chapter:
14

>> Aggregate Demand and Aggregate Supply

SHOCKS TO THE SYSTEM

Sometimes it's not easy being Ben.

In 2008 Ben Bernanke, a distinguished former Princeton economics professor, was the chairman of the Federal Reserve—the institution that sets U.S. *monetary policy,* along with regulating the financial sector. The Federal Reserve's job is to help the economy avoid the twin evils of high inflation and high unemployment. It normally does this, loosely speaking, either by pumping cash into the economy to fight unemployment or by pulling cash out of the economy to fight inflation.

When the U.S. economy went into a recession in 2001, the Fed rushed cash into the system. It was an easy choice: unemployment was rising, and inflation was low and falling. In fact, for much of 2002 the Fed was actually worried about the possibility of *deflation.*

For much of 2008, however, Bernanke faced a much more difficult problem. In fact, he faced the problem people in his position dread most: a combination of unacceptably high inflation and rising unemployment, often referred to as *stagflation.* Stagflation was the scourge of the 1970s: the recessions of 1973–1975 and 1979–1982, the two deepest slumps since the Great Depression, were both accompanied by soaring inflation. And in the first half of 2008, the threat of stagflation seemed to have raised its head yet again.

AP Photo/Manuel Balce Ceneta

In 2008, *stagflation* made for difficult policy choices for Federal Reserve Chairman Ben Bernanke.

Why did the economic difficulties of early 2008 look so different from those of 2001? Because the difficulties had a different cause. The lesson of stagflation in the 1970s was that recessions can have different causes and that the appropriate policy response depends on the cause. Many recessions, from the great slump of 1929–1933 to the much milder recession of 2001, have been caused by a fall in investment and consumer spending. In these recessions high inflation isn't a threat. In fact, the 1929–1933 slump was accompanied by a sharp fall in the aggregate price level. And because inflation isn't a problem in such recessions, policy makers unambiguously know what they should do: they should pump cash in, to fight rising unemployment.

The recessions of the 1970s, however, were largely caused by events in the Middle East that led to sharp cuts in world oil production and soaring prices for oil and other fuels. Not coincidentally, soaring oil prices also contributed to the economic difficulties of 2008. In both periods, high energy prices led to a combination of unemployment and high inflation. They also created a dilemma: should the Fed fight the slump by pumping cash *into* the economy, or should it fight inflation by pulling cash *out* of the economy? In 2008, the Fed chose to pump cash into the struggling economy.

In this chapter, we'll develop a model that shows us how to distinguish between different types of short-run

economic fluctuations—*demand shocks,* like those of the Great Depression, the 2001 recession, and the sharp drop in spending that followed the financial crisis in the autumn of 2008, and *supply shocks,* like those of the 1970s and 2008.

To develop this model, we'll proceed in three steps. First, we'll develop the concept of *aggregate demand.* Then we'll turn to the parallel concept of *aggregate supply.* Finally, we'll put them together in the *AD–AS model.*

WHAT YOU WILL LEARN IN THIS CHAPTER:

- How the **aggregate demand curve** illustrates the relationship between the aggregate price level and the quantity of aggregate output demanded in the economy
- How the **aggregate supply curve** illustrates the relationship between the aggregate price level and the quantity of aggregate output supplied in the economy
- Why the aggregate supply curve is different in the short run compared to the long run
- How the ***AD–AS* model** is used to analyze economic fluctuations
- How monetary policy and fiscal policy can stabilize the economy

Aggregate Demand

The Great Depression, the great majority of economists agree, was the result of a massive negative demand shock. What does that mean? In Chapter 3 we explained that when economists talk about a fall in the demand for a particular good or service, they're referring to a leftward shift of the demand curve. Similarly, when economists talk about a negative demand shock to the economy as a whole, they're referring to a leftward shift of the **aggregate demand curve,** a curve that shows the relationship between the aggregate price level and the quantity of aggregate output demanded by households, firms, the government, and the rest of the world.

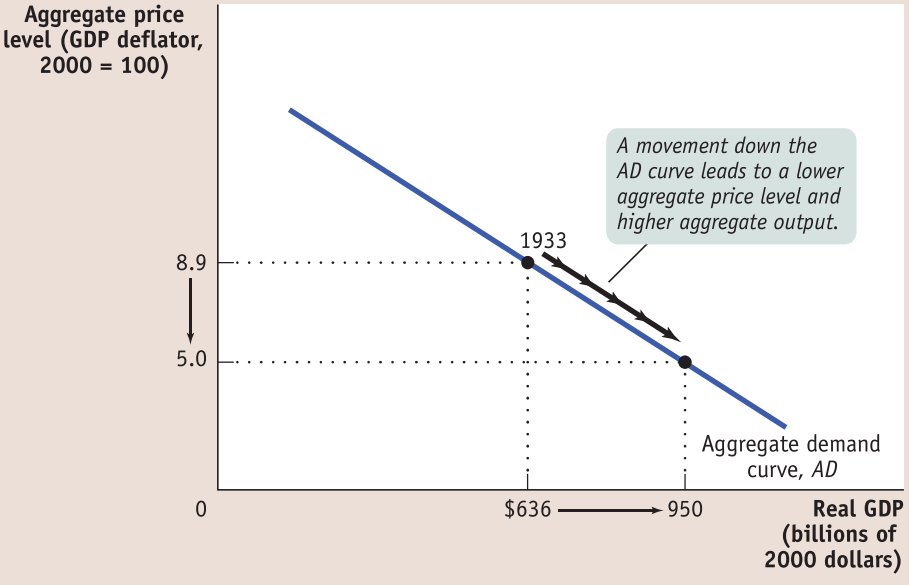
The **aggregate demand curve** shows the relationship between the aggregate price level and the quantity of aggregate output demanded by households, businesses, the government, and the rest of the world.

Figure 14-1 shows what the aggregate demand curve may have looked like in 1933, at the end of the 1929–1933 recession. The horizontal axis shows the total

FIGURE 14-1

The Aggregate Demand Curve

The aggregate demand curve shows the relationship between the aggregate price level and the quantity of aggregate output demanded. The curve is downward sloping due to the wealth effect of a change in the aggregate price level and the interest rate effect of a change in the aggregate price level. Corresponding to the actual 1933 data, here the total quantity of goods and services demanded at an aggregate price level of 8.9 is $636 billion in 2000 dollars. According to our hypothetical curve, however, if the aggregate price level had been only 5.0, the quantity of aggregate output demanded would have risen to $950 billion.



quantity of domestic goods and services demanded, measured in 2000 dollars. We use real GDP to measure aggregate output and will often use the two terms interchangeably. The vertical axis shows the aggregate price level, measured by the GDP deflator. With these variables on the axes, we can draw a curve, *AD*, showing how much aggregate output would have been demanded at any given aggregate price level. Since *AD* is meant to illustrate aggregate demand in 1933, one point on the curve corresponds to actual data for 1933, when the aggregate price level was 8.9 and the total quantity of domestic final goods and services purchased was $636 billion in 2000 dollars.

As drawn in Figure 14-1, the aggregate demand curve is downward sloping, indicating a negative relationship between the aggregate price level and the quantity of aggregate output demanded. A higher aggregate price level, other things equal, reduces the quantity of aggregate output demanded; a lower aggregate price level, other things equal, increases the quantity of aggregate output demanded. According to Figure 14-1, if the price level in 1933 had been 5.0 instead of 8.9, the total quantity of domestic final goods and services demanded would have been $950 billion in 2000 dollars instead of $636 billion.

The first key question about the aggregate demand curve is: why should the curve be downward sloping?

Why Is the Aggregate Demand Curve Downward Sloping?

In Figure 14-1, the curve *AD* is downward sloping. To understand why, you'll need to learn the basic equation of national income accounting:

(14-1) $\text{GDP} = C + I + G + X - IM$

where C is consumer spending, I is investment spending, G is government purchases of goods and services, X is exports to other countries, and IM is imports. If we measure these variables in constant dollars—that is, in prices of a base year—then $C + I + G + X - IM$ is the quantity of domestically produced final goods and services demanded during a given period. G is decided by the government, but the other variables are private-sector decisions. To understand why the aggregate demand curve slopes downward, we need to understand why a rise in the aggregate price level reduces C, I, and $X - IM$.

You might think that the downward slope of the aggregate demand curve is a natural consequence of the *law of demand* we defined back in Chapter 3. That is, since the demand curve for any one good is downward sloping, isn't it natural that the demand curve for aggregate output is also downward sloping? This turns out, however, to be a misleading parallel. The demand curve for any individual good shows how the quantity demanded depends on the price of that good, *holding the prices of other goods and services constant*. The main reason the quantity of a good demanded falls when the price of that good rises—that is, the quantity of a good demanded falls as we move up the demand curve—is that people switch their consumption to other goods and services.

But when we consider movements up or down the aggregate demand curve, we're considering *a simultaneous change in the prices of all final goods and services*. Furthermore, changes in the composition of goods and services in consumer spending aren't relevant to the aggregate demand curve: if consumers decide to buy fewer clothes but more cars, this doesn't necessarily change the total quantity of final goods and services they demand.

Why, then, does a rise in the aggregate price level lead to a fall in the quantity of all domestically produced final goods and services demanded? There are two main reasons: the *wealth effect* and the *interest rate effect* of a change in the aggregate price level.

The **wealth effect of a change in the aggregate price level** is the effect on consumer spending caused by the effect of a change in the aggregate price level on the purchasing power of consumers' assets.

The **interest rate effect of a change in the aggregate price level** is the effect on consumer spending and investment spending caused by the effect of a change in the aggregate price level on the purchasing power of consumers' and firms' money holdings.

The Wealth Effect An increase in the aggregate price level, other things equal, reduces the purchasing power of many assets. Consider, for example, someone who has $5,000 in a bank account. If the aggregate price level were to rise by 25%, that $5,000 would buy only as much as $4,000 would have bought previously. With the loss in purchasing power, the owner of that bank account would probably scale back his or her consumption plans. Millions of other people would respond the same way, leading to a fall in spending on final goods and services, because a rise in the aggregate price level reduces the purchasing power of everyone's bank account. Correspondingly, a fall in the aggregate price level increases the purchasing power of consumers' assets and leads to more consumer demand. The **wealth effect of a change in the aggregate price level** is the effect on consumer spending caused by the effect of a change in the aggregate price level on the purchasing power of consumers' assets. Because of the wealth effect, consumer spending, *C,* falls when the aggregate price level rises, leading to a downward-sloping aggregate demand curve.

The Interest Rate Effect Economists use the term *money* in its narrowest sense to refer to cash and bank deposits on which people can write checks. People and firms hold money because it reduces the cost and inconvenience of making transactions. An increase in the aggregate price level, other things equal, reduces the purchasing power of a given amount of money holdings. To purchase the same basket of goods and services as before, people and firms now need to hold more money. So, in response to an increase in the aggregate price level, the public tries to increase its money holdings, either by borrowing more or by selling assets such as bonds. This reduces the funds available for lending to other borrowers and drives interest rates up. A rise in the interest rate reduces investment spending because it makes the cost of borrowing higher. It also reduces consumer spending because households save more of their disposable income. So a rise in the aggregate price level depresses investment spending, *I,* and consumer spending, *C,* through its effect on the purchasing power of money holdings, an effect known as the **interest rate effect of a change in the aggregate price level.** This also leads to a downward-sloping aggregate demand curve.

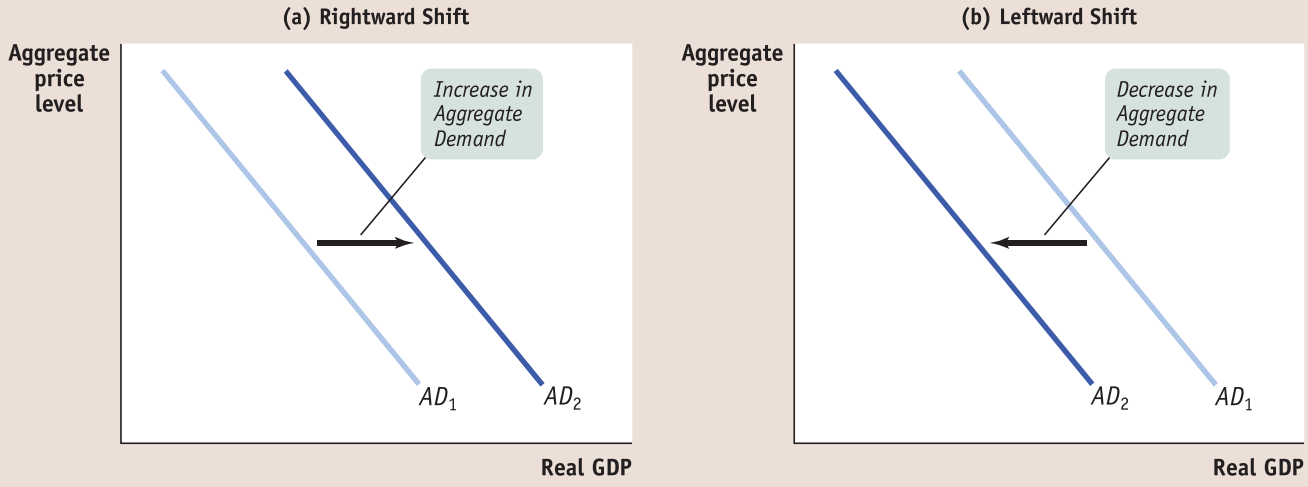
We'll have a lot more to say about money and interest rates in Chapter 17 on monetary policy. We'll also see, in Chapter 18 that a higher interest rate indirectly tends to reduce exports (*X*) and increase imports (*IM*). For now, the important point is that the aggregate demand curve is downward sloping due to both the wealth effect and the interest rate effect of a change in the aggregate price level.

Shifts of the Aggregate Demand Curve

In Chapter 3, where we introduced the analysis of supply and demand in the market for an individual good, we stressed the importance of the distinction between *movements along* the demand curve and *shifts of* the demand curve. The same distinction applies to the aggregate demand curve. Figure 14-1 shows a *movement along* the aggregate demand curve, a change in the aggregate quantity of goods and services demanded as the aggregate price level changes. But there can also be *shifts of* the aggregate demand curve, changes in the quantity of goods and services demanded at any given price level, as shown in Figure 14-2. When we talk about an increase in aggregate demand, we mean a shift of the aggregate demand curve to the right, as shown in panel (a) by the shift from AD_1 to AD_2. A rightward shift occurs when the quantity of aggregate output demanded increases at any given aggregate price level. A decrease in aggregate demand means that the *AD* curve shifts to the left, as in panel (b). A leftward shift implies that the quantity of aggregate output demanded falls at any given aggregate price level.

A number of factors can shift the aggregate demand curve. Among the most important factors are changes in expectations, changes in wealth, and the size of the

FIGURE 14-2 **Shifts of the Aggregate Demand Curve**



Panel (a) shows the effect of events that increase the quantity of aggregate output demanded at any given aggregate price level, such as improvements in business and consumer expectations or increased government spending. Such changes shift the aggregate demand curve to the right, from AD_1 to AD_2. Panel (b) shows the effect of events that decrease the quantity of aggregate output demanded at any given aggregate price level, such as a fall in wealth caused by a stock market decline. This shifts the aggregate demand curve leftward from AD_1 to AD_2.

existing stock of physical capital. In addition, both fiscal and monetary policy can shift the aggregate demand curve.

Changes in Expectations Both consumer spending and investment spending depend in part on people's expectations about the future. Consumers base their spending not only on the income they have now but also on the income they expect to have in the future. Firms base their investment spending not only on current conditions but also on the sales they expect to make in the future. As a result, changes in expectations can push consumer spending and investment spending up or down. If consumers and firms become more optimistic, aggregate spending rises; if they become more pessimistic, aggregate spending falls. In fact, short-run economic forecasters pay careful attention to surveys of consumer and business sentiment. In particular, forecasters watch the Consumer Confidence Index, a monthly measure calculated by the Conference Board, and the Michigan Consumer Sentiment Index, a similar mea-sure calculated by the University of Michigan.

Changes in Wealth Consumer spending depends in part on the value of household assets. When the real value of these assets rises, the purchasing power they embody also rises, leading to an increase in aggregate spending. For example, in the 1990s there was a significant rise in the stock market that increased aggregate demand. And when the real value of household assets falls—for example, because of a stock market crash—the purchasing power they embody is reduced and aggregate demand

PITFALLS

CHANGES IN WEALTH: A MOVEMENT ALONG VERSUS A SHIFT OF THE AGGREGATE DEMAND CURVE

In the last section we explained that one reason the *AD* curve is downward sloping is due to the wealth effect of a change in the aggregate price level: a higher aggregate price level reduces the purchasing power of households' assets and leads to a fall in consumer spending, *C*. But in this section we've just explained that changes in wealth lead to a shift of the *AD* curve. Aren't those two explanations contradictory? Which one is it—does a change in wealth move the economy along the *AD* curve or does it shift the *AD* curve? The answer is both: it depends on the *source* of the change in wealth. A movement along the *AD* curve occurs when a change in the aggregate price level changes the purchasing power of consumers' existing wealth (the real value of their assets). This is the *wealth effect of a change in the aggregate price level*—a change in the aggregate price level is the source of the change in wealth. For example, a fall in the aggregate price level increases the purchasing power of consumers' assets and leads to a movement down the *AD* curve. In contrast, a change in wealth *independent of a change in the aggregate price level* shifts the *AD* curve. For example, a rise in the stock market or a rise in real estate values leads to an increase in the real value of consumers' assets at any given aggregate price level. In this case, the source of the change in wealth is a change in the values of assets without any change in the aggregate price level—that is, a change in asset values holding the prices of all final goods and services constant.

also falls. The stock market crash of 1929 was a significant factor leading to the Great Depression. Similarly, a sharp decline in real estate values and the subsequent steep fall in the stock market was a major factor depressing consumer spending in 2008.

Size of the Existing Stock of Physical Capital Firms engage in planned investment spending to add to their stock of physical capital. Their incentive to spend depends in part on how much physical capital they already have: the more they have, the less they will feel a need to add more, other things equal. The same applies to other types of investment spending—for example, if a large number of houses have been built in recent years, this will depress the demand for new houses and as a result also tend to reduce residential investment spending. In fact, that's part of the reason for the deep slump in residential investment spending that began in 2006. The housing boom of the previous few years had created an oversupply of houses: by spring 2008, the inventory of unsold houses on the market was equal to more than 11 months of sales, and prices had fallen more than 20% from their peak. This gave the construction industry little incentive to build even more homes.

Government Policies and Aggregate Demand

One of the key insights of macroeconomics is that the government can have a powerful influence on aggregate demand and that, in some circumstances, this influence can be used to improve economic performance.

The two main ways the government can influence the aggregate demand curve are through fiscal policy and monetary policy. We'll briefly discuss their influence on aggregate demand, leaving a full-length discussion for upcoming chapters.

Fiscal Policy As we learned in Chapter 10, fiscal policy is the use of either government spending—government purchases of final goods and services and government transfers—or tax policy to stabilize the economy. In practice, governments often respond to recessions by increasing spending, cutting taxes, or both. They often respond to inflation by reducing spending or increasing taxes.

The effect of government purchases of final goods and services, *G*, on the aggregate demand curve is *direct* because government purchases are themselves a component of aggregate demand. So an increase in government purchases shifts the aggregate demand curve to the right and a decrease shifts it to the left. History's most dramatic example of how increased government purchases affect aggregate demand was the effect of wartime government spending during World War II. Because of the war, U.S. federal purchases surged 400%. This increase in purchases is usually credited with ending the Great Depression. In the 1990s Japan used large public works projects—such as government-financed construction of roads, bridges, and dams—in an effort to increase aggregate demand in the face of a slumping economy.

In contrast, changes in either tax rates or government transfers influence the economy *indirectly* through their effect on disposable income. A lower tax rate means that consumers get to keep more of what they earn, increasing their disposable income. An increase in government transfers also increases consumers' disposable income. In either case, this increases consumer spending and shifts the aggregate demand curve to the right. A higher tax rate or a reduction in transfers reduces the amount of disposable income received by consumers. This reduces consumer spending and shifts the aggregate demand curve to the left.

Monetary Policy We opened this chapter by talking about the problems faced by the Federal Reserve, which controls monetary policy—the use of changes in the quantity of money or the interest rate to stabilize the economy. We've just discussed how a rise in the aggregate price level, by reducing the purchasing power of money holdings, causes a rise in the interest rate. That, in turn, reduces both investment spending and consumer spending.

But what happens if the quantity of money in the hands of households and firms changes? In modern economies, the quantity of money in circulation is largely determined by the decisions of a *central bank* created by the government. As we'll learn in Chapter 16, the Federal Reserve, the U.S. central bank, is a special institution that is neither exactly part of the government nor exactly a private institution. When the central bank increases the quantity of money in circulation, households and firms have more money, which they are willing to lend out. The effect is to drive the interest rate down at any given aggregate price level, leading to higher investment spending and higher consumer spending. That is, increasing the quantity of money shifts the aggregate demand curve to the right. Reducing the quantity of money has the opposite effect: households and firms have less money holdings than before, leading them to borrow more and lend less. This raises the interest rate, reduces investment spending and consumer spending, and shifts the aggregate demand curve to the left.

For an overview of factors that shift the aggregate demand curve, see Table 14.1.

TABLE 14-1

Factors That Shift the Aggregate Demand Curve

Changes in expectations		
	If consumers and firms become more optimistic, . . .	. . . aggregate demand increases.
	If consumers and firms become more pessimistic, . . .	. . . aggregate demand decreases.
Changes in wealth		
	If the real value of household assets rises, . . .	. . . aggregate demand increases.
	If the real value of household assets falls, . . .	. . . aggregate demand decreases.
Size of the existing stock of physical capital		
	If the existing stock of physical capital is relatively small, . . .	. . . aggregate demand increases.
	If the existing stock of physical capital is relatively large, . . .	. . . aggregate demand decreases.
Fiscal policy		
	If the government increases spending or cuts taxes, . . .	. . . aggregate demand increases.
	If the government reduces spending or raises taxes, . . .	. . . aggregate demand decreases.
Monetary policy		
	If the central bank increases the quantity of money, . . .	. . . aggregate demand increases.
	If the central bank reduces the quantity of money, . . .	. . . aggregate demand decreases.

➤ECONOMICS IN ACTION

Shifts of the Aggregate Demand Curve, 2008–2009

When looking at data, sometimes it's hard to tell the difference between a change in spending that represents a *movement along* the aggregate demand curve and one that represents a *shift of* the aggregate demand curve. But what happened during the financial crisis of 2008 was crystal clear. During the crisis and the recession that followed, consumers and firms decreased spending, and this caused the aggregate

QUICK REVIEW

- The **aggregate demand curve** is downward sloping because of the **wealth effect of a change in the aggregate price level** and the **interest rate effect of a change in the aggregate price level.**
- The aggregate demand curve shows how real GDP changes when the aggregate price level changes.
- Changes in consumer spending caused by changes in wealth and expectations about the future shift the aggregate demand curve. Changes in investment spending caused by changes in expectations and by the size of the existing stock of physical capital also shift the aggregate demand curve.
- Fiscal policy affects aggregate demand directly through government purchases and indirectly through changes in taxes or government transfers. Monetary policy affects aggregate demand indirectly through changes in the interest rate.

demand curve to shift to the left. As a result, GDP fell by over 2% between the third quarter of 2008 and the third quarter of 2009. Prices fell by 1.3%.

In response, the Federal Reserve greatly increased the quantity of money, which led to a decrease in interest rates. The prime rate—the interest rate banks charge their best customers—fell from 7.5% in late 2007, to 3.25% in late 2008. Meanwhile, Congress enacted a number of measures, such as the American Reinvestment and Recovery Act of 2009, to stimulate spending. Low interest rates combined with the stimulus packages led to increased spending by consumers, investors, and government. The result of all this spending: the demand curve shifted again, but this time to the right. Estimates show that in the fourth quarter of 2009, GDP rose at an annual rate of 6.2%, and the aggregate price level (measured by the CPI) rose at an annual rate of 3.2%.

In other words, between the third quarter of 2008 and the third quarter of 2009, the economy responded just as we'd expect if the aggregate demand curve shifted to the left. Then, in the final quarter of 2009, the economy responded just as we would expect if the demand curve shifted to the right.

But, why did the aggregate price level change? To answer that question, we'll have to look at the *short-run aggregate supply curve*, and then put the aggregate supply curve and the aggregate demand curve together. The result is the *AD-AS* model, as we will see in the last section of this chapter. ▲

CHECK YOUR UNDERSTANDING 14-1

1. Determine the effect on aggregate demand of each of the following events. Explain whether it represents a movement along the aggregate demand curve (up or down) or a shift of the curve (leftward or rightward).
   a. A rise in the interest rate caused by a change in monetary policy
   b. A fall in the real value of money in the economy due to a higher aggregate price level
   c. News of a worse-than-expected job market next year
   d. A fall in tax rates
   e. A rise in the real value of assets in the economy due to a lower aggregate price level
   f. A rise in the real value of assets in the economy due to a surge in real estate values

Solutions appear at back of book.

Aggregate Supply

Between 1929 and 1933, there was a sharp fall in aggregate demand—a reduction in the quantity of goods and services demanded at any given price level. One consequence of the economy-wide decline in demand was a fall in the prices of most goods and services. By 1933, the GDP deflator (one of the price indexes we defined in Chapter 11) was 26% below its 1929 level, and other indexes were down by similar amounts. A second consequence was a decline in the output of most goods and services: by 1933, real GDP was 27% below its 1929 level. A third consequence, closely tied to the fall in real GDP, was a surge in the unemployment rate from 3% to 25%.

The association between the plunge in real GDP and the plunge in prices wasn't an accident. Between 1929 and 1933, the U.S. economy was moving down its **aggregate supply curve,** which shows the relationship between the economy's aggregate price level (the overall price level of final goods and services in the economy) and the total quantity of final goods and services, or aggregate output, producers are willing to supply. (As you will recall, we use real GDP to measure aggregate output. So we'll often use the two terms interchangeably.) More specifically, between 1929 and 1933 the U.S. economy moved down its *short-run aggregate supply curve.*

The **aggregate supply curve** shows the relationship between the aggregate price level and the quantity of aggregate output supplied in the economy.

The Short-Run Aggregate Supply Curve

The period from 1929 to 1933 demonstrated that there is a positive relationship in the short run between the aggregate price level and the quantity of aggregate output supplied. That is, a rise in the aggregate price level is associated with a rise in the

quantity of aggregate output supplied, other things equal; a fall in the aggregate price level is associated with a fall in the quantity of aggregate output supplied, other things equal. To understand why this positive relationship exists, consider the most basic question facing a producer: is producing a unit of output profitable or not? Let's define profit per unit:

(14-2) Profit per unit of output =
Price per unit of output – Production cost per unit of output

The **nominal wage** is the dollar amount of the wage paid.

Sticky wages are nominal wages that are slow to fall even in the face of high unemployment and slow to rise even in the face of labor shortages.

Thus, the answer to the question depends on whether the price the producer receives for a unit of output is greater or less than the cost of producing that unit of output. At any given point in time, many of the costs producers face are fixed per unit of output and can't be changed for an extended period of time. Typically, the largest source of inflexible production cost is the wages paid to workers. *Wages* here refers to all forms of worker compensation, such as employer-paid health care and retirement benefits in addition to earnings. Wages are typically an inflexible production cost because the dollar amount of any given wage paid, called the **nominal wage,** is often determined by contracts that were signed some time ago. And even when there are no formal contracts, there are often informal agreements between management and workers, making companies reluctant to change wages in response to economic conditions. For example, companies usually will not reduce wages during poor economic times—unless the downturn has been particularly long and severe—for fear of generating worker resentment. Correspondingly, they typically won't raise wages during better economic times—until they are at risk of losing workers to competitors—because they don't want to encourage workers to routinely demand higher wages. As a result of both formal and informal agreements, then, the economy is characterized by **sticky wages:** nominal wages that are slow to fall even in the face of high unemployment and slow to rise even in the face of labor shortages. It's important to note, however, that nominal wages cannot be sticky forever: ultimately, formal contracts and informal agreements will be renegotiated to take into account changed economic circumstances. As the Pitfalls at the end of this section explains, how long it takes for nominal wages to become flexible is an integral component of what distinguishes the short run from the long run.

To understand how the fact that many costs are fixed in nominal terms gives rise to an upward-sloping short-run aggregate supply curve, it's helpful to know that prices are set somewhat differently in different kinds of markets. In *perfectly competitive markets,* producers take prices as given; in *imperfectly competitive markets,* producers have some ability to choose the prices they charge. In both kinds of markets, there is a short-run positive relationship between prices and output, but for slightly different reasons.

Let's start with the behavior of producers in perfectly competitive markets; remember, they take the price as given. Imagine that, for some reason, the aggregate price level falls, which means that the price received by the typical producer of a final good or service falls. Because many production costs are fixed in the short run, production cost per unit of output doesn't fall by the same proportion as the fall in the price of output. So the profit per unit of output declines, leading perfectly competitive producers to reduce the quantity supplied in the short run.

On the other hand, suppose that for some reason the aggregate price level rises. As a result, the typical producer receives a higher price for its final good or service. Again, many production costs are fixed in the short run, so production cost per unit of output doesn't rise by the same proportion as the rise in the price of a unit. And since the typical perfectly competitive producer takes the price as given, profit per unit of output rises and output increases.

Now consider an imperfectly competitive producer that is able to set its own price. If there is a rise in the demand for this producer's product, it will be able to sell more at any given price. Given stronger demand for its products, it will probably choose to increase its prices as well as its output, as a way of increasing profit per unit of output. In fact, industry analysts often talk about variations in an industry's

FOR INQUIRING MINDS

What's Truly Flexible, What's Truly Sticky

Most macroeconomists agree that the basic picture shown in Figure 14-3 is correct: there is, other things equal, a positive short-run relationship between the aggregate price level and aggregate output. But many would argue that the details are a bit more complicated.

So far we've stressed a difference in the behavior of the aggregate price level and the behavior of nominal wages. That is, we've said that the aggregate price level is flexible but nominal wages are sticky in the short run. Although this assumption is a good way to explain why the short-run aggregate supply curve is upward sloping, empirical data on wages and prices don't wholly support a sharp distinction between flexible prices of final goods and services and sticky nominal wages. On one side, some nominal wages are in fact flexible even in the short run because some workers are not covered by a contract or informal agreement with their employers. Since some nominal wages are sticky but others are flexible, we observe that the *average nominal wage*—the nominal wage averaged over all workers in the economy—falls when there is a steep rise in unemployment. For example, nominal wages fell substantially in the early years of the Great Depression. On the other side, some prices of final goods and services are sticky rather than flexible. For example, some firms, particularly the makers of luxury or name-brand goods, are reluctant to cut prices even when demand falls. Instead they prefer to cut output even if their profit per unit hasn't declined.

These complications, as we've said, don't change the basic picture. When the aggregate price level falls, some producers cut output because the nominal wages they pay are sticky. And some producers don't cut their prices in the face of a falling aggregate price level, preferring instead to reduce their output. In both cases, the positive relationship between the aggregate price level and aggregate output is maintained. So, in the end, the short-run aggregate supply curve is still upward sloping.

"pricing power": when demand is strong, firms with pricing power are able to raise prices—and they do.

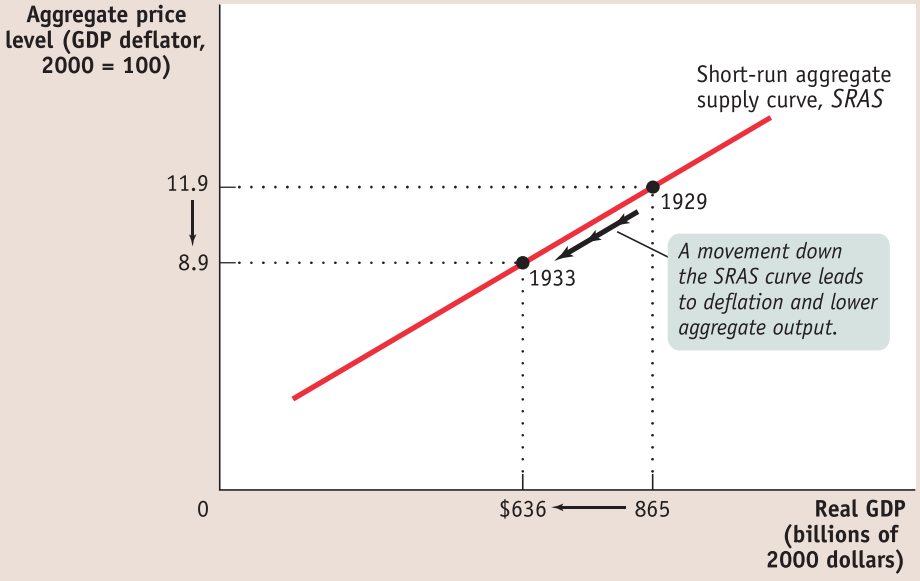
Conversely, if there is a fall in demand, firms will normally try to limit the fall in their sales by cutting prices.

Both the responses of firms in perfectly competitive industries and those of firms in imperfectly competitive industries lead to an upward-sloping relationship between aggregate output and the aggregate price level. The positive relationship between the aggregate price level and the quantity of aggregate output producers are willing to

FIGURE 14-3

The Short-Run Aggregate Supply Curve

The short-run aggregate supply curve shows the relationship between the aggregate price level and the quantity of aggregate output supplied in the short run, the period in which many production costs such as nominal wages are fixed. It is upward sloping because a higher aggregate price level leads to higher profit per unit of output and higher aggregate output given fixed nominal wages. Here we show numbers corresponding to the Great Depression, from 1929 to 1933: when deflation occurred and the aggregate price level fell from 11.9 (in 1929) to 8.9 (in 1933), firms responded by reducing the quantity of aggregate output supplied from $865 billion to $636 billion measured in 2000 dollars.



supply during the time period when many production costs, particularly nominal wages, can be taken as fixed is illustrated by the **short-run aggregate supply curve.** The positive relationship between the aggregate price level and aggregate output in the short run gives the short-run aggregate supply curve its upward slope. Figure 14-3 shows a hypothetical short-run aggregate supply curve, *SRAS,* which matches actual U.S. data for 1929 and 1933. On the horizontal axis is aggregate output (or, equivalently, real GDP)—the total quantity of final goods and services supplied in the economy—measured in 2000 dollars. On the vertical axis is the aggregate price level as measured by the GDP deflator, with the value for the year 2000 equal to 100. In 1929, the aggregate price level was 11.9 and real GDP was $865 billion. In 1933, the aggregate price level was 8.9 and real GDP was only $636 billion. The movement down the *SRAS* curve corresponds to the deflation and fall in aggregate output experienced over those years.

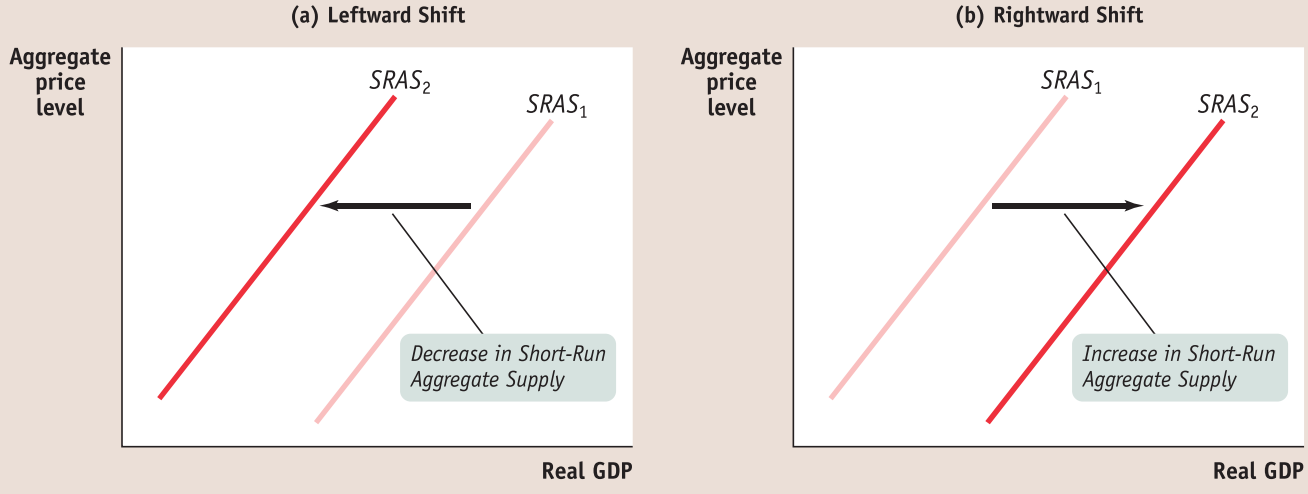
The **short-run aggregate supply curve** shows the relationship between the aggregate price level and the quantity of aggregate output supplied that exists in the short run, the time period when many production costs can be taken as fixed.

Shifts of the Short-Run Aggregate Supply Curve

Figure 14-3 shows a *movement along* the short-run aggregate supply curve, as the aggregate price level and aggregate output fell from 1929 to 1933. But there can also be *shifts of* the short-run aggregate supply curve, as shown in Figure 14-4. Panel (a) shows a *decrease in short-run aggregate supply*—a leftward shift of the short-run aggregate supply curve. Aggregate supply decreases when producers reduce the quantity of aggregate output they are willing to supply at any given aggregate price level. Panel (b) shows an *increase in short-run aggregate supply*—a rightward shift of the short-run aggregate supply curve. Aggregate supply increases when producers increase the quantity of aggregate output they are willing to supply at any given aggregate price level.

To understand why the short-run aggregate supply curve can shift, it's important to recall that producers make output decisions based on their profit per unit of output. The short-run aggregate supply curve illustrates the relationship between the aggregate price level and aggregate output: because some production costs are fixed in the short run, a change in the aggregate price level leads to a change in producers' profit per unit of output and, in turn, leads to a change in aggregate output. But other

FIGURE 14-4 Shifts of the Short-Run Aggregate Supply Curve



Panel (a) shows a decrease in short-run aggregate supply: the short-run aggregate supply curve shifts leftward from $SRAS_1$ to $SRAS_2$, and the quantity of aggregate output supplied at any given aggregate price level falls. Panel (b) shows an increase in short-run aggregate supply: the short-run aggregate supply curve shifts rightward from $SRAS_1$ to $SRAS_2$, and the quantity of aggregate output supplied at any given aggregate price level rises.

factors besides the aggregate price level can affect profit per unit and, in turn, aggregate output. It is changes in these other factors that will shift the short-run aggregate supply curve.

To develop some intuition, suppose that something happens that raises production costs—say, an increase in the price of oil. At any given price of output, a producer now earns a smaller profit per unit of output. As a result, producers reduce the quantity supplied at any given aggregate price level, and the short-run aggregate supply curve shifts to the left. If, in contrast, something happens that lowers production costs—say, a fall in the nominal wage—a producer now earns a higher profit per unit of output at any given price of output. This leads producers to increase the quantity of aggregate output supplied at any given aggregate price level, and the short-run aggregate supply curve shifts to the right.

Now we'll discuss some of the important factors that affect producers' profit per unit and so can lead to shifts of the short-run aggregate supply curve.

Changes in Commodity Prices A surge in the price of oil caused problems for the U.S. economy in the 1970s and in early 2008. Oil is a commodity, a standardized input bought and sold in bulk quantities. An increase in the price of a commodity—oil—raised production costs across the economy and reduced the quantity of aggregate output supplied at any given aggregate price level, shifting the short-run aggregate supply curve to the left. Conversely, a decline in commodity prices reduces production costs, leading to an increase in the quantity supplied at any given aggregate price level and a rightward shift of the short-run aggregate supply curve.

Why isn't the influence of commodity prices already captured by the short-run aggregate supply curve? Because commodities—unlike, say, soft drinks—are not a final good, their prices are not included in the calculation of the aggregate price level. Further, commodities represent a significant cost of production to most suppliers, just like nominal wages do. So changes in commodity prices have large impacts on production costs. And in contrast to noncommodities, the prices of commodities can sometimes change drastically due to industry-specific shocks to supply—such as wars in the Middle East or rising Chinese demand that leaves less oil for the United States.

Changes in Nominal Wages At any given point in time, the dollar wages of many workers are fixed because they are set by contracts or informal agreements made in the past. Nominal wages can change, however, once enough time has passed for contracts and informal agreements to be renegotiated. Suppose, for example, that there is an economy-wide rise in the cost of health care insurance premiums paid by employers as part of employees' wages. From the employers' perspective, this is equivalent to a rise in nominal wages because it is an increase in employer-paid compensation. So this rise in nominal wages increases production costs and shifts the short-run aggregate supply curve to the left. Conversely, suppose there is an economy-wide fall in the cost of such premiums. This is equivalent to a fall in nominal wages from the point of view of employers; it reduces production costs and shifts the short-run aggregate supply curve to the right.

An important historical fact is that during the 1970s the surge in the price of oil had the indirect effect of also raising nominal wages. This "knock-on" effect occurred because many wage contracts included *cost-of-living allowances* that automatically raised the nominal wage when consumer prices increased. Through this channel, the surge in the price of oil—which led to an increase in overall consumer prices—ultimately caused a rise in nominal wages. So the economy, in the end, experienced two leftward shifts of the aggregate supply curve: the first generated by the initial surge in the price of oil, the second generated by the induced increase in nominal wages. The negative effect on the economy of rising oil prices was greatly magnified through the cost-of-living allowances in wage contracts. Today, cost-of-living allowances in wage contracts are rare.

Changes in Productivity An increase in productivity means that a worker can produce more units of output with the same quantity of inputs. For example, the introduction of bar-code scanners in retail stores greatly increased the ability of a single worker to stock, inventory, and resupply store shelves. As a result, the cost to a store of "producing" a dollar of sales fell and profit rose. And, correspondingly, the quantity supplied increased. (Think of Wal-Mart and the increase in the number of its stores as an increase in aggregate supply.) So a rise in productivity, whatever the source, increases producers' profits and shifts the short-run aggregate supply curve to the right. Conversely, a fall in productivity—say, due to new regulations that require workers to spend more time filling out forms—reduces the number of units of output a worker can produce with the same quantity of inputs. Consequently, the cost per unit of output rises, profit falls, and quantity supplied falls. This shifts the short-run aggregate supply curve to the left.

For a summary of the factors that shift the short-run aggregate supply curve, see Table 14-2.

TABLE 14-2

Factors that Shift the Short-Run Aggregate Supply Curve

Changes in commodity prices		
	If commodity prices fall, . . .	. . . short-run aggregate supply increases.
	If commodity prices rise, . . .	. . . short-run aggregate supply decreases.
Changes in nominal wages		
	If nominal wages fall, . . .	. . . short-run aggregate supply increases.
	If nominal wages rise, . . .	. . . short-run aggregate supply decreases.
Changes in productivity		
	If workers become more productive, . . .	. . . short-run aggregate supply increases.
	If workers become less productive, . . .	. . . short-run aggregate supply decreases.

The Long-Run Aggregate Supply Curve

We've just seen that in the short run a fall in the aggregate price level leads to a decline in the quantity of aggregate output supplied because nominal wages are sticky in the short run. But, as we mentioned earlier, contracts and informal agreements are renegotiated in the long run. So in the long run, nominal wages—like the aggregate price level—are flexible, not sticky. This fact greatly alters the long-run relationship between the aggregate price level and aggregate supply. In fact, in the long run the aggregate price level has *no* effect on the quantity of aggregate output supplied.

To see why, let's conduct a thought experiment. Imagine that you could wave a magic wand—or maybe a magic bar-code scanner—and cut *all prices* in the economy in half at the same time. By "all prices" we mean the prices of all inputs, including nominal wages, as well as the prices of final goods and services. What would happen to aggregate output, given that the aggregate price level has been halved and all input prices, including nominal wages, have been halved?

The answer is: nothing. Consider Equation 14-2 again: each producer would receive a lower price for its product, but costs would fall by the same proportion. As a result, every unit of output profitable to produce before the change in prices would still be profitable to produce after the change in prices. So a halving of *all* prices in the economy has no effect on the economy's aggregate output. In other words, changes in the aggregate price level now have no effect on the quantity of aggregate output supplied.

In reality, of course, no one can change all prices by the same proportion at the same time. But now, we'll consider the *long run, the period of time over which all prices are fully flexible.* In the long run, inflation or deflation has the same effect as someone changing

The **long-run aggregate supply curve** shows the relationship between the aggregate price level and the quantity of aggregate output supplied that would exist if all prices, including nominal wages, were fully flexible.

Potential output is the level of real GDP the economy would produce if all prices, including nominal wages, were fully flexible.

all prices by the same proportion. *As a result, changes in the aggregate price level do not change the quantity of aggregate output supplied in the long run.* That's because changes in the aggregate price level will, in the long run, be accompanied by equal proportional changes in *all* input prices, including nominal wages.

The **long-run aggregate supply curve,** illustrated in Figure 14-5 by the curve *LRAS,* shows the relationship between the aggregate price level and the quantity of aggregate output supplied that would exist if all prices, including nominal wages, were fully flexible. The long-run aggregate supply curve is vertical because changes in the aggregate price level have *no* effect on aggregate output in the long run. At an aggregate price level of 15.0, the quantity of aggregate output supplied is $800 billion in 2000 dollars. If the aggregate price level falls by 50% to 7.5, the quantity of aggregate output supplied is unchanged in the long run at $800 billion in 2000 dollars.

It's important to understand not only that the *LRAS* curve is vertical but also that its position along the horizontal axis represents a significant measure. The horizontal intercept in Figure 14-5, where *LRAS* touches the horizontal axis ($800 billion in 2000 dollars), is the economy's **potential output,** Y_P: the level of real GDP the economy would produce if all prices, including nominal wages, were fully flexible.

In reality, the actual level of real GDP is almost always either above or below potential output. We'll see why later in this chapter, when we discuss the *AD–AS* model. Still, an economy's potential output is an important number because it defines the trend around which actual aggregate output fluctuates from year to year.

In the United States, the Congressional Budget Office, or CBO, estimates annual potential output for the purpose of federal budget analysis. In Figure 14-6, the CBO's estimates of U.S. potential output from 1989 to 2009 are represented by the black line and the actual values of U.S. real GDP over the same period are represented by the blue line. Years shaded purple on the horizontal axis correspond to periods in which actual aggregate output fell short of potential output, years shaded green to periods in which actual aggregate output exceeded potential output.

As you can see, U.S. potential output has risen steadily over time—implying a series of rightward shifts of the *LRAS* curve. What has caused these rightward shifts? The answer lies in the factors related to long-run growth that we discussed in Chapter 13, such as increases in physical capital and human capital as well as technological

FIGURE 14-5

The Long-Run Aggregate Supply Curve

The long-run aggregate supply curve shows the quantity of aggregate output supplied when all prices, including nominal wages, are flexible. It is vertical at potential output, Y_P, because in the long run a change in the aggregate price level has no effect on the quantity of aggregate output supplied.

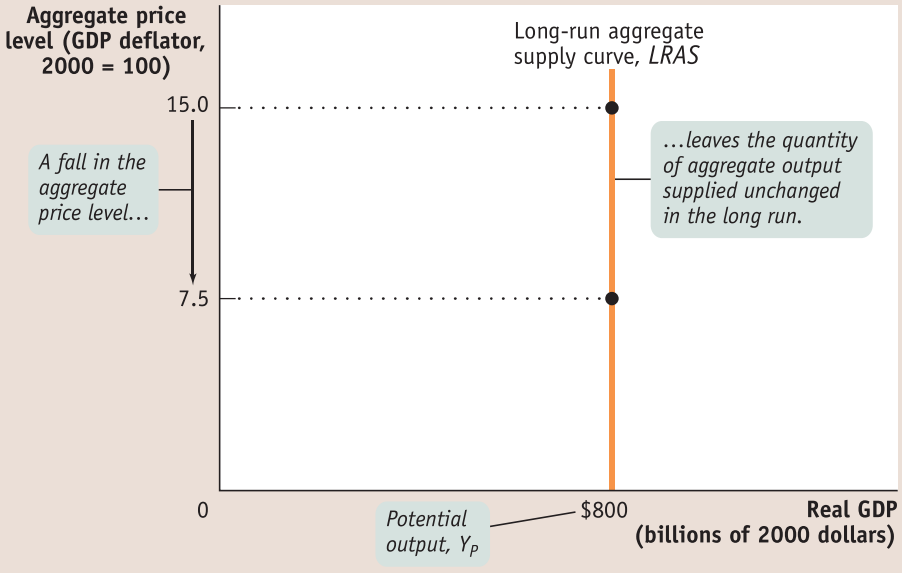
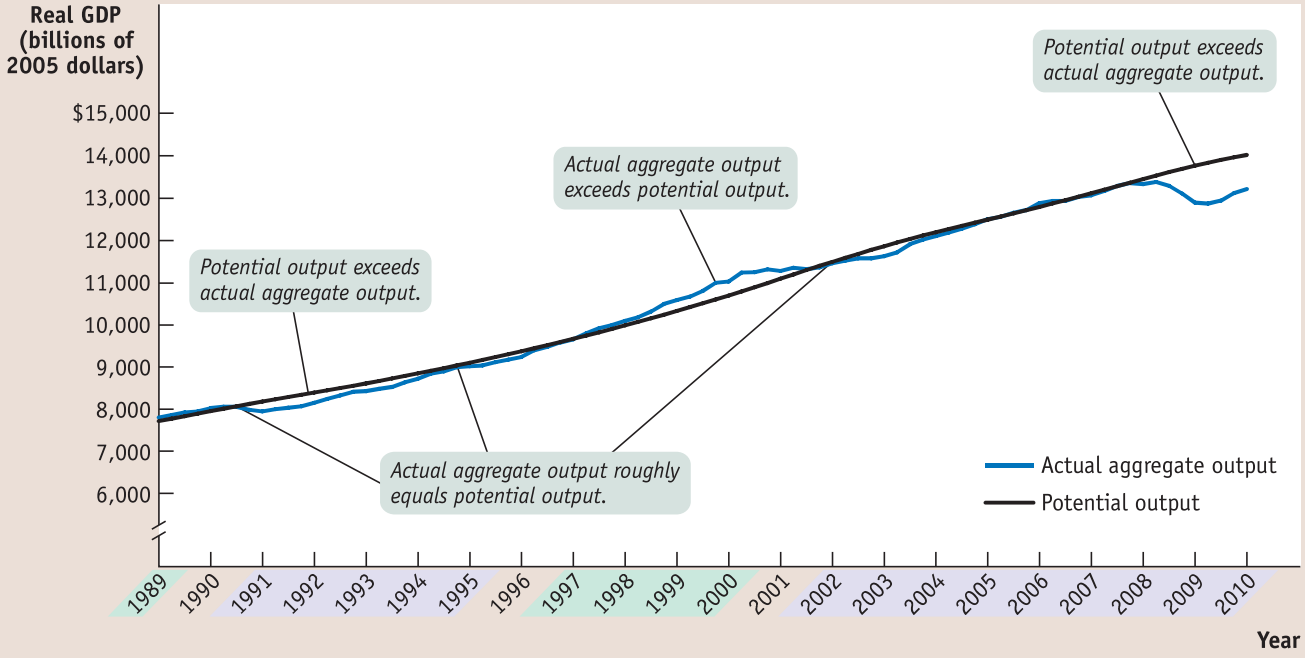


FIGURE 14-6 **Actual and Potential Output from 1989 to 2010**



This figure shows the performance of actual and potential output in the United States from 1989 to the first quarter of 2010. The black line shows estimates of U.S. potential output, produced by the Congressional Budget Office, and the blue line shows actual aggregate output. The purple-shaded years are periods in which actual aggregate output fell below potential output, and the green-shaded years are periods in which actual aggregate output exceeded potential output. As shown, significant shortfalls occurred in the recessions of the early 1990s and after 2000. Actual aggregate output was significantly above potential output in the boom of the late 1990s and below potential output during the recession beginning in December 2007.

Source: Congressional Budget Office; Bureau of Economic Analysis.

progress. Over the long run, as the size of the labor force and the productivity of labor both rise, the level of real GDP that the economy is capable of producing also rises. Indeed, one way to think about long-run economic growth is that it is the growth in the economy's potential output. We generally think of the long-run aggregate supply curve as shifting to the right over time as an economy experiences long-run growth.

From the Short Run to the Long Run

As you can see in Figure 14-6, the economy normally produces more or less than potential output: actual aggregate output was below potential output in the early 1990s, above potential output in the late 1990s, below potential output for most of the 2000s. So the economy is normally on its short-run aggregate supply curve—but not on its long-run aggregate supply curve. So why is the long-run curve relevant? Does the economy ever move from the short run to the long run? And if so, how?

The first step to answering these questions is to understand that the economy is always in one of only two states with respect to the short-run and long-run aggregate supply curves. It can be on both curves simultaneously by being at a point where the curves cross (as in the few years in Figure 14-6 in which actual aggregate output and potential output roughly coincided). Or it can be on the short-run aggregate supply curve but not the long-run aggregate supply curve (as in the years in which actual aggregate output and potential output *did not* coincide). But that is not the end of the story. If the economy is on the short-run but not the long-run aggregate supply curve, the short-run aggregate

PITFALLS

ARE WE THERE YET? WHAT THE LONG RUN REALLY MEANS

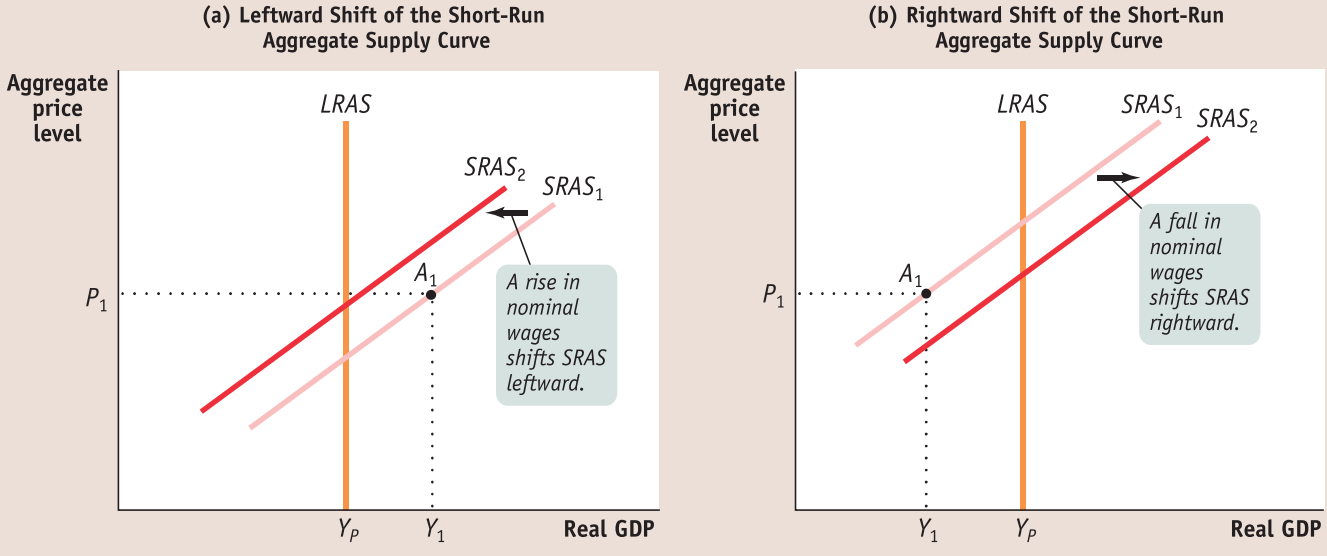
We've used the term *long run* in two different contexts. In an earlier chapter we focused on *long-run economic growth:* growth that takes place over decades. In this chapter we introduced the *long-run aggregate supply curve,* which depicts the economy's potential output: the level of aggregate output that the economy would produce if all prices, including nominal wages, were fully flexible. It might seem that we're using the same term, *long run,* for two different concepts. But we aren't: these two concepts are really the same thing.

Because the economy always tends to return to potential output in the long run, actual aggregate output *fluctuates around* potential output, rarely getting too far from it. As a result, the economy's rate of growth over long periods of time—say, decades—is very close to the rate of growth of potential output. And potential output growth is determined by the factors we analyzed in the chapter on long-run economic growth. So that means that the "long run" of long-run growth and the "long run" of the long-run aggregate supply curve coincide.

supply curve will shift over time until the economy is at a point where both curves cross—a point where actual aggregate output is equal to potential output.

Figure 14-7 illustrates how this process works. In both panels *LRAS* is the long-run aggregate supply curve, $SRAS_1$ is the initial short-run aggregate supply curve, and the aggregate price level is at P_1. In panel (a) the economy starts at the initial production point, A_1, which corresponds to a quantity of aggregate output supplied, Y_1, that is higher than potential output, Y_P. Producing an aggregate output level (such as Y_1) that is higher than potential output (Y_P) is possible only because nominal wages haven't yet fully adjusted upward. Until this upward adjustment in nominal wages occurs, producers are earning high profits and producing a high level of output. But a level of aggregate output higher than potential output means a low

FIGURE 14-7 From the Short Run to the Long Run



In panel (a), the initial short-run aggregate supply curve is $SRAS_1$. At the aggregate price level, P_1, the quantity of aggregate output supplied, Y_1, exceeds potential output, Y_P. Eventually, low unemployment will cause nominal wages to rise, leading to a leftward shift of the short-run aggregate supply curve from $SRAS_1$ to $SRAS_2$. In panel (b), the reverse happens: at the aggregate price level, P_1, the quantity of aggregate output supplied is less than potential output. High unemployment eventually leads to a fall in nominal wages over time and a rightward shift of the short-run aggregate supply curve.

level of unemployment. Because jobs are abundant and workers are scarce, nominal wages will rise over time, gradually shifting the short-run aggregate supply curve leftward. Eventually it will be in a new position, such as $SRAS_2$. (Later in this chapter, we'll show where the short-run aggregate supply curve ends up. As we'll see, that depends on the aggregate demand curve as well.)

In panel (b), the initial production point, A_1, corresponds to an aggregate output level, Y_1, that is lower than potential output, Y_P. Producing an aggregate output level (such as Y_1) that is lower than potential output (Y_P) is possible only because nominal wages haven't yet fully adjusted downward. Until this downward adjustment occurs, producers are earning low (or negative) profits and producing a low level of output. An aggregate output level lower than potential output means high unemployment. Because workers are abundant and jobs are scarce, nominal wages will fall over time, shifting the short-run aggregate supply curve gradually to the right. Eventually it will be in a new position, such as $SRAS_2$.

We'll see shortly that these shifts of the short-run aggregate supply curve will return the economy to potential output in the long run.

➤ECONOMICS IN ACTION

Prices and Output During the Great Depression

Figure 14-8 shows the actual track of the aggregate price level, as measured by the GDP deflator, and real GDP, from 1929 to 1942. As you can see, aggregate output and the aggregate price level fell together from 1929 to 1933 and rose together from 1933 to 1937. This is what we'd expect to see if the economy was moving down the short-run aggregate supply curve from 1929 to 1933 and moving up it (with a brief reversal in 1937–1938) thereafter.

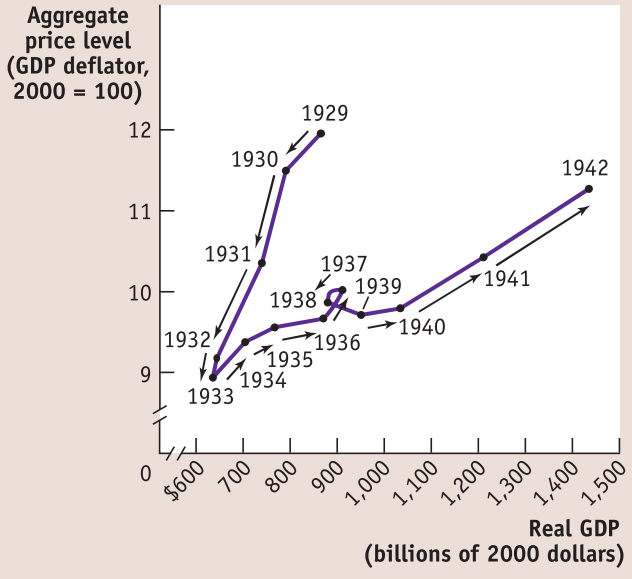
But even in 1942 the aggregate price level was still lower than it was in 1929; yet real GDP was much higher. What happened?

The answer is that the short-run aggregate supply curve shifted to the right over time. This shift partly reflected rising productivity—a rightward shift of the underlying long-run aggregate supply curve. But since the U.S. economy was producing

FIGURE 14-8

Prices and Output During the Great Depression

From 1929 to 1933, prices and aggregate output fell together. And from 1933 to 1937, prices and aggregate output rose together. That is, during the period of 1929 to 1937, the economy behaved as if it were first moving down and then up the short-run aggregate supply curve. By the late 1930s, however, aggregate output was above 1929 levels even though the aggregate price level was still lower than it was in 1929. This reflects the fact that the short-run aggregate supply curve had shifted to the right during this period, due to both the short-run adjustment process in the economy and to a rightward shift of the long-run aggregate supply curve.



QUICK REVIEW

- The **aggregate supply curve** illustrates the relationship between the aggregate price level and the quantity of aggregate output supplied.
- The **short-run aggregate supply curve** is upward sloping: a higher aggregate price level leads to higher aggregate output given that **nominal wages** are **sticky.**
- Changes in commodity prices, nominal wages, and productivity shift the short-run aggregate supply curve.
- In the long run, all prices are flexible, and changes in the aggregate price level have no effect on aggregate output. The **long-run aggregate supply curve** is vertical at **potential output.**
- If actual aggregate output exceeds potential output, nominal wages eventually rise and the short-run aggregate supply curve shifts leftward. If potential output exceeds actual aggregate output, nominal wages eventually fall and the short-run aggregate supply curve shifts rightward.

below potential output and had high unemployment during this period, the rightward shift of the short-run aggregate supply curve also reflected the adjustment process shown in panel (b) of Figure 14-7. So the movement of aggregate output from 1929 to 1942 reflected both movements along and shifts of the short-run aggregate supply curve. ▲

CHECK YOUR UNDERSTANDING 14-2

1. Determine the effect on short-run aggregate supply of each of the following events. Explain whether it represents a movement along the *SRAS* curve or a shift of the *SRAS* curve.
   a. A rise in the consumer price index (CPI) leads producers to increase output.
   b. A fall in the price of oil leads producers to increase output.
   c. A rise in legally mandated retirement benefits paid to workers leads producers to reduce output.
2. Suppose the economy is initially at potential output and the quantity of aggregate output supplied increases. What information would you need to determine whether this was due to a movement along the *SRAS* curve or a shift of the *LRAS* curve?

Solutions appear at back of book.

The *AD–AS* Model

From 1929 to 1933, the U.S. economy moved down the short-run aggregate supply curve as the aggregate price level fell. In contrast, from 1979 to 1980 the U.S. economy moved up the aggregate demand curve as the aggregate price level rose. In each case, the cause of the movement along the curve was a shift of the other curve. In 1929–1933, it was a leftward shift of the aggregate demand curve—a major fall in consumer spending. In 1979–1980, it was a leftward shift of the short-run aggregate supply curve—a dramatic fall in short-run aggregate supply caused by the oil price shock.

So to understand the behavior of the economy, we must put the aggregate supply curve and the aggregate demand curve together. The result is the ***AD–AS* model,** the basic model we use to understand economic fluctuations.

Short-Run Macroeconomic Equilibrium

We'll begin our analysis by focusing on the short run. Figure 14-9 shows the aggregate demand curve and the short-run aggregate supply curve on the same diagram. The point at which the *AD* and *SRAS* curves intersect, E_{SR}, is the **short-run macroeconomic equilibrium:** the point at which the quantity of aggregate output supplied is equal to the quantity demanded by domestic households, businesses, the government, and the rest of the world. The aggregate price level at E_{SR}, P_E, is the **short-run equilibrium aggregate price level.** The level of aggregate output at E_{SR}, Y_E, is the **short-run equilibrium aggregate output.**

In the supply and demand model of Chapter 3 we saw that a shortage of any individual good causes its market price to rise but a surplus of the good causes its market price to fall. These forces ensure that the market reaches equilibrium. The same logic applies to short-run macroeconomic equilibrium. If the aggregate price level is above its equilibrium level, the quantity of aggregate output supplied exceeds the quantity of aggregate output demanded. This leads to a fall in the aggregate price level and pushes it toward its equilibrium level. If the aggregate price level is below its equilibrium level, the quantity of aggregate output supplied is less than the quantity of aggregate output demanded. This leads to a rise in the aggregate price level, again pushing it toward its equilibrium level. In the discussion that follows, we'll assume that the economy is always in short-run macroeconomic equilibrium.

In the ***AD–AS* model,** the aggregate supply curve and the aggregate demand curve are used together to analyze economic fluctuations.

The economy is in **short-run macroeconomic equilibrium** when the quantity of aggregate output supplied is equal to the quantity demanded.

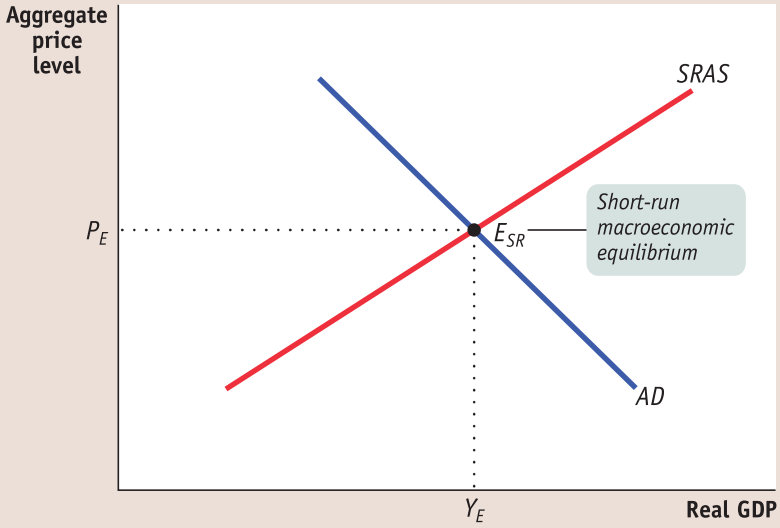
The **short-run equilibrium aggregate price level** is the aggregate price level in the short-run macroeconomic equilibrium.

Short-run equilibrium aggregate output is the quantity of aggregate output produced in the short-run macroeconomic equilibrium.

FIGURE 14-9

The *AD–AS* Model

The *AD–AS* model combines the aggregate demand curve and the short-run aggregate supply curve. Their point of intersection, E_{SR}, is the point of short-run macroeconomic equilibrium where the quantity of aggregate output demanded is equal to the quantity of aggregate output supplied. P_E is the short-run equilibrium aggregate price level, and Y_E is the short-run equilibrium level of aggregate output.



We'll also make another important simplification based on the observation that in reality there is a long-term upward trend in both aggregate output and the aggregate price level. We'll assume that a fall in either variable really means a fall compared to the long-run trend. For example, if the aggregate price level normally rises 4% per year, a year in which the aggregate price level rises only 3% would count, for our purposes, as a 1% decline. In fact, since the Great Depression there have been very few years in which the aggregate price level of any major nation actually declined—Japan's period of deflation from 1995 to 2005 is one of the few exceptions. There have, however, been many cases in which the aggregate price level fell relative to the long-run trend.

Short-run equilibrium aggregate output and the short-run equilibrium aggregate price level can change either because of shifts of the *AD* curve or because of shifts of the *SRAS* curve. Let's look at each case in turn.

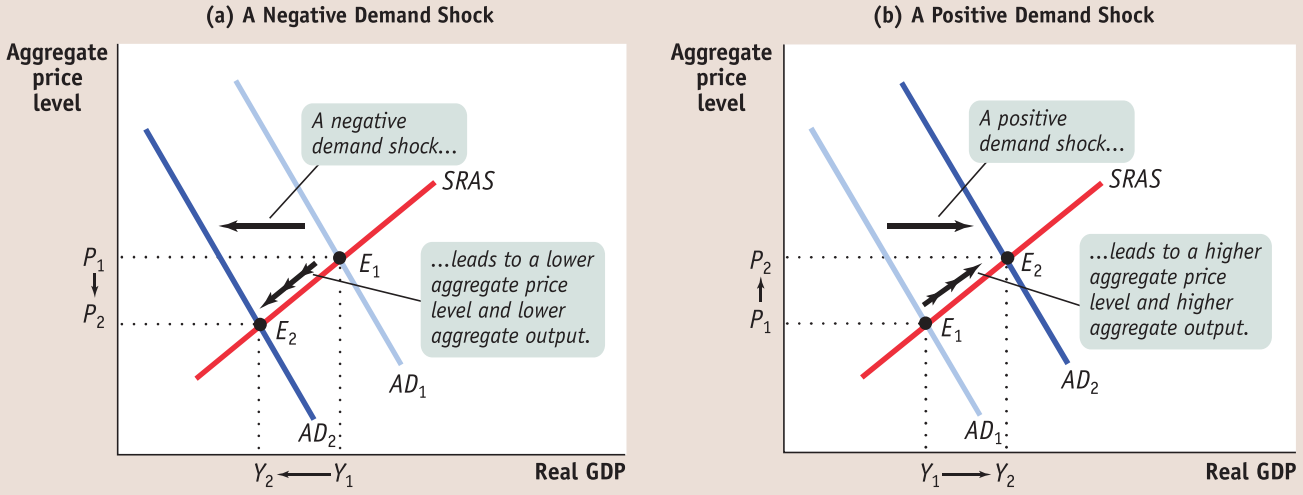
Shifts of Aggregate Demand: Short-Run Effects

An event that shifts the aggregate demand curve, such as a change in expectations or wealth, the effect of the size of the existing stock of physical capital, or the use of fiscal or monetary policy, is known as a **demand shock.** The Great Depression was caused by a negative demand shock, the collapse of wealth and of business and consumer confidence that followed the stock market crash of 1929 and the banking crisis of 1930–1931. The Depression was ended by a positive demand shock—the huge increase in government purchases during World War II. In 2008 the U.S. economy experienced another significant negative demand shock as the housing market turned from boom to bust. The stock market then fell sharply during the financial crisis, leading consumers and firms to scale back their spending.

Figure 14-10 on the next page shows the short-run effects of negative and positive demand shocks. A negative demand shock shifts the aggregate demand curve, *AD,* to the left, from AD_1 to AD_2, as shown in panel (a). The economy moves down along the *SRAS* curve from E_1 to E_2, leading to lower short-run equilibrium aggregate output and a lower short-run equilibrium aggregate price level. A positive demand shock shifts the aggregate demand curve, *AD,* to the right, as shown in panel (b). Here, the economy moves up along the *SRAS* curve, from E_1 to E_2. This leads to higher short-run equilibrium aggregate output and a higher short-run equilibrium aggregate price level. Demand shocks cause aggregate output and the aggregate price level to move in the same direction.

An event that shifts the aggregate demand curve is a **demand shock.**

FIGURE 14-10 **Demand Shocks**

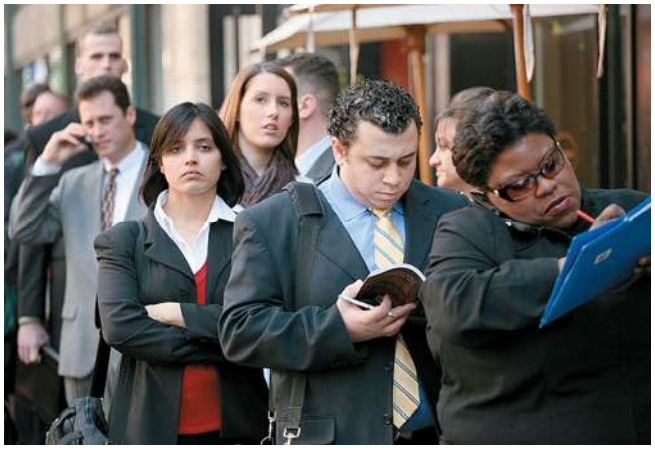


A demand shock shifts the aggregate demand curve, moving the aggregate price level and aggregate output in the same direction. In panel (a), a negative demand shock shifts the aggregate demand curve leftward from AD_1 to AD_2, reducing the aggregate price level from P_1 to P_2 and aggregate output from Y_1 to Y_2. In panel (b), a positive demand shock shifts the aggregate demand curve rightward, increasing the aggregate price level from P_1 to P_2 and aggregate output from Y_1 to Y_2.

An event that shifts the short-run aggregate supply curve is a **supply shock**.

Shifts of the *SRAS* Curve

An event that shifts the short-run aggregate supply curve, such as a change in commodity prices, nominal wages, or productivity, is known as a **supply shock.** A *negative* supply shock raises production costs and reduces the quantity producers are willing to supply at any given aggregate price level, leading to a leftward shift of the short-run aggregate supply curve. The U.S. economy experienced severe negative supply shocks following disruptions to world oil supplies in 1973 and 1979. In contrast, a *positive* supply shock reduces production costs and increases the quantity supplied at any given aggregate price level, leading to a rightward shift of the short-run aggregate supply curve. The United States experienced a positive supply shock between 1995 and 2000, when the increasing use of the Internet and other information technologies caused productivity growth to surge.

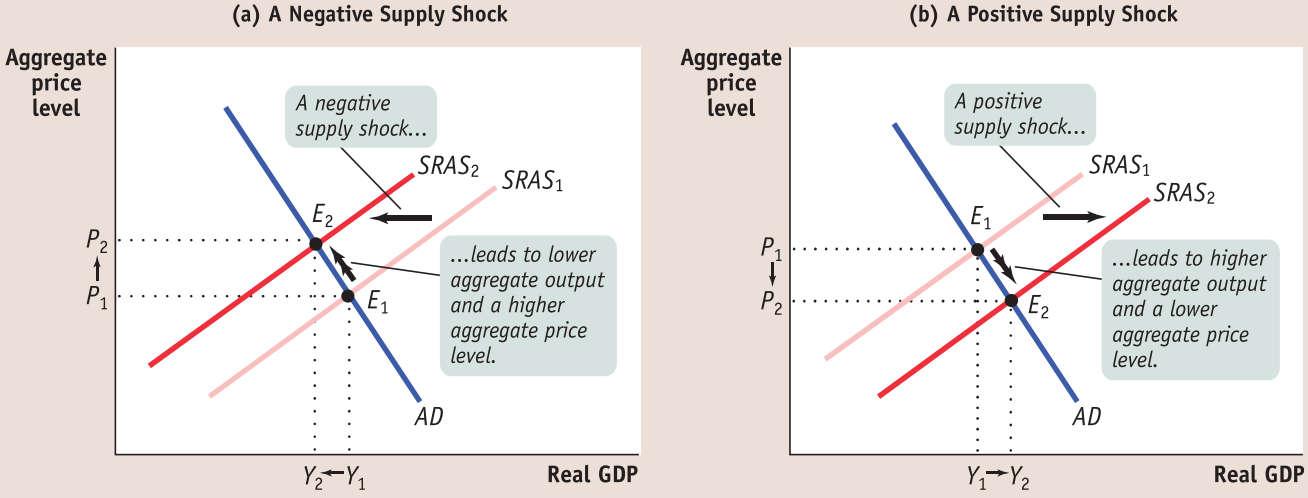


AP Photo/Mark Lennihan

Pessimism prevails during stagflation as unemployment and prices rise.

The effects of a negative supply shock are shown in panel (a) of Figure 14-11. The initial equilibrium is at E_1, with aggregate price level P_1 and aggregate output Y_1. The disruption in the oil supply causes the short-run aggregate supply curve to shift to the left, from $SRAS_1$ to $SRAS_2$. As a consequence, aggregate output falls and the aggregate price level rises, an upward movement along the *AD* curve. At the new equilibrium, E_2, the short-run

FIGURE 14-11 **Supply Shocks**



A supply shock shifts the short-run aggregate supply curve, moving the aggregate price level and aggregate output in opposite directions. Panel (a) shows a negative supply shock, which shifts the short-run aggregate supply curve leftward and causes stagflation—lower aggregate output and a higher aggregate price level. Here the short-run aggregate supply curve shifts from $SRAS_1$ to $SRAS_2$, and the economy moves from E_1 to E_2. The aggregate price level rises from P_1 to P_2, and aggregate output falls from Y_1 to Y_2. Panel (b) shows a positive supply shock, which shifts the short-run aggregate supply curve rightward, generating higher aggregate output and a lower aggregate price level. The short-run aggregate supply curve shifts from $SRAS_1$ to $SRAS_2$, and the economy moves from E_1 to E_2. The aggregate price level falls from P_1 to P_2, and aggregate output rises from Y_1 to Y_2.

equilibrium aggregate price level, P_2, is higher, and the short-run equilibrium aggregate output level, Y_2, is lower than before.

The combination of inflation and falling aggregate output shown in panel (a) has a special name: **stagflation,** for "stagnation plus inflation." When an economy experiences stagflation, it's very unpleasant: falling aggregate output leads to rising unemployment, and people feel that their purchasing power is squeezed by rising prices. Stagflation in the 1970s led to a mood of national pessimism. It also, as we'll see shortly, poses a dilemma for policy makers.

Stagflation is the combination of inflation and falling aggregate output.

A positive supply shock, shown in panel (b), has exactly the opposite effects. A rightward shift of the *SRAS* curve from $SRAS_1$ to $SRAS_2$ results in a rise in aggregate output and a fall in the aggregate price level, a downward movement along the *AD* curve. The favorable supply shocks of the late 1990s led to a combination of full employment and declining inflation. That is, the aggregate price level fell compared with the long-run trend. This combination produced, for a time, a great wave of national optimism.

The distinctive feature of supply shocks, both negative and positive, is that, unlike demand shocks, they cause the aggregate price level and aggregate output to move in *opposite* directions.

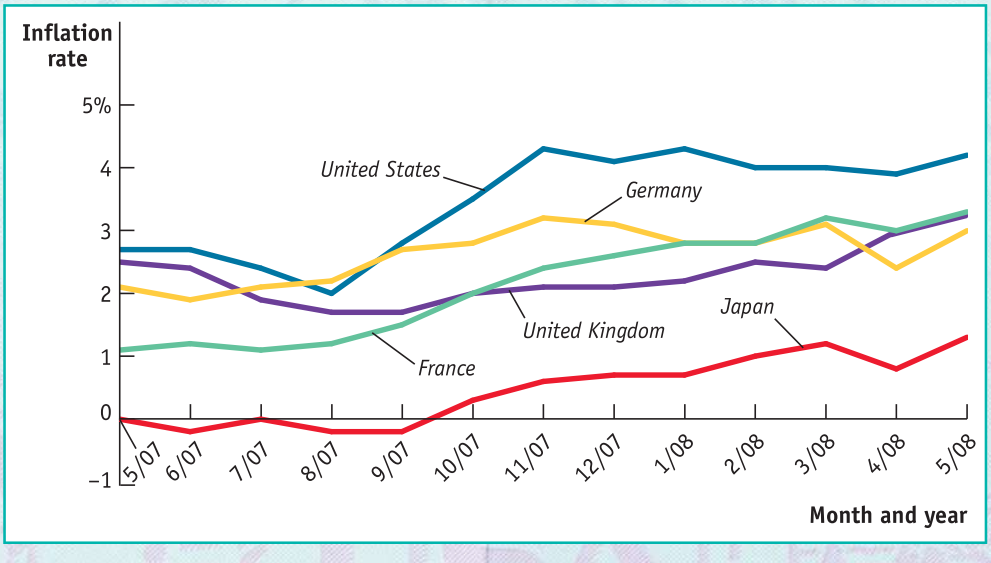
There's another important contrast between supply shocks and demand shocks. As we've seen, monetary policy and fiscal policy enable the government to shift the *AD* curve, meaning that governments are in a position to create the kinds of shocks shown in Figure 14-10. It's much harder for governments to shift the *SRAS* curve. Are there good policy reasons to shift the *AD* curve? We'll turn to that question soon. First, however, let's look at the difference between short-run macroeconomic equilibrium and long-run macroeconomic equilibrium.

GLOBAL COMPARISON

THE SUPPLY SHOCK OF 2007–2008

In the summer of 2007, for reasons that are still a matter of dispute, the prices of many raw materials sold on world markets began shooting up. By the middle of 2008, the price of oil had doubled, the price of rice had tripled, and there had been major increases in the prices of many other commodities, from wheat to iron ore.

The surge in raw-material prices amounted to a global negative supply shock, affecting all economies. This figure shows the rate of inflation, as measured by the percentage increase in the consumer price index over the previous year, for five major economies from May 2007 to May 2008. The countries started from very different initial positions, ranging from 2.7% inflation in the United States to zero inflation in Japan. Yet all of the countries experienced a substantial jump in prices.



Source: OECD.

Long-Run Macroeconomic Equilibrium

Figure 14-12 combines the aggregate demand curve with both the short-run and long-run aggregate supply curves. The aggregate demand curve, *AD*, crosses the short-run aggregate supply curve, *SRAS*, at E_{LR}. Here we assume that enough time has elapsed that the economy is also on the long-run aggregate supply curve, *LRAS*. As a result, E_{LR} is at the intersection of all three curves—*SRAS*, *LRAS*, and *AD*. So short-run equilibrium aggregate output is equal to potential output, Y_P. Such a situation, in which the point of short-run macroeconomic equilibrium is on the long-run aggregate supply curve, is known as **long-run macroeconomic equilibrium.**

The economy is in **long-run macroeconomic equilibrium** when the point of short-run macroeconomic equilibrium is on the long-run aggregate supply curve.

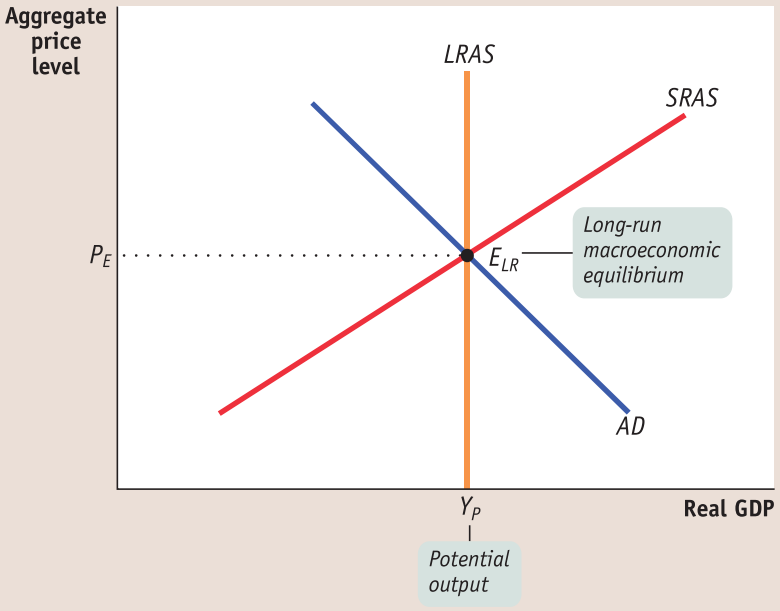
To see the significance of long-run macroeconomic equilibrium, let's consider what happens if a demand shock moves the economy away from long-run macroeconomic equilibrium. In Figure 14-13, we assume that the initial aggregate demand curve is AD_1 and the initial short-run aggregate supply curve is $SRAS_1$. So the initial macroeconomic equilibrium is at E_1, which lies on the long-run aggregate supply curve, *LRAS*. The economy, then, starts from a point of short-run and long-run macroeconomic equilibrium, and short-run equilibrium aggregate output equals potential output at Y_1.

Now suppose that for some reason—such as a sudden worsening of business and consumer expectations—aggregate demand falls and the aggregate demand curve

FIGURE 14-12

Long-Run Macroeconomic Equilibrium

Here the point of short-run macroeconomic equilibrium also lies on the long-run aggregate supply curve, *LRAS*. As a result, short-run equilibrium aggregate output is equal to potential output, Y_P. The economy is in long-run macroeconomic equilibrium at E_{LR}.

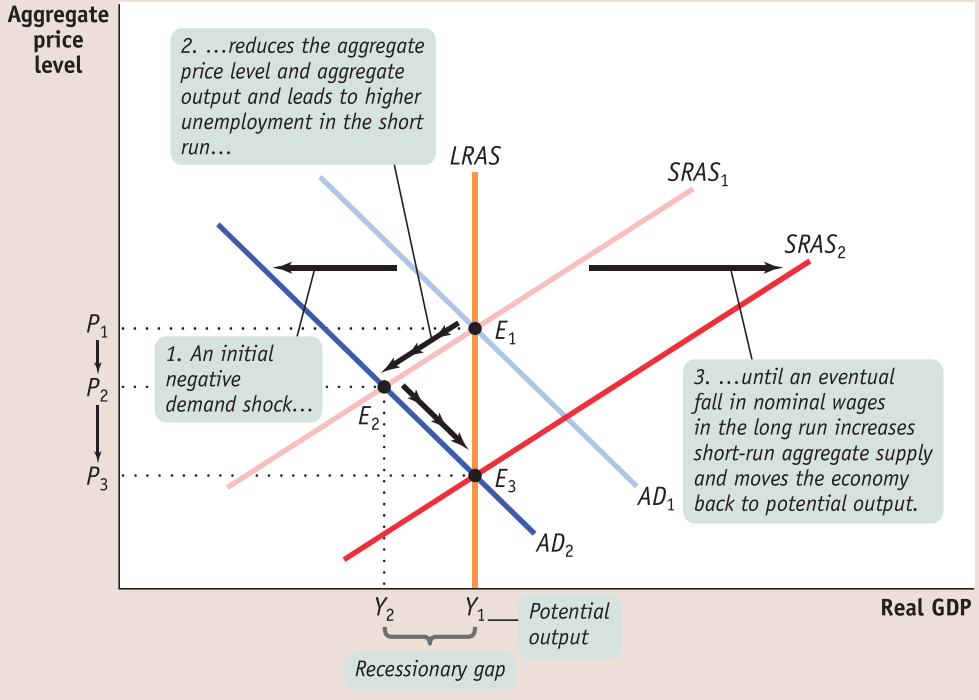


shifts leftward to AD_2. This results in a lower equilibrium aggregate price level at P_2 and a lower equilibrium aggregate output level at Y_2 as the economy settles in the short run at E_2. The short-run effect of such a fall in aggregate demand is what the U.S. economy experienced in 1929–1933: a falling aggregate price level and falling aggregate output.

FIGURE 14-13

Short-Run versus Long-Run Effects of a Negative Demand Shock

In the long run the economy is self-correcting: demand shocks have only a short-run effect on aggregate output. Starting at E_1, a negative demand shock shifts AD_1 leftward to AD_2. In the short run the economy moves to E_2 and a recessionary gap arises: the aggregate price level declines from P_1 to P_2, aggregate output declines from Y_1 to Y_2, and unemployment rises. But in the long run nominal wages fall in response to high unemployment at Y_2, and $SRAS_1$ shifts rightward to $SRAS_2$. Aggregate output rises from Y_2 to Y_1, and the aggregate price level declines again, from P_2 to P_3. Long-run macroeconomic equilibrium is eventually restored at E_3.



There is a **recessionary gap** when aggregate output is below potential output.

There is an **inflationary gap** when aggregate output is above potential output.

The **output gap** is the percentage difference between actual aggregate output and potential output.

Aggregate output in this new short-run equilibrium, E_2, is below potential output. When this happens, the economy faces a **recessionary gap.** A recessionary gap inflicts a great deal of pain because it corresponds to high unemployment. The large recessionary gap that had opened up in the United States by 1933 caused intense social and political turmoil. And the devastating recessionary gap that opened up in Germany at the same time played an important role in Hitler's rise to power.

But this isn't the end of the story. In the face of high unemployment, nominal wages eventually fall, as do any other sticky prices, ultimately leading producers to increase output. As a result, a recessionary gap causes the short-run aggregate supply curve to gradually shift to the right over time. This process continues until $SRAS_1$ reaches its new position at $SRAS_2$, bringing the economy to equilibrium at E_3, where AD_2, $SRAS_2$, and *LRAS* all intersect. At E_3, the economy is back in long-run macroeconomic equilibrium; it is back at potential output Y_1 but at a lower aggregate price level, P_3, reflecting a long-run fall in the aggregate price level. In the end, the economy is *self-correcting* in the long run.

What if, instead, there was an increase in aggregate demand? The results are shown in Figure 14-14, where we again assume that the initial aggregate demand curve is AD_1 and the initial short-run aggregate supply curve is $SRAS_1$, so that the initial macroeconomic equilibrium, at E_1, lies on the long-run aggregate supply curve, *LRAS*. Initially, then, the economy is in long-run macroeconomic equilibrium.

Now suppose that aggregate demand rises, and the *AD* curve shifts rightward to AD_2. This results in a higher aggregate price level, at P_2, and a higher aggregate output level, at Y_2, as the economy settles in the short run at E_2. Aggregate output in this new short-run equilibrium is above potential output, and unemployment is low in order to produce this higher level of aggregate output. When this happens, the economy experiences an **inflationary gap.** As in the case of a recessionary gap, this isn't the end of the story. In the face of low unemployment, nominal wages will rise, as will other sticky prices. An inflationary gap causes the short-run aggregate supply curve to shift gradually to the left as producers reduce output in the face of rising nominal wages. This process continues until $SRAS_1$ reaches its new position at $SRAS_2$, bringing the economy to equilibrium at E_3, where AD_2, $SRAS_2$, and *LRAS* all intersect. At E_3, the economy is back in long-run macroeconomic equilibrium. It is back at potential output, but at a higher price level, P_3, reflecting a long-run rise in the aggregate price level. Again, the economy is self-correcting in the long run.

To summarize the analysis of how the economy responds to recessionary and inflationary gaps, we can focus on the **output gap,** the percentage difference

FOR INQUIRING MINDS

Where's the Deflation?

The *AD–AS* model says that either a negative demand shock or a positive supply shock should lead to a fall in the aggregate price level—that is, deflation. In fact, however, the United States hasn't experienced an actual fall in the aggregate price level since 1949. Neither have most other countries; Japan, which experienced sustained mild deflation in the late 1990s and the early part of the next decade, is the big (and much discussed) exception. What happened to the deflation?

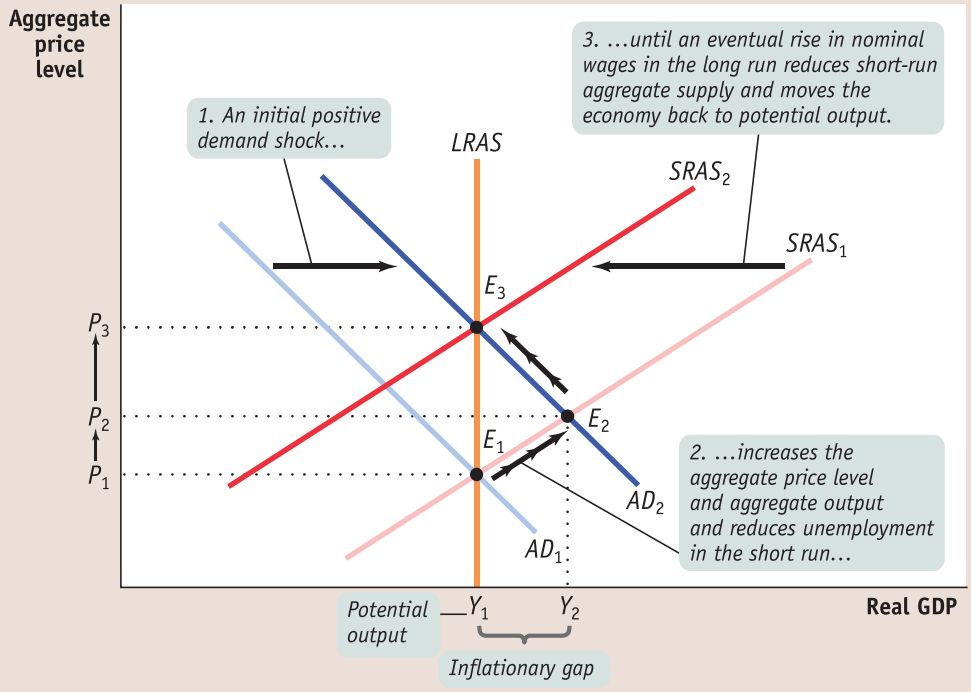
The basic answer is that since World War II economic fluctuations have taken place around a long-run inflationary trend. Before the war, it was common for prices to fall during recessions, but since then negative demand shocks have been reflected in a *decline in the rate of inflation* rather than an actual fall in prices. For example, the rate of consumer price inflation fell from more than 3% at the beginning of the 2001 recession to 1.1% a year later, but it never went below zero.

A very severe negative demand shock could still bring deflation, which is what happened in Japan. This has not happened in the United States, although there were renewed deflation concerns in the wake of the 2008 financial crisis.

FIGURE 14-14

Short-Run versus Long-Run Effects of a Positive Demand Shock

Starting at E_1, a positive demand shock shifts AD_1 rightward to AD_2, and the economy moves to E_2 in the short run. This results in an inflationary gap as aggregate output rises from Y_1 to Y_2, the aggregate price level rises from P_1 to P_2, and unemployment falls to a low level. In the long run, $SRAS_1$ shifts leftward to $SRAS_2$ as nominal wages rise in response to low unemployment at Y_2. Aggregate output falls back to Y_1, the aggregate price level rises again to P_3, and the economy self-corrects as it returns to long-run macroeconomic equilibrium at E_3.



between actual aggregate output and potential output. The output gap is calculated as follows:

$$\textbf{(14-3)}\quad \text{Output gap} = \frac{\text{Actual aggregate output} - \text{Potential output}}{\text{Potential output}} \times 100$$

Our analysis says that the output gap always tends toward zero.

If there is a recessionary gap, so that the output gap is negative, nominal wages eventually fall, moving the economy back to potential output and bringing the output gap back to zero. If there is an inflationary gap, so that the output gap is positive, nominal wages eventually rise, also moving the economy back to potential output and again bringing the output gap back to zero. So in the long run the economy is **self-correcting:** shocks to aggregate demand affect aggregate output in the short run but not in the long run.

The economy is **self-correcting** when shocks to aggregate demand affect aggregate output in the short run, but not the long run.

➤ECONOMICS IN ACTION

Supply Shocks versus Demand Shocks in Practice

How often do supply shocks and demand shocks, respectively, cause recessions? The verdict of most, though not all, macroeconomists is that recessions are mainly caused by demand shocks. But when a negative supply shock does happen, the resulting recession tends to be particularly severe.

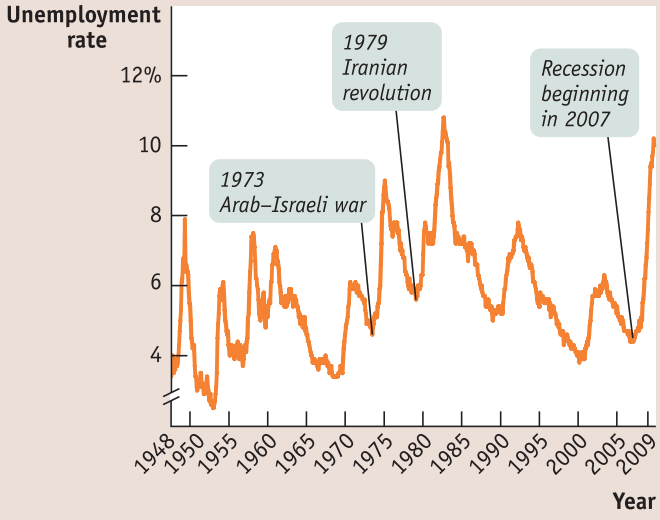
Let's get specific. Officially there have been twelve recessions in the United States since World War II. However, two of these, in 1979–1980 and 1981–1982, are often treated as a single "double-dip" recession, bringing the total number down to 11. Of these 11 recessions, only two—the recession of 1973–1975 and the double-dip

FIGURE 14-15

Negative Supply Shocks Are Relatively Rare but Nasty

Only two of 11 postwar recessions seem to fit the profile of a recession caused by a negative supply shock: the recession that followed the increase in oil prices after the 1973 Arab–Israeli war and the recession that followed another surge in oil prices after the Iranian revolution. These two recessions were, however, among the worst in terms of unemployment. A third recession that began in December 2007 was at least partially caused by a spike in oil prices. By October of 2009, unemployment reached 10%.

Source: Bureau of Labor Statistics.



recession of 1979–1982—showed the distinctive combination of falling aggregate output and a surge in the price level that we call stagflation. In each case, the cause of the supply shock was political turmoil in the Middle East—the Arab–Israeli war of 1973 and the Iranian revolution of 1979—that disrupted world oil supplies and sent oil prices skyrocketing. In fact, economists sometimes refer to the two slumps as "OPEC I" and "OPEC II," after the Organization of Petroleum Exporting Countries, the world oil cartel. A third recession that began in December 2007 was at least partially caused by a spike in oil prices.

So eight of eleven postwar recessions were purely the result of demand shocks, not supply shocks. The few supply-shock recessions, however, were among the worst as measured by the unemployment rate. Figure 14-15 shows the U.S. unemployment rate since 1948, with the dates of the 1973 Arab–Israeli war and the 1979 Iranian revolution marked on the graph. Very high unemployment rates came after these big negative supply shocks.

There's a reason the aftermath of a supply shock tends to be particularly severe for the economy: macroeconomic policy has a much harder time dealing with supply shocks than with demand shocks. Indeed, the reason the Federal Reserve was having a hard time in 2008, as described in the opening story, was the fact that in early 2008 the U.S. economy was in a recession partially caused by a supply shock (although it was also facing a demand shock). We'll see in a moment why supply shocks present such a problem. ▲

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QUICK REVIEW

- The ***AD–AS* model** is used to study economic fluctuations.
- **Short-run macroeconomic equilibrium** occurs at the intersection of the short-run aggregate supply and aggregate demand curves. This determines the **short-run equilibrium aggregate price level** and the level of **short-run equilibrium aggregate output.**
- A **demand shock,** a shift of the *AD* curve, causes the aggregate price level and aggregate output to move in the same direction. A **supply shock,** a shift of the *SRAS* curve, causes them to move in opposite directions. **Stagflation** is the consequence of a negative supply shock.
- A fall in nominal wages occurs in response to a **recessionary gap,** and a rise in nominal wages occurs in response to an **inflationary gap.** Both move the economy to **long-run macroeconomic equilibrium,** where the *AD*, *SRAS*, and *LRAS* curves intersect.
- The **output gap** always tends toward zero because the economy is **self-correcting** in the long run.

CHECK YOUR UNDERSTANDING 14-3

1. Describe the short-run effects of each of the following shocks on the aggregate price level and on aggregate output.
   a. The government sharply increases the minimum wage, raising the wages of many workers.
   b. Solar energy firms launch a major program of investment spending.
   c. Congress raises taxes and cuts spending.
   d. Severe weather destroys crops around the world.
2. A rise in productivity increases potential output, but some worry that demand for the additional output will be insufficient even in the long run. How would you respond?

Solutions appear at back of book.

Macroeconomic Policy

Stabilization policy is the use of government policy to reduce the severity of recessions and rein in excessively strong expansions.

We've just seen that the economy is self-correcting in the long run: it will eventually trend back to potential output. Most macroeconomists believe, however, that the process of self-correction typically takes a decade or more. In particular, if aggregate output is below potential output, the economy can suffer an extended period of depressed aggregate output and high unemployment before it returns to normal.

This belief is the background to one of the most famous quotations in economics: John Maynard Keynes's declaration, "In the long run we are all dead." We explain the context in which he made this remark in the accompanying For Inquiring Minds.

Economists usually interpret Keynes as having recommended that governments not wait for the economy to correct itself. Instead, it is argued by many economists, but not all, that the government should use monetary and fiscal policy to get the economy back to potential output in the aftermath of a shift of the aggregate demand curve. This is the rationale for an active **stabilization policy,** which is the use of government policy to reduce the severity of recessions and rein in excessively strong expansions.

Can stabilization policy improve the economy's performance? If we reexamine Figure 14-6, the answer certainly appears to be yes. Under active stabilization policy, the U.S. economy returned to potential output in 1996 after an approximately five-year recessionary gap. Likewise, in 2001 it also returned to potential output after an approximately four-year inflationary gap. These periods are much shorter than the decade or more that economists believe it would take for the economy to self-correct in the absence of active stabilization policy. However, as we'll see shortly, the ability to improve the economy's performance is not always guaranteed. It depends on the kinds of shocks the economy faces.

FOR INQUIRING MINDS

Keynes and the Long Run

The British economist Sir John Maynard Keynes (1883–1946), probably more than any other single economist, created the modern field of macroeconomics. We'll look at his role, and the controversies that still swirl around some aspects of his thought, in a later chapter on macroeconomic events and ideas. But for now let's just look at his most famous quote.

In 1923 Keynes published *A Tract on Monetary Reform,* a small book on the economic problems of Europe after World War I. In it he decried the tendency of many of his colleagues to focus on how things work out in the long run—as in the long-run macroeconomic equilibrium we have just analyzed—while ignoring the often very painful and possibly disastrous things that can happen along the way. Here's a fuller version of the quote:

> This *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 that when the storm is long past the sea is flat again.

Policy in the Face of Demand Shocks

Imagine that the economy experiences a negative demand shock, like the one shown in Figure 14-13. As we've discussed in this chapter, monetary and fiscal policy shift the aggregate demand curve. If policy makers react quickly to the fall in aggregate demand, they can use monetary or fiscal policy to shift the aggregate demand curve back to the right. And if policy were able to perfectly anticipate shifts of the aggregate demand curve, it could short-circuit the whole process shown in Figure 14-13. Instead of going through a period of low aggregate output and falling prices, the government could manage the economy so that it would stay at E_1.

Why might a policy that short-circuits the adjustment shown in Figure 14-13 and maintains the economy at its original equilibrium be desirable? For two reasons. First,

the temporary fall in aggregate output that would happen without policy intervention is a bad thing, particularly because such a decline is associated with high unemployment. Second, as we explained in Chapter 12, price stability is generally regarded as a desirable goal. So preventing deflation—a fall in the aggregate price level—is a good thing.

Does this mean that policy makers should always act to offset declines in aggregate demand? Not necessarily. As we'll see in later chapters, some policy measures to increase aggregate demand, especially those that increase budget deficits, may have long-term costs in terms of lower long-run growth. Furthermore, in the real world policy makers aren't perfectly informed, and the effects of their policies aren't perfectly predictable. This creates the danger that stabilization policy will do more harm than good; that is, attempts to stabilize the economy may end up creating more instability. Despite these qualifications, most economists believe that a good case can be made for using macroeconomic policy to offset major negative shocks to the *AD* curve.

Should policy makers also try to offset positive shocks to aggregate demand? It may not seem obvious that they should. After all, even though inflation may be a bad thing, isn't more output and lower unemployment a good thing? Not necessarily. Most economists now believe that any short-run gains from an inflationary gap must be paid back later. So policy makers today usually try to offset positive as well as negative demand shocks. Attempts to eliminate recessionary gaps and inflationary gaps usually rely on monetary rather than fiscal policy. In 2007 and 2008 the Federal Reserve sharply cut interest rates in an attempt to head off a rising recessionary gap; earlier in the decade, when the U.S. economy seemed headed for an inflationary gap, it raised interest rates to generate the opposite effect.

But how should macroeconomic policy respond to supply shocks?

Responding to Supply Shocks

We've now come full circle to the story that began this chapter. We can now explain why people in Ben Bernanke's position dread stagflation.

Back in panel (a) of Figure 14-11 we showed the effects of a negative supply shock: in the short run such a shock leads to lower aggregate output but a higher aggregate price level. As we've noted, policy makers can respond to a negative *demand* shock by using monetary and fiscal policy to return aggregate demand to its original level. But what can or should they do about a negative *supply* shock?

In contrast to the aggregate demand curve, there are no easy policies that shift the short-run aggregate supply curve. That is, there is no government policy that can easily affect producers' profitability and so compensate for shifts of the short-run aggregate supply curve. So the policy response to a negative supply shock cannot aim to simply push the curve that shifted back to its original position.

And if you consider using monetary or fiscal policy to shift the aggregate demand curve in response to a supply shock, the right response isn't obvious. Two bad things are happening simultaneously: a fall in aggregate output, leading to a rise in unemployment, *and* a rise in the aggregate price level. Any policy that shifts the aggregate demand curve helps one problem only by making the other worse. If the government acts to increase aggregate demand and limit the rise in unemployment, it reduces the decline in output but causes even more inflation. If it acts to reduce aggregate demand, it curbs inflation but causes a further rise in unemployment.

It's a trade-off with no good answer. In the end, the United States and other economically advanced nations suffering from the supply shocks of the 1970s eventually chose to stabilize prices even at the cost of higher unemployment. But being an economic policy maker in the 1970s, or in early 2008, meant facing even harder choices than usual.

➤ECONOMICS IN ACTION

Is Stabilization Policy Stabilizing?

We've described the theoretical rationale for stabilization policy as a way of responding to demand shocks. But does stabilization policy actually stabilize the economy? One way we might try to answer this question is to look at the long-term historical record. Before World War II, the U.S. government didn't really have a stabilization policy, largely because macroeconomics as we know it didn't exist, and there was no consensus about what to do. Since World War II, and especially since 1960, active stabilization policy has become standard practice.

So here's the question: has the economy actually become more stable since the government began trying to stabilize it? The answer is a qualified yes. It's qualified because data from the pre–World War II era are less reliable than more modern data. But there still seems to be a clear reduction in the size of economic fluctuations.

FIGURE 14-16

Has Stabilization Policy Been Stabilizing?

The nonfarm unemployment rate—the number of unemployed as a percentage of the nonfarm labor force—has fluctuated considerably less since World War II than it did before. This suggests that stabilization policy, which didn't begin until the postwar period and especially after 1960, has in fact been stabilizing. It's also worth noting that two of the peaks of postwar unemployment, in 1975 and 1982, both came as a result of supply shocks—the kind of shock that stabilization policy has a hard time handling.

Source: C. Romer, "Spurious Volatility in Historical Unemployment Data." *Journal of Political Economy* 94, no. 1 (1986): 1–37 (years 1890–1928); Bureau of Labor Statistics (years 1929–2009).

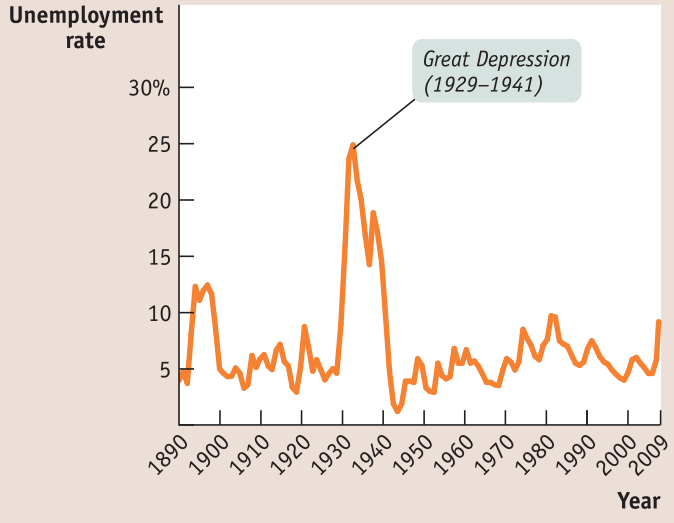

Figure 14-16 shows the number of unemployed as a percentage of the nonfarm labor force since 1890. (We focus on nonfarm workers because farmers, though they often suffer economic hardship, are rarely reported as unemployed.) Even ignoring the huge spike in unemployment during the Great Depression, unemployment seems to have varied a lot more before World War II than after. It's also worth noticing that two of the peaks in postwar unemployment, in 1975 and 1982, both corresponded to major supply shocks—the kind of shock for which stabilization policy has no good answer.

It's possible that the greater stability of the economy reflects good luck rather than policy. But on the face of it, the evidence suggests that stabilization policy is indeed stabilizing. ▲

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>> QUICK REVIEW

- **Stabilization policy** is the use of fiscal or monetary policy to offset demand shocks. There can be drawbacks, however. Such policies may lead to a long-term rise in the budget deficit and lower long-run growth. And, due to incorrect predictions, a misguided policy can increase economic instability.
- Negative supply shocks pose a policy dilemma because fighting the slump in aggregate output worsens inflation and fighting inflation worsens the slump.

➤ CHECK YOUR UNDERSTANDING 14-4

1. Suppose someone says, "Using monetary or fiscal policy to pump up the economy is counterproductive—you get a brief high, but then you have the pain of inflation."
   a. Explain what this means in terms of the *AD–AS* model.
   b. Is this a valid argument against stabilization policy? Why or why not?