Dynamic Change, Economic Fluctuations, and the AD–AS Model

CHAPTER FOCUS

- What factors change aggregate demand? What factors change aggregate supply?
- How will an economy adjust to unanticipated changes in aggregate demand? How will it adjust to unanticipated changes in aggregate supply?
- What causes recessions and booms?
- When an economy is in a recession, will market forces help direct it back to full employment? If so, how rapidly will this adjustment process work?
- What does the AD–AS model reveal about the economic crisis of 2008?

Not only will the [aggregate demand and aggregate supply] analysis help us interpret recent episodes in the business cycle, but it will also enable us to understand the debates on how economic policy should be conducted.

—Frederic Mishkin

In Chapter 9, we focused on the equilibrium conditions in the four basic macroeconomic markets. Equilibrium is important, but we live in a dynamic world that continually wars against it. Unexpected changes are constantly occurring. New products and technologies are developed; consumers and investors become more optimistic (or pessimistic) about the future; weather affects crop yields; international tensions disrupt or threaten to disrupt the supply of a key resource, and so on. Consequently, equilibrium is continually disrupted. Thus, if we want to understand how the real world works, we need to know how macroeconomic markets adjust to change.

In this chapter, we focus on what happens when the macroequilibrium of an economy is disrupted. The linkage between these disruptions and the ups and downs of the business cycle is also investigated. If economic change throws an economy into a recession, will market forces direct it back to full employment? If so, how quickly will this occur? This chapter will examine these questions and related issues.

We will continue to assume that the government’s tax, spending, and monetary policies don’t change. The impact of changes in these policy variables will be examined in subsequent chapters. For now, our focus is on the basic macroeconomic markets and how they respond to various disruptions.

Anticipated and Unanticipated Changes

In Chapter 8, we stated that it is important to distinguish between price-level changes that are anticipated and those that are not. This distinction is important in several areas of economics. **Anticipated changes** are foreseen by economic participants. Decision makers have time to adjust to them before they occur. For example, suppose that, under normal weather conditions, a new drought-resistant hybrid seed is expected to expand grain production in the Midwest by 10 percent next year. As a result, buyers and sellers will plan for a larger supply of grain and lower grain prices in the future. They will adjust their decision-making behavior accordingly.

In contrast, **unanticipated changes** catch people by surprise. New products are introduced, technological discoveries alter production costs, droughts reduce crop yields, and demand expands for some goods and contracts for others. It is impossible for decision makers to foresee many of these changes. As we will explain in a moment, there is good reason to expect that the path of the adjustment process will be influenced by whether or not a change is anticipated.

Factors That Shift Aggregate Demand

The aggregate demand curve isolates the effect of the price level on the quantity demanded of goods and services. As we discussed in the previous chapter, a reduction in the price level will (1) increase the wealth of people holding a fixed quantity of money, (2) reduce the real rate of interest, and (3) make domestically produced goods cheaper than those produced abroad. All three of these factors will lead to an increase in the quantity of goods and services demanded at the lower price level.
The price level, however, is not the only factor that influences the demand for goods and services. When we constructed the aggregate demand curve, we assumed that several other factors affecting the choices of buyers in the goods and services market were constant. Changes in these “other factors” will shift the entire aggregate demand schedule, altering the amount purchased at each price level. Let us take a closer look at the major factors that alter aggregate demand and shift the aggregate demand \( (AD) \) curve.

1. **Changes in Real Wealth. Ownership of Stocks and Housing Constitutes a Large Share of the Wealth of Americans.** Between 2002 and 2006, stock prices in the United States increased by more than 60 percent. During the same period, housing prices increased by nearly 90 percent. This huge increase in both stock and housing prices increased the wealth of Americans. In contrast, stock prices plummeted by more than 50 percent during the sixteen months following October 2007, and housing prices fell by more than 30 percent between the fourth quarter of 2006 and the fourth quarter of 2008. These price declines reduced the wealth of Americans.

   How will changes in the wealth of households affect the demand for goods and services? If the real wealth of households increases, perhaps as the result of higher prices in stock, housing, and/or real estate markets, people will demand more goods and services. As **Exhibit 1** illustrates, this increase in wealth will shift the entire \( AD \) curve to the right (from \( AD_0 \) to \( AD_1 \)). More goods and services are purchased at each price level. Conversely, a reduction in wealth will reduce the demand for goods and services, shifting the \( AD \) curve to the left (to \( AD_2 \)).

2. **Changes in the Real Interest Rate.** As we discussed in Chapter 9, the major macroeconomic markets are closely related. A change in the real interest rate in the loanable funds market will influence the choices of consumers and investors in the goods and services market. A lower real interest rate makes it cheaper for consumers to buy major appliances, automobiles, and houses now rather than in the future. Simultaneously, a lower interest rate will also stimulate business spending on capital goods (investment). If a firm must borrow, the real interest rate will contribute directly to the cost of a project. Even if the firm uses its own funds, it sacrifices interest that could have been earned by loaning the funds to someone else. Therefore, a lower interest rate reduces the opportunity cost of a project, regardless of whether it is financed with internal funds or by borrowing.

   Because a fall in the real interest rate makes both consumer and investment goods cheaper, both households and investors will increase their current expenditures in response.
In turn, their additional expenditures will increase aggregate demand, shifting the entire AD curve to the right. In contrast, a higher real interest rate makes current consumption and investment goods more expensive, which leads to a reduction in aggregate demand, shifting the AD curve to the left.

**3. CHANGES IN THE EXPECTATIONS OF BUSINESSES AND HOUSEHOLDS ABOUT THE FUTURE DIRECTION OF THE ECONOMY.** What people think will happen in the future influences current purchasing decisions. Optimism about the future direction of the economy will stimulate current investment. Business decision makers know that an expanding economy will mean strong sales and improved profit margins. Investment today may be necessary if business firms are going to benefit fully from these opportunities. Similarly, consumers are more likely to buy big-ticket items, such as automobiles and houses, when they expect an expanding economy to provide them with both job security and rising income in the future. Increased optimism encourages additional current expenditures by both investors and consumers, increasing aggregate demand.

Of course, pessimism about the future of the economy exerts just the opposite effect. When investors and consumers expect an economic downturn (a recession), they will cut back on their current spending to avoid overextending themselves. This pessimism leads to a decline in aggregate demand, shifting the AD curve to the left.

The University of Michigan conducts a monthly survey of consumers and uses the information to develop a **consumer sentiment index.** EXHIBIT 2 presents this index for the 1978–2009 period. An increase in the consumer sentiment index indicates that consumers are more optimistic about the future. A decline indicates increased consumer pessimism. Notice how the index fell sharply prior to and during the early stages of the recessions that occurred in this period. The reduction was particularly sharp prior to and during the most recent recession. The index fell to an all-time low of 57.7 in the fourth quarter of 2008.

**4. CHANGE IN THE EXPECTED RATE OF INFLATION.** When consumers and investors believe that the rate of inflation will go up in the future, they have an incentive to spend more during the current period. This expectation of higher inflation will stimulate current aggregate demand, shifting the AD curve to the right.

In contrast, if people expect inflation to decline in the future, this will discourage current spending. When prices are expected to decline (or at least increase less rapidly), people will have an incentive to wait before they buy things. This expectation of lower inflation will cause current aggregate demand to fall, shifting the AD curve to the left.
5. Changes in Income Abroad. Changes in the income of a nation’s trading partners will influence the demand for its exports. If the income of a nation’s trading partners increases rapidly, the demand for its exports will expand. This will stimulate its aggregate demand. For example, rapid growth of income in Europe, Canada, and Mexico increases the demand of consumers in these areas for U.S.-produced goods. This will cause U.S. exports to expand, increasing aggregate demand (shifting the AD curve to the right).

Conversely, when a nation’s trading partners are experiencing recessionary conditions, citizens in these countries reduce their purchases, including their purchases of foreign-produced goods. Thus, a decline in the income of a nation’s trading partners will reduce its exports and the aggregate demand for its products.

Currently, approximately 11 percent of the goods and services produced in the United States are sold to purchasers abroad. Canada, Mexico, and most Western European countries export an even larger share of what they produce. The larger the size of the trade sector, the greater the potential importance of fluctuations in income abroad as a source of instability in aggregate demand. If the demand of foreign buyers does not rise and fall at the same time as domestic demand, the diversity of markets will reduce the fluctuations in demand for a nation’s exports and thereby exert a stabilizing effect on aggregate demand. However, when incomes abroad are falling at the same time as domestic demand, this factor will reduce exports, causing domestic demand to fall by an even larger amount. This is precisely what happened during 2008–2009. Most of the world’s major economies dipped into a recession at approximately the same time, placing downward pressure on aggregate demand throughout the world.

6. Changes in Exchange Rates. As we previously discussed, changes in exchange rates influence the relative price of both imports and exports. If the dollar appreciates, imported goods will be cheaper for Americans to buy, and goods exported from the United States will be more expensive for foreigners to purchase. As a result, U.S. imports will rise and exports will fall. This decline in net exports (exports minus imports) will reduce aggregate demand (shifting the AD curve to the left).

If the dollar depreciates, the effect will be just the opposite. When the value of the dollar falls, foreign-produced goods become more expensive for U.S. consumers, whereas U.S.-produced goods become cheaper for foreigners. This is precisely what happened during the 2003–2007 period, when the dollar depreciated by about 15 percent relative to the euro and several other major currencies. When the dollar depreciates, imports will tend to fall and exports rise. In turn, this increase in net exports will stimulate aggregate demand in the United States (shifting the AD curve to the right).2

What Factors Affect Aggregate Demand?1

These factors increase aggregate demand (AD).
1. An increase in real wealth
2. A decrease in the real rate of interest
3. Optimism about future economic conditions
4. A rise in the expected rate of inflation
5. Higher real incomes abroad
6. A fall in the value of a nation’s currency

These factors decrease aggregate demand (AD).
1. Lower real wealth
2. An increase in the real rate of interest
3. Pessimism about future economic conditions
4. A fall in the expected rate of inflation
5. Lower real incomes abroad
6. A rise in the value of a nation’s currency

1The impact of macroeconomic policy is considered later.

2Later, when discussing international finance, we will analyze the determinants of the exchange rate and consider in more detail how changes in exchange rates affect both trade and macroeconomic markets.
The accompanying Thumbnail Sketch summarizes the major factors that change aggregate demand and shift the AD curve. Other factors include the government’s spending, taxing, and monetary policies. In subsequent chapters, we will analyze the impact of fiscal and monetary policy on aggregate demand and economic performance. We now turn to the analysis of the factors that alter aggregate supply. Then we will be in a position to consider how macroeconomic markets adjust and whether these adjustments will help keep output and employment high.

**Shifts in Aggregate Supply**

What factors will cause the aggregate supply curve to shift? The answer to this question will differ depending on whether the change in supply is long run and sustainable or short run and only temporary. A long-run change in aggregate supply indicates that it will be possible to achieve and sustain a larger rate of output. For example, the discovery of a lower-cost source of energy would cause a long-run change in aggregate supply. If this happened, both long-run aggregate supply (LRAS) and short-run aggregate supply (SRAS) would change.

In contrast, changes that temporarily alter the production capacity of an economy will shift the SRAS curve, but not the LRAS curve. A drought in California would be an example of such a short-run change. The drought will hurt in the short run, but it will eventually end, and output will return to the long-run normal rate. Changes that are temporary in nature shift only the SRAS curve. Let’s consider the factors that change long-run and short-run aggregate supply in more detail.

**Changes in Long-Run Aggregate Supply**

Remember, the long-run aggregate supply curve shows the maximum rate of sustainable output of an economy, given its current (1) resource base, (2) level of technology, and (3) institutional arrangements that affect its productivity and the efficient use of its resources. Changes in any of these three determinants of output will cause the LRAS curve to shift.

As part (a) of EXHIBIT 3 illustrates, changes that increase the economy’s production capacity will shift the LRAS curve to the right. Over time, net investment will expand the supply of physical capital, natural resources, and labor (human resources). Physical capital investment expands the supply of buildings, machines, and other physical assets. Education and training improve the quality of the labor force and thereby expand the availability of human capital. Because investment in physical and human capital enhances output both now and in the future, it increases both long-run and short-run aggregate supply, causing both curves to shift to the right. However, things can work the other way around, too. Reductions in physical and human capital over time could cause the current and long-term production capacity of an economy to fall, shifting the SRAS and LRAS curves to the left.

Improvements in technology—the discovery of economical new products or less costly ways of producing goods and services—also permit us to squeeze a larger output from a given resource supply. The enormous improvement in our living standards during the last 250 years is largely the result of the discovery and adoption of technologically superior ways of transforming resources into goods and services. The development of the internal combustion engine, electricity, and nuclear power has vastly altered our energy sources (and consumption). The railroad, automobile, and airplane dramatically changed both the speed and cost of transportation. More recently, high-tech products like personal computers, fax machines, e-mail, and the Internet have cut the cost of doing business and expanded our production capacity. Technological improvements of this type enhance productivity and thereby shift both LRAS and SRAS curves to the right.

Finally, institutional changes can affect productivity and efficiency and change both short- and long-run aggregate supply. Depending on how well a government’s institutional, or policy, changes are designed, they can increase aggregate supply by enhancing economic efficiency and productivity or decrease it by encouraging waste and making production more costly.
The long-run growth of real GDP in the United States has been about 3 percent per year. In other words, we have been able to expand our productivity steadily over the years. Hence, the LRAS and SRAS curves have gradually drifted to the right at about a 3 percent annual rate, sometimes a little faster and sometimes a little slower.

**Changes in Short-Run Aggregate Supply**

Changes can sometimes influence current output without altering the economy’s long-run capacity. When this is the case, the SRAS curve will shift even though the LRAS curve remains unchanged. What types of changes would do this?

1. **Changes in Resource Prices.** When we derived the SRAS schedule in Chapter 9, we held resource prices constant. But a change in resource prices will alter SRAS, although not necessarily LRAS. A reduction in resource prices will lower production costs and therefore shift the SRAS curve to the right, as illustrated in part (b) of Exhibit 3. However, unless the lower cost of resources reflects a long-term increase in their supply, LRAS won’t change. Conversely, an increase in the price of resources used in production will increase firms’ costs, shifting the SRAS curve to the left. But unless the higher prices are the result of a long-term reduction in the size of the economy’s resource base, they will not reduce LRAS.\(^3\)

2. **Changes in the Expected Rate of Inflation.** As we learned, a change in the expected rate of inflation will affect aggregate demand (AD) in the goods and services market. It will also alter short-run aggregate supply (SRAS). If sellers in the goods and services market expect the future rate of inflation to increase, they will be less motivated to sell their products at lower prices in the current period. After all, goods that they do not sell today will be available for sale in the future at what they anticipate will be even higher prices because of inflation. But they will have produced them earlier at lower costs. Therefore, an increase in the expected rate of inflation will reduce the current supply of

\(^3\)In subsequent chapters, we will explain how stable prices can be achieved as real output increases.
3. SUPPLY SHOCKS. Supply shocks can also alter current output without directly affecting the productive capacity of the economy. Supply shocks are surprise occurrences that temporarily increase or decrease current output. For example, adverse weather conditions, a natural disaster, or a temporary rise in the price of imported resources (for example, oil in the case of the United States) will reduce current supply, even though they do not alter the economy’s long-term production capacity. They lower short-run aggregate supply (shift the SRAS curve to the left) without directly affecting LRAS, in other words. In contrast, favorable weather conditions or a temporary fall in the world price of major resources imported by a country will expand current output, even though the economy’s long-run capacity remains unchanged.

The accompanying Thumbnail Sketch summarizes the major factors that influence both long-run and short-run aggregate supply. Of course, macroeconomic policy can also influence aggregate supply. Like aggregate demand, we will study the impact macroeconomic policies have on aggregate supply in subsequent chapters.

Steady Economic Growth and Anticipated Changes in Long-Run Aggregate Supply

As we’ve said, changes that people anticipate affect the economy differently from changes they don’t. When a change takes place slowly and predictably, decision makers will make choices based on their anticipation of the event. These changes do not generally disrupt equilibrium in markets. With time, net investment and improvements in technology and institutional efficiency will lead to increases in the sustainable rate of output and shift the economy’s LRAS curve to the right.

EXHIBIT 4 illustrates the impact of economic growth on the goods and services market. Initially, the economy is in long-run equilibrium at price level $P_1$ and output $Y_{F_1}$.
The growth expands the economy’s potential output, shifting both the LRAS and SRAS curves to the right (to \( LRAS_2 \) and \( SRAS_2 \)). Because these changes are gradual, decision makers have time to anticipate the changing market conditions and adjust their behavior accordingly.

When economic growth expands the economy’s production possibilities, a higher rate of real output can be achieved and sustained. The larger output can be attained even while unemployment remains at its natural rate. If the money supply is held constant, the increase in aggregate supply will lead to a lower price level (\( P_2 \)).

During the past fifty years, real output has expanded significantly in the United States and other countries. However, contrary to the presentation of Exhibit 4, the price level has generally not declined. This is because monetary policy makers have expanded the supply of money. As we will see later, an increase in the money supply stimulates aggregate demand, shifting \( AD \) to the right and pushing the price level upward.

### Unanticipated Changes and Market Adjustments

In contrast to anticipated changes, unanticipated changes in aggregate demand and aggregate supply will disrupt long-run equilibrium in the goods and services market. If a change isn’t anticipated, initially, it may be unclear to decision makers whether the change—an increase in sales, for example—reflects a random occurrence or a real change in demand conditions. Businesses will also take some time to differentiate between temporary fluctuations and more permanent changes. Even after decision makers are convinced that market conditions have changed, it will take some time for them to make new decisions and carry them out. In some cases, long-term contracts will delay the adjustment process.

Equilibrium may be disrupted by unexpected changes in either aggregate demand or aggregate supply. We will begin with the analysis of changes in aggregate demand.

### Unanticipated Increases in Aggregate Demand

Part (a) of Exhibit 5 shows how an economy that is initially in long-run equilibrium will adjust to an unanticipated increase in aggregate demand. Initially, at output \( Y_F \) and price level \( P_{100} \) (point \( E_1 \)), the economy is in long-run equilibrium. Aggregate demand and
aggregate supply are in balance. Decision makers have correctly anticipated the current price level, and the economy is operating at its full-employment level of output.

What would happen if this equilibrium were disrupted by an unanticipated increase in aggregate demand (a shift from $AD_1$ to $AD_2$), which might result for example from a stock market boom or the rapid growth of income abroad? An excess demand for goods and services would result at the initial price level ($P_{100}$). Responding to the strong sales and excess demand, businesses would increase their prices. Their profit margins would improve (because product prices have increased relative to the cost of the resources used to make them), and they would expand output along the SRAS curve. As part (a) of Exhibit 5 shows, the economy would move to a short-run equilibrium ($e_2$), at a larger output ($Y_2$) and higher price level ($P_{105}$). (Note: A short-run equilibrium is indicated with a lowercase $e$, whereas a capital $E$ is used to designate a long-run equilibrium. This convention will be followed throughout the text.)

\[ P_{105} \]
\[ Y_2 \]

In response to an unanticipated increase in aggregate demand for goods and services that shifts $AD_1$ to $AD_2$ (shown in part a), prices will rise to $P_{105}$ in the short run and output will increase temporarily to $Y_2$, exceeding full-employment capacity. However, over time, prices in resource markets, including the labor market, will rise as the result of the strong demand. The higher resource prices will mean higher production costs, which will reduce aggregate supply to $SRAS_2$ (as shown in part b). In the long run, a new equilibrium will emerge at a higher price level ($P_{110}$) and an output consistent with the economy’s sustainable capacity. Thus, the increase in aggregate demand will expand output only temporarily.

\[ P_{110} \]
\[ Y_2 \]

**EXHIBIT 5**
An Unanticipated Increase in Aggregate Demand

The definition of long-run aggregate supply helps clarify why a change in resource prices will affect short-run aggregate supply but not long-run aggregate supply. When an economy is operating on its LRAS curve, the relationship between resource prices (costs) and product prices will reflect normal competitive market conditions. Because both profit and unemployment rates are at their normal levels, there is no tendency for resource prices to change relative to product prices when current output is equal to the economy’s long-run potential. Therefore, when an economy is operating on its LRAS schedule, any change in resource prices will be matched by a proportional change in product prices, leaving the incentive to supply resources (and output) unchanged.
This isn’t the end of the story, though. **The increase in GDP above the economy’s long-run potential will last only until temporarily fixed resource prices (and interest rates) can be adjusted upward by people in light of the new stronger demand conditions.**

The strong demand accompanying the high level of output (rates beyond \( Y_F \)) will put upward pressure on prices in the resource and loanable funds markets. As part (b) of Exhibit 5 shows, eventually the rising resource prices and costs will shift the short-run aggregate supply curve to the left (to \( SRAS_2 \)). Given sufficient time, wages, other resource prices, and interest rates will completely adjust. When this happens, a new long-run equilibrium (\( E_2 \)) will be established at a higher price level (\( P_{110} \)). Correspondingly, profit margins will return to their normal levels, output will recede to the economy’s long-run potential, and unemployment will return to its natural rate.

Notice that because an increase in aggregate demand doesn’t change the economy’s production capacity, it cannot permanently expand output (beyond \( Y_F \)). The increase in demand temporarily expands output, but in the long term, it only increases the price level.

### Unanticipated Reductions in Aggregate Demand

How would the goods and services market adjust to an unanticipated reduction in aggregate demand? For example, suppose decision makers become more pessimistic about the future or an unexpected decline in income abroad reduces demand for their products.

**EXHIBIT 6** will help us analyze what happens during an unanticipated reduction in aggregate demand. In part (a) of Exhibit 6, the economy is in long-run equilibrium (\( E_1 \)) at output \( Y_F \) and the price level \( P_{100} \). The reduction in demand will shift aggregate demand from \( AD_1 \) to \( AD_2 \), disrupting the initial equilibrium. As a result of the fall in demand, businesses will be unable to sell \( Y_F \) units of output at the initial price level of \( P_{100} \). In the short run, business firms will reduce their output (to \( Y_2 \)) and cut their prices (to \( P_{95} \)) in response to the weak demand conditions. Because many business costs are temporarily fixed, profit margins will fall. Predictably, firms will cut back on output and lay off workers, causing the unemployment rate to rise. The actual rate of unemployment will rise above the economy’s natural rate of unemployment. Weak demand and excess supply will

**EXHIBIT 6**

An Unanticipated Reduction in Aggregate Demand

The short-run impact of an unanticipated fall in aggregate demand, shifting \( AD_1 \) to \( AD_2 \), will be a decline in output to \( Y_2 \) and a lower price level of \( P_{95} \) (as shown in part a). Temporarily, profit margins will decline, output will fall, and unemployment will rise above its natural rate. In the long run, weak demand and excess supply in the resource market will lead to lower wages and resource prices. This will lower production costs, leading to an expansion in short-run aggregate supply, shifting it to \( SRAS_2 \) (as shown in part b). However, this method of restoring equilibrium (\( E_2 \)) may be both painful and quite lengthy.
be widespread in resource markets. Many firms will have excess production capacity, and the demand for investment funds will be weak. These forces will place downward pressure on both resource prices and interest rates.

If resource prices quickly adjust downward in response to weak demand, then the decline in output to \( Y_2 \) will be brief. Lower resource prices will reduce costs and increase aggregate supply, shifting the \( SRAS_1 \) curve to \( SRAS_2 \), as part (b) shows. The result will be a new long-run equilibrium \((E_2)\) at the economy’s full-employment output rate \((Y_F)\) and a lower price level \((P_{90})\). Lower interest rates will also help keep the economy on track. Given the excess production capacity of many firms, weak demand for capital goods (investment) will reduce the demand for loanable funds, which will put downward pressure on interest rates. The lower rates will stimulate current spending, which will help offset the lower demand and direct the economy back to full employment.

Resource prices and interest rates, however, may not adjust quickly. Long-term contracts and uncertainty about whether the weak demand is only temporary will slow down the adjustment process. Moreover, workers and unions may be reluctant to accept lower wages. If resource prices are downwardly inflexible, as many economists believe, the adjustment process may be lengthy and painful. Pessimism on the part of both investors and consumers may also complicate the adjustment process. This has been the case in recent recessions. As Exhibit 2 shows, consumer confidence remained at a low level for twelve to eighteen months after the 1990–1991 and 2001 recessions were over. This pessimism acted as a drag on the growth of aggregate demand, and, as a result, the initial recovery from these recessions was sluggish.

**Unanticipated Increases in Short-Run Aggregate Supply**

Supply shocks catch people by surprise. That is, in part, why they’re called “shocks.” What would happen if the nation’s output expanded because of a favorable shock like good weather conditions or a temporary fall in the world price of oil? **EXHIBIT 7** provides the answer. Because the temporarily favorable supply conditions can’t be counted on in the future, they won’t change the economy’s long-term production capacity. Short-run aggregate supply will increase (to \( SRAS_2 \)), but \( LRAS \) will remain unchanged. Output (and income) will temporarily expand beyond the economy’s full-employment constraints. This increase in current supply will put downward pressure on the price level.

Over time, however, the favorable conditions will come to an end. As this happens, the \( SRAS \) curve will return to its original position, and long-run equilibrium will be restored. The expansion in output will be only temporary. Knowing this, many households will save...
a substantial portion of the extra income they earn during the expansion for a time when things aren’t so prosperous.

What would happen if the favorable conditions increasing supply reflected long-term factors? For example, suppose the discovery and development of a huge natural gas field in the United States lowered energy prices and these price reductions were expected to be long-term rather than temporary. In this instance, both the LRAS and the SRAS would increase (shift to the right). This case would parallel the analysis of Exhibit 4. A new long-run equilibrium at a higher output would result.

**Unanticipated Reductions in Short-Run Aggregate Supply**

In recent decades, the U.S. economy has been jolted by several unfavorable supply-side factors. During the summer of 1988, the worst drought to hit the country in fifty years made for an extremely poor harvest in the U.S. agricultural belt. In 1973, 1979, 1990, and again in 2000–2001, the United States, which imports more than half of the oil it consumes, was hit with sharply higher oil prices due to instability in the Middle East. The higher oil prices had a significant impact because they raised the transportation costs of virtually everything as well as the production costs of numerous items, such as plastics, fertilizer, and asphalt. Most recently, the world price of crude oil soared to more than $140 per barrel in 2007–2008, and, for the first time in the United States, the average nominal price of a gallon of gasoline rose above $4.

How do unfavorable supply shocks like this affect macroeconomic markets? As **EXHIBIT 8** (part a) illustrates, an unfavorable supply shock, such as might result from adverse weather or a higher world price of oil, will reduce supply (from $S_1$ to $S_2$) in the domestic resource market. Resource prices will rise to $P_r^\prime$. In turn, the higher resource prices will reduce short-

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**EXHIBIT 8**

The Effects of an Adverse Supply Shock

Suppose that there’s an unanticipated fall in the economy’s supply of resources, perhaps because of a crop failure or sharp increase in the price of a major imported resource like oil. Resource prices will rise from $P_r$ to $P_r^\prime$, as shown in part (a). The higher resource prices will shift the SRAS curve to the left, as shown in part (b). In the short run, the price level will rise to $P_{110}$, and output will decline to $Y_2$. What happens in the long run depends on whether the reduction in the supply of resources is temporary or permanent. If it is temporary, resource prices will fall in the future, permitting the economy to return to its initial equilibrium ($E_1$). Conversely, if it is permanent, the production capacity of the economy will shrink, shifting LRAS to the left, and $E_2$ will become the new long-run equilibrium.
run aggregate supply (the shift from $SRAS_1$ to $SRAS_2$ in part b) in the goods and services market. Because supply shocks of this type are generally unanticipated, initially they will reduce output and put upward pressure on prices in the goods and services market.

If an unfavorable supply shock is expected to be temporary, as will generally be the case, long-run aggregate supply will be unaffected. For example, unfavorable weather conditions for a year or two do not represent a permanent change in the climate. As normal weather returns, supply and prices in the resource market will return to normal, and the economy will return to long-run equilibrium at output $Y_F$.

When an adverse supply-side factor is more permanent, the long-run supply curve will also shift to the left. For example, an oil price increase that is expected to continue for several years will reduce long-run as well as short-run aggregate supply. Under these circumstances, the economy will have to adjust to a lower level of output. Whether the decline in aggregate supply is temporary or permanent, other things being constant, the price level will rise. Similarly, output will decline, at least temporarily.

### The Price Level, Inflation, and the AD–AS Model

In the basic AD–AS model, the level of prices is measured on the y-axis in both the goods and services and resource markets. This approach makes it easier to visualize relative price changes. If prices change in one of the markets, goods and services, for example, this indicates that prices in that market have changed relative to those in other markets. It is important to note, however, that this structure implicitly incorporates the assumption that the actual and expected rates of inflation are initially zero.

As we have previously discussed, when persistent inflation is present, it will be anticipated by both buyers and sellers. Moreover, the anticipated inflation will be incorporated into the price agreements of long-term contracts, including those affecting important components of costs. When the actual and anticipated rates of inflation are equal, persistent price increases will be present in both goods and services and resource markets, even though the relative prices between the two markets are unchanged.

However, once decision makers anticipate a given rate of inflation and build it into long-term contracts, an actual rate of inflation that is less than expected is essentially the equivalent of a reduction in the price level when price stability (zero inflation) is anticipated. For example, consider the situation in which 5 percent inflation has been present over a lengthy time period and therefore the 5 percent rate has been built into long-term contracts, including those in resource markets. If weak demand causes the inflation rate to fall to, say, 2 percent, the adjustments will be the same as those for a reduction in product prices when zero inflation is anticipated (see Exhibit 6). In both cases, prices in the goods and services market will fall relative to resource prices. In the short run, profit margins will be squeezed, and firms will cut back on output. Workers will be laid off, and the economy may well fall into a recession.

Similarly, the impact of an inflation rate that is greater than was anticipated will be like that of an increase in the price level when price stability is anticipated. Both will increase product prices relative to resource prices, which will enhance profits and thereby induce firms to expand output and employment.

### Unanticipated Changes, Recessions, and Booms

The AD–AS model indicates that unanticipated changes will disrupt macroequilibrium and result in economic instability. On the one hand, unanticipated reductions in either aggregate demand or short-run aggregate supply can throw an economy into a recession. On the other hand, unanticipated increases in aggregate demand or short-run aggregate supply
can generate an unsustainable economic boom—a temporarily high level of output and employment that cannot be maintained.

However, the model also suggests that changes in resource prices and interest rates will tend to direct an economy back toward full employment following a disruption. Let’s take a closer look at these two forces that underlie the self-corrective mechanism of macroeconomic markets.

1. **CHANGES IN REAL RESOURCE PRICES WILL HELP DIRECT AN ECONOMY TOWARD EQUILIBRIUM.** Price adjustments in the resource market will help keep an economy on an even keel. When an economy is in a recession and its output is less than its full-employment potential, the demand for resources will be weak. Underutilized assets and unemployment of resources will be widespread. However, the weak demand will place downward pressure on resource prices. As real resource prices fall, costs will decline, and this will help restore profit margins and strengthen the incentive of producers to expand output. Thus, the lower resource prices will help direct a recessionary economy back toward full employment.

   In contrast, when a booming economy is operating beyond its full-employment capacity—when unemployment is less than the natural unemployment rate—strong demand will push up the real price of labor (wages) and other resources. In turn, the higher resource prices will increase costs and reduce profit margins. As costs increase, firms will cut back their output, directing the economy toward its full-employment potential.

2. **CHANGES IN REAL INTEREST RATES HELP STABILIZE AGGREGATE DEMAND AND REDIRECT ECONOMIC FLUCTUATIONS.** Real interest rates tend to reflect business conditions. During an economic downturn, businesses borrow less money for new investment projects. The demand for loanable funds is weak, and real interest rates generally fall. In turn, the lower interest rates lead to higher consumption and make investment projects cheaper, motivating businesses to undertake them. This helps offset the decline in aggregate demand and redirect output toward the full-employment level.

   Conversely, during an economic boom, businesses borrow more money to invest in projects that will help them meet the stronger demand for their goods and services. The demand for loanable funds will strengthen, putting upward pressure on real interest rates. In turn, the higher interest rates will make it more expensive to purchase consumer durables and undertake investment projects. This helps restrain aggregate demand and redirect output toward the full-employment level.

   Interest rate adjustments will also help offset potential economic disturbances arising from shifts in expectations about future business conditions. Suppose consumers and business operators suddenly become more pessimistic and, as a result, reduce their current level of spending. This will lower consumer spending and increase saving. Demand in the loanable funds market will be weak. Thus, the supply of loanable funds will increase relative to the demand. However, this will lead to lower real interest rates, which will help keep the economy on track by offsetting spending reductions caused by the increased pessimism.

   Just the opposite will happen if consumers and businesses suddenly became more optimistic. If they suddenly decide to spend more of their current income, this will reduce the supply of loanable funds relative to the demand, causing real interest rates to rise. The higher rates will then make current spending less attractive and will help stabilize aggregate demand.\(^5\)

   The implications of the \(\text{AD–AS}\) model with regard to economic instability might be summarized in the following manner.

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\(^5\)The foreign exchange market may also help stabilize the business cycle. When an economy dips into a recession, investment prospects will deteriorate, leading to a reduction in the inflow of capital from abroad. In turn, the decline in capital inflow will lead to depreciation in the foreign exchange rate, which will stimulate net exports and aggregate demand and thereby help to redirect the economy back toward full employment. Just the opposite will occur during the expansionary phase of the business cycle. However, these adjustments are not likely to be very important in countries like the United States where the international trade sector is a relatively small share of the economy. Thus, we focus on the importance of the interest rate and resource price adjustments as the primary forces that will direct a market economy toward full employment.
Various shocks (unanticipated changes in $AD$ or $AS$) can disrupt full-employment equilibrium and lead either to recessionary unemployment or to an inflationary boom. In the short run, long-term contracts and misperceptions about the current price level can lead to output levels that differ from long-run equilibrium. With time, however, changes in real resource prices and interest rates will act as a stabilizing force and direct a market economy back to its full employment potential.

But the $AD$–$AS$ model does not indicate how quickly the market adjustment process will work. This is an area in which the views of economists often differ. Some believe that, if not undermined by harmful policies, market forces will direct the economy back to full employment within a relatively short time frame, and therefore recessions will generally last only a few quarters. Other economists argue that the self-corrective mechanism of markets works slowly, and therefore without appropriate macroeconomic policy changes, recessions will be long and painful. As we proceed, we will present each of these views in detail and examine their policy implications.

Expansions and Recessions: The Historical Record

**EXHIBIT 9** shows the time intervals of the expansions and recessions experienced by the U.S. economy since 1950. There have been ten business cycles, periods of expansion followed by a recession, during this period of six decades. The expansions have generally been more lengthy than the recessions. The ten expansions since 1950 have averaged approximately sixty months in length, and three of those expansions have lasted seven years or more. In contrast, the average length of the recessions has been about ten months, and prior to the recession that began in December 2007, none lasted more than sixteen months.

Using the AD–AS Model to Think about the Business Cycle and the Crisis of 2008

The 1930s were a period of extremely high unemployment and depressed economic conditions. The unemployment rate rose to nearly 25 percent of the labor force in 1932 and 1933. Between 1931 and 1940, the rate of unemployment exceeded 14 percent during each year. These extreme conditions explain why this period is referred to as the Great Depression.

The collapse of the U.S. economy and others around the world during 2008 has caused many to wonder if the current conditions will spiral downward and become something like the Great Depression. Clearly, current conditions are not comparable with those of the 1930s, but the downturn may well be the longest and most severe experienced since that painful era. Why did economic conditions deteriorate so rapidly in 2008? The $AD$–$AS$ model provides considerable insight on this issue.

**EXHIBIT 9**
Expansions and Recessions, 1950–2009

The accompanying table indicates the periods of both economic expansions (rising GDP) and recessions (falling GDP) since 1950. As the table indicates, the length of both varies substantially, but the expansions have clearly been longer.

<table>
<thead>
<tr>
<th>Period of Expansion</th>
<th>Length (in months)</th>
<th>Period of Recession</th>
<th>Length (in months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct ’49 to July ’53</td>
<td>44</td>
<td>July ’53 to May ’54</td>
<td>10</td>
</tr>
<tr>
<td>May ’54 to August ’57</td>
<td>39</td>
<td>August ’57 to April ’58</td>
<td>9</td>
</tr>
<tr>
<td>April ’58 to April ’60</td>
<td>24</td>
<td>April ’60 to February ’61</td>
<td>10</td>
</tr>
<tr>
<td>February ’61 to Dec ’69</td>
<td>105</td>
<td>Dec ’69 to November ’70</td>
<td>10</td>
</tr>
<tr>
<td>Nov ’70 to Nov ’73</td>
<td>36</td>
<td>Nov ’73 to March ’75</td>
<td>16</td>
</tr>
<tr>
<td>March ’75 to January ’80</td>
<td>58</td>
<td>January ’80 to July ’80</td>
<td>6</td>
</tr>
<tr>
<td>July ’80 to July ’81</td>
<td>12</td>
<td>July ’81 to November ’82</td>
<td>16</td>
</tr>
<tr>
<td>Nov ’82 to July ’90</td>
<td>92</td>
<td>July ’90 to March ’91</td>
<td>9</td>
</tr>
<tr>
<td>March ’91 to March ’01</td>
<td>120</td>
<td>March ’01 to November ’01</td>
<td>8</td>
</tr>
<tr>
<td>November ’01 to November ’07</td>
<td>73</td>
<td>December ’07 to ?a</td>
<td>18</td>
</tr>
</tbody>
</table>

*a To date, this recession has continued through May 2009.
Source: http://www.nber.org
Between 2002 and mid-year 2006, there was a sharp increase in housing prices. Nationwide, the average home price increased by 89 percent during this period. At the same time, stock prices were also increasing rapidly. This huge increase in wealth stimulated aggregate demand and generated an economic boom.

But the situation began to change in 2006. Housing prices reversed and began to fall. Mortgage default rates and housing foreclosures started to rise. The construction industry contracted sharply. As housing wealth fell, people became more pessimistic, causing a further reduction in aggregate demand. The depressed conditions in the housing market soon spread to other parts of the economy. In 2008, stocks plummeted, leading to a further erosion in both wealth and the confidence of consumers and businesses. Moreover, the recession quickly spread to other countries, and the falling incomes abroad depressed aggregate demand even more. During 2007 and the first half of 2008, energy prices were soaring. The price of gasoline doubled, and other energy prices also rose sharply. As we previously discussed, unanticipated increases in the prices of key imported resources would reduce short-run aggregate supply. These adverse forces combine to reduce both aggregate demand and supply, and just as the AD–AS model indicates, they generated a sharp decline in real output and employment.

**EXHIBIT 10** presents data on the change in both real housing and stock prices during the first two years of expansions and contractions since 1969. Note how the housing price reduction preceding the 2008 recession was substantially greater than during earlier recessions. This is a major reason for the severity of this recession. Stock prices are based on Standard and Poor’s monthly opening prices through May 2009. Housing prices prior to 1976 are based on National Association of Realtors median existing home sale prices. Sale prices for 1976 to 1986 are based on Office of Federal Housing Enterprise Oversight quarterly constant quality home price index. The housing prices for 1987 to fourth quarter 2008 are based on the Case-Shiller quarterly housing price index. All prices were adjusted for inflation using the Consumer Price Index. The price changes during the expansion are for the 24 months subsequent to the end of the recession.
The AD–AS model enhances our understanding of macroeconomic markets and potential sources of economic fluctuations. It also provides a constructive framework with which to address key unanswered questions. Can fiscal and monetary policy promote economic stability? Can they help direct an economy out of a recession? If so, how might this be achieved? Has macroeconomic policies sometimes been the source of economic instability? The next four chapters will focus on these questions and related issues.

Looking ahead

It is important to distinguish between anticipated and unanticipated changes.

An increase in aggregate demand involves a shift of the entire AD curve to the right. Major factors causing an increase in aggregate demand (other than government policies) are (1) an increase in real wealth, (2) a lower real interest rate, (3) increased optimism on the part of businesses and consumers, (4) an increase in the expected rate of inflation, (5) higher real income abroad, and (6) a depreciation in the exchange rate. Conversely, if these factors change in the opposite direction, a decrease in aggregate demand will result.

It is important to distinguish between long-run and short-run aggregate supply. The following factors will increase long-run aggregate supply (LRAS): (1) increases in the supply of labor and capital resources, (2) improvements in technology and productivity, and (3) institutional changes improving the efficiency of resource use. Changes in resource prices, the expected rate of inflation, and supply shocks will cause shifts in short-run aggregate supply (SRAS).

An increase in output due to economic growth (an increase in the economy’s production capacity) will increase both short-run and long-run aggregate supply, permitting the economy to achieve and sustain a larger output level.

Unanticipated changes in either aggregate demand or aggregate supply will disrupt long-run equilibrium and cause current output to differ from the economy’s long-run potential.

Unanticipated increases in aggregate demand and favorable supply shocks can cause economic booms that push output beyond the economy’s long-run potential and unemployment below its natural rate. However, as decision makers adjust to the strong demand, resource prices and interest rates will rise, and output will recede to long-run capacity.

Unanticipated reductions in aggregate demand and adverse supply shocks can lead to below-capacity