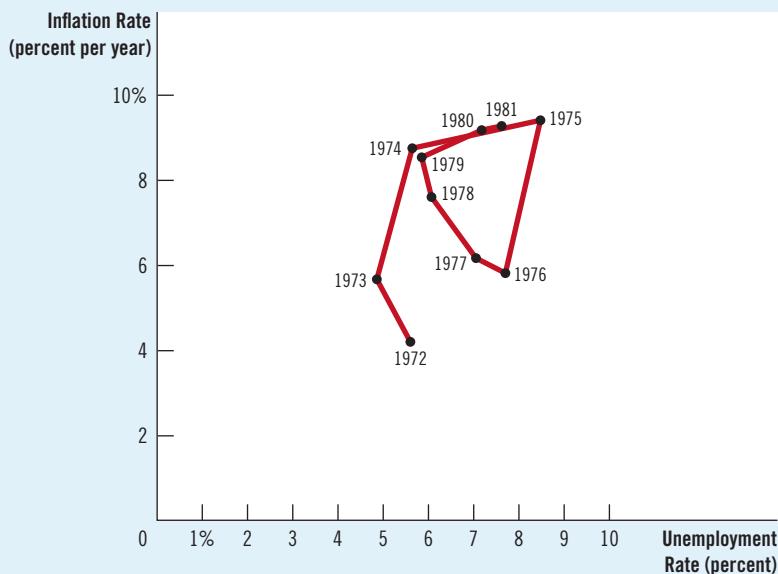


rate of unemployment for a given rate of inflation, or some combination of higher unemployment and higher inflation.

Faced with such an adverse shift in the Phillips curve, policymakers will ask whether the shift is temporary or permanent. The answer depends on how people adjust their expectations of inflation. If people view the rise in inflation due to the supply shock as a temporary aberration, expected inflation will not change and the Phillips curve will soon revert to its former position. But if people believe the shock will lead to a new era of higher inflation, then expected inflation will rise and the Phillips curve will remain at its new, less desirable position.

In the United States during the 1970s, expected inflation did rise substantially. This rise in expected inflation was partly attributable to the Fed's decision to accommodate the supply shock with higher money growth. (Recall that policymakers are said to *accommodate* an adverse supply shock when they respond to it by increasing aggregate demand in an effort to keep output from falling.) Because of this policy decision, the recession that resulted from the supply shock was smaller than it otherwise might have been, but the U.S. economy faced an unfavorable trade-off between inflation and unemployment for many years. The problem was compounded in 1979 when OPEC once again started to exert its market power, more than doubling the price of oil. Figure 9 shows inflation and unemployment in the U.S. economy during this period.

In 1980, after two OPEC supply shocks, the U.S. economy had an inflation rate of more than 9 percent and an unemployment rate of about 7 percent. This combination of inflation and unemployment was not at all near the trade-off that seemed possible in the 1960s. (In the 1960s, the Phillips curve suggested that an unemployment rate of 7 percent would be associated with an inflation rate of only 1 percent. Inflation of more than 9 percent was unthinkable.) With the misery index in 1980 near a historic high, the public was widely dissatisfied with the performance of the economy. Largely because of this dissatisfaction, President Jimmy Carter lost his bid for reelection in November 1980 and was replaced by Ronald Reagan. Something had to be done, and soon it would be.



**FIGURE 9**

### The Supply Shocks of the 1970s

This figure shows annual data from 1972 to 1981 on the unemployment rate and on the inflation rate (as measured by the GDP deflator). In the periods 1973–1975 and 1978–1981, increases in world oil prices led to higher inflation and higher unemployment.

*Source:* U.S. Department of Labor; U.S. Department of Commerce.

### QuickQuiz

5. When an adverse supply shock shifts the short-run aggregate-supply curve to the left, it also
  - a. moves the economy along the short-run Phillips curve to a point with higher inflation and lower unemployment.
  - b. moves the economy along the short-run Phillips curve to a point with lower inflation and higher unemployment.
  - c. shifts the short-run Phillips curve to the right.
  - d. shifts the short-run Phillips curve to the left.
6. From one year to the next, inflation falls from 5 to 4 percent, while unemployment rises from 6 to 7 percent. Which of the following events could be responsible for this change?
  - a. The central bank increases the growth rate of the money supply.
  - b. The government cuts spending and raises taxes to reduce the budget deficit.
7. From one year to the next, inflation falls from 5 to 4 percent, while unemployment falls from 7 to 6 percent. Which of the following events could be responsible for this change?
  - a. The central bank increases the growth rate of the money supply.
  - b. The government cuts spending and raises taxes to reduce the budget deficit.
  - c. Newly discovered oil reserves cause world oil prices to plummet.
  - d. The appointment of a new Fed chair increases expected inflation.

*Answers at end of chapter.*

## 35-4 The Cost of Reducing Inflation

In October 1979, as OPEC was imposing adverse supply shocks on the world's economies for the second time in a decade, Fed Chairman Paul Volcker decided that the time for action had come. Volcker had been appointed chairman by President Carter only two months earlier, and he had taken the job knowing that inflation had reached unacceptable levels. As guardian of the nation's monetary system, he felt he had little choice but to pursue a policy of disinflation. *Disinflation* is a reduction in the rate of inflation, and it should not be confused with *deflation*, a reduction in the price level. To draw an analogy to a car's motion, disinflation is like slowing down, whereas deflation is like going in reverse. Chairman Volcker, along with many other Americans, wanted the economy's rising level of prices to slow down.

Volcker had no doubt that the Fed could reduce inflation through its ability to control the quantity of money. But what would be the short-run cost of disinflation? The answer to this question was much less certain.

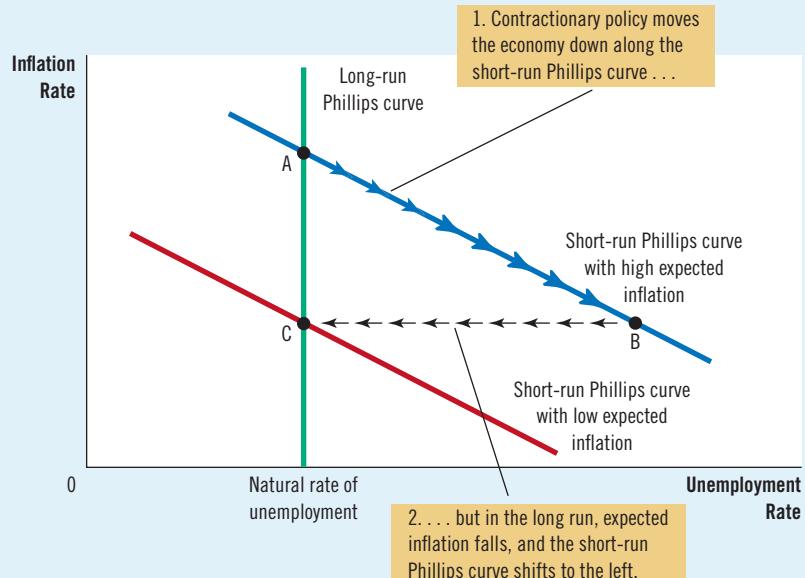
### 35-4a The Sacrifice Ratio

To reduce the inflation rate, the Fed has to pursue contractionary monetary policy. Figure 10 shows some of the effects of such a decision. When the Fed slows growth in the money supply, it contracts aggregate demand. The fall in aggregate demand, in turn, reduces the quantity of goods and services that firms produce, and this fall in production leads to a rise in unemployment. The economy begins at point A in the figure and moves along the short-run Phillips curve to point B, which has lower inflation and higher unemployment. Over time, as people come to understand that prices are rising more slowly, expected inflation falls, and the short-run Phillips curve shifts downward. The economy moves from point B to point C. Inflation is lower than it was initially at point A, and unemployment is back at its natural rate.

**FIGURE 10**

### Disinflationary Monetary Policy in the Short Run and Long Run

When the Fed pursues contractionary monetary policy to reduce inflation, the economy moves along a short-run Phillips curve from point A to point B. Over time, expected inflation falls, and the short-run Phillips curve shifts downward. When the economy reaches point C, unemployment is back at its natural rate.



Thus, if a nation wants to reduce inflation, it must endure a period of high unemployment and low output. In Figure 10, this cost is represented by the movement of the economy through point B as it travels from point A to point C. The size of this cost depends on the slope of the Phillips curve and how quickly expectations of inflation adjust to the new monetary policy.

Many studies have examined the data on inflation and unemployment to estimate the cost of reducing inflation. The findings of these studies are often summarized in a statistic called the **sacrifice ratio**. The sacrifice ratio is the number of percentage points of annual output lost in the process of reducing inflation by 1 percentage point. A typical estimate of the sacrifice ratio is 5. That is, for each percentage point that inflation is reduced, 5 percent of annual output must be sacrificed in the transition.

Such estimates surely must have made Paul Volcker apprehensive as he confronted the task of reducing inflation. Inflation was running at almost 10 percent per year. To reach moderate inflation of, say, 4 percent per year would mean reducing inflation by 6 percentage points. If each percentage point costs 5 percent of the economy's annual output, then reducing inflation by 6 percentage points would require sacrificing 30 percent of annual output.

According to studies of the Phillips curve and the cost of disinflation, this sacrifice could be paid in various ways. An immediate reduction in inflation would depress output by 30 percent for a single year, but that outcome was surely too harsh even for an inflation hawk like Paul Volcker. It would be better, many argued, to spread out the cost over several years. If the reduction in inflation took place over five years, for instance, then output would have to average only 6 percent below trend during that period to add up to a sacrifice of 30 percent. An even more gradual approach would be to reduce inflation slowly over a decade so that output

### sacrifice ratio

the number of percentage points of annual output lost in the process of reducing inflation by 1 percentage point

would have to be only 3 percent below trend. Whatever path was chosen, however, it seemed that reducing inflation would not be easy.

### 35-4b Rational Expectations and the Possibility of Costless Disinflation

Just as Paul Volcker was pondering how costly reducing inflation might be, a group of economics professors was leading an intellectual revolution that would challenge the conventional wisdom on the sacrifice ratio. This group included such prominent economists as Robert Lucas, Thomas Sargent, and Robert Barro. Their revolution was based on a new approach to economic theory and policy called **rational expectations**. According to the theory of rational expectations, people optimally use all the information they have, including information about government policies, when forecasting the future.

This new approach has had profound implications for many areas of macroeconomics, but none is more important than its application to the trade-off between inflation and unemployment. As Friedman and Phelps had first emphasized, expected inflation is an important variable that explains why there is a trade-off between inflation and unemployment in the short run but not in the long run. How quickly the short-run trade-off disappears depends on how quickly people adjust their expectations of inflation. Proponents of rational expectations expanded upon the Friedman–Phelps analysis to argue that when economic policies change, people adjust their expectations of inflation accordingly. The studies of inflation and unemployment that had tried to estimate the sacrifice ratio had failed to take account of the direct effect of the policy regime on expectations. As a result, estimates of the sacrifice ratio were, according to the rational-expectations theorists, unreliable guides for policy.

In a 1981 paper titled “The End of Four Big Inflations,” Thomas Sargent described this new view as follows:

An alternative “rational expectations” view denies that there is any inherent momentum to the present process of inflation. This view maintains that firms and workers have now come to expect high rates of inflation in the future and that they strike inflationary bargains in light of these expectations. However, it is held that people expect high rates of inflation in the future precisely because the government’s current and prospective monetary and fiscal policies warrant those expectations. . . . An implication of this view is that inflation can be stopped much more quickly than advocates of the “momentum” view have indicated and that their estimates of the length of time and the costs of stopping inflation in terms of forgone output are erroneous. . . . This is not to say that it would be easy to eradicate inflation. On the contrary, it would require more than a few temporary restrictive fiscal and monetary actions. It would require a change in the policy regime. . . . How costly such a move would be in terms of forgone output and how long it would be in taking effect would depend partly on how resolute and evident the government’s commitment was.

According to Sargent, the sacrifice ratio could be much smaller than suggested by previous estimates. Indeed, in the most extreme case, it could be zero: If the government made a credible commitment to a policy of low inflation, people would be rational enough to lower their expectations of inflation immediately. The short-run Phillips curve would shift downward, and the economy would reach low inflation quickly without the cost of temporarily high unemployment and low output.

#### rational expectations

the theory that people optimally use all the information they have, including information about government policies, when forecasting the future

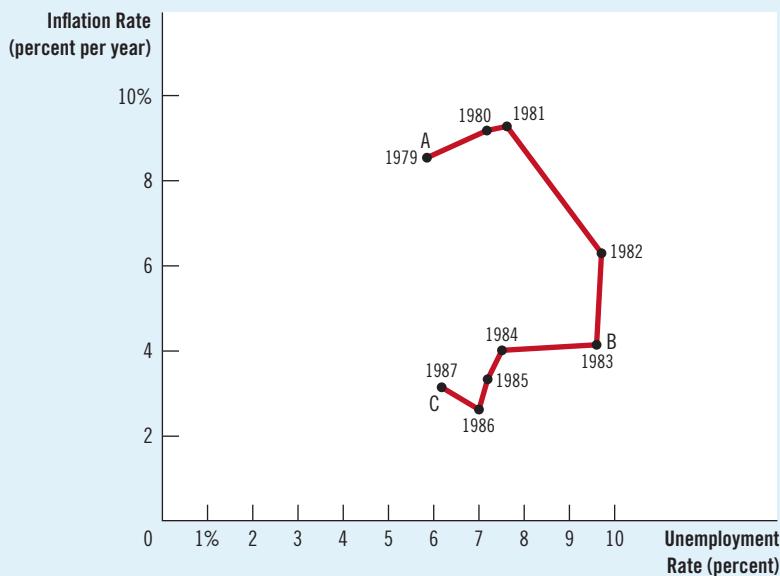
### 35-4c The Volcker Disinflation

As we have seen, when Paul Volcker faced the prospect of reducing inflation from its peak of about 10 percent, the economics profession offered two conflicting predictions. One group of economists offered estimates of the sacrifice ratio and concluded that reducing inflation would have great cost in terms of lost output and high unemployment. Another group offered the theory of rational expectations and concluded that reducing inflation could be much less costly and, perhaps, could even have no cost at all. Who was right?

Figure 11 shows inflation and unemployment from 1979 to 1987. As you can see, Volcker did succeed at reducing inflation. Inflation came down from almost 10 percent in 1980 and 1981 to about 4 percent in 1983 and 1984. Credit for this reduction in inflation goes completely to monetary policy. Fiscal policy at this time was acting in the opposite direction: The increases in the budget deficit during the Reagan administration were expanding aggregate demand, which tends to raise inflation. The fall in inflation from 1981 to 1984 is attributable to the tough anti-inflation policies of Fed Chairman Paul Volcker.

The figure shows that the Volcker disinflation did come at the cost of high unemployment. In 1982 and 1983, the unemployment rate was about 10 percent—about 4 percentage points above its level when Paul Volcker was appointed Fed chairman. At the same time, the production of goods and services as measured by real GDP was well below its trend level. The Volcker disinflation produced a recession that was, at the time, the deepest the United States had experienced since the Great Depression of the 1930s.

Does this episode refute the possibility of costless disinflation as suggested by the rational-expectations theorists? Some economists have argued that the answer to this question is a resounding yes. Indeed, the pattern of disinflation shown in Figure 11 is similar to the pattern predicted in Figure 10. To make the transition from high inflation (point A in both figures) to low inflation (point C), the economy had to experience a painful period of high unemployment (point B).



**FIGURE 11**

#### The Volcker Disinflation

This figure shows annual data from 1979 to 1987 on the unemployment rate and on the inflation rate (as measured by the GDP deflator). The reduction in inflation during this period came at the cost of very high unemployment in 1982 and 1983. Note that the points labeled A, B, and C in this figure correspond roughly to the points in Figure 10.

**Source:** U.S. Department of Labor; U.S. Department of Commerce.

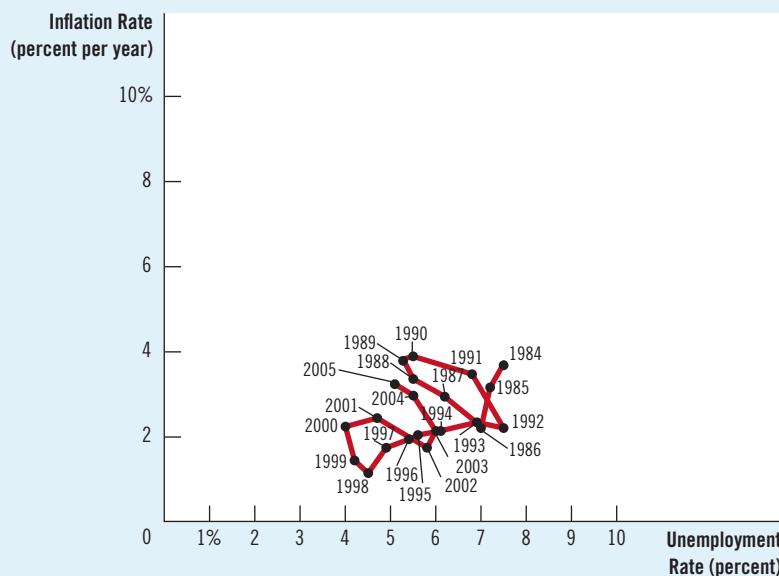
Yet there are two reasons not to reject the conclusions of the rational-expectations theorists so quickly. First, even though the Volcker disinflation did impose a cost of temporarily high unemployment, the cost was not as large as many economists had predicted. Most estimates of the sacrifice ratio based on the Volcker disinflation are smaller than estimates that had been obtained from previous data. Perhaps Volcker's tough stand on inflation did have some direct effect on expectations, as the rational-expectations theorists claimed.

Second, and more important, even though Volcker announced that he would aim monetary policy to lower inflation, much of the public did not believe him. Because few people thought Volcker would reduce inflation as quickly as he did, expected inflation did not fall immediately; as a result, the short-run Phillips curve did not shift down as quickly as it might have. Some evidence for this hypothesis comes from the forecasts made by commercial forecasting firms: Their forecasts of inflation fell more slowly in the 1980s than did actual inflation. Thus, the Volcker disinflation does not necessarily refute the rational-expectations view that credible disinflation can be costless. It does show, however, that policymakers cannot count on people to immediately believe them when they announce a policy of disinflation.

### 35-4d The Greenspan Era

After the OPEC inflation of the 1970s and the Volcker disinflation of the 1980s, the U.S. economy experienced relatively mild fluctuations in inflation and unemployment. Figure 12 shows inflation and unemployment from 1984 to 2005. This period is called the Greenspan era, after Alan Greenspan who in 1987 followed Paul Volcker as chairman of the Federal Reserve.

This period began with a favorable supply shock. In 1986, OPEC members started arguing over production levels, and their long-standing agreement to restrict supply broke down. Oil prices fell by about half. As the figure shows, this favorable supply shock led to falling inflation and falling unemployment from 1984 to 1986.



**FIGURE 12**

#### The Greenspan Era

This figure shows annual data from 1984 to 2005 on the unemployment rate and on the inflation rate (as measured by the GDP deflator). During most of this period, Alan Greenspan was chairman of the Federal Reserve. Fluctuations in inflation and unemployment were relatively small.

Source: U.S. Department of Labor; U.S. Department of Commerce.

Throughout the Greenspan era, the Fed was careful to avoid repeating the policy mistakes of the 1960s, when excessive aggregate demand pushed unemployment below the natural rate and raised inflation. When unemployment fell and inflation rose in 1989 and 1990, the Fed raised interest rates and contracted aggregate demand, leading to a small recession in 1991 and 1992. Unemployment then rose above most estimates of the natural rate, and inflation fell once again.

The rest of the 1990s witnessed technological boom and a period of economic prosperity. Inflation gradually drifted downward, approaching zero by the end of the decade. Unemployment also drifted downward, leading many observers to believe that the natural rate of unemployment had fallen. Part of the credit for this good economic performance goes to Greenspan and his colleagues at the Fed, for low inflation can be achieved only with prudent monetary policy. But good luck in the form of favorable supply shocks is also part of the story.

In 2001, however, the economy ran into problems. The end of the dot-com stock market bubble, the 9/11 terrorist attacks, and corporate accounting scandals all depressed aggregate demand. Unemployment rose as the economy experienced its first recession in a decade. But a combination of expansionary monetary and fiscal policies helped end the downturn, and by early 2005, unemployment was close to most estimates of the natural rate.

In 2005, President Bush nominated Ben Bernanke to succeed Alan Greenspan as Fed chair. Bernanke was sworn in on February 1, 2006. In 2009, Bernanke was reappointed by President Obama. At the time of his initial nomination, Bernanke said, "My first priority will be to maintain continuity with the policies and policy strategies established during the Greenspan years."

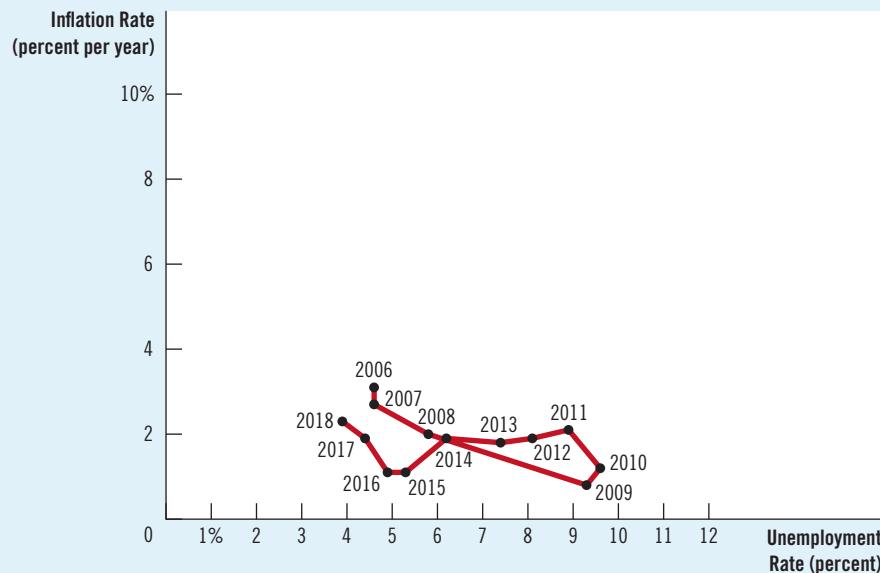
### 35-4e A Financial Crisis Takes Us for a Ride along the Phillips Curve

Ben Bernanke may have hoped to continue the policies of the Greenspan era and to enjoy the relative calm of those years, but his wishes would not be fulfilled. During his first few years on the job, the new Fed chairman faced some daunting challenges.

As we have seen in previous chapters, the main challenge arose from problems in the housing market and financial system. From 1995 to 2006, the U.S. housing market boomed and average U.S. house prices more than doubled. But this housing boom proved unsustainable, and from 2006 to 2009 house prices fell by about one-third. This large fall led to declines in household wealth and difficulties for many financial institutions that had bet (through the purchase of mortgage-backed securities) that house prices would continue to rise. The resulting financial crisis resulted in a large decline in aggregate demand and a steep increase in unemployment.

We have already looked at the story of the crisis and the policy responses to it in previous chapters, but Figure 13 shows what these events meant for inflation and unemployment. From 2007 to 2010, as the decline in aggregate demand raised unemployment from below 5 percent to about 10 percent, it also reduced the rate of inflation from 3 percent in 2006 to below 1 percent in 2009, the lowest inflation experienced in more than a half-century. In essence, the economy rode down the short-run Phillips curve.

After 2010, the economy slowly recovered. Unemployment gradually declined, while the rate of inflation remained between 1 and 2 percent. One notable feature of this period is that the very low inflation of 2009 and 2010 does not appear to have substantially reduced expected inflation and shifted the short-run Phillips curve downward. Instead, expected inflation appears to have remained steady at

**FIGURE 13****The Phillips Curve during and after the Recession of 2008–2009**

This figure shows annual data from 2006 to 2018 on the unemployment rate and on the inflation rate (as measured by the GDP deflator). A financial crisis caused aggregate demand to plummet, leading to much higher unemployment and pushing inflation down to a very low level.

Source: U.S. Department of Labor; U.S. Department of Commerce.

about 2 percent, keeping the short-run Phillips curve relatively stable. A common explanation for this phenomenon is that the Federal Reserve had, over the previous 20 years, established a lot of credibility in its commitment to keep inflation at about 2 percent. This credibility kept expected inflation well-anchored. As a result, the position of the short-run Phillips curve reacted less to the dramatic short-run events.

By 2018, the unemployment rate fell below 4 percent, and inflation reached 2.3 percent, its highest level since 2007. With unemployment below most estimates of the natural rate and inflation slightly above the Fed's target of 2 percent, the Fed pursued a more contractionary monetary policy, raising the federal funds rate from the roughly zero rates that prevailed from December 2008 to December 2015 to 2.4 percent in early 2019. How much more monetary tightening would be needed, if any, to keep unemployment near its natural rate and inflation near its target was a hotly debated topic.

**QuickQuiz**

8. Reducing inflation will tend to be costly if
  - a. policymakers are credibly committed to low inflation.
  - b. wages and prices are not very sticky.
  - c. expectations of inflation are slow to adjust.
  - d. central bankers exhibit a strong dislike of inflation.
  
9. Advocates of the theory of rational expectations believe that
  - a. the sacrifice ratio can be much smaller if policymakers make a credible commitment to low inflation.
  - b. if disinflation catches people by surprise, it will have minimal impact on unemployment.
  - c. wage and price setters never expect the central bank to follow through on its announcements.
  - d. expected inflation depends on the rates of inflation that people have recently observed.

Answers at end of chapter.

## 35-5 Conclusion

This chapter has examined how economists' thinking about inflation and unemployment has evolved. We have discussed the ideas of many of the best economists of the 20th century: from the Phillips curve of Phillips, Samuelson, and Solow, to the natural-rate hypothesis of Friedman and Phelps, to the rational-expectations theory of Lucas, Sargent, and Barro. Six members of this group won Nobel Prizes for their work in economics.

Although the trade-off between inflation and unemployment has generated much intellectual turmoil, certain principles have developed that command consensus. Here is how Milton Friedman expressed the relationship between inflation and unemployment in 1968:

There is always a temporary tradeoff between inflation and unemployment; there is no permanent tradeoff. The temporary tradeoff comes not from inflation per se, but from unanticipated inflation, which generally means, from a rising rate of inflation. The widespread belief that there is a permanent tradeoff is a sophisticated version of the confusion between "high" and "rising" that we all recognize in simpler forms. A rising rate of inflation may reduce unemployment, a high rate will not.

But how long, you will say, is "temporary"? . . . I can at most venture a personal judgment, based on some examination of the historical evidence, that the initial effects of a higher and unanticipated rate of inflation last for something like two to five years.

Today, more than a half-century later, this statement still reflects the view of most macroeconomists.

## CHAPTER IN A NUTSHELL

- The Phillips curve describes a negative relationship between inflation and unemployment. By expanding aggregate demand, policymakers can choose a point on the Phillips curve with higher inflation and lower unemployment. By contracting aggregate demand, policymakers can choose a point on the Phillips curve with lower inflation and higher unemployment.
- The trade-off between inflation and unemployment described by the Phillips curve holds only in the short run. In the long run, expected inflation adjusts to changes in actual inflation, and the short-run Phillips curve shifts. As a result, the long-run Phillips curve is vertical at the natural rate of unemployment.
- The short-run Phillips curve also shifts because of shocks to aggregate supply. An adverse supply shock, such as an increase in world oil prices, gives policy-makers a less favorable trade-off between inflation and unemployment. That is, after an adverse supply shock, policymakers have to accept a higher rate of inflation for any given rate of unemployment or a higher rate of unemployment for any given rate of inflation.
- When the Fed contracts growth in the money supply to reduce inflation, it moves the economy along the short-run Phillips curve, resulting in temporarily high unemployment. The cost of disinflation depends on how quickly expectations of inflation fall. Some economists argue that a credible commitment to low inflation can reduce the cost of disinflation by inducing a quick adjustment of expectations.

## KEY CONCEPTS

Phillips curve, p. 746

natural-rate hypothesis, p. 754

supply shock, p. 757

sacrifice ratio, p. 760

rational expectations, p. 761

## QUESTIONS FOR REVIEW

1. Draw the short-run trade-off between inflation and unemployment. How might the Fed move the economy from one point on this curve to another?
2. Draw the long-run trade-off between inflation and unemployment. Explain how the short-run and long-run trade-offs are related.
3. What is “natural” about the natural rate of unemployment? Why might the natural rate of unemployment differ across countries?
4. Suppose a drought destroys farm crops and drives up the price of food. What is the effect on the short-run trade-off between inflation and unemployment?
5. The Fed decides to reduce inflation. Use the Phillips curve to show the short-run and long-run effects of this policy. How might the short-run costs be reduced?

## PROBLEMS AND APPLICATIONS

1. Suppose the natural rate of unemployment is 6 percent. On one graph, draw two Phillips curves that describe the four situations listed here. Label the point that shows the position of the economy in each case.
  - a. Actual inflation is 5 percent, and expected inflation is 3 percent.
  - b. Actual inflation is 3 percent, and expected inflation is 5 percent.
  - c. Actual inflation is 5 percent, and expected inflation is 5 percent.
  - d. Actual inflation is 3 percent, and expected inflation is 3 percent.
2. Illustrate the effects of the following developments on both the short-run and long-run Phillips curves. Give the economic reasoning underlying your answers.
  - a. a rise in the natural rate of unemployment
  - b. a decline in the price of imported oil
  - c. a rise in government spending
  - d. a decline in expected inflation
3. Suppose that a fall in consumer spending causes a recession.
  - a. Illustrate the immediate change in the economy using both an aggregate-supply/aggregate-demand diagram and a Phillips-curve diagram. On both graphs, label the initial long-run equilibrium as point A and the resulting short-run equilibrium as point B. What happens to inflation and unemployment in the short run?
  - b. Now suppose that over time expected inflation changes in the same direction that actual inflation changes. What happens to the position of the short-run Phillips curve? After the recession is over, does the economy face a better or worse set of inflation–unemployment combinations? Explain.
4. Suppose the economy is in a long-run equilibrium.
  - a. Draw the economy’s short-run and long-run Phillips curves.
  - b. Suppose a wave of business pessimism reduces aggregate demand. Show the effect of this shock on your diagram from part a. If the Fed undertakes expansionary monetary policy, can it return the economy to its original inflation rate and original unemployment rate?
  - c. Now suppose the economy is back in long-run equilibrium and then the price of imported oil rises. Show the effect of this shock with a new diagram like that in part a. If the Fed undertakes expansionary monetary policy, can it return the economy to its original inflation rate and original unemployment rate? If the Fed undertakes contractionary monetary policy, can it return the economy to its original inflation rate and original unemployment rate? Explain why this situation differs from that in part b.
5. The inflation rate is 10 percent, and the central bank is considering slowing the rate of money growth to reduce inflation to 5 percent. Economist Milton believes that expectations of inflation change quickly in response to new policies, whereas economist James believes that expectations are very sluggish. Which economist is more likely to favor the proposed change in monetary policy? Why?
6. Suppose the Federal Reserve’s policy is to maintain low and stable inflation by keeping unemployment at its natural rate. However, the Fed believes that the natural rate of unemployment is 4 percent when the actual natural rate is 5 percent. If the Fed based its policy decisions on its belief, what would happen to the economy? How might the Fed come to realize that its belief about the natural rate was mistaken?

7. Suppose the Federal Reserve announced that it would pursue contractionary monetary policy to reduce inflation. For each of the following conditions, explain whether it would make the ensuing recession more or less severe.
- Wage contracts have short durations.
  - There is little confidence in the Fed's determination to reduce inflation.
  - Expectations of inflation adjust quickly to actual inflation.
8. The Federal Reserve in 2008 faced a decrease in aggregate demand caused by the housing and financial crises and a decrease in short-run aggregate supply caused by rising commodity prices.
- Starting from a long-run equilibrium, illustrate the effects of these two changes using both an aggregate-supply/aggregate-demand diagram and a Phillips-curve diagram. On both diagrams, label the initial long-run equilibrium as point A and the resulting short-run equilibrium as point B. For each of the following variables, state whether it rises or falls or whether the impact is ambiguous: output, unemployment, the price level, the inflation rate.
  - Suppose the Fed responds quickly to these shocks and adjusts monetary policy to keep unemployment and output at their natural rates. What action would it take? On the same set of graphs from part a, show the results. Label the new equilibrium as point C.
  - Why might the Fed choose not to pursue the course of action described in part b?

#### QuickQuiz Answers

1. d    2. b    3. d    4. a    5. c    6. b    7. c    8. c    9. a

# CHAPTER 36

## Six Debates over Macroeconomic Policy

**I**t is hard to follow the news without finding some politician or editorial writer advocating a change in economic policy. The president should raise taxes to reduce the budget deficit, or he should stop worrying about the budget deficit. The Federal Reserve should cut interest rates to stimulate a flagging economy, or it should avoid such moves in order not to risk higher inflation. Congress should reform the tax system to promote faster economic growth, or it should reform the tax system to achieve a more equal distribution of income. Such economic issues are central to the ongoing political debate in the United States and other countries around the world.

Previous chapters have developed the tools that economists use to analyze the behavior of the economy as a whole and the impact of policies on the economy. This final chapter considers six classic questions about macroeconomic policy. Economists have long debated these questions, and they will likely continue to do so for years to come. The knowledge you have accumulated in this course provides the foundation upon which we can discuss these important, unsettled issues. It should help you choose a side in these debates or, at least, help you see why choosing a side is so difficult.



## 36-1 Should Monetary and Fiscal Policymakers Try to Stabilize the Economy?

In the preceding three chapters, we saw how changes in aggregate demand and aggregate supply can lead to short-run fluctuations in production and employment. We also saw how monetary and fiscal policy can shift aggregate demand and influence these fluctuations. But even if policymakers *can* influence short-run economic fluctuations, does that mean they *should*? Our first debate concerns whether monetary and fiscal policymakers should use the tools at their disposal in an attempt to smooth the ups and downs of the business cycle.

### 36-1a Pro: Policymakers Should Try to Stabilize the Economy

Left on their own, economies fluctuate. When households and firms become pessimistic, for instance, they cut back on spending, thereby reducing the aggregate demand for goods and services. The fall in aggregate demand, in turn, reduces the production of goods and services. Firms lay off workers, and the unemployment rate rises. Real GDP and other measures of income fall. Rising unemployment and falling income help confirm the pessimism that initially generated the economic downturn.

Such a recession has no benefit for society—it represents a sheer waste of resources. Workers who lose their jobs because of declining aggregate demand would rather be working. Business owners whose factories are idle during a recession would rather be producing valuable goods and services and selling them at a profit.

There is no reason for society to suffer through the booms and busts of the business cycle. Macroeconomic theory shows policymakers how to reduce the severity of economic fluctuations. By “leaning against the wind” of economic change, monetary and fiscal policy can stabilize aggregate demand and, in turn, production and employment. When aggregate demand is inadequate to ensure full employment, policymakers should boost government spending, cut taxes, and expand the money supply. When aggregate demand is excessive, risking higher inflation, policymakers should cut government spending, raise taxes, and reduce the money supply. Such policy actions put macroeconomic theory to its best use by leading to a more stable economy, which benefits everyone.

### 36-1b Con: Policymakers Should Not Try to Stabilize the Economy

Monetary and fiscal policy can be used to stabilize the economy in theory, but there are substantial obstacles to the use of such policies in practice.

One problem is that monetary and fiscal policies do not affect the economy immediately but instead work with a long lag. Monetary policy affects aggregate demand primarily by changing interest rates, which in turn affect spending, particularly residential and business investment. But many households and firms set their spending plans in advance. As a result, it takes time for changes in interest rates to alter the aggregate demand for goods and services. Many studies indicate that changes in monetary policy have little effect on aggregate demand until about six months after the change is made.

Fiscal policy works with a lag because of the long political process that governs changes in spending and taxes. To make any change in fiscal policy, a bill must go



FRANK MODELL/THE NEW YORKER COLLECTION/THE CARTOON BANK

through congressional committees, pass both the House and the Senate, and be signed by the president. It can take years to propose, pass, and implement a major change in fiscal policy.

Because of these long lags, policymakers who want to stabilize the economy need to look ahead to economic conditions that are likely to prevail when their actions will take effect. Unfortunately, economic forecasting is highly imprecise, in part because macroeconomics is such a primitive science and in part because the shocks that cause economic fluctuations are intrinsically unpredictable. Thus, when policymakers change monetary or fiscal policy, they must rely on educated guesses about future economic conditions.

Too often, policymakers trying to stabilize the economy end up having the opposite effect. Economic conditions can easily change between the time a policy action begins and the time it takes effect. As a result, policymakers can inadvertently exacerbate rather than mitigate the magnitude of economic fluctuations. Some economists have claimed that many of the major economic fluctuations in history, including the Great Depression of the 1930s, can be traced to destabilizing policy actions.

A rule that all physicians learn early in their training is “first, do no harm.” The human body has natural restorative powers. Confronted with a sick patient and an uncertain diagnosis, often a doctor should do nothing but leave the patient’s body to its own devices. Intervening in the absence of reliable knowledge merely risks making matters worse.

The same can be said about treating an ailing economy. It might be desirable for policymakers to eliminate all economic fluctuations, but such a goal is not realistic given the limits of macroeconomic knowledge and the inherent unpredictability of world events. Economic policymakers should refrain from intervening often with monetary and fiscal policy and be content if they do no harm.

### QuickQuiz

1. Approximately how long does it take a change in monetary policy to influence aggregate demand?
  - a. one month
  - b. six months
  - c. two years
  - d. five years
  
2. Fiscal policy has a long lag mainly because
  - a. policymakers at the Federal Reserve do not meet frequently.
  - b. firms making investments are slow to respond to changes in interest rates.
  - c. the political process is slow to enact changes in government spending or taxes.
  - d. consumers are slow to respond to changes in their after-tax incomes.

*Answers at end of chapter.*

## 36-2 Should the Government Fight Recessions with Spending Hikes Rather Than Tax Cuts?

When George W. Bush became president in 2001, the economy was slipping into a recession. He responded by cutting tax rates. When Barack Obama became president in 2009, the economy was in the middle of the Great Recession, the worst economic downturn in many decades. He responded with a stimulus package that offered some tax reductions but also included substantial increases in government spending. The contrast between these two policies illustrates a classic question of macroeconomics: Which instrument of fiscal policy—government spending or taxes—is a better tool for reducing the severity of economic downturns?

### 36-2a Pro: The Government Should Fight Recessions with Spending Hikes

John Maynard Keynes transformed economics when he wrote *The General Theory of Employment, Interest and Money* in the midst of the Great Depression of the 1930s, the worst economic downturn in U.S. history. Since then, economists have understood that the fundamental problem during recessions is inadequate aggregate demand. When firms are unable to sell a sufficient quantity of goods and services, they reduce production and employment. The key to ending recessions is to restore aggregate demand to a level consistent with full employment of the economy's labor force.

To be sure, monetary policy is the first line of defense against economic downturns. By increasing the money supply, the central bank reduces interest rates. Lower interest rates in turn reduce the cost of borrowing to finance investment projects, such as new factories and new housing. Increased spending on investment adds to aggregate demand and helps to restore normal levels of production and employment.

Fiscal policy provides an additional tool to combat recessions. When the government cuts taxes, it increases households' disposable income, encouraging them to increase spending on consumption. When the government buys goods and services, it adds directly to aggregate demand. Moreover, these fiscal actions can have multiplier effects: Higher aggregate demand leads to higher incomes, higher incomes lead to additional consumer spending, and additional consumer spending leads to further increases in aggregate demand.

Fiscal policy is particularly useful when the tools of monetary policy lose their effectiveness. During the Great Recession of 2008 and 2009, for example, the Federal Reserve cut its target interest rate to about zero. The Fed cannot reduce interest rates below zero, because, at that point, people would hold onto their cash rather than

lending it out at a negative interest rate. Thus, once interest rates are at zero, the Fed loses its most powerful tool for stimulating the economy. In this circumstance, it is natural for the government to turn to fiscal policy—taxes and government spending—to prop up aggregate demand.

Traditional Keynesian analysis indicates that increases in government purchases are a more potent tool than decreases in taxes. When households get extra disposable income from a tax cut, they will likely save some of that additional income rather than spend it all (especially if households view the tax reduction as temporary rather than permanent). The fraction of the extra income saved does not contribute to the aggregate demand for goods and services. By contrast, when the government spends a dollar buying a good or service, that dollar immediately and fully adds to aggregate demand.

In 2009, economists in the Obama administration used a conventional macroeconomic model to calculate the magnitude of these effects. According to their computer simulations, each dollar of tax cuts increases GDP by \$0.99, whereas each dollar of government purchases increases GDP by \$1.59. Thus, increases in government spending offer a bigger “bang for the buck” than decreases in taxes. For this reason, the policy response in 2009 featured fewer federal tax cuts and more increases in federal spending.

Policymakers focused on three kinds of spending. First, there was spending on “shovel-ready” projects. These were public works projects such as repairs to highways and bridges on which construction could begin immediately, putting the unemployed back to work. Second, there was federal aid to state and local governments. Because many of these governments are constitutionally required to run balanced budgets, falling tax revenues during recessions can make it necessary for them to lay off teachers, police, and other public workers; federal aid prevented that outcome or, at least, reduced its severity. Third, there were increased payments to the jobless through the unemployment insurance system. Because the unemployed are often financially stretched, they were thought to be likely to spend rather than save this extra income. Thus, these transfer payments were thought to contribute more to aggregate demand—and in turn to production and employment—than tax cuts would. According to the macroeconomic model used by the Obama administration, the \$800 billion stimulus package would create or save more than 3 million jobs by the end of the president’s second year in office.

It is impossible to know for sure what effect the stimulus in fact had. Because we get only one run at history, we cannot observe what would have happened without the stimulus package. Yet one thing is clear: While the economic downturn of 2008–2009 was severe, it could have been worse. In the Great Depression of the 1930s, real GDP fell by 27 percent and unemployment reached 25 percent. In the Great Recession, real GDP fell by only 4 percent and unemployment reached only 10 percent. As judged by either GDP or unemployment, the Great Recession did not approach the magnitude of the Great Depression.

### **36-2b Con: The Government Should Fight Recessions with Tax Cuts**

There is a long tradition of using tax policy to stimulate a moribund economy. President Kennedy proposed a tax reduction as one of his major economic initiatives; it eventually passed under President Johnson in 1964. President Reagan also signed into law significant tax cuts when he became president in 1981. Both of these tax reductions were soon followed by robust economic growth.

Tax cuts have a powerful influence on both aggregate demand and aggregate supply. They increase aggregate demand by increasing households’ disposable income, as emphasized in traditional Keynesian analysis. But they can also increase aggregate

demand by altering incentives. For example, if the tax reductions take the form of an expanded investment tax credit, they can induce increased spending on investment goods. Because investment spending is the most volatile component of GDP over the business cycle, stimulating investment is a key to ending recessions. Policymakers can target investment using well-designed tax policy.

At the same time that tax cuts increase aggregate demand, they can also increase aggregate supply. When the government reduces marginal tax rates, workers keep a higher fraction of any income they earn. As a result, the unemployed have a greater incentive to search for jobs, and the employed have a greater incentive to work longer hours. Increased aggregate supply, along with the increased aggregate demand, means that the production of goods and services can expand without putting upward pressure on the rate of inflation.

There are various problems with increasing government spending during recessions. First of all, consumers understand that higher government spending, together with the government borrowing needed to finance it, will likely lead to higher taxes in the future. The anticipation of those future taxes induces consumers to cut back spending today. Moreover, like most taxes, future taxes are likely to cause a variety of deadweight losses. As businesses look ahead to a more highly distorted future economy, they may reduce their expectations of future profits and reduce investment spending today. Because of these various effects, government-spending multipliers may be smaller than is conventionally believed.

It is also far from clear whether the government can spend money both wisely and quickly. Large government spending projects often require years of planning, as policymakers and voters weigh the costs and benefits of the many alternative courses of action. By contrast, when unemployment soars during recessions, the need for additional aggregate demand is immediate. If the government increases spending quickly, it may end up buying things of little public value. But if it tries to be careful and deliberate in planning its expenditures, it may fail to increase aggregate demand in a timely fashion.

Tax cuts have the advantage of decentralizing spending decisions, rather than relying on a centralized and highly imperfect political process. Households spend their disposable income on things they value. Firms spend their investment dollars on projects they expect to be profitable. By contrast, when the government tries to spend large sums of money fast, subject to various political pressures, it may end up building “bridges to nowhere.” Ill-conceived public projects may employ some workers, but they create little lasting value. Moreover, they will leave future generations of taxpayers with significant additional debts. In the end, the short-run benefits of additional aggregate demand from increased government spending may fail to compensate for the long-run costs.

### QuickQuiz

3. According to traditional Keynesian analysis, which of the following increases aggregate demand the most?
  - a. \$100 billion increase in taxes
  - b. \$100 billion decrease in taxes
  - c. \$100 billion increase in government purchases
  - d. \$100 billion decrease in government purchases
4. A cut in income tax rates tends to \_\_\_\_\_ aggregate demand and \_\_\_\_\_ aggregate supply.
  - a. increase; increase
  - b. increase; decrease
  - c. decrease; increase
  - d. decrease; decrease

*Answers at end of chapter.*

## 36-3 Should Monetary Policy Be Made by Rule Rather Than by Discretion?

As we learned in the chapter on the monetary system, the Federal Open Market Committee sets monetary policy in the United States. The committee meets about every six weeks to evaluate the state of the economy. Based on this evaluation and forecasts of future economic conditions, it chooses whether to raise, lower, or leave unchanged the level of short-term interest rates. The Fed then adjusts the money supply to reach that interest-rate target, which will normally remain unchanged until the next meeting.

The Federal Open Market Committee operates with almost complete discretion over how to conduct monetary policy. The laws that created the Fed give the institution only vague recommendations about what goals it should pursue. A 1977 amendment to the 1913 Federal Reserve Act said the Fed “shall maintain long run growth of the monetary and credit aggregates commensurate with the economy’s long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates.” But the act does not specify how to weight these various goals, nor does it tell the Fed how to pursue whatever objective it might choose.

Some economists are critical of this institutional design. Our next debate over macroeconomic policy, therefore, focuses on whether the Fed should have its discretionary powers reduced and, instead, be committed to following a rule for how it conducts monetary policy.

### 36-3a Pro: Monetary Policy Should Be Made by Rule

Discretion in the conduct of monetary policy has two problems. The first is that it does not limit incompetence and abuse of power. When the government sends police into a community to maintain civic order, it gives them strict guidelines about how to carry out their job. Because police have great power, allowing them to exercise that power however they wanted would be dangerous. Yet when the government gives central bankers the authority to maintain economic order, it gives them few guidelines. Monetary policymakers are allowed undisciplined discretion.

One example of the abuse of power is that central bankers are sometimes tempted to use monetary policy to affect the outcome of elections. Suppose that the vote for the incumbent president is based on economic conditions at the time he is up for reelection. A central banker sympathetic to the incumbent might be tempted to pursue expansionary policies just before the election to stimulate production and employment, knowing that the resulting inflation will not show up until after the election. Thus, to the extent that central bankers ally themselves with politicians, discretionary policy can lead to economic fluctuations that reflect the electoral calendar. Economists call such fluctuations the *political business cycle*. Prior to the election of 1972, for instance, President Richard Nixon pressured Fed Chair Arthur Burns to pursue a more expansionary monetary policy, presumably to bolster Nixon’s reelection chances.

The second and subtler problem with discretionary monetary policy is that it might lead to higher inflation than is desirable. Central bankers, knowing that there is no long-run trade-off between inflation and unemployment, often announce that their goal is zero inflation. Yet they rarely achieve price stability. Why? Perhaps it is because, once the public forms expectations of inflation, policymakers face

a short-run trade-off between inflation and unemployment. They are tempted to renege on their announcement of price stability to achieve lower unemployment. This discrepancy between announcements (what policymakers *say* they are going to do) and actions (what they subsequently in fact do) is called the *time inconsistency of policy*. Because policymakers can be time inconsistent, people are skeptical when central bankers announce their intentions to reduce inflation. As a result, people often expect higher inflation than monetary policymakers claim they are trying to achieve. Higher expectations of inflation, in turn, shift the short-run Phillips curve upward, making the short-run trade-off between inflation and unemployment less favorable than it otherwise might be.

One way to avoid these two problems with discretionary policy is to commit the central bank to a policy rule. For example, suppose that Congress passed a law requiring the Fed to increase the money supply by exactly 3 percent per year. (Why 3 percent? Because real GDP grows on average about 3 percent per year, and because money demand grows with real GDP, 3 percent growth in the money supply is roughly the rate necessary to produce long-run price stability.) Such a law would eliminate incompetence and abuse of power on the part of the Fed, and it would make the political business cycle impossible. In addition, policy could no longer be time inconsistent. People would now believe the Fed's announcement of low inflation because the Fed would be legally required to pursue a low-inflation monetary policy. With low expected inflation, the economy would face a more favorable short-run trade-off between inflation and unemployment.

Other rules for monetary policy are also possible. A more active rule might allow some feedback from the state of the economy to changes in monetary policy. For example, a more active rule might require the Fed to increase monetary growth by 1 percentage point for every percentage point that unemployment rises above its natural rate. Regardless of the precise form of the rule, committing the Fed to some rule would yield advantages by limiting incompetence, abuse of power, and time inconsistency in the conduct of monetary policy.

### **36-3b Con: Monetary Policy Should Not Be Made by Rule**

There may be pitfalls with discretionary monetary policy, but there is also an important advantage to it: flexibility. The Fed has to confront various circumstances, not all of which can be foreseen. In the 1930s, banks failed in record numbers. In the 1970s, the price of oil skyrocketed around the world. In October 1987, the stock market fell by 22 percent in a single day. From 2007 to 2009, house prices dropped, home foreclosures soared, and the financial system experienced significant problems. The Fed must decide how to respond to these shocks to the economy. A designer of a policy rule could not possibly consider all the contingencies and specify in advance the right policy response. It is better to appoint good people to conduct monetary policy and then give them the freedom to do the best they can.

Moreover, the alleged problems with discretion are largely hypothetical. The practical importance of the political business cycle, for instance, is far from clear. While it is true that Nixon tried to pressure Burns in 1972, it is not clear that he succeeded: Interest rates rose significantly during the election year. Moreover, in some cases, just the opposite seems to occur. President Jimmy Carter appointed Paul Volcker to head the Federal Reserve in 1979. Nonetheless, in October of that

year, Volcker switched to a contractionary monetary policy to combat the high inflation that he had inherited from his predecessor. The predictable result of Volcker's decision was a recession, and the predictable result of the recession was a decline in Carter's popularity. Rather than using monetary policy to help the president who had appointed him, Volcker took actions he thought were in the national interest, even though they contributed to Carter's defeat by Ronald Reagan in the November 1980 election.

The practical importance of time inconsistency is also far from clear. Although most people are skeptical of central-bank announcements, central bankers can achieve credibility over time by backing up their words with actions. In the 1990s and 2000s, the Fed achieved and maintained a low rate of inflation, despite the ever-present temptation to take advantage of the short-run trade-off between inflation and unemployment. This experience shows that low inflation does not require that the Fed be committed to a policy rule.

Any attempt to replace discretion with a rule must confront the difficult task of specifying a precise rule. Despite much research examining the costs and benefits of alternative rules, economists have not reached consensus about what a good rule would be. Until there is consensus, society has little choice but to give central bankers discretion to conduct monetary policy as they see fit.

## FYI

### Inflation Targeting

Over the past few decades, many central banks around the world have adopted a policy called *inflation targeting*. Sometimes this policy takes the form of a central bank announcing its intentions regarding the inflation rate over the next few years. At other times it takes the form of a national law that specifies an inflation goal for the central bank.

Inflation targeting is not a commitment to an ironclad rule. In all the countries that have adopted inflation targeting, central banks still have a fair amount of discretion. Inflation targets are often set as a range—an inflation rate of 1 to 3 percent, for example—rather than a single number. Thus, the central bank can choose where in the range it wants to be. Moreover, the central bank is sometimes allowed to adjust its target for inflation, at least temporarily, if some event (such as a shock to world oil prices) pushes inflation outside the target range.

Although inflation targeting leaves the central bank with some discretion, the policy does constrain how that discretion is used. When a central bank is told simply to “do the right thing,” it is hard to hold the central bank accountable, because people can argue forever about what is right. By contrast, when a central bank has an inflation target, the public can more easily judge whether the central bank is meeting its goals. Inflation targeting does not tie the hands of the central bank, but it does increase the transparency and accountability of monetary policy. In a sense, inflation targeting is a compromise in the debate over rules versus discretion.

Compared with other central banks around the world, the Federal Reserve was slow to adopt a policy of inflation targeting, although some commentators had long suggested that the Fed had an implicit inflation target of about 2 percent. In January 2012, the Federal Open Market Committee made the policy more explicit. Its press release read as follows:

*The inflation rate over the longer run is primarily determined by monetary policy, and hence the Committee has the ability to specify a longer-run goal for inflation. The Committee judges that inflation at the rate of 2 percent, as measured by the annual change in the price index for personal consumption expenditures, is most consistent over the longer run with the Federal Reserve's statutory mandate. Communicating this inflation goal clearly to the public helps keep longer-term inflation expectations firmly anchored, thereby fostering price stability and moderate long-term interest rates and enhancing the Committee's ability to promote maximum employment in the face of significant economic disturbances.*

**Source:** “Policy Makers Rethink a 2% Inflation Target.” *Wall Street Journal*, September 24, 2018

### QuickQuiz

5. Advocates for setting monetary policy by rule rather than discretion often argue that
  - a. central bankers with discretion are tempted to renege on their announced commitments to low inflation.
  - b. central bankers following a rule will be more responsive to the needs of the political process.
  - c. fiscal policy is better than monetary policy as a tool for economic stabilization.
  - d. it is sometimes useful to give the economy a burst of surprise inflation.
6. A policy of inflation targeting
  - a. removes the need for discretionary decision making by central bankers.
  - b. frees central bankers from having to respond to shocks to aggregate demand.
  - c. makes central bank policy more transparent and accountable.
  - d. has been abandoned by most central banks around the world.

*Answers at end of chapter.*

## 36-4 Should the Central Bank Aim for Zero Inflation?

One of the *Ten Principles of Economics* introduced in Chapter 1, and developed more fully in the chapter on money growth and inflation, is that prices rise when the government prints too much money. Another of the *Ten Principles of Economics* introduced in Chapter 1, and developed more fully in the preceding chapter, is that society faces a short-run trade-off between inflation and unemployment. Put together, these two principles raise a question for policymakers: How much inflation should the central bank be willing to tolerate? Our next debate is whether zero is the right target for the inflation rate.

### 36-4a Pro: The Central Bank Should Aim for Zero Inflation

Inflation confers no benefit on society, but it imposes several real costs. As we have discussed, economists have identified six costs of inflation:

- Shoeleather costs associated with reduced money holdings
- Menu costs associated with more frequent adjustment of prices
- Increased variability of relative prices
- Unintended changes in tax liabilities due to non-indexation of the tax code
- Confusion and inconvenience resulting from a changing unit of account
- Arbitrary redistributions of wealth associated with dollar-denominated debts

Some economists argue that these costs are small, at least at moderate rates of inflation, such as the 2 percent inflation experienced in the United States during the first two decades of the 21st century. But other economists claim these costs can be substantial, even during periods of moderate inflation. Moreover, there is no doubt that the public dislikes inflation. When inflation heats up, opinion polls identify inflation as one of the nation's leading problems.

The benefits of zero inflation have to be weighed against the costs of achieving it. Reducing inflation usually requires a period of high unemployment and low output, as illustrated by the short-run Phillips curve. But this disinflationary recession is only temporary. Once people come to understand that policymakers are aiming for zero inflation, expectations of inflation will fall and the short-run trade-off will improve. Because expectations adjust, there is no trade-off between inflation and unemployment in the long run.

Reducing inflation is, therefore, a policy with temporary costs and permanent benefits. Once the disinflationary recession is over, the benefits of zero inflation persist into the future. If policymakers are farsighted, they should be willing to incur the temporary costs for the permanent benefits. This was precisely the calculation made by Paul Volcker in the early 1980s, when he tightened monetary policy and reduced inflation from about 10 percent in 1980 to about 4 percent in 1983. Although in 1982 unemployment reached its highest level since the Great Depression, the economy eventually recovered from the recession, leaving a legacy of low inflation. Today, Volcker is considered a hero among central bankers.

Moreover, the costs of reducing inflation need not be as large as some economists claim. If the Fed announces a credible commitment to zero inflation, it can directly influence expectations of inflation. Such a change in expectations can improve the short-run trade-off between inflation and unemployment, allowing the economy to reach lower inflation at a reduced cost. The key to this strategy is credibility: People must believe that the Fed is actually going to carry through on its announced policy. Congress could help in this regard by passing legislation that makes price stability the Fed's primary goal. Such a law would decrease the cost of achieving zero inflation without reducing any of the resulting benefits.

One advantage of a zero-inflation target is that zero provides a more natural focal point for policymakers than any other number. In recent years, the Fed has pursued an inflation target of 2 percent, and inflation has remained reasonably close to that target. But will the Fed continue to stick to that 2 percent target? If events inadvertently pushed inflation up to 3 or 4 percent, why wouldn't the Fed just raise the target? There is, after all, nothing special about the number 2. By contrast, zero is the only number for the inflation rate at which the Fed can claim that it has achieved price stability and fully eliminated the costs of inflation.

### **36-4b Con: The Central Bank Should Not Aim for Zero Inflation**

Price stability may be desirable, but the additional benefits of having zero inflation rather than having moderate inflation are small, whereas the costs of reaching zero inflation are large. Estimates of the sacrifice ratio suggest that reducing inflation by 1 percentage point requires giving up about 5 percent of one year's output. Reducing inflation from, say, 4 percent to zero requires a loss of 20 percent of a year's output. People might dislike inflation of 4 percent, but it is not at all clear that they would (or should) be willing to pay 20 percent of a year's income to get rid of it.

The social costs of disinflation are even larger than this 20 percent figure suggests, for the lost income is not spread equitably over the population. When the economy goes into recession, all incomes do not fall proportionately. Instead, the fall in aggregate income is concentrated on those workers who lose their jobs. The vulnerable workers are often those with the least skills and experience. Hence, much of the cost of reducing inflation is borne by those who can least afford to pay it.

Economists can list several costs of inflation, but there is no professional consensus that these costs are substantial. The shoeleather costs, menu costs, and others that economists have identified do not seem great, at least for moderate rates of inflation. It is true that the public dislikes inflation, but the public may be misled into believing the inflation fallacy—the view that inflation erodes living standards. Economists understand that living standards depend on productivity,

not monetary policy. Because inflation in nominal incomes goes hand in hand with inflation in prices, reducing inflation would not cause real incomes to rise more rapidly.

Moreover, policymakers can reduce many of the costs of inflation without actually reducing inflation. They can eliminate the problems associated with the non-indexed tax system by rewriting the tax laws to account for the effects of inflation. They can also reduce the arbitrary redistributions of wealth between creditors and debtors caused by unexpected inflation by issuing indexed government bonds, as the Clinton administration did in 1997. Such an act insulates holders of government debt from inflation. In addition, by setting an example, the policy might encourage private borrowers and lenders to write debt contracts indexed for inflation.

Reducing inflation might be desirable if it could be done at no cost, as some economists argue is possible. Yet this trick seems hard to carry out in practice. When economies reduce their rate of inflation, they almost always experience a period of high unemployment and low output. It is risky to believe that the central bank could achieve credibility so quickly as to make disinflation painless.

Indeed, a disinflationary recession can potentially leave permanent scars on the economy. Firms in all industries reduce their spending on new plants and equipment substantially during recessions, making investment the most volatile component of GDP. Even after the recession is over, the smaller stock of capital reduces productivity, incomes, and living standards below the levels they otherwise would have achieved. In addition, when workers become unemployed in recessions, they lose job skills, permanently reducing their value as workers.

## IN THE NEWS

### A Central Bank Assesses Its Policy

*Fed policymakers have been rethinking how best to implement their target for inflation.*

#### Fed Officials to Mull Inflation Target Shift

By Nick Timiraos

Top Federal Reserve officials said Friday that the central bank would consider broad changes to its policy framework to encourage periods of modestly higher inflation, a response to the challenges the Fed has faced in driving inflation higher in recent years.

New York Fed President John Williams, speaking at a conference in New York, said central bankers need to guard against consumers and businesses coming to anticipate

low inflation, lest their expectations become self-fulfilling.

The Fed set a 2% inflation target in 2012, but inflation has run below that level for much of the recent expansion. A measure of inflation that excludes volatile food and energy categories has averaged 1.6%, though it was running at 1.9% at the end of last year. The Fed seeks to maintain stable prices by influencing households' and businesses' inflation expectations.

Many Fed officials believe the American public has generally come to expect inflation around 2%, helping restrain price pressures, in contrast to the 1970s when people's expectations of rapidly rising prices helped to actually push them higher.

"The persistent undershoot of the Fed's target risks undermining the 2% inflation anchor," said Mr. Williams. Because

short-term interest rates aren't likely to rise as high as they have in the past, the Fed will likely have less room to cut rates to stimulate growth in a downturn.

"The risk of the inflation-expectations anchor slipping toward shore calls for a reassessment of the dominant inflation-targeting framework," Mr. Williams said.

With the Fed's current target, the central bank aims for 2% inflation every year, no matter what happened the year before.

Under a forthcoming review of the Fed's strategies, Fed Vice Chairman Richard Clarida said Friday that the central bank would consider a policy, such as one advocated by Mr. Williams, under which it might react to what happened in the past if it undershoots inflation—a so-called "makeup" policy.

Academic models show that "these makeup strategies lead to better average

A little bit of inflation may even be a good thing. Some economists believe that inflation “greases the wheels” of the labor market. Because workers resist cuts in nominal wages, a fall in real wages is more easily accomplished with a rising price level. Inflation thus makes it easier for real wages to adjust to changes in labor-market conditions.

In addition, inflation allows for the possibility of negative real interest rates. Nominal interest rates can never fall below zero, because lenders can always hold on to their money rather than lending it out at a negative return. If inflation is zero, real interest rates can also never be negative. However, if inflation is positive, then a cut in nominal interest rates below the inflation rate produces negative real interest rates. Sometimes the economy may need negative real interest rates to provide sufficient stimulus to aggregate demand—an option ruled out by zero inflation.

In light of all these arguments, why should policymakers put the economy through a costly and inequitable disinflationary recession to achieve zero inflation? Economist Alan Blinder, who was once vice chairman of the Federal Reserve, argued in his book *Hard Heads, Soft Hearts* that policymakers should not make this choice:

The costs that attend the low and moderate inflation rates experienced in the United States and in other industrial countries appear to be quite modest—more like a bad cold than a cancer on society. . . . As rational individuals, we do not volunteer for a lobotomy to cure a head cold. Yet, as a collectivity, we routinely prescribe the economic equivalent of lobotomy (high unemployment) as a cure for the inflationary cold.

Blinder concludes that it is better to learn to live with moderate inflation.

“performance” of meeting the Fed’s goals of keeping prices stable while maximizing employment, he said, speaking separately at the same conference.

One critical question, he added, is whether those policies can work as effectively in the real world, where central banks must convince households and businesses that they will indeed follow through in encouraging higher inflation.

The Fed said last fall that it would conduct a review this year of its monetary-policy strategy and communications, to culminate in a research conference sponsored by the central bank in Chicago in early June.

Mr. Williams responded to a paper presented at the conference in New York on Friday by highlighting the prospects for inflation to pick up as unemployment has fallen.

At issue is the framework known as the Phillips curve, which has long animated thinking in mainstream economics and inside the central bank. It holds that inflation rises as

slack—the unused or under-utilized resources across the economy—declines, and that the disappearance of slack can best be measured as unemployment declines below a level estimated to be consistent with stable prices.

Several changes in the structure of the economy have weakened the relationship between inflation and unemployment, said San Francisco Fed President Mary Daly, who also discussed the paper at the New York conference on Friday. Those changes include weaker bargaining power for workers, as well as changes in the composition of the workforce that could create more slack than is measured by the unemployment rate.

Given those changes and the weak response of inflation to tighter labor markets in recent years, “you don’t want to react too quickly to the idea inflation could be just around the corner,” Ms. Daly said.

While the paper presented Friday warned of so-called nonlinearities in the relationship

between prices and unemployment—that is, the potential for prices to accelerate higher as unemployment drops lower—Ms. Daly played down her concern about the prospect for any acceleration that would catch Fed officials flat-footed.

Price pressures “form in such a way that we can see them in advance,” she said. ■

### Questions to Discuss

1. Do you think it is a good idea for the Fed, when it undershoots its inflation target, to make up for the past miss by subsequently overshooting its inflation target? Why or why not?
2. If, as the article suggests, the Phillips curve relationship between inflation and unemployment has weakened in recent years, how should that development alter the conduct of monetary policy? As a result of this change, should the Fed focus more on unemployment or more on inflation?

**Source:** *The Wall Street Journal*, February 23, 2019.

### QuickQuiz

7. Which of the following is NOT an argument for a zero rate of inflation?
- It eliminates distortions from a non-indexed tax code.
  - It encourages people to hold a greater quantity of money.
  - It reduces the menu costs that firms have to incur.
  - It stops real wages from falling if nominal wages cannot be cut.
8. Which of the following is NOT an argument for a positive rate of inflation?
- It permits real interest rates to be negative.
  - It increases the variability of relative prices.
  - It allows real wages to fall without cuts in nominal wages.
  - It would be costly to reduce inflation to zero.

[Answers at end of chapter.](#)

## 36-5 Should the Government Balance Its Budget?

A persistent macroeconomic debate concerns the government's finances. Whenever the government spends more than it collects in tax revenue, it finances this budget deficit by issuing government debt. In our study of financial markets, we saw how budget deficits affect saving, investment, and interest rates. But how big a problem are budget deficits? Our next debate concerns whether fiscal policymakers should make balancing the government's budget a high priority.

### 36-5a Pro: The Government Should Balance Its Budget

The U.S. federal government is far more indebted today than it was four decades ago. In 1980, the federal debt was \$712 billion; in 2018, it was \$15.8 trillion. If we divide today's debt by the size of the population, we learn that each person's share of the government debt is about \$48,000.

The most direct effect of the government debt is to place a burden on future generations of taxpayers. When these debts and accumulated interest come due, future taxpayers will face a difficult choice. They can choose some combination of higher taxes and less government spending to make resources available to pay off the debt and accumulated interest. Or, instead, they can delay the day of reckoning and put the government into even deeper debt by borrowing once again to pay off the old debt and interest. In essence, when the government runs a budget deficit and issues government debt, it allows current taxpayers to pass the bill for some of their government spending on to future taxpayers. Inheriting such a large debt will lower the living standard of future generations.

In addition to this direct effect, budget deficits have various macroeconomic effects. Because budget deficits represent *negative* public saving, they lower national saving (the sum of private and public saving). Reduced national saving causes real interest rates to rise and investment to fall. Reduced investment leads over time to a smaller stock of capital. A lower capital stock reduces labor productivity, real wages, and the economy's production of goods and services. Thus, when the government increases its debt, future generations are born into an economy with lower incomes as well as higher taxes.

There are, nevertheless, situations in which running a budget deficit is justifiable. Throughout history, the most common cause of increased government debt has been war. When a military conflict raises government spending temporarily, it is reasonable to finance this extra spending by borrowing. Otherwise, taxes during

wartime would have to rise precipitously. Such high tax rates would greatly distort the incentives faced by those who are taxed, leading to large deadweight losses. In addition, such high tax rates would be unfair to current citizens who are making the sacrifice of fighting the war to ensure security and freedom not only for themselves but also for future generations.

Similarly, it is reasonable to allow a budget deficit during a temporary downturn in economic activity. When the economy goes into a recession, tax revenue falls automatically because the income tax and the payroll tax are levied on measures of income. If the government tried to balance its budget during a recession, it would have to raise taxes or cut spending at a time of high unemployment. Such a policy would tend to depress aggregate demand at precisely the time it needed to be stimulated and, therefore, would tend to increase the magnitude of economic fluctuations.

Yet not all budget deficits can be justified as a result of war or recession. In 2019, the Congressional Budget Office (CBO) projected that, if current policies are maintained, U.S. government debt as a percentage of GDP would increase from 78 percent in 2019 to 147 percent in 2049. Yet the CBO made the optimistic assumption the nation will experience neither a major military conflict nor a major economic downturn during this period. The government was projected to run sizable budget deficits simply because presidents and Congresses had committed the federal government to a variety of spending programs without passing the taxes necessary to fund them.

This projected policy is unsustainable. Eventually, the government will need to admit its past mistakes and enact measures to bring spending in line with tax revenue. The open question is whether the fiscal adjustment should take the form of reduced spending, increased taxes, or a combination of the two. Compared with the alternative of ongoing budget deficits, a balanced budget means greater national saving, increased capital accumulation, and faster economic growth. It means that future college graduates will enter a more prosperous economy.

### 36-5b Con: The Government Should Not Balance Its Budget

The problem of government debt is often exaggerated. Although the government debt does represent a tax burden on younger generations, it is not large compared to the average person's lifetime income. The debt of the U.S. federal government is about \$48,000 per person. A person who works 40 years for \$50,000 a year will earn \$2 million over his lifetime. His share of the government debt represents only about 2.4 percent of his lifetime resources.

Moreover, it is misleading to consider the effects of budget deficits in isolation. The budget deficit is just one piece of a larger picture of how the government chooses to raise and spend money. In making these decisions about fiscal policy, policymakers affect different generations of taxpayers in many ways. The government's budget deficit or surplus should be evaluated together with these other policies.

For example, suppose the government reduces the budget deficit by cutting spending on public investments, such as education. Does this policy make younger generations better off? The government debt will be smaller when they enter the labor force, reducing their tax burden. Yet if they are less educated than they otherwise would be, their productivity and incomes will be lower. Many studies find that the return to schooling (the increase in a worker's wage that results from an additional year in school) is quite large. Reducing the budget deficit rather than funding more education spending could, all things considered, make future generations worse off.



DMSFOTOS/SHUTTERSTOCK.COM

*"What?!? My share of the government debt is \$48,000?"*

Single-minded concern about the budget deficit is also dangerous because it draws attention away from various other policies that redistribute income across generations. For example, in the 1960s and 1970s, the U.S. federal government raised Social Security benefits for the elderly. It financed this higher spending by increasing the payroll tax on the working-age population. This policy redistributed income away from younger generations toward older generations, even though it did not affect the government debt. Thus, the budget deficit is only a small part of the larger issue of how government policy affects the welfare of different generations.

To some extent, forward-looking parents can reverse the adverse effects of government debt. Parents can offset the impact simply by saving and leaving a larger bequest. The bequest would enhance their children's ability to bear the burden of future taxes. Some economists claim that people do in fact behave this way. If this were true, higher private saving by parents would offset the public dissaving of budget deficits; as a result, deficits would not affect the economy. Most economists doubt that parents are so farsighted, but some people probably do act this way, and anyone could. Deficits give people the opportunity to consume at the expense of their children, but deficits do not require them to do so. If the government debt were actually a great problem facing future generations, some parents would help to solve it.

Critics of budget deficits sometimes assert that the government debt cannot continue to rise forever, but in fact, it can. Just as a bank evaluating a loan application would compare a person's debts to his income, we should judge the burden of the government debt relative to the size of the nation's income. Population growth and technological progress cause the total income of the U.S. economy to grow over time. As a result, the nation's ability to pay the interest on the government debt grows over time as well. As long as the government debt grows more slowly than the nation's income, there is nothing to prevent the government debt from growing forever.

Some numbers can put this into perspective. The CBO projects that the real output of the U.S. economy will grow by about 2 percent per year. If the inflation rate is also 2 percent per year, as the Fed is targeting, then nominal income will grow at 4 percent per year. The government debt can therefore rise by 4 percent per year without increasing the ratio of debt to income. In 2018, the federal government debt was \$15.8 trillion; 4 percent of this figure is \$632 billion. As long as the federal budget deficit is smaller than \$632 billion, the policy is sustainable.

To be sure, very large budget deficits cannot persist forever. The \$1 trillion budget deficits projected for 2020 and beyond may be too large. But zero is the wrong target for fiscal policymakers. As long as the deficit is only moderate in size, there will never be a day of reckoning that forces government borrowing to end or the economy to collapse.

### QuickQuiz

9. Throughout U.S. history, what has been the most common cause of substantial increases in government debt?
  - a. recessions
  - b. wars
  - c. financial crises
  - d. tax cuts
10. Other things equal, when the government runs a large budget deficit, it \_\_\_\_\_ national saving and thereby \_\_\_\_\_ capital formation and productivity growth.
  - a. increases; increases
  - b. increases; decreases
  - c. decreases; increases
  - d. decreases; decreases

*Answers at end of chapter.*

## 36-6 Should the Tax Laws Be Reformed to Encourage Saving?

A nation's standard of living depends on its ability to produce goods and services. This was one of the *Ten Principles of Economics* in Chapter 1. As we saw in the chapter on production and growth, a nation's productive capability, in turn, is determined largely by how much it saves and invests for the future. Our last debate is whether policymakers should reform the tax laws to encourage greater saving and investment.

### 36-6a Pro: The Tax Laws Should Be Reformed to Encourage Saving

A nation's saving rate is a key determinant of its long-run prosperity. When the saving rate is higher, more resources are available for investment in new plant and equipment. A larger stock of plant and equipment, in turn, raises labor productivity, wages, and incomes. It is, therefore, no surprise that international data show a positive correlation between national saving rates and measures of economic well-being.

Another of the *Ten Principles of Economics* in Chapter 1 is that people respond to incentives. This lesson should apply to people's decisions about how much to save. If a nation's laws make saving attractive, people will save a higher fraction of their incomes, and this higher saving will lead to a more prosperous future.

Unfortunately, the U.S. tax system discourages saving by taxing the return to saving quite heavily. For example, consider a 25-year-old worker who saves \$1,000 of his income to have a more comfortable retirement at the age of 70. If he buys a bond that pays an interest rate of 10 percent, the \$1,000 will accumulate at the end of 45 years to \$72,900 in the absence of taxes on interest. But suppose he faces a marginal tax rate on interest income of 40 percent, which is typical for many workers once federal and state income taxes are added together. In this case, his after-tax interest rate is only 6 percent, and the \$1,000 will accumulate at the end of 45 years to only \$13,800. That is, accumulated over this long span of time, the tax rate on interest income reduces the benefit of saving \$1,000 from \$72,900 to \$13,800—or by about 80 percent.

The tax code further discourages saving by taxing some forms of capital income twice. Suppose a person uses some of his saving to buy stock in a corporation. When the corporation earns a profit from its capital investments, it first pays tax on this profit in the form of the corporate income tax. If the corporation pays out the rest of the profit to the stockholder in the form of dividends, the stockholder pays tax on this income a second time in the form of the individual income tax. This double taxation substantially reduces the return to the stockholder, thereby reducing the incentive to save.

The tax laws again discourage saving if a person wants to leave his accumulated wealth to his children (or anyone else) rather than consuming it during his lifetime. Parents can bequeath some money to their children tax-free, but if the bequest becomes large, the estate tax rate can be as high as 40 percent. To a large extent, concern about national saving is motivated by a desire to ensure economic prosperity for future generations. It is odd, therefore, that the tax laws discourage the most direct way in which one generation can help the next.

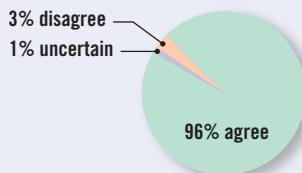
In addition to the tax code, many other policies and institutions in our society reduce the incentive for households to save. Some government benefits, such as welfare and Medicaid, are means-tested. That is, the benefits are reduced for those who in the past have been prudent enough to save some of their income. Similarly,

**ASK THE EXPERTS**

## Taxing Capital and Labor

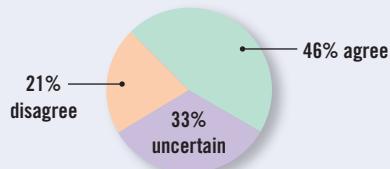
"One drawback of taxing capital income at a lower rate than labor income is that it gives people incentives to relabel income that policymakers find hard to categorize as 'capital' rather than 'labor'."

### What do economists say?



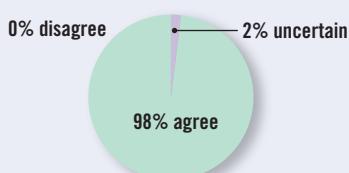
"Despite relabeling concerns, taxing capital income at a permanently lower rate than labor income would result in higher average long-term prosperity, relative to an alternative that generated the same amount of tax revenue by permanently taxing capital and labor income at equal rates instead."

### What do economists say?



"Although they do not always agree about the precise likely effects of different tax policies, another reason why economists often give disparate advice on tax policy is because they hold differing views about choices between raising average prosperity and redistributing income."

### What do economists say?



Source: IGM Economic Experts Panel, October 9, 2012.

colleges and universities grant financial aid as a function of the wealth of the students and their parents. Such a policy is like a tax on wealth and, as such, discourages students and parents from saving.

There are various ways in which the tax code could provide an incentive to save, or at least reduce the disincentive that households now face. Already the tax laws give preferential treatment to some types of retirement saving. When a taxpayer puts income into an Individual Retirement Account (IRA), for instance, that income and the interest it earns are not taxed until the funds are withdrawn at retirement. The tax code gives a similar tax advantage to retirement accounts that go by other names, such as 401(k), 403(b), and profit-sharing plans. There are, however, limits on who is eligible to use these plans and on the amount an eligible person can put into them. Moreover, because there are penalties for withdrawal before retirement age, these retirement plans provide little incentive for other types of saving, such as saving to buy a house or pay for college. A small step to encourage greater saving would be to expand the ability of households to use such tax-advantaged savings accounts.

A more comprehensive approach would be to reconsider the entire basis by which the government collects revenue. The centerpiece of the U.S. tax system is the income tax. A dollar earned is taxed the same whether it is spent or saved. An alternative advocated by many economists is a consumption tax. Under a consumption tax, a household pays taxes only on the basis of what it spends. Income that is saved is exempt from taxation until the saving is later withdrawn and spent on consumption goods. In essence, a consumption tax automatically puts all saving into a tax-advantaged savings account, much like an IRA. A switch from income taxation to consumption taxation would greatly increase the incentive to save.

### 36-6b Con: The Tax Laws Should Not Be Reformed to Encourage Saving

Increasing saving may be desirable, but it is not the only goal of tax policy. Policymakers also must be sure to distribute the tax burden fairly. The problem with proposals to increase the incentive to save is that they increase the tax burden on those who can least afford it.

It is undeniable that high-income households save a greater fraction of their income than low-income households. As a result, any tax change that favors people who save will also tend to favor people with high income. Policies such as tax-advantaged retirement accounts may seem appealing, but they lead to a less egalitarian society. By reducing the tax burden on the wealthy who can take advantage of these accounts, they force the government to raise the tax burden on the poor.

Moreover, tax policies designed to encourage saving may not be effective at achieving that goal. Economic theory does not give a clear prediction about whether a higher rate of return would increase saving. The outcome depends on the relative size of two conflicting forces, called the *substitution effect* and the *income effect*. On the one hand, a higher rate of return raises the benefit of saving: Each dollar saved today produces more consumption in the future. This substitution effect tends to increase saving. On the other hand, a higher rate of return lowers the need for saving: A household has to save less to achieve any target level of consumption in the future. This income effect tends to reduce saving. If the substitution and income effects approximately cancel each other, as some studies suggest, then saving will not change when lower taxation of capital income raises the rate of return.

There are ways to increase national saving other than by giving tax breaks to the rich. National saving is the sum of private and public saving. Instead of trying to alter the tax code to encourage greater private saving, policymakers can simply raise public saving by reducing the budget deficit, perhaps by raising taxes on the wealthy. This approach offers a direct way of raising national saving and increasing prosperity for future generations.

Indeed, once public saving is taken into account, tax provisions to encourage saving might backfire. Tax changes that reduce the taxation of capital income reduce government revenue and, thereby, lead to a larger budget deficit. To increase national saving, such changes in the tax code must increase private saving by more than they decrease public saving. If they fail to do so, so-called saving incentives can potentially make matters worse.

### QuickQuiz

- |   |  |
|---|--|
| <p>11. Advocates of taxing consumption rather than income argue that</p> <ol style="list-style-type: none"> <li>the current tax code discourages people from saving.</li> <li>the rich consume a higher fraction of income than the poor.</li> <li>a consumption tax is a better automatic stabilizer.</li> <li>taxing consumption does not cause any deadweight losses.</li> </ol> | <p>12. Critics of taxing consumption rather than income argue that</p> <ol style="list-style-type: none"> <li>switching to a consumption tax would benefit the rich.</li> <li>private saving does not respond much to tax incentives.</li> <li>reducing the budget deficit is a better way to raise national saving.</li> <li>All of the above.</li> </ol> |
|---|--|

*Answers at end of chapter.*

## 36-7 Conclusion

This chapter has considered six classic debates over macroeconomic policy. For each, it began with a controversial proposition and then offered the arguments pro and con. If you find it hard to choose a side in these debates, you may find some comfort in the fact that you are not alone. The study of economics does not always make it easy to choose among alternative policies. Indeed, by clarifying the trade-offs that policymakers face, it can make the choice more difficult.

Difficult choices, however, have no right to seem easy. When you hear politicians or commentators proposing something that sounds too good to be true, it probably is. If they appear to be offering you a free lunch, you should look for the hidden price tag. Few policies come with benefits and no costs. By helping you see through the fog of rhetoric so common in political discourse, the study of economics should make you a better participant in our national debates.

## CHAPTER IN A NUTSHELL

- Advocates of active monetary and fiscal policy view the economy as inherently unstable and believe that policy can manage aggregate demand to offset the inherent instability. Critics of active monetary and fiscal policy emphasize that policy affects the economy with a lag and that our ability to forecast future economic conditions is poor. As a result, attempts to stabilize the economy can end up being destabilizing.
- Advocates of increased government spending to fight recessions argue that because the extra income from tax cuts may be saved rather than spent, direct government spending provides a greater boost to increase aggregate demand, which is key to promoting production and employment. Critics of spending hikes argue that tax cuts can expand both aggregate demand and aggregate supply and that hasty increases in government spending may lead to wasteful public projects.
- Advocates of rules for monetary policy argue that discretionary policy can suffer from incompetence, the abuse of power, and time inconsistency. Critics of rules for monetary policy argue that discretionary policy is more flexible in responding to changing economic circumstances.
- Advocates of a zero-inflation target emphasize that inflation has many costs and few benefits. Moreover, the cost of eliminating inflation—depressed output and increased unemployment—is only temporary. Even this cost can be reduced if the central bank announces a credible plan to reduce inflation, thereby directly

lowering expectations of inflation. Critics of a zero-inflation target claim that moderate inflation imposes only small costs on society and that the recession necessary to reduce inflation to zero is quite costly. The critics also point out several ways in which moderate inflation may be helpful to an economy.

- Advocates of a balanced government budget argue that budget deficits impose an unjustifiable burden on future generations by raising their taxes and lowering their incomes. Critics of a balanced government budget argue that the deficit is only one small piece of fiscal policy. Single-minded concern about the budget deficit can obscure the many ways in which policy, including various spending programs, affects different generations.
- Advocates of tax incentives for saving point out that our society discourages saving in many ways, such as by heavily taxing capital income and by reducing benefits for those who have accumulated wealth. They endorse reforming the tax laws to encourage saving, perhaps by switching from an income tax to a consumption tax. Critics of tax incentives for saving argue that many proposed changes to stimulate saving would primarily benefit the wealthy, who do not need a tax break. They also argue that such changes might have only a small effect on private saving. Raising public saving by reducing the government's budget deficit would provide a more direct and equitable way to increase national saving.

## QUESTIONS FOR REVIEW

1. What causes the lags in the effect of monetary and fiscal policy on aggregate demand? What are the implications of these lags for the debate over active versus passive policy?
2. According to traditional Keynesian analysis, why does a tax cut have a smaller effect on GDP than a similarly sized increase in government spending? Why might the opposite be the case?
3. What might motivate a central banker to cause a political business cycle? What does the political business cycle imply for the debate over policy rules?
4. Explain how credibility might affect the cost of reducing inflation.
5. Why are some economists against a target of zero inflation?
6. Explain two ways in which a government budget deficit hurts a future worker.
7. What are two situations in which most economists view a budget deficit as justifiable?
8. Some economists say that the government can continue running a budget deficit forever. How is that possible?
9. Some income from capital is taxed twice. Explain.
10. What adverse effect might be caused by tax incentives to increase saving?

## PROBLEMS AND APPLICATIONS

1. The chapter suggests that the economy, like the human body, has “natural restorative powers.”
  - a. Illustrate the short-run effect of a fall in aggregate demand using an aggregate-demand/aggregate-supply diagram. What happens to total output, income, and employment?
  - b. If the government does not use stabilization policy, what happens to the economy over time? Illustrate this adjustment on your diagram. Does it generally occur in a matter of months or a matter of years?
  - c. Do you think the “natural restorative powers” of the economy mean that policymakers should be passive in response to the business cycle?
2. Policymakers who want to stabilize the economy must decide how much to change the money supply, government spending, or taxes. Why is it difficult for policymakers to choose the appropriate strength of their actions?
3. The problem of time inconsistency applies to fiscal policy as well as to monetary policy. Suppose the government announced a reduction in taxes on income from capital investments, like new factories.
  - a. If investors believed that capital taxes would remain low, how would the government’s action affect the level of investment?
  - b. After investors have responded to the announced tax reduction, does the government have an incentive to renege on its policy? Explain.
  - c. Given your answer to part (b), would investors believe the government’s announcement? What can the government do to increase the credibility of announced policy changes?
4. Chapter 2 explains the difference between positive analysis and normative analysis. In the debate about whether the central bank should aim for zero inflation, which areas of disagreement involve positive statements and which involve normative judgments?
5. Why are the benefits of reducing inflation permanent and the costs temporary? Why are the costs of increasing inflation permanent and the benefits temporary? Use Phillips-curve diagrams in your answer.
6. Suppose the federal government cuts taxes and increases spending, raising the budget deficit to 12 percent of GDP. If nominal GDP is rising 5 percent per year, are such budget deficits sustainable forever? Explain. If budget deficits of this size are maintained for 20 years, what is likely to happen to your taxes and your children’s taxes in the future? Can you personally do something today to offset this future effect?
7. Explain how each of the following policies redistributes income across generations. Is the redistribution from young to old or from old to young?
  - a. an increase in the budget deficit
  - b. more generous subsidies for education loans
  - c. greater investments in highways and bridges
  - d. an increase in Social Security benefits
8. What is the fundamental trade-off that society faces if it chooses to save more? How might the government increase national saving?

### QuickQuiz Answers

1. b    2. c    3. c    4. a    5. a    6. c    7. d    8. b    9. b    10. d    11. a    12. d