section 4

National Income and Price Determination

FROM BOOM TO BUST

Ft. Myers, Florida, was a boom town in 2003, 2004, and most of 2005. Jobs were plentiful: by 2005 the unemployment rate was less than 3%. The shopping malls were humming, and new stores were opening everywhere.

But then the boom went bust. Jobs became scarce, and by 2009 the unemployment rate had reached 14%. Stores had few customers, and many were closing. One new business was flourishing, however. Marc Joseph, a real estate agent, began offering "foreclosure tours": visits to homes that had been seized by banks after the owners were unable to make mortgage payments.

What happened? Ft. Myers boomed from 2003 to 2005 because of a surge in home construction, fueled in part by speculators who bought houses not to live in, but because they believed they could resell those houses at much higher prices. Home construction gave jobs to construction workers, electricians, real estate agents, and others. And these workers, in turn, spent money locally, creating jobs for sales workers, waiters, gardeners, pool cleaners, and more. These workers also spent money locally, creating further expansion, and so on.

The boom turned into a bust when home construction came to a virtual halt. It turned out that speculation had been feeding on itself: people were buying houses as investments, then selling them to other people who were also buying houses as investments, and the prices had risen to levels far beyond what people who actually wanted to live in houses were willing to pay.

Courtesy of the Dallas Morning News

The abrupt collapse of the housing market pulled the local economy down with it, as the process that had created the earlier boom operated in reverse.

The boom and bust in Ft. Myers illustrates, on a small scale, the way booms and busts often happen for the economy as a whole. The business cycle is often driven by ups or downs in investment spending—either residential investment spending (that is, spending on home construction) or nonresidential investment spending (such as spending on construction of office buildings, factories, and shopping malls). Changes in investment spending, in turn, indirectly lead to changes in consumer spending, which magnify—or *multiply*—the effect of the investment spending changes on the economy as a whole.

In this section we'll study how this process works on a grand scale. As a first step, we introduce *multiplier* analysis and show how it helps us understand the business cycle. In Module 17 we explain *aggregate demand* and its two most important components, consumer spending and investment spending. Module 18 introduces *aggregate supply,* the other half of the model used to analyze economic fluctuations. We will then be ready to explore how aggregate supply and aggregate demand determine the levels of prices and real output in an economy. Finally, we will use the aggregate demand–aggregate supply model to visualize the state of the economy and examine the effects of economic policy.

What you will learn in this **Module:**

- The nature of the multiplier, which shows how initial changes in spending lead to further changes
- The meaning of the aggregate consumption function, which shows how current disposable income affects consumer spending
- How expected future income and aggregate wealth affect consumer spending
- The determinants of investment spending
- Why investment spending is considered a leading indicator of the future state of the economy

Module 16 Income and Expenditure

The Multiplier: An Informal Introduction

The story of the boom and bust in Ft. Myers involves a sort of chain reaction in which an initial rise or fall in spending leads to changes in income, which lead to further changes in spending, and so on. Let's examine that chain reaction more closely, this time thinking through the effects of changes in spending in the economy as a whole.

For the sake of this analysis, we'll make four simplifying assumptions that we will have to reconsider in later modules.

1. We assume that *producers are willing to supply additional output at a fixed price.* That is, if consumers or businesses buying investment goods decide to spend an additional $1 billion, that will translate into the production of $1 billion worth of additional goods and services without driving up the overall level of prices. As a result, *changes in overall spending translate into changes in aggregate output,* as measured by real GDP. As we'll learn in this section, this assumption isn't too unrealistic in the short run, but it needs to be changed when we think about the long-run effects of changes in demand.
2. We take the interest rate as given.
3. We assume that there is no government spending and no taxes.
4. We assume that exports and imports are zero.

Given these simplifying assumptions, consider what happens if there is a change in investment spending. Specifically, imagine that for some reason home builders decide to spend an extra $100 billion on home construction over the next year.

The direct effect of this increase in investment spending will be to increase income and the value of aggregate output by the same amount. That's because each dollar spent on home construction translates into a dollar's worth of income for construction workers, suppliers of building materials, electricians, and so on. If the process stopped there, the increase in housing investment spending would raise overall income by exactly $100 billion.

But the process doesn't stop there. The increase in aggregate output leads to an increase in disposable income that flows to households in the form of profits and wages. The increase in households' disposable income leads to a rise in consumer spending,

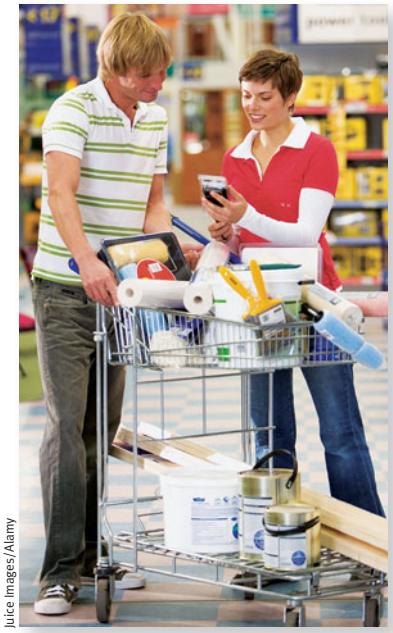
which, in turn, induces firms to increase output yet again. This generates another rise in disposable income, which leads to another round of consumer spending increases, and so on. So there are multiple rounds of increases in aggregate output.

How large is the total effect on aggregate output if we sum the effect from all these rounds of spending increases? To answer this question, we need to introduce the concept of the **marginal propensity to consume,** or ***MPC:*** the increase in consumer spending when disposable income rises by $1. When consumer spending changes because of a rise or fall in disposable income, *MPC* is the change in consumer spending divided by the change in disposable income:

$$\textbf{(16-1)}\quad MPC = \frac{\Delta \text{ Consumer spending}}{\Delta \text{ Disposable income}}$$

where the symbol Δ (delta) means "change in." For example, if consumer spending goes up by $6 billion when disposable income goes up by $10 billion, *MPC* is $6 billion/$10 billion = 0.6.

Because consumers normally spend part but not all of an additional dollar of disposable income, *MPC* is a number between 0 and 1. The additional disposable income that consumers don't spend is saved; the **marginal propensity to save,** or ***MPS,*** is the fraction of an additional dollar of disposable income that is saved. *MPS* is equal to 1 − *MPC*.



Juice Images/Alamy

Many businesses, such as those that support home improvement and interior design, benefit during housing booms.

With the assumption of no taxes and no international trade, each $1 increase in spending raises both real GDP and disposable income by $1. So the $100 billion increase in investment spending initially raises real GDP by $100 billion. The corresponding $100 billion increase in disposable income leads to a second-round increase in consumer spending, which raises real GDP by a further *MPC* × $100 billion. It is followed by a third-round increase in consumer spending of *MPC* × *MPC* × $100 billion, and so on. After an infinite number of rounds, the total effect on real GDP is:

Increase in investment spending	=	$100 billion
+ Second-round increase in consumer spending	=	$MPC \times$ $100 billion
+ Third-round increase in consumer spending	=	$MPC^2 \times$ $100 billion
+ Fourth-round increase in consumer spending	=	$MPC^3 \times$ $100 billion
•		•
•		•
•		•

Total increase in real GDP = $(1 + MPC + MPC^2 + MPC^3 + \ldots) \times$ $100 billion

So the $100 billion increase in investment spending sets off a chain reaction in the economy. The net result of this chain reaction is that a $100 billion increase in investment spending leads to a change in real GDP that is a *multiple* of the size of that initial change in spending.

How large is this multiple? It's a mathematical fact that an infinite series of the form $1 + x + x^2 + x^3 + \ldots$, where x is between 0 and 1, is equal to $1/(1-x)$. So the total effect of a $100 billion increase in investment spending, *I,* taking into account all the subsequent increases in consumer spending (and assuming no taxes and no international trade), is given by:

$$\textbf{(16-2)}\quad \text{Total increase in real GDP from \$100 billion rise in } I = \frac{1}{(1-MPC)} \times \$100 \text{ billion}$$

The **marginal propensity to consume,** or ***MPC,*** is the increase in consumer spending when disposable income rises by $1.

The **marginal propensity to save,** or ***MPS,*** is the increase in household savings when disposable income rises by $1.

An **autonomous change in aggregate spending** is an initial rise or fall in aggregate spending that is the cause, not the result, of a series of income and spending changes.

The **multiplier** is the ratio of the total change in real GDP caused by an autonomous change in aggregate spending to the size of that autonomous change.

Let's consider a numerical example in which $MPC = 0.6$: each \$1 in additional disposable income causes a \$0.60 rise in consumer spending. In that case, a \$100 billion increase in investment spending raises real GDP by \$100 billion in the first round. The second-round increase in consumer spending raises real GDP by another $0.6 \times$ \$100 billion, or \$60 billion. The third-round increase in consumer spending raises real GDP by another $0.6 \times$ \$60 billion, or \$36 billion. This process goes on and on until the amount of spending in another round would be virtually zero. In the end, real GDP rises by \$250 billion as a consequence of the initial \$100 billion rise in investment spending:

$$\frac{1}{(1-0.6)} \times \$100 \text{ billion} = 2.5 \times \$100 \text{ billion} = \$250 \text{ billion}$$

Notice that even though there can be a nearly endless number of rounds of expansion of real GDP, the total rise in real GDP is limited to \$250 billion. The reason is that at each stage some of the rise in disposable income "leaks out" because it is saved, leaving less and less to be spent in the next round. How much of an additional dollar of disposable income is saved depends on *MPS,* the marginal propensity to save.

We've described the effects of a change in investment spending, but the same analysis can be applied to any other change in spending. The important thing is to distinguish between the initial change in aggregate spending, before real GDP rises, and the additional change in aggregate spending caused by the change in real GDP as the chain reaction unfolds. For example, suppose that a boom in housing prices makes consumers feel richer and that, as a result, they become willing to spend more at any given level of disposable income. This will lead to an initial rise in consumer spending, before real GDP rises. But it will also lead to second and later rounds of higher consumer spending as real GDP and disposable income rise.

An initial rise or fall in aggregate spending at a given level of real GDP is called an **autonomous change in aggregate spending.** It's autonomous—which means "self-governing"—because it's the cause, not the result, of the chain reaction we've just described. Formally, the **multiplier** is the ratio of the total change in real GDP caused by an autonomous change in aggregate spending to the size of that autonomous change. If we let ΔAAS stand for the autonomous change in aggregate spending and ΔY stand for the total change in real GDP, then the multiplier is equal to $\Delta Y/\Delta AAS$. We've already seen how to find the value of the multiplier. Assuming no taxes and no trade, the total change in real GDP caused by an autonomous change in aggregate spending is:

$$\textbf{(16-3)} \quad \Delta Y = \frac{1}{(1-MPC)} \times \Delta AAS$$

So the multiplier is:

$$\textbf{(16-4)} \quad \text{Multiplier} = \frac{\Delta Y}{\Delta AAS} = \frac{1}{(1-MPC)}$$

Notice that the size of the multiplier depends on *MPC*. If the marginal propensity to consume is high, so is the multiplier. This is true because the size of *MPC* determines how large each round of expansion is compared with the previous round. To put it another way, the higher *MPC* is, the less disposable income "leaks out" into savings at each round of expansion.

In later modules we'll use the concept of the multiplier to analyze the effects of fiscal and monetary policies. We'll also see that the formula for the multiplier changes when we introduce various complications, including taxes and foreign trade. First, however, we need to look more deeply at what determines consumer spending.

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The Multiplier and the Great Depression

The concept of the multiplier was originally devised by economists trying to understand the greatest economic disaster in history, the collapse of output and employment from 1929 to 1933, which began the Great Depression. Most economists believe that the slump from 1929 to 1933 was driven by a collapse in investment spending. But as the economy shrank, consumer spending also fell sharply, multiplying the effect on real GDP.

The table shows what happened to investment spending, consumer spending, and GDP during those four terrible years. All data are in 2005 dollars. What we see is that investment spending imploded, falling by more than 80%. But consumer spending also fell drastically and actually accounted for more of the fall in real GDP. (The total fall in real GDP was larger than the combined fall in consumer and investment spending, mainly because of technical accounting issues.)

Investment Spending, Consumer Spending, and Real GDP in the Great Depression (billions of 2005 dollars)

	1929	1933	Change
Investment spending	$101.7	$18.9	–$82.8
Consumer spending	736.6	601.1	–135.5
Real GDP	977.0	716.4	–260.6

Source: Bureau of Economic Analysis.

The numbers in the table suggest that at the time of the Great Depression, the multiplier was around 3. Most current estimates put the size of the multiplier considerably lower—but there's a reason for that change. In 1929, government in the United States was very small by modern standards: taxes were low and major government programs like Social Security and Medicare had not yet come into being. In the modern U.S. economy, taxes are much higher, and so is government spending. Why does this matter? Because taxes and some government programs act as *automatic stabilizers,* reducing the size of the multiplier. For example, when incomes are relatively high, tax payments are relatively high as well, thus moderating increases in expenditures. And when incomes are relatively low, the unemployment insurance program pays more money out to individuals, thus boosting expenditures higher than they would otherwise be.

Consumer Spending

Should you splurge on a restaurant meal or save money by eating at home? Should you buy a new car and, if so, how expensive a model? Should you redo that bathroom or live with it for another year? In the real world, households are constantly confronted with such choices—not just about the consumption mix but also about how much to spend in total. These choices, in turn, have a powerful effect on the economy: consumer spending normally accounts for two-thirds of total spending on final goods and services. But what determines how much consumers spend?

Current Disposable Income and Consumer Spending

The most important factor affecting a family's consumer spending is its current disposable income—income after taxes are paid and government transfers are received. It's obvious from daily life that people with high disposable incomes on average drive more expensive cars, live in more expensive houses, and spend more on meals and clothing than people with lower disposable incomes. And the relationship between current disposable income and spending is clear in the data.

The Bureau of Labor Statistics (BLS) collects annual data on family income and spending. Families are grouped by levels of before-tax income; after-tax income for each group is also reported. Since the income figures include transfers from the government, what the BLS calls a household's after-tax income is equivalent to its current disposable income.

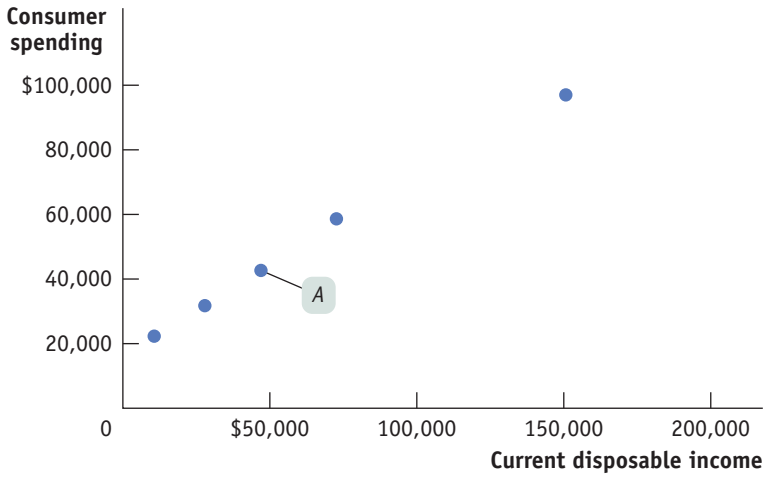
Figure 16.1 on the next page is a scatter diagram illustrating the relationship between household current disposable income and household consumer spending for

figure 16.1

Current Disposable Income and Consumer Spending for American Households in 2008

For each income group of households, average current disposable income in 2008 is plotted versus average consumer spending in 2008. For example, the middle income group, with an annual income of $36,271 to $59,086, is represented by point *A*, indicating a household average current disposable income of $46,936 and average household consumer spending of $42,659. The data clearly show a positive relationship between current disposable income and consumer spending: families with higher current disposable income have higher consumer spending.

Source: Bureau of Labor Statistics.



The **consumption function** is an equation showing how an individual household's consumer spending varies with the household's current disposable income.

Autonomous consumer spending is the amount of money a household would spend if it had no disposable income.

American households by income group in 2008. For example, point *A* shows that in 2008 the middle fifth of the population had an average current disposable income of $46,936 and average spending of $42,659. The pattern of the dots slopes upward from left to right, making it clear that households with higher current disposable income had higher consumer spending.

It's very useful to represent the relationship between an individual household's current disposable income and its consumer spending with an equation. The **consumption function** is an equation showing how an individual household's consumer spending varies with the household's current disposable income. The simplest version of a consumption function is a linear equation:

$$\textbf{(16-5)} \quad c = a + MPC \times y_d$$

where lowercase letters indicate variables measured for an individual household.

In this equation, c is individual household consumer spending and y_d is individual household current disposable income. Recall that *MPC*, the marginal propensity to consume, is the amount by which consumer spending rises if current disposable income rises by $1. Finally, a is a constant term—individual household **autonomous consumer spending**, the amount a household would spend if it had no disposable income. We assume that a is greater than zero because a household with no disposable income is able to fund some consumption by borrowing or using its savings. Notice, by the way, that we're using y for income. That's standard practice in macroeconomics, even though income isn't actually spelled "yncome." The reason is that I is reserved for investment spending.

Recall that we expressed *MPC* as the ratio of a change in consumer spending to the change in current disposable income. We've rewritten it for an individual household as Equation 16-6:

$$\textbf{(16-6)} \quad MPC = \Delta c / \Delta y_d$$

Multiplying both sides of Equation 16-6 by Δy_d, we get:

$$\textbf{(16-7)} \quad MPC \times \Delta y_d = \Delta c$$

Equation 16-7 tells us that when y_d goes up by $1, c goes up by $MPC \times \$1$.

figure 16.2

The Consumption Function

The consumption function relates a household's current disposable income to its consumer spending. The vertical intercept, *a,* is individual household autonomous consumer spending: the amount of a household's consumer spending if its current disposable income is zero. The slope of the consumption function line, *cf,* is the marginal propensity to consume, or *MPC:* of every additional $1 of current disposable income, *MPC* × $1 is spent.

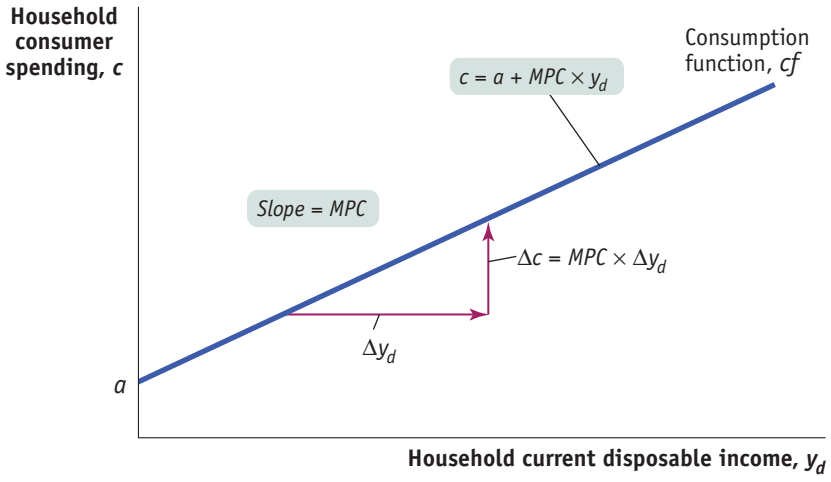


Figure 16.2 shows what Equation 16-5 looks like graphically, plotting y_d on the horizontal axis and c on the vertical axis. Individual household autonomous consumer spending, a, is the value of c when y_d is zero—it is the vertical *intercept* of the consumption function, *cf*. *MPC* is the *slope* of the line, measured by rise over run. If current disposable income rises by Δy_d, household consumer spending, c, rises by Δc. Since *MPC* is defined as $\Delta c/\Delta y_d$, the slope of the consumption function is:

(16-8) Slope of consumption function
= Rise over run
= $\Delta c/\Delta y_d$
= *MPC*

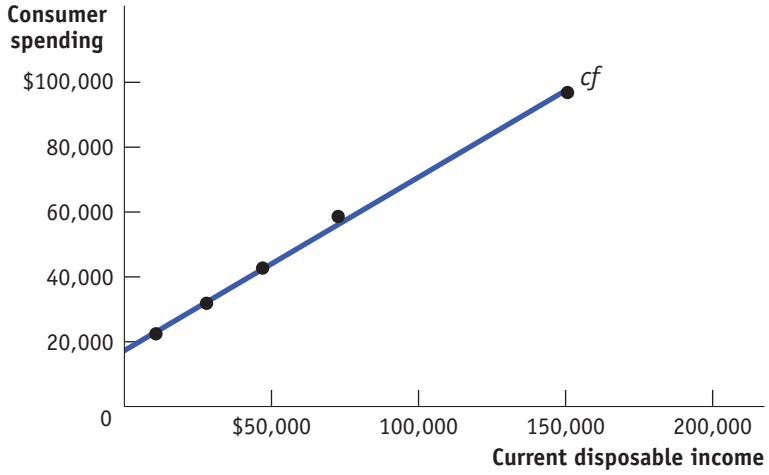
In reality, actual data never fit Equation 16-5 perfectly, but the fit can be pretty good. Figure 16.3 shows the data from Figure 16.1 again, together with a line drawn to fit the data as closely as possible. According to the data on households' consumer

figure 16.3

A Consumption Function Fitted to Data

The data from Figure 16.1 are reproduced here, along with a line drawn to fit the data as closely as possible. For American households in 2008, the best estimate of the average household's autonomous consumer spending, *a,* is $17,484 and the best estimate of *MPC* is 0.534, or approximately 0.53.

Source: Bureau of Labor Statistics.



The **aggregate consumption function** is the relationship for the economy as a whole between aggregate current disposable income and aggregate consumer spending.

spending and current disposable income, the best estimate of a is \$17,484 and of MPC is 0.534. So the consumption function fitted to the data is:

$$c = \$17{,}484 + 0.534 \times y_d$$

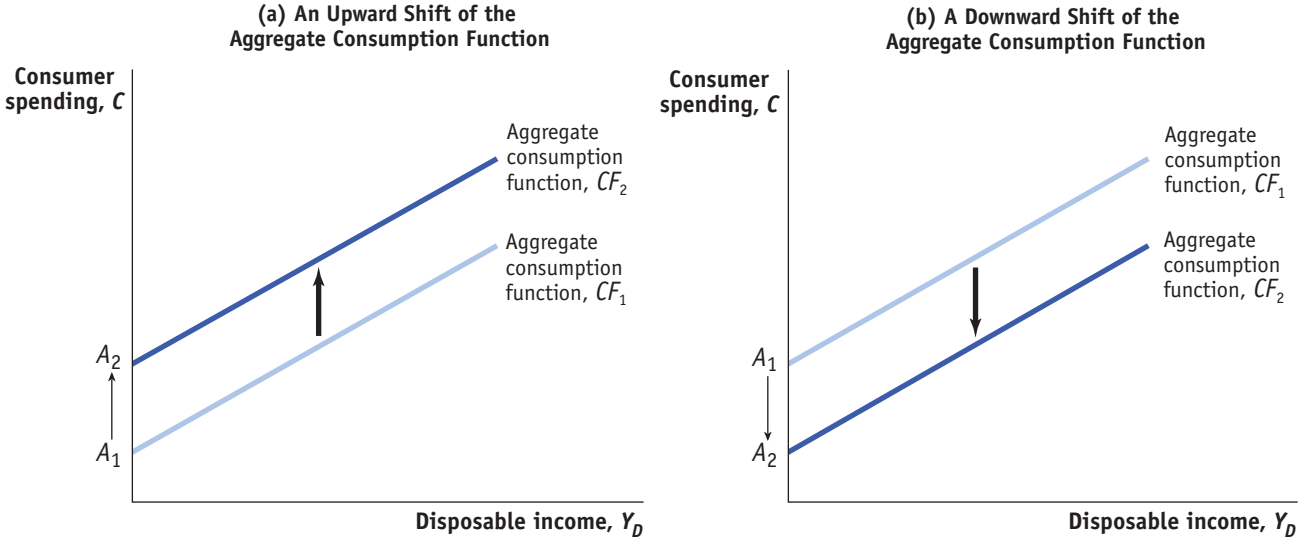
That is, the data suggest a marginal propensity to consume of approximately 0.53. This implies that the marginal propensity to save (MPS)—the amount of an additional \$1 of disposable income that is saved—is approximately $1 - 0.53 = 0.47$, and the multiplier is $1/(1 - MPC) = 1/MPS$ = approximately $1/0.47 = 2.13$.

It's important to realize that Figure 16.3 shows a *microeconomic* relationship between the current disposable income of individual households and their spending on goods and services. However, macroeconomists assume that a similar relationship holds *for the economy as a whole:* that there is a relationship, called the **aggregate consumption function,** between aggregate current disposable income and aggregate consumer spending. We'll assume that it has the same form as the household-level consumption function:

(16-9) $C = A + MPC \times Y_D$

Here, C is aggregate consumer spending (called just "consumer spending"); Y_D is aggregate current disposable income (called, for simplicity, just "disposable income"); and A is aggregate autonomous consumer spending, the amount of consumer spending when Y_D equals zero. This is the relationship represented in Figure 16.4 by CF, analogous to cf in Figure 16.3.

figure 16.4 Shifts of the Aggregate Consumption Function



Panel (a) illustrates the effect of an increase in expected aggregate future disposable income. Consumers will spend more at every given level of aggregate current disposable income, Y_D. As a result, the initial aggregate consumption function CF_1, with aggregate autonomous consumer spending A_1, shifts up to a new position at CF_2 with aggregate autonomous consumer spending A_2. An increase in aggregate wealth will also shift the aggregate consumption function up. Panel (b), in contrast, illustrates the effect of a reduction in expected aggregate future disposable income. Consumers will spend less at every given level of aggregate current disposable income, Y_D. Consequently, the initial aggregate consumption function CF_1, with aggregate autonomous consumer spending A_1, shifts down to a new position at CF_2 with aggregate autonomous consumer spending A_2. A reduction in aggregate wealth will have the same effect.

Shifts of the Aggregate Consumption Function

The aggregate consumption function shows the relationship between disposable income and consumer spending for the economy as a whole, other things equal. When things other than disposable income change, the aggregate consumption function shifts. There are two principal causes of shifts of the aggregate consumption function: changes in expected future disposable income and changes in aggregate wealth.

Changes in Expected Future Disposable Income Suppose you land a really good, well-paying job on graduating from college—but the job, and the paychecks, won't start for several months. So your disposable income hasn't risen yet. Even so, it's likely that you will start spending more on final goods and services right away—maybe buying nicer work clothes than you originally planned—because you know that higher income is coming.

Conversely, suppose you have a good job but learn that the company is planning to downsize your division, raising the possibility that you may lose your job and have to take a lower-paying one somewhere else. Even though your disposable income hasn't gone down yet, you might well cut back on spending even while still employed, to save for a rainy day.

Both of these examples show how expectations about future disposable income can affect consumer spending. The two panels of Figure 16.4, which plot disposable income against consumer spending, show how changes in expected future disposable income affect the aggregate consumption function. In both panels, CF_1 is the initial aggregate consumption function. Panel (a) shows the effect of good news: information that leads consumers to expect higher disposable income in the future than they did before. Consumers will now spend more at any given level of current disposable income Y_D, corresponding to an increase in A, aggregate autonomous consumer spending, from A_1 to A_2. The effect is to shift the aggregate consumption function up, from CF_1 to CF_2. Panel (b) shows the effect of bad news: information that leads consumers to expect lower disposable income in the future than they did before. Consumers will now spend less at any given level of current disposable income, Y_D, corresponding to a fall in A from A_1 to A_2. The effect is to shift the aggregate consumption function down, from CF_1 to CF_2.

In a famous 1956 book, *A Theory of the Consumption Function,* Milton Friedman showed that taking the effects of expected future income into account explains an otherwise puzzling fact about consumer behavior. If we look at consumer spending during any given year, we find that people with high current income save a larger fraction of their income than those with low current income. (This is obvious from the data in Figure 16.3: people in the highest income group spend considerably less than their income; those in the lowest income group spend more than their income.) You might think this implies that the overall savings rate—the percentage of a country's disposable income that is saved—will rise as the economy grows and average current income rises; in fact, however, this hasn't happened.

Friedman pointed out that when we look at individual incomes in a given year, there are systematic differences between current and expected future income that create a positive relationship between current income and the savings rate. On one side, many of the people with low current income are having an unusually bad year. For example, they may be workers who have been laid off but will probably find new jobs eventually. They are people whose expected future income is higher than their current income, so it makes sense for them to have low or even negative savings. On the other side, many of the people with high current income in a given year are having an unusually good year. For example, they may have investments that happened to do extremely well. They are people whose expected future income is lower than their current income, so it makes sense for them to save most of their windfall.

When the economy grows, by contrast, current and expected future incomes rise together. Higher current income tends to lead to higher savings today, but higher

Mike Kemp/Rubberball/Getty Images

expected future income tends to lead to lower savings today. As a result, there's a weaker relationship between current income and the savings rate.

Friedman argued that consumer spending ultimately depends mainly on the income people expect to have over the long term rather than on their current income. This argument is known as the *permanent income hypothesis.*

Changes in Aggregate Wealth Imagine two individuals, Maria and Mark, both of whom expect to earn $30,000 this year. Suppose, however, that they have different histories. Maria has been working steadily for the past 10 years, owns her own home, and has $200,000 in the bank. Mark is the same age as Maria, but he has been in and out of work, hasn't managed to buy a house, and has very little in savings. In this case, Maria has something that Mark doesn't have: wealth. Even though they have the same disposable income, other things equal, you'd expect Maria to spend more on consumption than Mark. That is, *wealth* has an effect on consumer spending.

The effect of wealth on spending is emphasized by an influential economic model of how consumers make choices about spending versus saving called the *life-cycle hypothesis.* According to this hypothesis, consumers plan their spending over their lifetime, not just in response to their current disposable income. As a result, people try to *smooth* their consumption over their lifetimes—they save some of their current disposable income during their years of peak earnings (typically occurring during a worker's 40s and 50s) and during their retirement live off the wealth they accumulated while working. We won't go into the details of this hypothesis but will simply point out that it implies an important role for wealth in determining consumer spending. For example, a middle-aged couple who have accumulated a lot of wealth—who have paid off the mortgage on their house and already own plenty of stocks and bonds—will, other things equal, spend more on goods and services than a couple who have the same current disposable income but still need to save for their retirement.

Because wealth affects household consumer spending, changes in wealth across the economy can shift the aggregate consumption function. A rise in aggregate wealth—say, because of a booming stock market—increases the vertical intercept *A,* aggregate autonomous consumer spending. This, in turn, shifts the aggregate consumption function up in the same way as does an expected increase in future disposable income. A decline in aggregate wealth—say, because of a fall in housing prices as occurred in 2008—reduces *A* and shifts the aggregate consumption function down.

Investment Spending

Although consumer spending is much greater than investment spending, booms and busts in investment spending tend to drive the business cycle. In fact, most recessions originate as a fall in investment spending. Figure 16.5 illustrates this point; it shows the annual percent change of investment spending and consumer spending in the United States, both measured in 2005 dollars, during five recessions from 1973 to 2001. As you can see, swings in investment spending are much more dramatic than those in consumer spending. In addition, economists believe, due to the multiplier process, that declines in consumer spending are usually the result of a process that begins with a slump in investment spending. Soon we'll examine in more detail how a slump in investment spending generates a fall in consumer spending through the multiplier process.

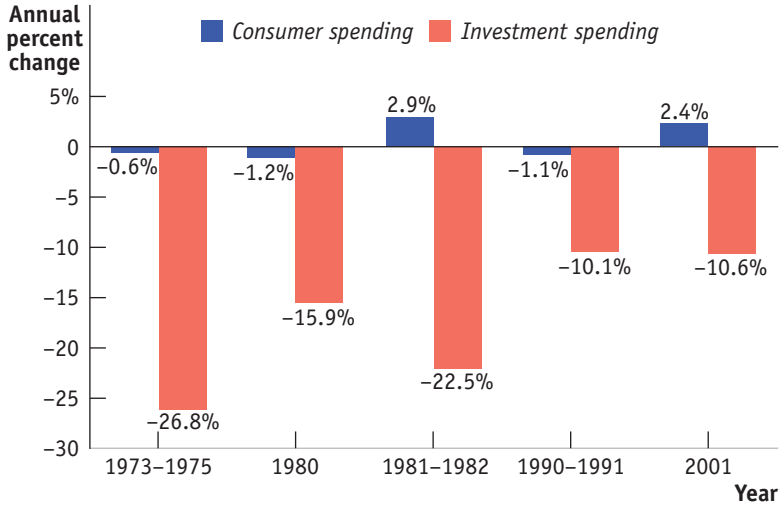
Planned investment spending is the investment spending that businesses intend to undertake during a given period.

Before we do that, however, let's analyze the factors that determine investment spending, which are somewhat different from those that determine consumer spending. **Planned investment spending** is the investment spending that firms *intend* to undertake during a given period. For reasons explained shortly, the level of investment

figure 16.5

Fluctuations in Investment Spending and Consumer Spending

The bars illustrate the annual percent change in investment spending and consumer spending during five recent recessions. As the lengths of the bars show, swings in investment spending were much larger in percentage terms than those in consumer spending. The pattern has led economists to believe that recessions typically originate as a slump in investment spending.



spending businesses *actually* carry out is sometimes not the same level as was planned. Planned investment spending depends on three principal factors: the interest rate, the expected future level of real GDP, and the current level of production capacity. First, we'll analyze the effect of the interest rate.

The Interest Rate and Investment Spending

Interest rates have their clearest effect on one particular form of investment spending: spending on residential construction—that is, on the construction of homes. The reason is straightforward: home builders only build houses they think they can sell, and houses are more affordable—and so more likely to sell—when the interest rate is low. Consider a potential home-buying family that needs to borrow $150,000 to buy a house. At an interest rate of 7.5%, a 30-year home mortgage will mean payments of $1,048 per month. At an interest rate of 5.5%, those payments would be only $851 per month, making houses significantly more affordable. Interest rates actually did drop from roughly 7.5% to 5.5% between the late 1990s and 2003, helping set off a housing boom.

Interest rates also affect other forms of investment spending. Firms with investment spending projects will go ahead with a project only if they expect a rate of return higher than the cost of the funds they would have to borrow to finance that project. If the interest rate rises, fewer projects will pass that test, and as a result investment spending will be lower.

You might think that the trade-off a firm faces is different if it can fund its investment project with its past profits rather than through borrowing. Past profits used to finance investment spending are called *retained earnings*. But even if a firm pays for investment spending out of retained earnings, the trade-off it must make in deciding whether or not to fund a project remains the same because it must take into account the opportunity cost of its funds. For example, instead of purchasing new equipment, the firm could lend out the funds and earn interest. The forgone interest earned is the opportunity cost of using retained earnings to fund an investment project. So the trade-off the firm faces when comparing a project's

Photodisc

Interest rates have a direct impact on whether or not construction companies decide to invest in the construction of new homes.

rate of return to the market interest rate has not changed when it uses retained earnings rather than borrowed funds. Either way, a rise in the market interest rate makes any given investment project less profitable. Conversely, a fall in the interest rate makes some investment projects that were unprofitable before profitable at the now lower interest rate. So some projects that had been unfunded before will be funded now.

So planned investment spending—spending on investment projects that firms voluntarily decide whether or not to undertake—is negatively related to the interest rate. Other things equal, a higher interest rate leads to a lower level of planned investment spending.

Expected Future Real GDP, Production Capacity, and Investment Spending

Suppose a firm has enough capacity to continue to produce the amount it is currently selling but doesn't expect its sales to grow in the future. Then it will engage in investment spending only to replace existing equipment and structures that wear out or are rendered obsolete by new technologies. But if, instead, the firm expects its sales to grow rapidly in the future, it will find its existing production capacity insufficient for its future production needs. So the firm will undertake investment spending to meet those needs. This implies that, other things equal, firms will undertake more investment spending when they expect their sales to grow.

Now suppose that the firm currently has considerably more capacity than necessary to meet current production needs. Even if it expects sales to grow, it won't have to undertake investment spending for a while—not until the growth in sales catches up with its excess capacity. This illustrates the fact that, other things equal, the current level of productive capacity has a negative effect on investment spending: other things equal, the higher the current capacity, the lower the investment spending.

If we put together the effects on investment spending of (1) growth in expected future sales and (2) the size of current production capacity, we can see one situation in which firms will most likely undertake high levels of investment spending: when they expect sales to grow rapidly. In that case, even excess production capacity will soon be used up, leading firms to resume investment spending.

What is an indicator of high expected growth in future sales? It's a high expected future growth rate of real GDP. A higher expected future growth rate of real GDP results in a higher level of planned investment spending, but a lower expected future growth rate of real GDP leads to lower planned investment spending.

Inventories and Unplanned Investment Spending

Most firms maintain **inventories,** stocks of goods held to satisfy future sales. Firms hold inventories so they can quickly satisfy buyers—a consumer can purchase an item off the shelf rather than waiting for it to be manufactured. In addition, businesses often hold inventories of their inputs to be sure they have a steady supply of necessary materials and spare parts. At the end of 2009, the overall value of inventories in the U.S. economy was estimated at $1.9 trillion, more than 13% of GDP.

A firm that increases its inventories is engaging in a form of investment spending. Suppose, for example, that the U.S. auto industry produces 800,000 cars per month but sells only 700,000. The remaining 100,000 cars are added to the inventory at auto company warehouses or car dealerships, ready to be sold in the future.

Inventory investment is the value of the change in total inventories held in the economy during a given period. Unlike other forms of investment spending, inventory investment can actually be negative. If, for example, the auto industry reduces its inventory over the course of a month, we say that it has engaged in negative inventory investment.

Inventories are stocks of goods held to satisfy future sales.

Inventory investment is the value of the change in total inventories held in the economy during a given period.

To understand inventory investment, think about a manager stocking the canned goods section of a supermarket. The manager tries to keep the store fully stocked so that shoppers can almost always find what they're looking for. But the manager does not want the shelves too heavily stocked because shelf space is limited and products can spoil. Similar considerations apply to many firms and typically lead them to manage

their inventories carefully. However, sales fluctuate. And because firms cannot always accurately predict sales, they often find themselves holding larger or smaller inventories than they had intended. When a firm's inventories are higher than intended due to an unforeseen decrease in sales, the result is **unplanned inventory investment.** An unexpected increase in sales depletes inventories and causes the value of unplanned inventory investment to be negative.


Getty Images

Positive **unplanned inventory investment** occurs when actual sales are less than businesses expected, leading to unplanned increases in inventories. Sales in excess of expectations result in negative unplanned inventory investment.

Actual investment spending is the sum of planned investment spending and unplanned inventory investment.

So in any given period, **actual investment spending** is equal to planned investment spending plus unplanned inventory investment. If we let $I_{Unplanned}$ represent unplanned inventory investment, $I_{Planned}$ represent planned investment spending, and I represent actual investment spending, then the relationship among all three can be represented as:

(16-10) $I = I_{Unplanned} + I_{Planned}$

fyi

Interest Rates and the U.S. Housing Boom

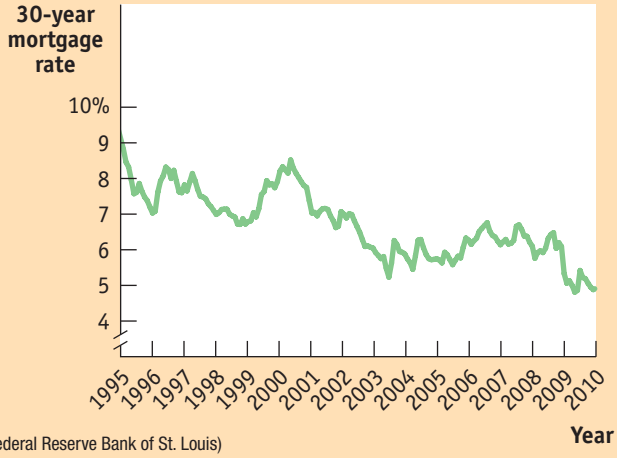
Interest rates dropped from roughly 7.5% to 5.5% between the late 1990s and 2003, helping set off a housing boom. The housing boom was part of a broader housing boom in the country as a whole. There is little question that this housing boom was caused, in the first instance, by low interest rates.

The figure shows the interest rate on 30-year home mortgages—the traditional way to borrow money for a home purchase—and the number of housing starts, the number of homes for which construction is started per month, from 1995 to the end of 2009 in the United States. Panel (a), which shows the mortgage rate, gives you an idea of how much interest rates fell. In the second half of the 1990s, mortgage rates generally fluctuated between 7% and 8%; by 2003, they were down to between 5% and 6%. These lower rates were largely the result of Federal Reserve policy: the Fed cut rates in response to the 2001 recession and continued cutting them into 2003 out of concern that the economy's recovery was too weak to generate sustained job growth.

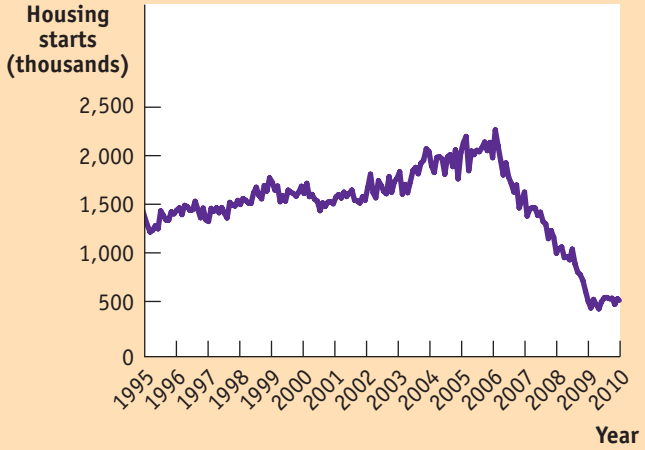
The low interest rates led to a large increase in residential investment spending, reflected in a surge of housing starts, shown in panel (b). This rise in investment spending drove an overall economic expansion, both through its direct effects and through the multiplier process.

Unfortunately, the housing boom eventually turned into too much of a good thing. By 2006, it was clear that the U.S. housing market was experiencing a bubble: people were buying housing based on unrealistic expectations about future price increases. When the bubble burst, housing—and the U.S. economy—took a fall.

(a) The Interest Rate on 30-Year Mortgages



(b) Housing Starts



(Federal Reserve Bank of St. Louis)

To see how unplanned inventory investment can occur, let's continue to focus on the auto industry and make the following assumptions. First, let's assume that the industry must determine each month's production volume in advance, before it knows the volume of actual sales. Second, let's assume that it anticipates selling 800,000 cars next month and that it plans neither to add to nor subtract from existing inventories. In that case, it will produce 800,000 cars to match anticipated sales.

Now imagine that next month's actual sales are less than expected, only 700,000 cars. As a result, the value of 100,000 cars will be added to investment spending as unplanned inventory investment.

The auto industry will, of course, eventually adjust to this slowdown in sales and the resulting unplanned inventory investment. It is likely that it will cut next month's production volume in order to reduce inventories. In fact, economists who study macroeconomic variables in an attempt to determine the future path of the economy pay careful attention to changes in inventory levels. Rising inventories typically indicate positive unplanned inventory investment and a slowing economy, as sales are less than had been forecast. Falling inventories typically indicate negative unplanned inventory investment and a growing economy, as sales are greater than forecast. In the next section, we will see how production adjustments in response to fluctuations in sales and inventories ensure that the value of final goods and services actually produced is equal to desired purchases of those final goods and services.

Module 16 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Explain why a decline in investment spending caused by a change in business expectations leads to a fall in consumer spending.
2. What is the multiplier if the marginal propensity to consume is 0.5? What is it if *MPC* is 0.8?
3. Suppose a crisis in the capital markets makes consumers unable to borrow and unable to save money. What implication does this have for the effects of expected future disposable income on consumer spending?
4. For each event, explain whether the initial effect is a change in planned investment spending or a change in unplanned inventory investment, and indicate the direction of the change.
   a. an unexpected increase in consumer spending
   b. a sharp rise in the cost of business borrowing
   c. a sharp increase in the economy's growth rate of real GDP
   d. an unanticipated fall in sales

Tackle the Test: Multiple-Choice Questions

1. Changes in which of the following leads to a shift of the aggregate consumption function?
   I. expected future disposable income
   II. aggregate wealth
   III. current disposable income
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. The slope of a family's consumption function is equal to
   a. the real interest rate.
   b. the inflation rate.
   c. the marginal propensity to consume.
   d. the rate of increase in household current disposable income.
   e. the tax rate.
3. Given the consumption function $c = \$16{,}000 + 0.5\,y_d$, if individual household current disposable income is $20,000, individual household consumer spending will equal
   a. $36,000.
   b. $26,000.
   c. $20,000.
   d. $16,000.
   e. $6,000.
4. The level of planned investment spending is negatively related to the
   a. rate of return on investment.
   b. level of consumer spending.

c. level of actual investment spending.
d. interest rate.
e. all of the above.

5. Actual investment spending in any period is equal to
   a. planned investment spending + unplanned inventory investment.
   b. planned investment spending – unplanned inventory investment.
   c. planned investment spending + inventory decreases.
   d. unplanned inventory investment + inventory increases.
   e. unplanned inventory investment – inventory increases.

Tackle the Test: Free-Response Questions

1. Use the consumption function provided to answer the following questions.

   $c = \$15{,}000 + 0.8 \times y_d$

   a. What is the value of the marginal propensity to consume?
   b. If individual household current disposable income is $40,000, individual household consumer spending will equal how much?
   c. Draw a correctly labeled graph showing this consumption function.
   d. What is the slope of this consumption function?
   e. On your graph from part c, show what would happen if expected future income decreased.

Answer (7 points)

1 point: 0.8

1 point: $47,000

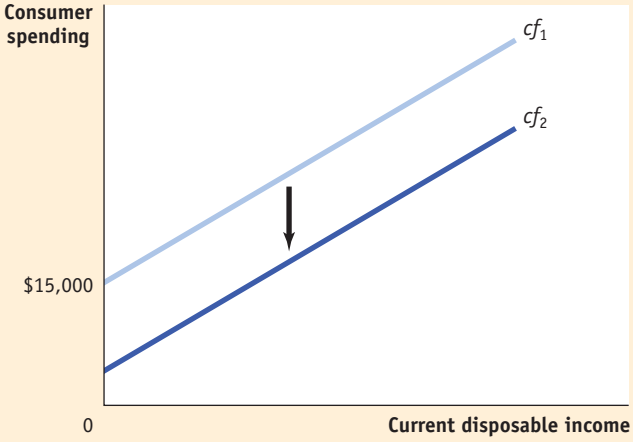
1 point: Vertical axis labeled "Consumer spending" and horizontal axis labeled "Current disposable income"

1 point: Vertical intercept of $15,000

1 point: Upward sloping consumption function

1 point: 0.8

1 point: Consumption function shifts downward



2. List the three most important factors affecting planned investment spending. Explain how each is related to actual investment spending.

What you will learn in this **Module:**

- 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 wealth effect and interest rate effect explain the aggregate demand curve's negative slope
- What factors can shift the aggregate demand curve

Module 17 Aggregate Demand: Introduction and Determinants

Aggregate Demand

The Great Depression, the great majority of economists agree, was the result of a massive negative demand shock. What does that mean? 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.

Figure 17.1 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 quantity of domestic goods and services demanded, measured in 2005 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 7.9 and the total quantity of domestic final goods and services purchased was $716 billion in 2005 dollars.

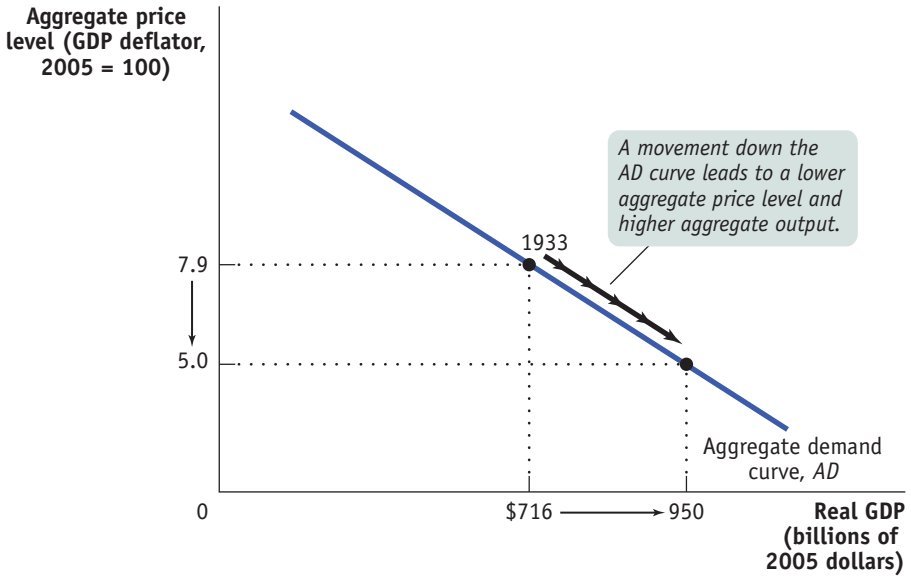
As drawn in Figure 17.1, the aggregate demand curve is downward sloping, indicating a negative relationship between the aggregate price level and the quantity of aggregate output demanded. A higher aggregate price level, other things equal, reduces the quantity of aggregate output demanded; a lower aggregate price level, other things equal, increases the quantity of aggregate output demanded. According to Figure 17.1, if the price level in 1933 had been 5.0 instead of 7.9, the total quantity of domestic final

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 17.1

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 7.9 is $716 billion in 2005 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.



goods and services demanded would have been $950 billion in 2005 dollars instead of $716 billion.

The first key question about the aggregate demand curve involves its negative slope.

Why Is the Aggregate Demand Curve Downward Sloping?

In Figure 17.1, the curve *AD* slopes downward. Why? Recall the basic equation of national income accounting:

(17-1) $GDP = C + I + G + X - IM$

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 $C + I + G + X - IM$ represents 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*. 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 that have become relatively less expensive.

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 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.

Tasos Katopodis/Getty Images

When the aggregate price level falls, the purchasing power of consumers' assets rises, leading shoppers to place more items in their carts.

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 change in consumer spending caused by the altered 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.

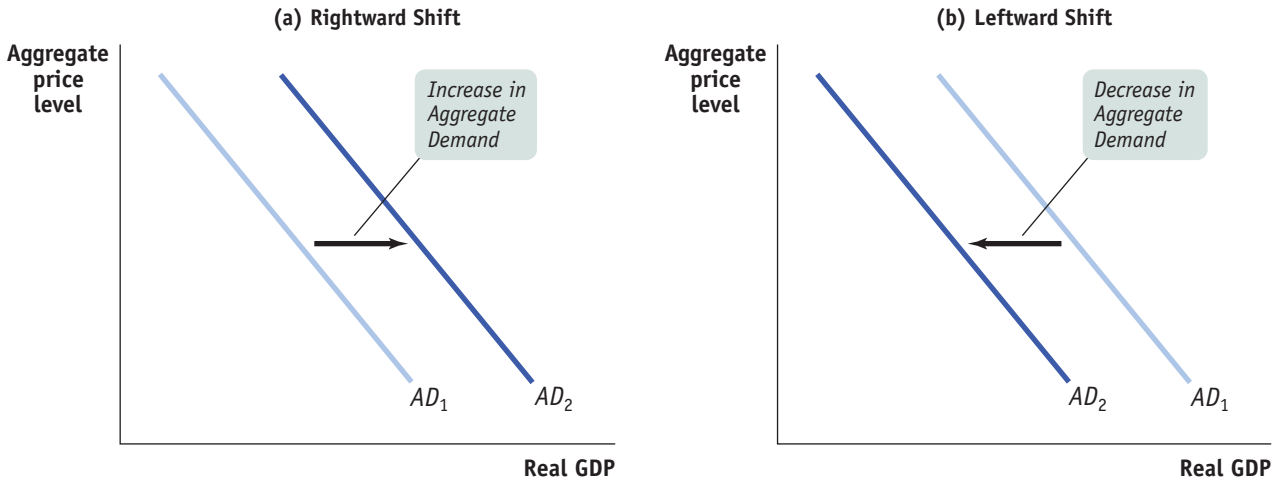
Shifts of the Aggregate Demand Curve

When 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 17.1 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 17.2. 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

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

The **interest rate effect of a change in the aggregate price level** is the change in investment and consumer spending caused by altered interest rates that result from changes in the demand for money.

figure 17.2 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, for example, 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.

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 existing stock of physical capital. In addition, both fiscal and monetary policy can shift the aggregate demand curve. All five factors set the multiplier process in motion. By causing an initial rise or fall in real GDP, they change disposable income, which leads to additional changes in aggregate spending, which lead to further changes in real GDP, and so on. For an overview of factors that shift the aggregate demand curve, see Table 17.1 on the next page.

Changes in Expectations Both consumer spending and planned 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 planned 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 planned 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 measure 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

table **17.1**

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.


BROOKLYN DAILY EAGLE
And Complete Long Island News
LATE NEWS
WALL ST. IN PANIC AS STOCKS CRASH
Attempt Made to Kill Italy's Crown Prince
ASSASSIN CAUGHT IN BRUSSELS MOB; PRINCE UNHURT
Hollywood Fire Destroys Films Worth Millions
FEAR 52 PERISHED IN LAKE MICHIGAN FERRY IS MISSING
PIECE OF PLANE LIKE DITEMAN'S IS FOUND AT SEA
High Duty Group Gave $700,000 to Coolidge Drive
STOCKS CRASH IN RUSH TO SELL; BILLIONS LOST
CARNEGIE CHARGE OF PAID ATHLETES
HOOVER'S TRAIN HALTED BY AUTO
WARDER SOUGHT TO KEEP SEA TRIP
SOMERS NAMED AS HEAD OF NEW

FPG/Getty Images

The loss of wealth resulting from the stock market crash of 1929 was a significant factor leading to the Great Depression.

crash—the purchasing power they embody is reduced and aggregate demand 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 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 later.

Fiscal policy is the use of taxes, government transfers, or government purchases of goods and services to stabilize the economy.

Fiscal Policy **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 In the next section, we will study the Federal Reserve System and monetary policy in detail. At this point, we just need to note that the Federal Reserve 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 more detail later, 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.

Monetary policy is the central bank's use of changes in the quantity of money or the interest rate to stabilize the economy.

Module 17 AP Review

Solutions appear at the back of the book.

Check Your Understanding

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

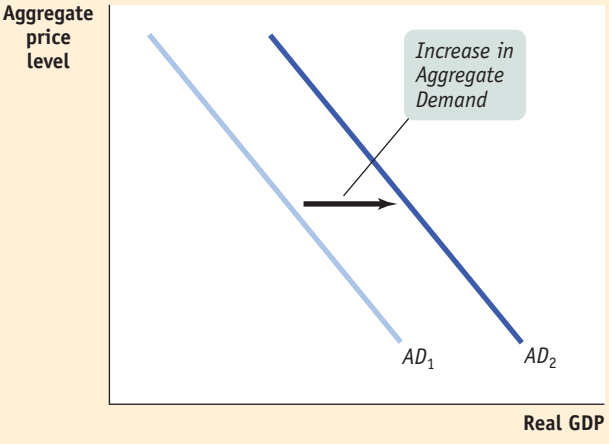
Tackle the Test: Multiple-Choice Questions

1. Which of the following explains the slope of the aggregate demand curve?
   I. the wealth effect of a change in the aggregate price level
   II. the interest rate effect of a change in the aggregate price level
   III. the product-substitution effect of a change in the aggregate price level
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. Which of the following will shift the aggregate demand curve to the right?
   a. a decrease in wealth
   b. pessimistic consumer expectations
   c. a decrease in the existing stock of capital
   d. contractionary fiscal policy
   e. a decrease in the quantity of money
3. The Consumer Confidence Index is used to measure which of the following?
   a. the level of consumer spending
   b. the rate of return on investments
   c. consumer expectations
   d. planned investment spending
   e. the level of current disposable income
4. Decreases in the stock market decrease aggregate demand by decreasing which of the following?
   a. consumer wealth
   b. the price level
   c. the stock of existing physical capital
   d. interest rates
   e. tax revenues
5. Which of the following government policies will shift the aggregate demand curve to the left?
   a. a decrease in the quantity of money
   b. an increase in government purchases of goods and services
   c. a decrease in taxes
   d. a decrease in interest rates
   e. an increase in government transfers

Tackle the Test: Free-Response Questions

1. a. Draw a correctly labeled graph showing aggregate demand.
   b. On your graph from part a, illustrate an increase in aggregate demand.
   c. List the four factors that shift aggregate demand.
   d. Describe a change in each determinant of aggregate demand that would lead to the shift you illustrated in part b.

Answer (12 points)



1 point: Vertical axis labeled "Aggregate price level" (or "Price level")

1 point: Horizontal axis labeled "Real GDP"

1 point: Downward sloping curve labeled "AD" (or "AD_1")

1 point: AD curve shifted to the right

1 point: Expectations

1 point: Wealth

1 point: Size of existing stock of physical capital

1 point: Government policies

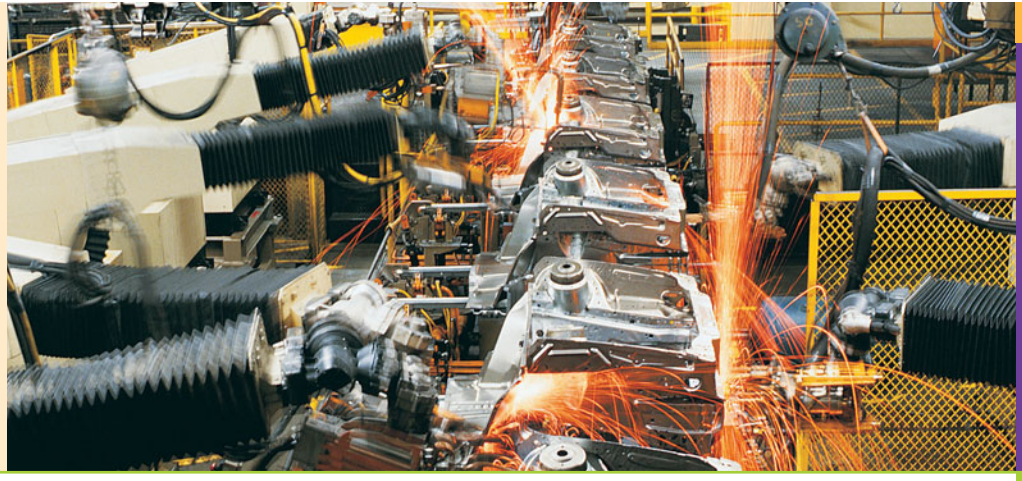
1 point: Consumers/Producers more confident

1 point: Increase in wealth

1 point: Lower existing stock of physical capital

1 point: An increase in government spending or in the money supply

2. Identify the two effects that cause the aggregate demand curve to have a downward slope. Explain each.



Module 18 Aggregate Supply: Introduction and Determinants

What you will learn in this Module:

- How the aggregate supply curve illustrates the relationship between the aggregate price level and the quantity of aggregate output supplied in the economy
- What factors can shift the aggregate supply curve
- Why the aggregate supply curve is different in the short run from in the long run

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) 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, and 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 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

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

question facing a producer: is producing a unit of output profitable or not? Let's define profit per unit:

(18-1) Profit per unit of output =
Price per unit of output – Production cost per unit of output

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, including employer-paid health care and retirement benefits in addition to earnings.

istockphoto

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. 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

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.

fact, industry analysts often talk about variations in an industry's "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 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 18.1 shows a hypothetical short-run aggregate supply curve, *SRAS,* that 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 2005 dollars. On the vertical axis is the aggregate price level as measured by the GDP deflator, with the value for the year 2005 equal to 100. In 1929, the aggregate price level was 10.6 and real GDP was $977 billion. In 1933, the aggregate price level was 7.9 and real GDP was only $716 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 18.1 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 18.2 on the next page. 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

figure 18.1

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 10.6 (in 1929) to 7.9 (in 1933), firms responded by reducing the quantity of aggregate output supplied from $977 billion to $716 billion measured in 2005 dollars.

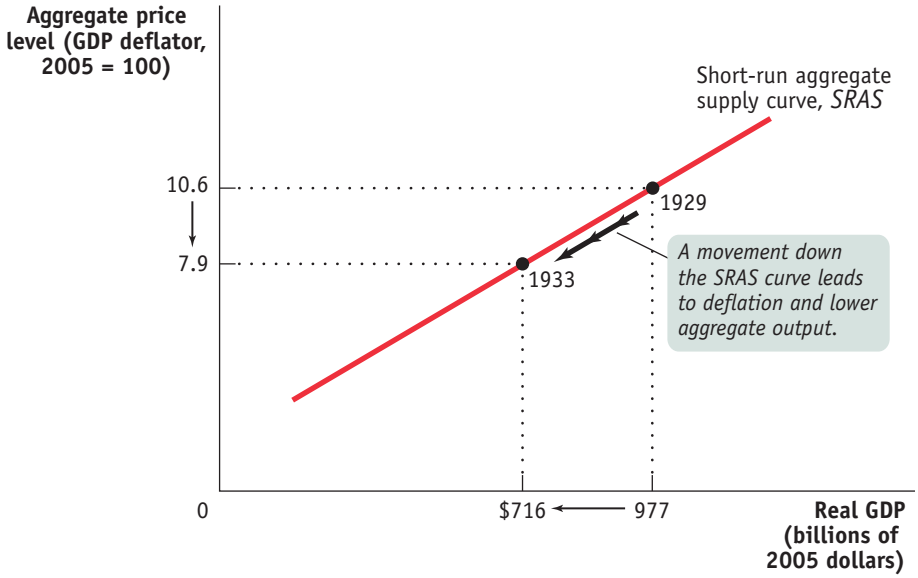
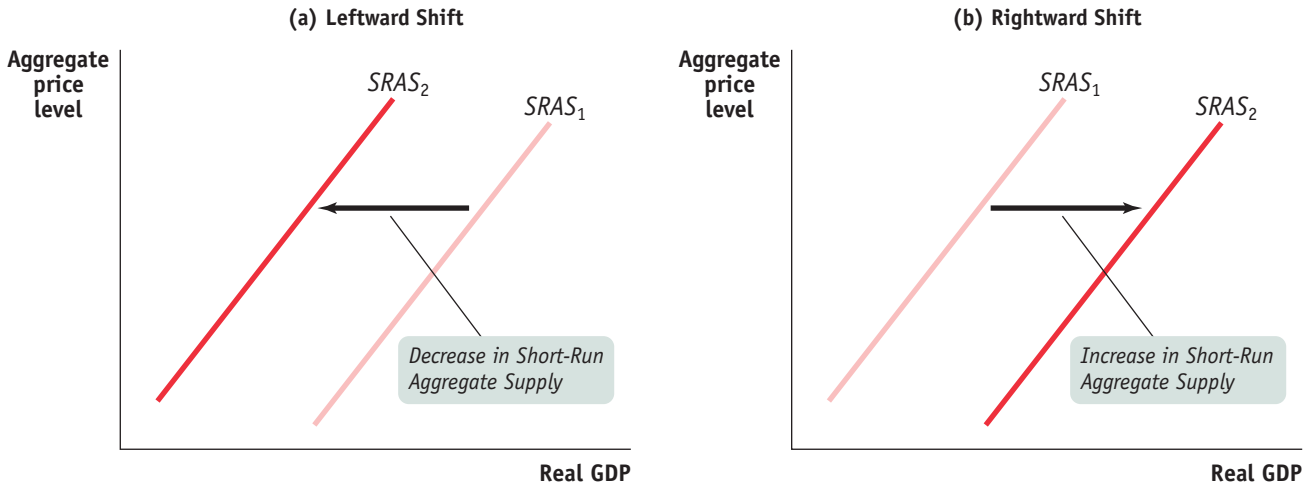


figure 18.2 Shifts of the Short-Run Aggregate Supply Curve



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.

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 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 look more closely at the link between important factors that affect producers' profit per unit and shifts in 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. Furthermore, 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.

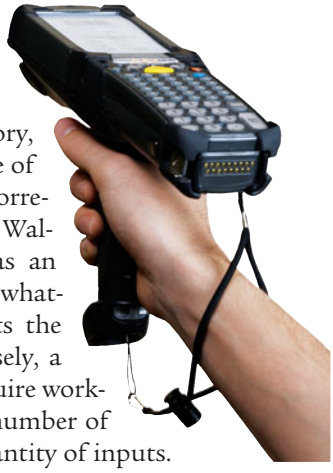
AP Photo/Paul Sakuma

Signs of the times: high oil prices caused high gasoline prices in 2008.

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 Walmart 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.


© Blend Images/Alamy

Almost every good purchased today has a UPC barcode on it, which allows stores to scan and track merchandise with great speed.

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 18.1.

table **18.1**

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. This is the result of nominal wages that 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. Wage flexibility 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 18-1 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 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.

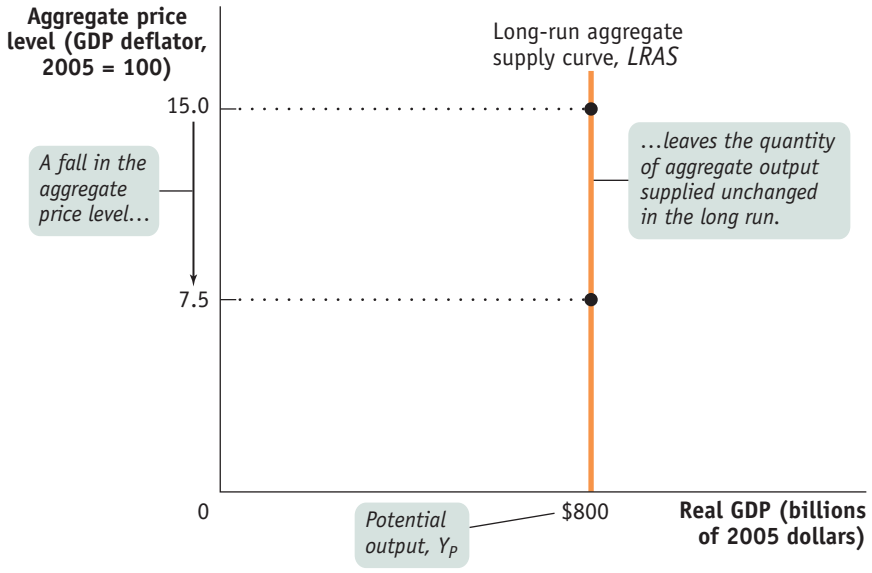
The **long-run aggregate supply curve,** illustrated in Figure 18.3 by the curve *LRAS,* shows the relationship between the aggregate price level and the quantity of aggregate

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.

figure 18.3

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.



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 2005 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 2005 dollars.

It's important to understand not only that the *LRAS* curve is vertical but also that its position along the horizontal axis marks an important benchmark for output. The horizontal intercept in Figure 18.3, where *LRAS* touches the horizontal axis ($800 billion in 2005 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, 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 18.4 on the next page, 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.

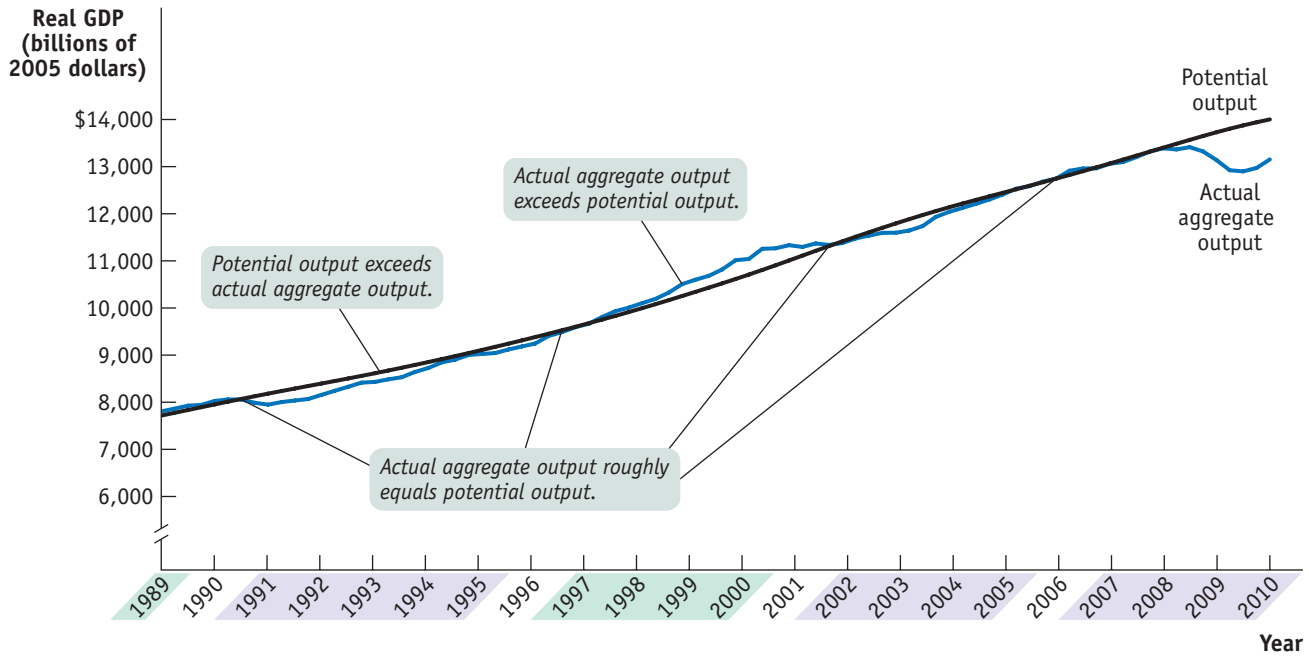
As you can see, U.S. potential output has risen steadily over time—implying a series of rightward shifts of the *LRAS* curve. What has caused these rightward shifts? The answer lies in the factors related to long-run growth:

- increases in the quantity of resources, including land, labor, capital, and entrepreneurship
- increases in the quality of resources, as with a better-educated workforce
- technological progress

Over the long run, as the size of the labor force and the productivity of labor both rise, for example, the level of real GDP that the economy is capable of producing also

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

figure 18.4 Actual and Potential Output from 1989 to 2009



This figure shows the performance of actual and potential output in the United States from 1989 to 2009. The black line shows estimates, produced by the Congressional Budget Office, of U.S. potential output, 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—particularly during the recession that began in 2007. Actual aggregate output was significantly above potential output in the boom of the late 1990s.

Source: Congressional Budget Office; Bureau of Economic Analysis.

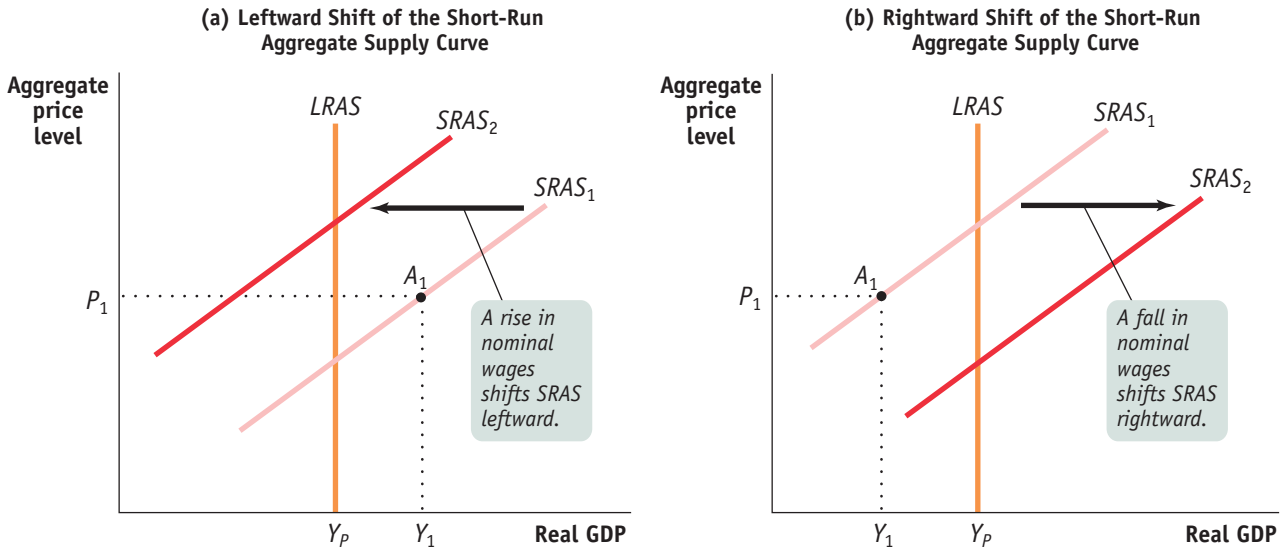
rises. Indeed, one way to think about long-run economic growth is that it is the growth in the economy's potential output. We generally think of the long-run aggregate supply curve as shifting to the right over time as an economy experiences long-run growth.

From the Short Run to the Long Run

As you can see in Figure 18.4, 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, and 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. Why, then, 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 18.4 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 supply curve will shift over time until the economy is at a

figure 18.5 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.

point where both curves cross—a point where actual aggregate output is equal to potential output.

Figure 18.5 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 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, 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.)

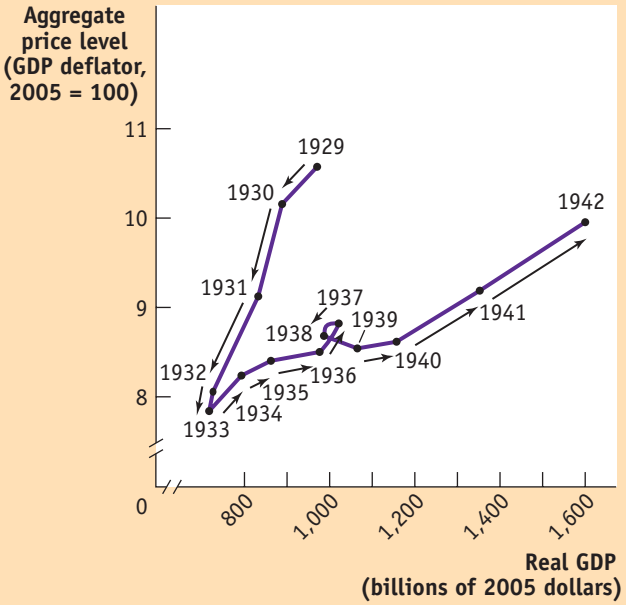
In panel (b), the initial production point, A_1, corresponds to an aggregate output level, Y_1, that is lower than potential output, Y_P. Producing an aggregate output level (such as Y_1) that is lower than potential output (Y_P) is possible only because nominal wages haven't yet fully adjusted downward. 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.

fyi

Prices and Output During the Great Depression

The figure 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 were 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 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 18.5. So the movement of aggregate output from 1929 to 1942 reflected both movements along and shifts of the short-run aggregate supply curve.

Module 18 AP Review

Solutions appear at the back of the book.

Check Your Understanding

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?

Tackle the Test: Multiple-Choice Questions

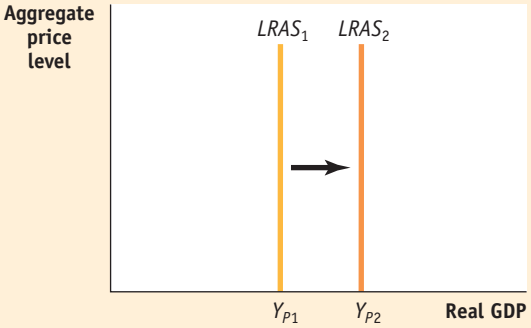
1. Which of the following will shift the short-run aggregate supply curve? A change in
   a. profit per unit at any given price level.
   b. commodity prices.
   c. nominal wages.
   d. productivity.
   e. all of the above

2. Because changes in the aggregate price level have no effect on aggregate output in the long run, the long-run aggregate supply curve is
   a. vertical.
   b. horizontal.
   c. fixed.
   d. negatively sloped.
   e. positively sloped.
3. The horizontal intercept of the long-run aggregate supply curve is
   a. at the origin.
   b. negative.
   c. at potential output.
   d. equal to the vertical intercept.
   e. always the same as the horizontal intercept of the short-run aggregate supply curve.
4. A decrease in which of the following will cause the short-run aggregate supply curve to shift to the left?
   a. commodity prices
   b. the cost of health care insurance premiums paid by employers
   c. nominal wages
   d. productivity
   e. the use of cost-of-living allowances in labor contracts
5. That employers are reluctant to decrease nominal wages during economic downturns and raise nominal wages during economic expansions leads nominal wages to be described as
   a. long-run.
   b. unyielding.
   c. flexible.
   d. real.
   e. sticky.

Tackle the Test: Free-Response Questions

1. a. Draw a correctly labeled graph illustrating a long-run aggregate supply curve.
   b On your graph from part a, label potential output.
   c. On your graph from part a, illustrate an increase in long-run aggregate supply.
   d. What could have caused the change you illustrated in part c? List three possible causes.
2. a. Draw a correctly labeled short-run aggregate supply curve.
   b. On your graph from part a, illustrate a decrease in short-run aggregate supply.
   c. List three types of changes, including the factor that changes and the direction of the change, that could lead to a decrease in aggregate supply.

Answer (8 points)



1 point: Vertical axis labeled "Aggregate price level" (or "Price level")

1 point: Horizontal axis labeled "Real GDP"

1 point: Vertical curve labeled "*LRAS*" (or "$LRAS_1$")

1 point: Potential output labeled Y_P (or Y_{P1}) on horizontal axis at intercept of long-run aggregate supply curve

1 point: Long-run aggregate supply curve shifted to the right

1 point: An increase in the quantity of resources (land, labor, capital, or entrepreneurship)

1 point: An increase in the quality of resources

1 point: Technological progress

What you will learn in this **Module:**

- The difference between short-run and long-run macroeconomic equilibrium
- The causes and effects of demand shocks and supply shocks
- How to determine if an economy is experiencing a recessionary gap or an inflationary gap and how to calculate the size of output gaps

Module 19 Equilibrium in the Aggregate Demand–Aggregate Supply Model

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.

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.

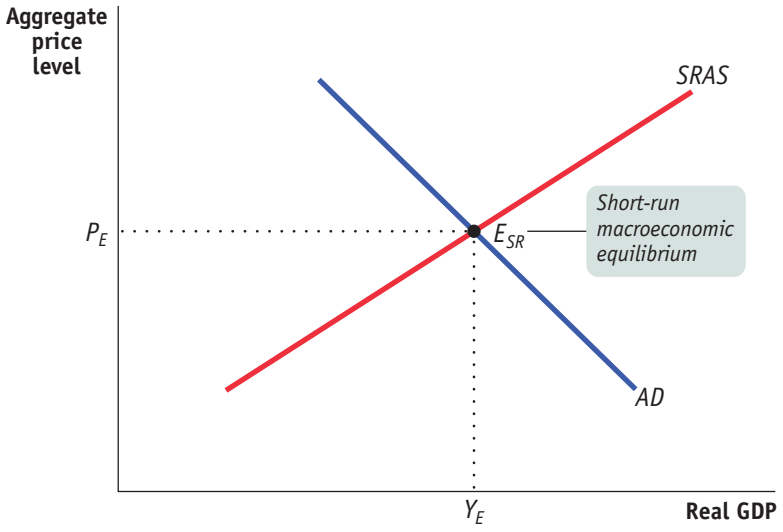
Short-Run Macroeconomic Equilibrium

We'll begin our analysis by focusing on the short run. Figure 19.1 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.**

figure 19.1

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 have seen that a shortage of any individual good causes its market price to rise and 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.

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 (which we will explain later). There have, however, been many cases in which the aggregate price level fell relative to the long-run trend.

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

Shifts of Aggregate Demand: Short-Run Effects

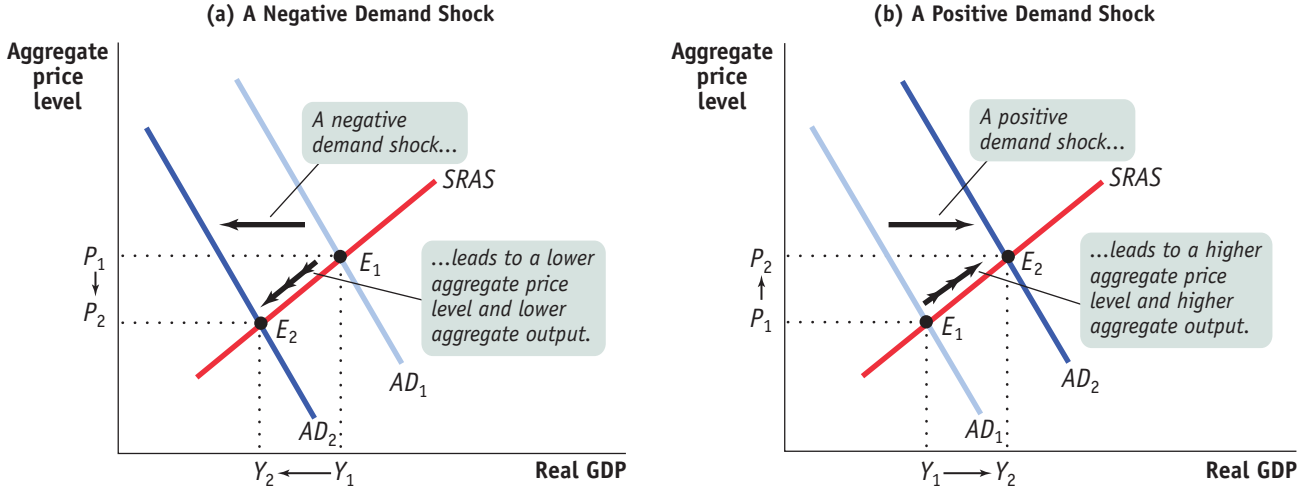
An event that shifts the aggregate demand curve, such as a change in expectations or wealth, the effect of the size of the existing stock of physical capital, or the use of fiscal or monetary policy, is known as a **demand shock.** The Great Depression was caused by a negative demand shock, the collapse of wealth and of business and consumer confidence that followed the stock market crash of 1929 and the banking crises of 1930–1931. The Depression was ended by a positive demand shock—the huge increase

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

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, leading consumers and firms to scale back their spending.

Figure 19.2 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.

figure 19.2 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.

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.

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

The effects of a negative supply shock are shown in panel (a) of Figure 19.3. 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 equilibrium aggregate price level, P_2, is higher, and the short-run equilibrium aggregate output level, Y_2, is lower than before.


© Dominique Aubert/Sygma/Corbis

Producers are vulnerable to dramatic changes in the price of oil, a cause of supply shocks.

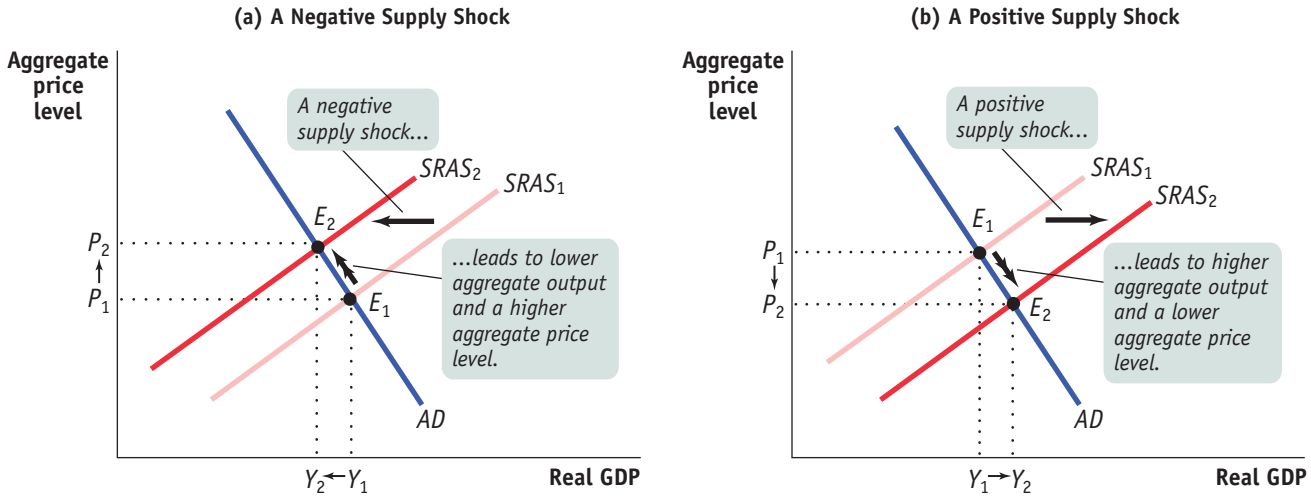
The combination of inflation and falling aggregate output shown in panel (a) has a special name: **stagflation,** for "stagnation plus inflation." When an economy experiences stagflation, it's very unpleasant: falling aggregate output leads to rising unemployment, and people feel that their purchasing 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 stagnating (or 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.

figure 19.3 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.

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

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 19.2. It's much harder for governments to shift the *AS* 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.

Long-Run Macroeconomic Equilibrium

Figure 19.4 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.**

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 19.5, 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 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

figure 19.4

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}.

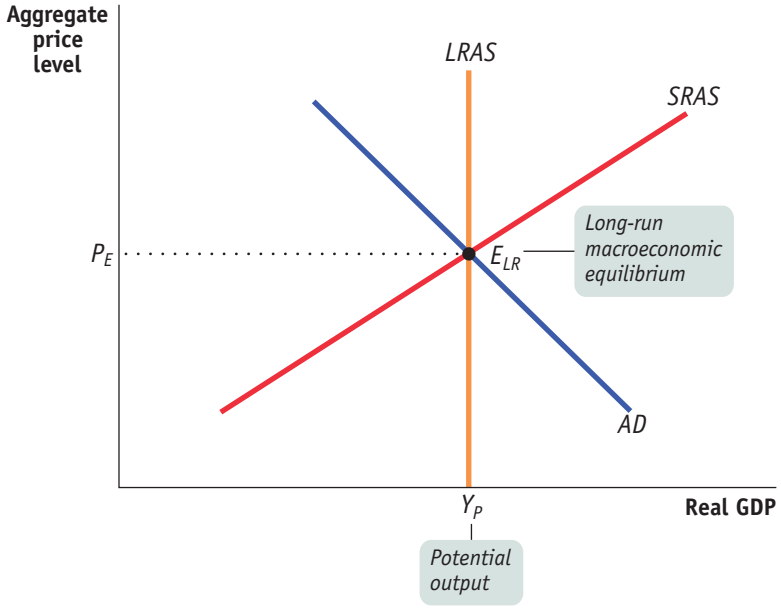
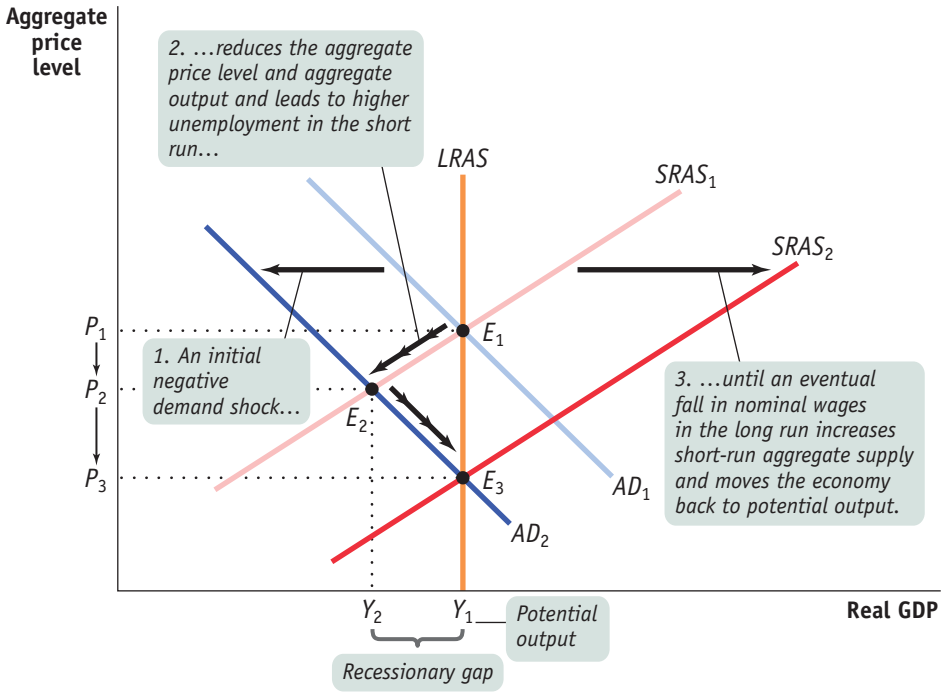


figure 19.5

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.



U.S. economy experienced in 1929–1933: a falling aggregate price level and falling aggregate 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.

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

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. 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. The economy is *self-correcting* in the long run.

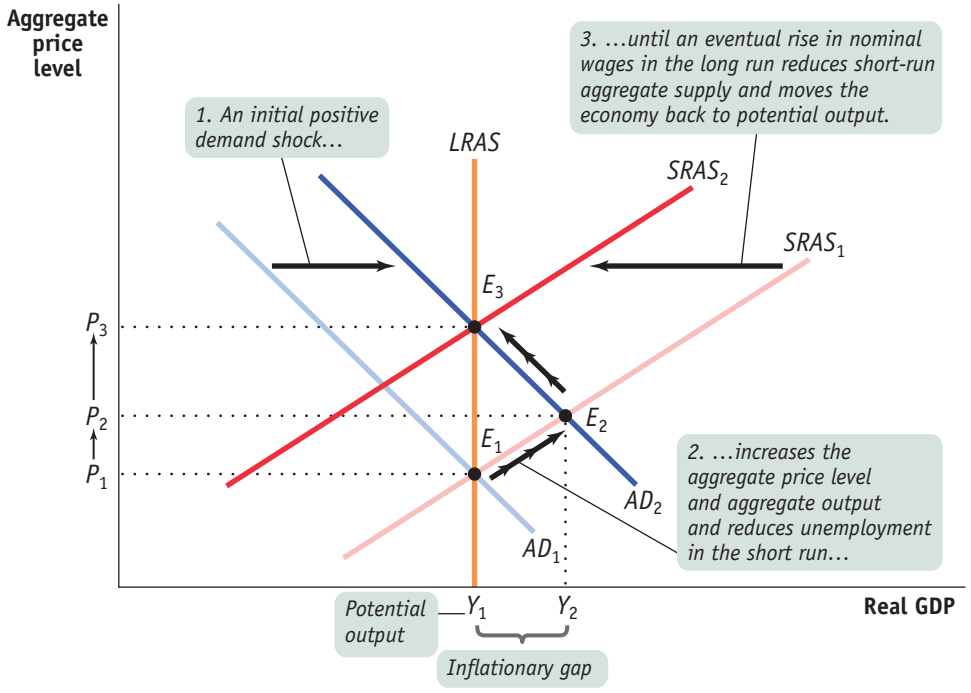
What if, instead, there was an increase in aggregate demand? The results are shown in Figure 19.6 on the next page, where we again assume that the initial aggregate demand curve is AD_1 and the initial short-run aggregate supply curve is $SRAS_1$, so that the initial macroeconomic equilibrium, at E_1, 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

figure 19.6

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 macro economic equilibrium at E_3.



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.

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

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

$$\textbf{(19-1)} \quad \text{Output gap} = \frac{\text{Actual aggregate output} - \text{Potential output}}{\text{Potential output}} \times 100$$

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.

fyi

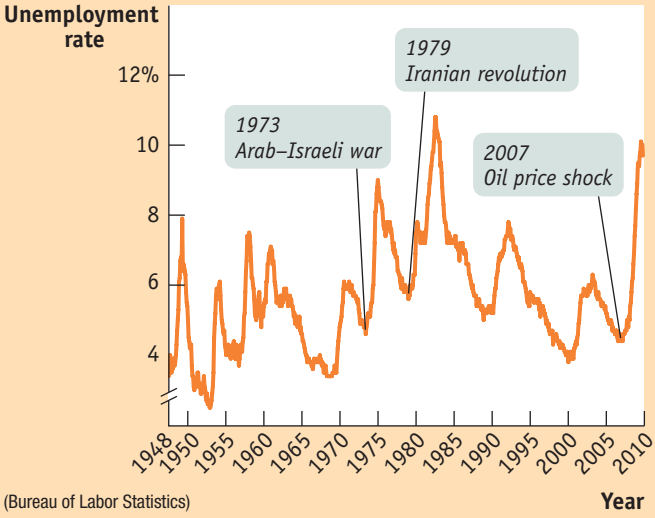
Supply Shocks Versus Demand Shocks in Practice

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 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, and that had lasted for almost two years by the time this book went to press, was at least partially caused by a spike in oil prices.

So 8 of 11 postwar recessions were purely the result of demand shocks, not supply shocks. The few supply-shock recessions, however, were the worst as measured by the unemployment rate. The figure shows the U.S. unemployment rate since 1948, with the dates of the 1973 Arab–Israeli war, the 1979 Iranian revolution, and the 2007 oil price shock marked on the graph. The three highest unemployment rates since World War II 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.



(Bureau of Labor Statistics)

Module 19 AP Review

Solutions appear at the back of the book.

Check Your Understanding

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?

Tackle the Test: Multiple-Choice Questions

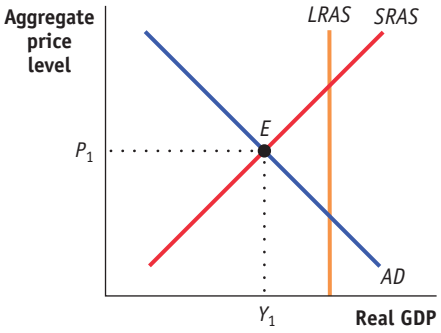
1. Which of the following causes a negative supply shock?
   I. a technological advance
   II. increasing productivity
   III. an increase in oil prices
   a. I only
   b. II only
   c. III only
   d. I and III only
   e. I, II, and III

2. Which of the following causes a positive demand shock?
   a. an increase in wealth
   b. pessimistic consumer expectations
   c. a decrease in government spending
   d. an increase in taxes
   e. an increase in the existing stock of capital

3. During stagflation, what happens to the aggregate price level and real GDP?

	Aggregate price level	*Real GDP*
a.	decreases	increases
b.	decreases	decreases
c.	increases	increases
d.	increases	decreases
e.	stays the same	stays the same

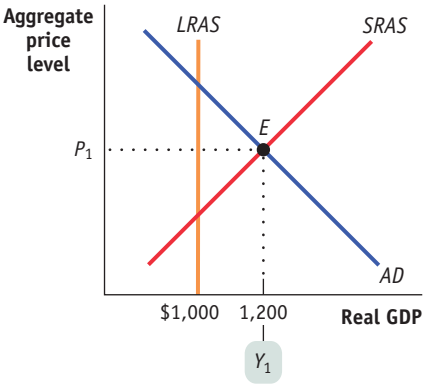
Refer to the graph for questions 4 and 5.



4. Which of the following statements is true if this economy is operating at P_1 and Y_1?
   I. The level of aggregate output equals potential output.
   II. It is in short-run macroeconomic equilibrium.
   III. It is in long-run macroeconomic equilibrium.
   a. I only
   b. II only
   c. III only
   d. II and III
   e. I and III

5. The economy depicted in the graph is experiencing a(n)
   a. contractionary gap.
   b. recessionary gap.
   c. inflationary gap.
   d. demand gap.
   e. supply gap.

Tackle the Test: Free-Response Questions



1. Refer to the graph above.
   a. Is the economy in short-run macroeconomic equilibrium? Explain.
   b. Is the economy in long-run macroeconomic equilibrium? Explain.
   c. What type of gap exists in this economy?
   d. Calculate the size of the output gap.
   e. What will happen to the size of the output gap in the long run?

Answer (7 points)

1 point: Yes

1 point: The economy is in short-run equilibrium because it operates at the point where short-run aggregate supply and aggregate demand intersect.

1 point: No

1 point: Short-run equilibrium occurs at a level of aggregate output that is not equal to potential output

1 point: Inflationary gap

1 point: [($1,200 – $1,000)/$1,000] × 100 = 20%

1 point: It will approach zero

2. Draw a correctly labeled aggregate demand and aggregate supply graph illustrating an economy in long-run macroeconomic equilibrium.

Module 20 Economic Policy and the Aggregate Demand–Aggregate Supply Model

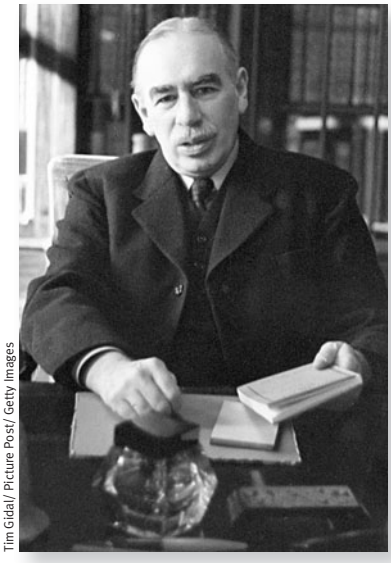
What you will learn in this Module:

- How the *AD–AS* model is used to formulate macroeconomic policy
- The rationale for stabilization policy
- Why fiscal policy is an important tool for managing economic fluctuations
- Which policies constitute expansionary fiscal policy and which constitute contractionary fiscal policy

Macroeconomic Policy

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." 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 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 active **stabilization policy,** which is the


Tim Gidal/ Picture Post/ Getty Images

Some people use *Keynesian economics* as a synonym for *left-wing economics*—but the truth is that the ideas of John Maynard Keynes have been accepted across a broad range of the political spectrum.

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

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

Can stabilization policy improve the economy's performance? As we saw in Figure 18.4, 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.

Policy in the Face of Demand Shocks

Imagine that the economy experiences a negative demand shock, like the one shown by the shift from AD_1 to AD_2 in Figure 19.5. 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 and counteract them, it could short-circuit the whole process shown in Figure 19.5. 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 19.5 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, *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, 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. We'll describe the long-running debate over macroeconomic policy in later modules. 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? Again, 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. For reasons we'll explain later, attempts to eliminate recessionary gaps and inflationary gaps usually rely on monetary rather than fiscal policy. For now, let's explore how macroeconomic policy can respond to supply shocks.

Responding to Supply Shocks

In panel (a) of Figure 19.3 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 case of a demand shock, there are no easy remedies for a supply shock. That is, there are no government policies that can easily counteract the

changes in production costs that shift 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.

AP Photo/Manuel Balce Ceneta

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

fyi

Is Stabilization Policy Stabilizing?

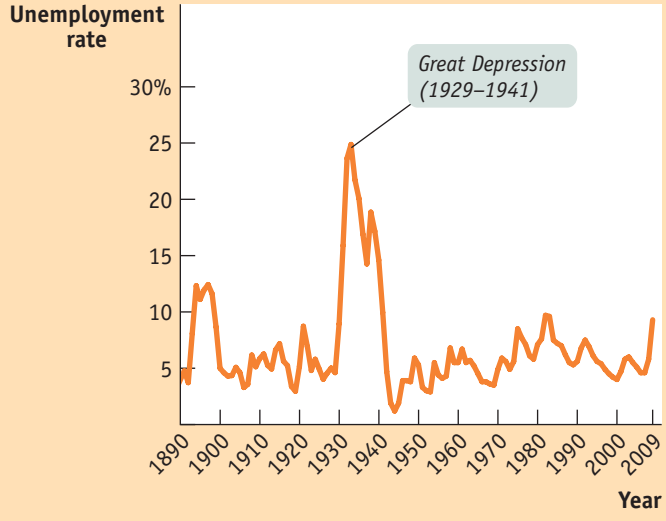
We've described the theoretical rationale for stabilization policy as a way of responding to demand shocks. But does stabilization policy actually stabilize the economy? One way we might try to answer this question is to look at the long- term historical record. Before World War II, the U.S. government 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.

The figure 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 the peaks in postwar unemployment in 1975 and 1982 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.

Source: C. Romer, "Spurious Volititility in Historical Unemployment Data," *Journal of Political Economy* 94, no. 1 (1986): 1–37 (years 1890–1930); Bureau of Labor statistics (years 1931–2009).



Fiscal Policy: The Basics

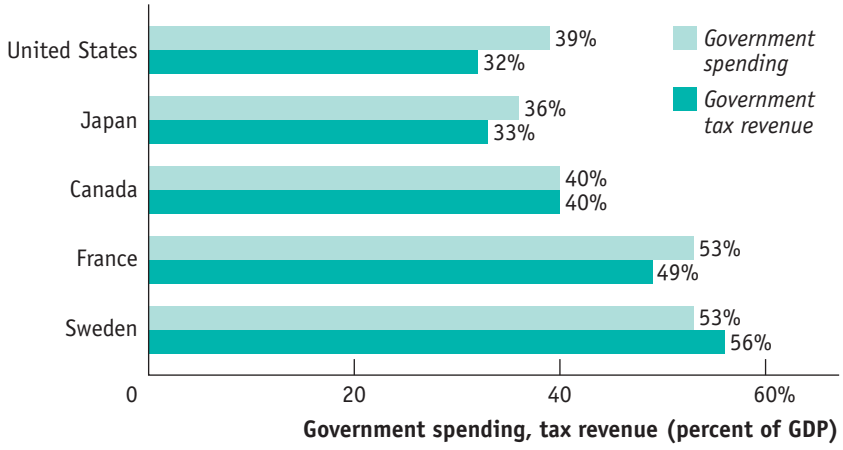
Let's begin with the obvious: modern governments spend a great deal of money and collect a lot in taxes. Figure 20.1 shows government spending and tax revenue as percentages of GDP for a selection of high-income countries in 2008. As you can see, the Swedish government sector is relatively large, accounting for more than half of the Swedish economy. The government of the United States plays a smaller role in the economy than those of Canada or most European countries. But that role is still sizable. As a result, changes in the federal budget—changes in government spending or in taxation—can have large effects on the American economy.

figure 20.1

Government Spending and Tax Revenue for Some High-Income Countries in 2008

Government spending and tax revenue are represented as a percentage of GDP. Sweden has a particularly large government sector, representing nearly 60% of its GDP. The U.S. government sector, although sizable, is smaller than those of Canada and most European countries.

Source: OECD (data for Japan is for year 2007).



To analyze these effects, we begin by showing how taxes and government spending affect the economy's flow of income. Then we can see how changes in spending and tax policy affect aggregate demand.

Taxes, Government Purchases of Goods and Services, Transfers, and Borrowing

In the circular flow diagram discussed in Module 10, we showed the circular flow of income and spending in the economy as a whole. One of the sectors represented in that figure was the government. Funds flow *into* the government in the form of taxes and government borrowing; funds flow *out* in the form of government purchases of goods and services and government transfers to households.

What kinds of taxes do Americans pay, and where does the money go? Figure 20.2 shows the composition of U.S. tax revenue in 2008. Taxes, of course, are required payments to the government. In the United States, taxes are collected at the national level by the federal government; at the state level by each state government; and at local levels by counties, cities, and towns. At the federal level, the main taxes are income taxes on both personal income and corporate profits as well as *social insurance* taxes, which we'll explain shortly. At the state and local levels, the picture is more complex: these governments rely on a mix of sales taxes, property taxes, income taxes, and fees of various kinds. Overall, taxes on personal income and corporate profits accounted for 44% of total government revenue in 2008; social insurance taxes accounted for 27%; and a variety of other taxes, collected mainly at the state and local levels, accounted for the rest.

figure 20.2

Sources of Tax Revenue in the United States, 2008

Personal income taxes, taxes on corporate profits, and social insurance taxes account for most government tax revenue. The rest is a mix of property taxes, sales taxes, and other sources of revenue.

Source: Bureau of Economic Analysis.

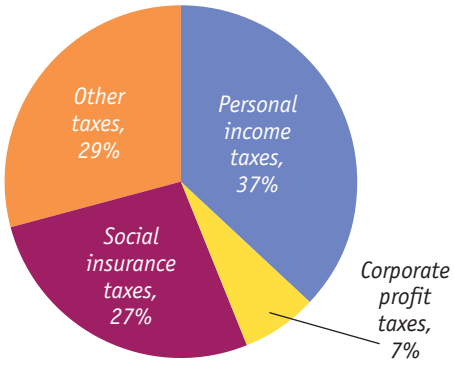


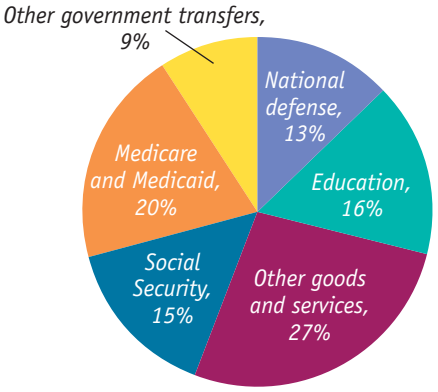
Figure 20.3 shows the composition of 2008 total U.S. government spending, which takes two forms. One form is purchases of goods and services. This includes everything from ammunition for the military to the salaries of public schoolteachers (who are treated in the national accounts as providers of a service—education). The big items here are national defense and education. The large category labeled "Other goods and services" consists mainly of state and local spending on a variety of services, from police and firefighters to highway construction and maintenance.

figure 20.3

Government Spending in the United States, 2008

The two types of government spending are purchases of goods and services and government transfers. The big items in government purchases are national defense and education. The big items in government transfers are Social Security and the Medicare and Medicaid health care programs.

Source: Bureau of Economic Analysis.



The other form of government spending is government transfers, which are payments by the government to households for which no good or service is provided in return. In the modern United States, as well as in Canada and Europe, government transfers represent a very large proportion of the budget. Most U.S. government spending on transfer payments is accounted for by three big programs:

- Social Security, which provides guaranteed income to older Americans, disabled Americans, and the surviving spouses and dependent children of deceased beneficiaries
- Medicare, which covers much of the cost of health care for Americans over age 65
- Medicaid, which covers much of the cost of health care for Americans with low incomes

William Thomas Cain/Getty Images

Government transfers on their way: Social Security checks are run through a printer at the U.S. Treasury printing facility in Philadelphia, Pennsylvania.

The term **social insurance** is used to describe government programs that are intended to protect families against economic hardship. These include Social Security, Medicare, and Medicaid, as well as smaller programs such as unemployment insurance and food stamps. In the United States, social insurance programs are largely paid for with special, dedicated taxes on wages—the social insurance taxes we mentioned earlier.

But how do tax policy and government spending affect the economy? The answer is that taxation and government spending have a strong effect on total aggregate spending in the economy.

The Government Budget and Total Spending

Let's recall the basic equation of national income accounting:

(20-1) $\text{GDP} = C + I + G + X - IM$

The left-hand side of this equation is GDP, the value of all final goods and services produced in the economy. The right-hand side is aggregate spending, the total spending on final goods and services produced in the economy. It is the sum of consumer spending (C), investment spending (I), government purchases of goods and services (G), and the value of exports (X) minus the value of imports (IM). It includes all the sources of aggregate demand.

The government directly controls one of the variables on the right-hand side of Equation 20-1: government purchases of goods and services (G). But that's not the only effect fiscal policy has on aggregate spending in the economy. Through changes in taxes and transfers, it also influences consumer spending (C) and, in some cases, investment spending (I).

To see why the budget affects consumer spending, recall that *disposable income,* the total income households have available to spend, is equal to the total income they receive from wages, dividends, interest, and rent, *minus* taxes, *plus* government transfers. So either an increase in taxes or a decrease in government transfers *reduces* disposable income. And a fall in disposable income, other things equal, leads to a fall in consumer spending. Conversely, either a decrease in taxes or an increase in government transfers *increases* disposable income. And a rise in disposable income, other things equal, leads to a rise in consumer spending.

The government's ability to affect investment spending is a more complex story, which we won't discuss in detail. The important point is that the government taxes profits, and changes in the rules that determine how much a business owes can increase or reduce the incentive to spend on investment goods.

Because the government itself is one source of spending in the economy, and because taxes and transfers can affect spending by consumers and firms, the government can use changes in taxes or government spending to *shift the aggregate demand curve.* There are sometimes good reasons to shift the aggregate demand curve. In early 2008, there was bipartisan agreement that the U.S. government should act to prevent a fall in aggregate demand—that is, to move the aggregate demand curve to the right of where it would otherwise be. The 2008 stimulus package was a classic example of fiscal policy: the use of taxes, government transfers, or government purchases of goods and services to stabilize the economy by shifting the aggregate demand curve.

Expansionary and Contractionary Fiscal Policy

Why would the government want to shift the aggregate demand curve? Because it wants to close either a recessionary gap, created when aggregate output falls below potential output, or an inflationary gap, created when aggregate output exceeds potential output.

Social insurance programs are government programs intended to protect families against economic hardship.

figure 20.4

Expansionary Fiscal Policy Can Close a Recessionary Gap

At E_1 the economy is in short-run macroeconomic equilibrium where the aggregate demand curve, AD_1, intersects the *SRAS* curve. At E_1, there is a recessionary gap of $Y_P - Y_1$. An expansionary fiscal policy—an increase in government purchases of goods and services, a reduction in taxes, or an increase in government transfers—shifts the aggregate demand curve rightward. It can close the recessionary gap by shifting AD_1 to AD_2, moving the economy to a new short-run macroeconomic equilibrium, E_2, which is also a long-run macroeconomic equilibrium.

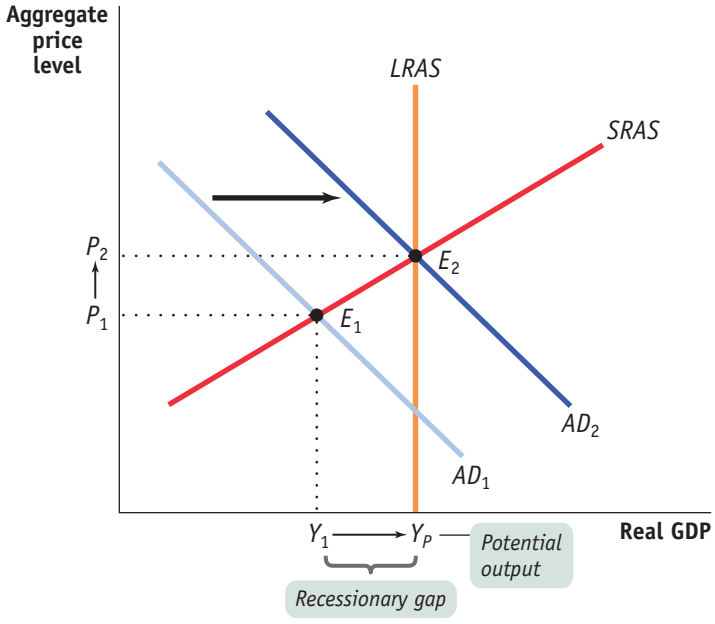


Figure 20.4 shows the case of an economy facing a recessionary gap. *SRAS* is the short-run aggregate supply curve, *LRAS* is the long-run aggregate supply curve, and AD_1 is the initial aggregate demand curve. At the initial short-run macroeconomic equilibrium, E_1, aggregate output is Y_1, below potential output, Y_P. What the government would like to do is increase aggregate demand, shifting the aggregate demand curve rightward to AD_2. This would increase aggregate output, making it equal to potential output. Fiscal policy that increases aggregate demand, called **expansionary fiscal policy,** normally takes one of three forms:

Expansionary fiscal policy increases aggregate demand.

Contractionary fiscal policy reduces aggregate demand.

- an increase in government purchases of goods and services
- a cut in taxes
- an increase in government transfers

Figure 20.5 on the next page shows the opposite case—an economy facing an inflationary gap. At the initial equilibrium, E_1, aggregate output is Y_1, above potential output, Y_P. As we'll explain later, policy makers often try to head off inflation by eliminating inflationary gaps. To eliminate the inflationary gap shown in Figure 20.5, fiscal policy must reduce aggregate demand and shift the aggregate demand curve leftward to AD_2. This reduces aggregate output and makes it equal to potential output. Fiscal policy that reduces aggregate demand, called **contractionary fiscal policy,** is the opposite of expansionary fiscal policy. It is implemented by:

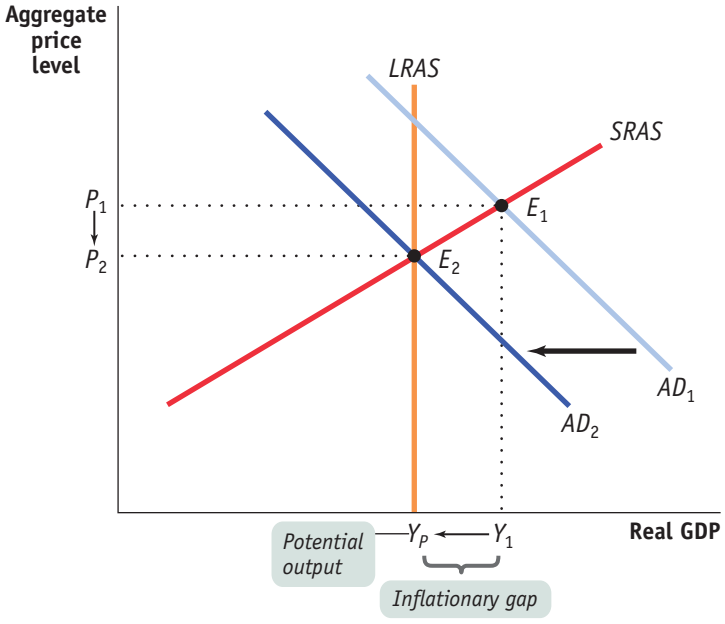
- a reduction in government purchases of goods and services
- an increase in taxes
- a reduction in government transfers

A classic example of contractionary fiscal policy occurred in 1968, when U.S. policy makers grew worried about rising inflation. President Lyndon Johnson imposed a temporary 10% surcharge on income taxes—everyone's income taxes were increased by 10%. He also tried to scale back government purchases of goods and services, which had risen dramatically because of the cost of the Vietnam War.

figure 20.5

Contractionary Fiscal Policy Can Close an Inflationary Gap

At E_1 the economy is in short-run macroeconomic equilibrium where the aggregate demand curve, AD_1, intersects the *SRAS* curve. At E_1, there is an inflationary gap of $Y_1 - Y_P$. A contractionary fiscal policy—such as reduced government purchases of goods and services, an increase in taxes, or a reduction in government transfers—shifts the aggregate demand curve leftward. It closes the inflationary gap by shifting AD_1 to AD_2, moving the economy to a new short-run macroeconomic equilibrium, E_2, which is also a long-run macroeconomic equilibrium.



A Cautionary Note: Lags in Fiscal Policy

Looking at Figures 20.4 and 20.5, it may seem obvious that the government should actively use fiscal policy—always adopting an expansionary fiscal policy when the economy faces a recessionary gap and always adopting a contractionary fiscal policy when the economy faces an inflationary gap. But many economists caution against an extremely active stabilization policy, arguing that a government that tries too hard to stabilize the economy—through either fiscal policy or monetary policy—can end up making the economy less stable.

We'll leave discussion of the warnings associated with monetary policy to later modules. In the case of fiscal policy, one key reason for caution is that there are important *time lags* in its use. To understand the nature of these lags, think about what has to happen before the government increases spending to fight a recessionary gap. First, the government has to realize that the recessionary gap exists: economic data take time to collect and analyze, and recessions are often recognized only months after they have begun. Second, the government has to develop a spending plan, which can itself take months, particularly if politicians take time debating how the money should be spent and passing legislation. Finally, it takes time to spend money. For example, a road construction project begins with activities such as surveying that don't involve spending large sums. It may be quite some time before the big spending begins.

AP Photo/Ron Edmonds

Will the stimulus come in time to be worthwhile? President Barack Obama listens to a question during a news conference in the East Room of the White House in Washington D.C.

Because of these lags, an attempt to increase spending to fight a recessionary gap may take so long to get going that the economy has already recovered on its own. In fact, the recessionary gap may have turned into an inflationary gap by the time the fiscal policy takes effect. In that case, the fiscal policy will make things worse instead of better.

This doesn't mean that fiscal policy should never be actively used. In early 2008, there was good reason to believe that the U.S. economy had begun a lengthy slowdown caused by turmoil in the financial markets, so that a fiscal stimulus designed to arrive within a few months would almost surely push aggregate demand in the right direction. But the problem of lags makes the actual use of both fiscal and monetary policy harder than you might think from a simple analysis like the one we have just given.

Module 20 AP Review

Solutions appear at the back of the book.

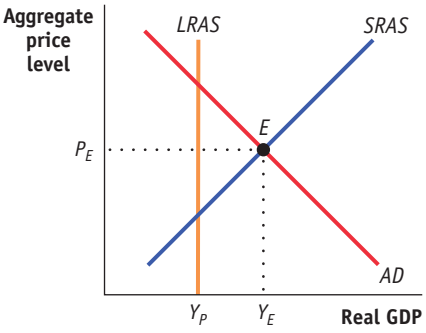
Check Your Understanding

1. In each of the following cases, determine whether the policy is an expansionary or contractionary fiscal policy.
   a. Several military bases around the country, which together employ tens of thousands of people, are closed.
   b. The number of weeks an unemployed person is eligible for unemployment benefits is increased.
   c. The federal tax on gasoline is increased.
2. Explain why federal disaster relief, which quickly disburses funds to victims of natural disasters such as hurricanes, floods, and large-scale crop failures, will stabilize the economy more effectively after a disaster than relief that must be legislated.
3. 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?

Tackle the Test: Multiple-Choice Questions

1. Which of the following contributes to the lag in implementing fiscal policy?
   I. It takes time for Congress and the President to pass spending and tax changes.
   II. Current economic data take time to collect and analyze.
   III. It takes time to realize an output gap exists.
   a. I only
   b. II only
   c. III only
   d. I and III only
   e. I, II, and III
2. Which of the following is a government transfer program?
   a. Social Security
   b. Medicare/Medicaid
   c. unemployment insurance
   d. food stamps
   e. all of the above
3. Which of the following is an example of expansionary fiscal policy?
   a. increasing taxes
   b. increasing government spending
   c. decreasing government transfers
   d. decreasing interest rates
   e. increasing the money supply
4. Which of the following is a fiscal policy that is appropriate to combat inflation?
   a. decreasing taxes
   b. decreasing government spending
   c. increasing government transfers
   d. increasing interest rates
   e. expansionary fiscal policy
5. An income tax rebate is an example of
   a. an expansionary fiscal policy.
   b. a contractionary fiscal policy.
   c. an expansionary monetary policy.
   d. a contractionary monetary policy.
   e. none of the above.

Tackle the Test: Free-Response Questions



1. Refer to the graph above.
   a. What type of gap exists in this economy?
   b. What type of fiscal policy is appropriate in this situation?
   c. List the three variables the government can change to implement fiscal policy.
   d. How would the government change each of the three variables to implement the policy you listed in part b.

Answer (8 points)

1 point: Inflationary

1 point: Contractionary

1 point: Taxes

1 point: Government transfers

1 point: Government purchases of goods and services

1 point: Increase taxes

1 point: Decrease Government transfers

1 point: Decrease government purchases of goods and services

2. a. Draw a correctly labeled graph showing an economy experiencing a recessionary gap.
   b. What type of fiscal policy is appropriate in this situation?
   c. Give an example of what the government could do to implement the type of policy you listed in part b.

What you will learn in this **Module:**

- Why fiscal policy has a multiplier effect
- How the multiplier effect is influenced by automatic stabilizers

Module 21 Fiscal Policy and the Multiplier

Using the Multiplier to Estimate the Influence of Government Policy

An expansionary fiscal policy, like the American Recovery and Reinvestment Act, pushes the aggregate demand curve to the right. A contractionary fiscal policy, like Lyndon Johnson's tax surcharge, pushes the aggregate demand curve to the left. For policy makers, however, knowing the direction of the shift isn't enough: they need estimates of *how much* the aggregate demand curve is shifted by a given policy. To get these estimates, they use the concept of the multiplier.

Multiplier Effects of an Increase in Government Purchases of Goods and Services

Suppose that a government decides to spend $50 billion building bridges and roads. The government's purchases of goods and services will directly increase total spending on final goods and services by $50 billion. But there will also be an indirect effect because the government's purchases will start a chain reaction throughout the economy. The firms producing the goods and services purchased by the government will earn revenues that flow to households in the form of wages, profit, interest, and rent. This increase in disposable income will lead to a rise in consumer spending. The rise in consumer spending, in turn, will induce firms to increase output, leading to a further rise in disposable income, which will lead to another round of consumer spending increases, and so on.

In Module 16 we learned about the concept of the *multiplier:* the ratio of the change in real GDP caused by an autonomous change in aggregate spending to the size of that autonomous change. An increase in government purchases of goods and services is an example of an autonomous increase in aggregate spending. Any change in government purchases of goods and services will lead to an even greater change in real GDP. This chain reaction will cause the initial change in government purchases to multiply through the economy, resulting in an even larger final change in real GDP. The initial

NASA/Tony Gray, Tom Farrar

When the government hires Boeing to build a space shuttle, Boeing employees spend their earnings on things like cars and the automakers spend their earnings on things like education, and so on, creating a multiplier effect.

change in spending, multiplied by the multiplier gives us the final change in real GDP.

Let's consider a simple case in which there are no taxes or international trade. In this case, any change in GDP accrues entirely to households. Assume that the aggregate price level is fixed, so that any increase in nominal GDP is also a rise in real GDP, and that the interest rate is fixed. In that case, the multiplier is $1/(1 - MPC)$. Recall that *MPC* is the *marginal propensity to consume,* the fraction of an additional dollar in disposable income that is spent. For example, if the marginal propensity to consume is 0.5, the multiplier is $1/(1 - 0.5) = 1/0.5 = 2$. Given a multiplier of 2, a $50 billion increase in government purchases of goods and services would increase real GDP by $100 billion. Of that $100 billion, $50 billion is the initial effect from the increase in *G,* and the remaining $50 billion is the subsequent effect of more production leading to more income which leads to more consumer spending, which leads to more production, and so on.

What happens if government purchases of goods and services are instead reduced? The math is exactly the same, except that there's a minus sign in front: if government purchases of goods and services fall by $50 billion and the marginal propensity to consume is 0.5, real GDP falls by $100 billion. This is the result of less production leading to less income, which leads to less consumption, which leads to less production, and so on.

Multiplier Effects of Changes in Government Transfers and Taxes

Expansionary or contractionary fiscal policy need not take the form of changes in government purchases of goods and services. Governments can also change transfer payments or taxes. In general, however, a change in government transfers or taxes shifts the aggregate demand curve by *less* than an equal-sized change in government purchases, resulting in a smaller effect on real GDP.

To see why, imagine that instead of spending $50 billion on building bridges, the government simply hands out $50 billion in the form of government transfers. In this case, there is no direct effect on aggregate demand as there was with government purchases of goods and services. Real GDP and income grow only because households spend some of that $50 billion—and they probably won't spend it all. In fact, they will spend additional income according to the *MPC*. If the *MPC* is 0.5, households will spend only 50 cents of every additional dollar they receive in transfers.

Table 21.1 shows a hypothetical comparison of two expansionary fiscal policies assuming an *MPC* equal to 0.5 and a multiplier equal to 2: one in which the government

table **21.1**

Hypothetical Effects of a Fiscal Policy with a Multiplier of 2

Effect on real GDP	$50 billion rise in government purchases of goods and services	$50 billion rise in government transfer payments
First round	$50 billion	$25 billion
Second round	$25 billion	$12.5 billion
Third round	$12.5 billion	$6.25 billion
⋮	⋮	⋮
Eventual effect	$100 billion	$50 billion

directly purchases $50 billion in goods and services and one in which the government makes transfer payments instead, sending out $50 billion in checks to consumers. In each case, there is a first-round effect on real GDP, either from purchases by the government or from purchases by the consumers who received the checks, followed by a series of additional rounds as rising real GDP raises income (all of which is disposable under our assumption of no taxes), which raises consumption.

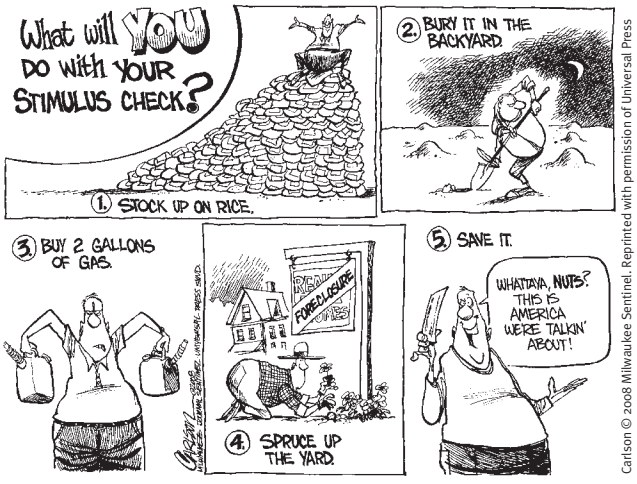
However, the first-round effect of the transfer program is smaller; because we have assumed that the *MPC* is 0.5, only $25 billion of the $50 billion is spent, with the other $25 billion saved. And as a result, all the further rounds are smaller, too. In the end, the transfer payment increases real GDP by only $50 billion. In comparison, a $50 billion increase in government purchases produces a $100 billion increase in real GDP.

Overall, when expansionary fiscal policy takes the form of a rise in transfer payments, real GDP may rise by either more or less than the initial government outlay—that is, the multiplier may be either more or less than 1. In Table 21.1, a $50 billion rise in transfer payments increases real GDP by $50 billion, so that the multiplier is exactly 1. If a smaller share of the initial transfer had been spent, the multiplier on that transfer would have been *less* than 1. If a larger share of the initial transfer had been spent, the multiplier would have been *more* than 1.

A tax cut has an effect similar to the effect of a transfer. It increases disposable income, leading to a series of increases in consumer spending. But the overall effect is smaller than that of an equal-sized increase in government purchases of goods and services: the autonomous increase in aggregate spending is smaller because households save part of the amount of the tax cut. They save a fraction of the tax cut equal to their *MPS* (or 1 – *MPC*).

We should also note that taxes introduce a further complication: they typically change the size of the multiplier. That's because in the real world governments rarely impose **lump-sum taxes,** in which the amount of tax a household owes is independent of its income. Instead, the great majority of tax revenue is raised via taxes that depend positively on the level of real GDP. As we'll discuss shortly, taxes that depend positively on real GDP reduce the size of the multiplier.

In practice, economists often argue that it also matters *who* among the population gets tax cuts or increases in government transfers. For example, compare the effects of an increase in unemployment benefits with a cut in taxes on profits distributed to shareholders as dividends. Consumer surveys suggest that the average unemployed worker will spend a higher share of any increase in his or her disposable income than would the average recipient of dividend income. That is, people who are unemployed tend to have a higher *MPC* than people who own a lot of stocks because the latter tend to be wealthier and tend to save more of any increase in disposable income. If that's true, a dollar spent on unemployment benefits increases aggregate demand more than a dollar's worth of dividend tax cuts. Such arguments played an important role in the final provisions of the 2008 stimulus package.



How Taxes Affect the Multiplier

Government taxes capture some part of the increase in real GDP that occurs in each round of the multiplier process, since most government taxes depend positively on real GDP. As a result, disposable income increases by considerably less than $1 once we include taxes in the model.

The increase in government tax revenue when real GDP rises isn't the result of a deliberate decision or action by the government. It's a consequence of the way the tax laws are written, which causes most sources of government revenue to increase *automatically* when real GDP goes up. For example, income tax receipts increase when real GDP rises because the amount each individual owes in taxes depends positively on his

Lump-sum taxes are taxes that don't depend on the taxpayer's income.

Automatic stabilizers are government spending and taxation rules that cause fiscal policy to be automatically expansionary when the economy contracts and automatically contractionary when the economy expands.

Discretionary fiscal policy is fiscal policy that is the result of deliberate actions by policy makers rather than rules.

or her income, and households' taxable income rises when real GDP rises. Sales tax receipts increase when real GDP rises because people with more income spend more on goods and services. And corporate profit tax receipts increase when real GDP rises because profits increase when the economy expands.

The effect of these automatic increases in tax revenue is to reduce the size of the multiplier. Remember, the multiplier is the result of a chain reaction in which higher real GDP leads to higher disposable income, which leads to higher consumer spending, which leads to further increases in real GDP. The fact that the government siphons off some of any increase in real GDP means that at each stage of this process, the increase in consumer spending is smaller than it would be if taxes weren't part of the picture. The result is to reduce the multiplier.

Many macroeconomists believe it's a good thing that in real life taxes reduce the multiplier. Most, though not all, recessions are the result of negative demand shocks. The same mechanism that causes tax revenue to increase when the economy expands causes it to decrease when the economy contracts. Since tax receipts decrease when real GDP falls, the effects of these negative demand shocks are smaller than they would be if there were no taxes. The decrease in tax revenue reduces the adverse effect of the initial fall in aggregate demand. The automatic decrease in government tax revenue generated by a fall in real GDP—caused by a decrease in the amount of taxes households pay—acts like an automatic expansionary fiscal policy implemented in the face of a recession. Similarly, when the economy expands, the government finds itself automatically pursuing a contractionary fiscal policy—a tax increase. Government spending and taxation rules that cause fiscal policy to be automatically expansionary when the economy contracts and automatically contractionary when the economy expands, without requiring any deliberate action by policy makers, are called **automatic stabilizers.**

AP Photo

A historical example of discretionary fiscal policy was the Works Progress Administration (WPA), a relief measure established during the Great Depression that put the unemployed to work building bridges, roads, buildings, and parks.

The rules that govern tax collection aren't the only automatic stabilizers, although they are the most important ones. Some types of government transfers also play a stabilizing role. For example, more people receive unemployment insurance when the economy is depressed than when it is booming. The same is true of Medicaid and food stamps. So transfer payments tend to rise when the economy is contracting and fall when the economy is expanding. Like changes in tax revenue, these automatic changes in transfers tend to reduce the size of the multiplier because the total change in disposable income that results from a given rise or fall in real GDP is smaller.

As in the case of government tax revenue, many macroeconomists believe that it's a good thing that government transfers reduce the multiplier. Expansionary and contractionary fiscal policies that are the result of automatic stabilizers are widely considered helpful to macroeconomic stabilization, because they blunt the extremes of the business cycle. But what about fiscal policy that *isn't* the result of automatic stabilizers? **Discretionary fiscal policy** is fiscal policy that is the direct result of deliberate actions by policy makers rather than automatic adjustment. For example, during a recession, the government may pass legislation that cuts taxes and increases government spending in order to stimulate the economy. In general, mainly due to problems with time lags as discussed in Module 10, economists tend to support the use of discretionary fiscal policy only in special circumstances, such as an especially severe recession.

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About That Stimulus Package . . .

In early 2008, there was broad bipartisan agreement that the U.S. economy needed a fiscal stimulus. There was, however, sharp partisan disagreement about what form that stimulus should take. The eventual bill was a compromise that left both sides unhappy and arguably made the stimulus less effective than it could have been.

Initially, there was little support for an increase in government purchases of goods and services—that is, neither party wanted to build bridges and roads to stimulate the economy. Both parties believed that the economy needed a quick boost, and ramping up spending would take too long. But there was a fierce debate over whether the stimulus should take the form of a tax cut, which would deliver its biggest benefits to those who paid the most taxes, or an increase in transfer payments targeted at Americans most in economic distress.

The eventual compromise gave most taxpayers a flat $600 rebate, $1,200 for married couples. Very high-income taxpayers were not entitled to a rebate; low earners who didn't make enough to pay income taxes, but did pay other taxes, received $300. In effect, the plan was a combination of tax cuts for most Americans and transfer payments to Americans with low incomes.

How well designed was the stimulus plan? Many economists believed that only a fraction of the rebate checks would actually be spent, so that the eventual multiplier would be fairly low. White House economists appeared to agree: they estimated that the stimulus would raise employment by half a million jobs above what it would have been otherwise, the same number offered by independent economists who believed that the multiplier on the plan would be around 0.75. (Remember, the multiplier on changes in taxes or transfers can be less than 1.) Some economists were critical, arguing that Congress should have insisted on a plan that yielded more "bang for the buck."

Both Democratic and Republican economists working for Congress defended the plan, arguing that the perfect is the enemy of the good—that it was the best that could be negotiated on short notice and was likely to be of real help in fighting the economy's weakness. But by late summer 2008, with the U.S. economy still in the doldrums, there was widespread agreement that the plan's results had been disappointing. And by late 2008, with the economy shrinking further, policy makers were working on a new, much larger stimulus plan that relied more heavily on government purchases. The American Recovery and Reinvestment Act was passed in February 2009. The bill called for $787 billion in expenditures on stimulus in three areas: help for the unemployed and those receiving Medicaid and food stamps; investments in infrastructure, energy, and health care; and tax cuts for families and small businesses.

John Moore/Getty Images

Despite controversies over specifics, the general consensus about active stabilization policy is apparent: when at first you don't succeed, try, try again.

Module 21 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Explain why a $500 million increase in government purchases of goods and services will generate a larger rise in real GDP than a $500 million increase in government transfers.
2. Explain why a $500 million reduction in government purchases of goods and services will generate a larger fall in real GDP than a $500 million tax increase.
3. The country of Boldovia has no unemployment insurance benefits and a tax system using only lump-sum taxes. The neighboring country of Moldovia has generous unemployment benefits and a tax system in which residents must pay a percentage of their income. Which country will experience greater variation in real GDP in response to demand shocks, positive and negative? Explain.

Tackle the Test: Multiple-Choice Questions

1. The marginal propensity to consume
   I. has a negative relationship to the multiplier.
   II. is equal to 1.
   III. represents the proportion of consumers' disposable income that is spent.
   a. I only
   b. II only
   c. III only
   d. I and III only
   e. I, II, and III

2. Assume that taxes and interest rates remain unchanged when government spending increases, and that both savings and consumer spending increase when income increases. The ultimate effect on real GDP of a $100 million increase in government purchases of goods and services will be
   a. an increase of $100 million.
   b. an increase of more than $100 million.
   c. an increase of less than $100 million.
   d. an increase of either more than or less than $100 million, depending on the *MPC*.
   e. a decrease of $100 million.

3. The presence of taxes has what effect on the multiplier? They
   a. increase it.
   b. decrease it.
   c. destabilize it.
   d. negate it.
   e. have no effect on it.

4. A lump-sum tax is
   a. higher as income increases.
   b. lower as income increases.
   c. independent of income.
   d. the most common form of tax.
   e. a type of business tax.

5. Which of the following is NOT an automatic stabilizer?
   a. income taxes
   b. unemployment insurance
   c. Medicaid
   d. food stamps
   e. monetary policy

Tackle the Test: Free-Response Questions

1. Assume the *MPC* in an economy is 0.8 and the government increases government purchases of goods and services by $50 million. Also assume the absence of taxes, international trade, and changes in the aggregate price level.
   a. What is the value of the multiplier?
   b. By how much will real GDP change as a result of the increase in government purchases?
   c. What would happen to the size of the effect on real GDP if the *MPC* fell? Explain.
   d. If we relax the assumption of no taxes, automatic changes in tax revenue as income changes will have what effect on the size of the multiplier?

Answer (5 points)

1 point: Multiplier = $1/(1 - MPC) = 1/(1 - 0.8) = 1/0.2 = 5$

1 point: $50 million $\times$ 5 = $250 million

1 point: It would decrease.

1 point: The multiplier is $1/(1 - MPC)$. A fall in *MPC* increases the denominator, $(1 - MPC)$, and therefore decreases the multiplier.

1 point: Decrease it

2. A change in government purchases of goods and services results in a change in real GDP equal to $200 million. Assume the absence of taxes, international trade, and changes in the aggregate price level.
   a. Suppose that the *MPC* is equal to 0.75. What was the size of the change in government purchases of goods and services that resulted in the increase in real GDP of $200 million?
   b. Now suppose that the change in government purchases of goods and services was $20 million. What value of the multiplier would result in an increase in real GDP of $200 million?
   c. Given the value of the multiplier you calculated in part b, what marginal propensity to save would have led to that value of the multiplier?

Section 4 Review

Summary

1. The **consumption function** shows how an individual household's consumer spending is determined by its current disposable income. The **aggregate consumption function** shows the relationship for the entire economy. According to the life-cycle hypothesis, households try to smooth their consumption over their lifetimes. As a result, the aggregate consumption function shifts in response to changes in expected future disposable income and changes in aggregate wealth.
2. **Planned investment spending** depends negatively on the interest rate and on existing production capacity; it depends positively on expected future real GDP.
3. Firms hold **inventories** of goods so that they can satisfy consumer demand quickly. **Inventory investment** is positive when firms add to their inventories, negative when they reduce them. Often, however, changes in inventories are not a deliberate decision but the result of mistakes in forecasts about sales. The result is **unplanned inventory investment,** which can be either positive or negative. **Actual investment spending** is the sum of planned investment spending and unplanned inventory investment.
4. The **aggregate demand curve** shows the relationship between the aggregate price level and the quantity of aggregate output demanded.
5. The aggregate demand curve is downward sloping for two reasons. The first is the **wealth effect of a change in the aggregate price level**—a higher aggregate price level reduces the purchasing power of households' wealth and reduces consumer spending. The second is the **interest rate effect of a change in the aggregate price level**—a higher aggregate price level reduces the purchasing power of households' and firms' money holdings, leading to a rise in interest rates and a fall in investment spending and consumer spending.
6. The aggregate demand curve shifts because of changes in expectations, changes in wealth not due to changes in the aggregate price level, and the effect of the size of the existing stock of physical capital. Policy makers can use **fiscal policy** and **monetary policy** to shift the aggregate demand curve.
7. The **aggregate supply curve** shows the relationship between the aggregate price level and the quantity of aggregate output supplied.
8. The **short-run aggregate supply curve** is upward sloping because **nominal wages** are **sticky** in the short run: a higher aggregate price level leads to higher profit per unit of output and increased aggregate output in the short run.
9. Changes in commodity prices, nominal wages, and productivity lead to changes in producers' profits and shift the short-run aggregate supply curve.
10. In the long run, all prices, including nominal wages, are flexible and the economy produces at its **potential output.** If actual aggregate output exceeds potential output, nominal wages will eventually rise in response to low unemployment and aggregate output will fall. If potential output exceeds actual aggregate output, nominal wages will eventually fall in response to high unemployment and aggregate output will rise. So the **long-run aggregate supply curve** is vertical at potential output.
11. In the ***AD–AS* model,** the intersection of the short-run aggregate supply curve and the aggregate demand curve is the point of **short-run macroeconomic equilibrium.** It determines the **short-run equilibrium aggregate price level** and the level of **short-run equilibrium aggregate output.**
12. Economic fluctuations occur because of a shift of the aggregate demand curve (a *demand shock*) or the short-run aggregate supply curve (a *supply shock*). A **demand shock** causes the aggregate price level and aggregate output to move in the same direction as the economy moves along the short-run aggregate supply curve. A **supply shock** causes them to move in opposite directions as the economy moves along the aggregate demand curve. A particularly nasty occurrence is **stagflation**—inflation and falling aggregate output—which is caused by a negative supply shock.
13. Demand shocks have only short-run effects on aggregate output because the economy is **self-correcting** in the long run. In a **recessionary gap,** an eventual fall in nominal wages moves the economy to **long-run macroeconomic equilibrium,** in which aggregate output is equal to potential output. In an **inflationary gap,** an eventual rise in nominal wages moves the economy to long-run macroeconomic equilibrium. We can use the **output gap,** the percentage difference between actual aggregate output and potential output, to summarize how the economy responds to recessionary and inflationary gaps. Because the economy tends to be self-correcting in the long run, the output gap always tends toward zero.
14. The high cost—in terms of unemployment—of a recessionary gap and the future adverse consequences of an inflationary gap lead many economists to advocate active **stabilization policy:** using fiscal or monetary policy to offset demand shocks. There can be drawbacks, however, because such policies may contribute to a long-term rise in the budget deficit, leading to lower

long-run growth. Also, poorly timed policies can increase economic instability.

15. Negative supply shocks pose a policy dilemma: a policy that counteracts the fall in aggregate output by increasing aggregate demand will lead to higher inflation, but a policy that counteracts inflation by reducing aggregate demand will deepen the output slump.
16. The government plays a large role in the economy, collecting a large share of GDP in taxes and spending a large share both to purchase goods and services and to make transfer payments, largely for **social insurance. Fiscal policy** is the use of taxes, government transfers, or government purchases of goods and services to shift the aggregate demand curve. But many economists caution that a very active fiscal policy may in fact make the economy less stable due to time lags in policy formulation and implementation.
17. Government purchases of goods and services directly affect aggregate demand, and changes in taxes and government transfers affect aggregate demand indirectly by changing households' disposable income. **Expansionary fiscal policy** shifts the aggregate demand curve rightward; **contractionary fiscal policy** shifts the aggregate demand curve leftward.
18. Fiscal policy has a multiplier effect on the economy, the size of which depends upon the fiscal policy. Except in the case of lump-sum taxes, taxes reduce the size of the multiplier. Expansionary fiscal policy leads to an increase in real GDP, while contractionary fiscal policy leads to a reduction in real GDP. Because part of any change in taxes or transfers is absorbed by savings in the first round of spending, changes in government purchases of goods and services have a more powerful effect on the economy than equal-size changes in taxes or transfers.
19. An **autonomous change in aggregate spending** leads to a chain reaction in which the total change in real GDP is equal to the multiplier times the initial change in aggregate spending. The size of the **multiplier,** $1/(1 - MPC)$, depends on the **marginal propensity to consume, *MPC,*** the fraction of an additional dollar of disposable income spent on consumption. The larger the *MPC,* the larger the multiplier and the larger the change in real GDP for any given autonomous change in aggregate spending. The fraction of an additional dollar of disposable income that is saved is called the **marginal propensity to save, *MPS*.**
20. Rules governing taxes—with the exception of **lump-sum taxes**—and some transfers act as **automatic stabilizers,** reducing the size of the multiplier and automatically reducing the size of fluctuations in the business cycle. In contrast, **discretionary fiscal policy** arises from deliberate actions by policy makers rather than from the business cycle.

Key Terms

Marginal propensity to consume (*MPC*), p. 159
Marginal propensity to save (*MPS*), p. 159
Autonomous change in aggregate spending, p. 160
Multiplier, p. 160
Consumption function, p. 162
Autonomous consumer spending, p. 162
Aggregate consumption function, p. 164
Planned investment spending, p. 166
Inventories, p. 168
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Automatic stabilizers, p. 212
Discretionary fiscal policy, p. 212

Problems

1. A fall in the value of the dollar against other currencies makes U.S. final goods and services cheaper to foreigners even though the U.S. aggregate price level stays the same. As a result, foreigners demand more American aggregate output. Your study partner says that this represents a movement down the aggregate demand curve because foreigners are demanding more in response to a lower price. You, however, insist that this represents a rightward shift of the aggregate demand curve. Who is right? Explain.

2. Your study partner is confused by the upward-sloping short-run aggregate supply curve and the vertical long-run aggregate supply curve. How would you explain the shapes of these two curves?

3. Suppose that in Wageland all workers sign annual wage contracts each year on January 1. No matter what happens to prices of final goods and services during the year, all workers earn the wage specified in their annual contract. This year, prices of final goods and services fall unexpectedly after the contracts are signed. Answer the following questions using a diagram and assume that the economy starts at potential output.

a. In the short run, how will the quantity of aggregate output supplied respond to the fall in prices?

b. What will happen when firms and workers renegotiate their wages?

4. Determine whether, in the short run, each of the following events causes a shift of a curve or a movement along a curve. Also determine which curve is involved and the direction of the change.

a. As a result of new discoveries of iron ore used to make steel, producers now pay less for steel, a major commodity used in production.

b. An increase in the money supply by the Federal Reserve increases the quantity of money that people wish to lend, lowering interest rates.

c. Greater union activity leads to higher nominal wages.

d. A fall in the aggregate price level increases the purchasing power of households' and firms' money holdings. As a result, they borrow less and lend more.

5. Suppose that all households hold all their wealth in assets that automatically rise in value when the aggregate price level rises (an example of this is what is called an "inflation-indexed bond"—a bond for which the interest rate, among other things, changes one-for-one with the inflation rate). What happens to the wealth effect of a change in the aggregate price level as a result of this allocation of assets? What happens to the slope of the aggregate demand curve? Will it still slope downward? Explain.

6. Suppose that the economy is currently at potential output. Also suppose that you are an economic policy maker and that a college economics student asks you to rank, if possible, your most preferred to least preferred type of shock: positive demand shock, negative demand shock, positive supply shock, negative supply shock. For those shocks that can be ranked, how would you rank them and why?

7. Explain whether the following government policies affect the aggregate demand curve or the short-run aggregate supply curve and how.

a. The government reduces the minimum nominal wage.

b. The government increases Temporary Assistance to Needy Families (TANF) payments, government transfers to families with dependent children.

c. To reduce the budget deficit, the government announces that households will pay much higher taxes beginning next year.

d. The government reduces military spending.

8. In Wageland, all workers sign an annual wage contract each year on January 1. In late January, a new computer operating system is introduced that increases labor productivity dramatically. Explain how Wageland will move from one short-run macroeconomic equilibrium to another. Illustrate with a diagram.

9. The Conference Board publishes the Consumer Confidence Index (CCI) every month based on a survey of 5,000 representative U.S. households. It is used by many economists to track the state of the economy. A press release by the Board on April 29, 2008 stated: "The Conference Board Consumer Confidence Index, which had declined sharply in March, fell further in April. The Index now stands at 62.3 (1985 = 100), down from 65.9 in March."

a. As an economist, is this news encouraging for economic growth?

b. Explain your answer to part a with the help of the *AD–AS* model. Draw a typical diagram showing two equilibrium points (E_1) and (E_2). Label the vertical axis "Aggregate price level" and the horizontal axis "Real GDP." Assume that all other major macroeconomic factors remain unchanged.

c. How should the government respond to this news? What are some policy measures that could be used to help neutralize the effect of falling consumer confidence?

10. There were two major shocks to the U.S. economy in 2007, leading to a severe economic slowdown. One shock was related to oil prices; the other was the slump in the housing market. This question analyzes the effect of these two shocks on GDP using the *AD–AS* framework.

a. Draw typical aggregate demand and short-run aggregate supply curves. Label the horizontal axis "Real GDP" and the vertical axis "Aggregate price level." Label the equilibrium point E_1, the equilibrium quantity Y_1, and equilibrium price P_1.

b. Data taken from the Department of Energy indicate that the average price of crude oil in the world increased from $54.63 per barrel on January 5, 2007, to $92.93 on December 28, 2007. Would an increase in oil prices cause a demand shock or a supply shock? Redraw the diagram from part a to illustrate the effect of this shock by shifting the appropriate curve.

c. The Housing Price Index, published by the Office of Federal Housing Enterprise Oversight, calculates that U.S. home prices fell by an average of 3.0% in the 12 months between January 2007 and January 2008. Would the fall in home prices cause a supply shock or demand shock? Redraw the diagram from part b to illustrate the effect of this shock by shifting the appropriate curve. Label the new equilibrium point E_2, the equilibrium quantity Y_2, and equilibrium price P_2.

d. Compare the equilibrium points E_1 and E_2 in your diagram for part c. What was the effect of the two shocks on real GDP and the aggregate price level (increase, decrease, or indeterminate)?

11. Using aggregate demand, short-run aggregate supply, and long-run aggregate supply curves, explain the process by which each of the following economic events will move the economy from one long-run macroeconomic equilibrium to another. Illustrate with diagrams. In each case, what are the short-run and long-run effects on the aggregate price level and aggregate output?

a. There is a decrease in households' wealth due to a decline in the stock market.

b. The government lowers taxes, leaving households with more disposable income, with no corresponding reduction in government purchases.

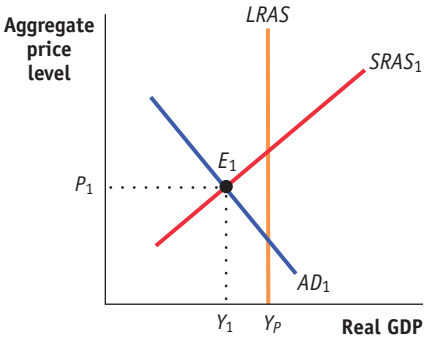
12. Using aggregate demand, short-run aggregate supply, and long-run aggregate supply curves, explain the process by which each of the following government policies will move the economy from one long-run macroeconomic equilibrium to another. Illustrate with diagrams. In each case, what are the short-run and long-run effects on the aggregate price level and aggregate output?

a. There is an increase in taxes on households.

b. There is an increase in the quantity of money.

c. There is an increase in government spending.

13. The economy is in short-run macroeconomic equilibrium at point E_1 in the accompanying diagram. Based on the diagram, answer the following questions.



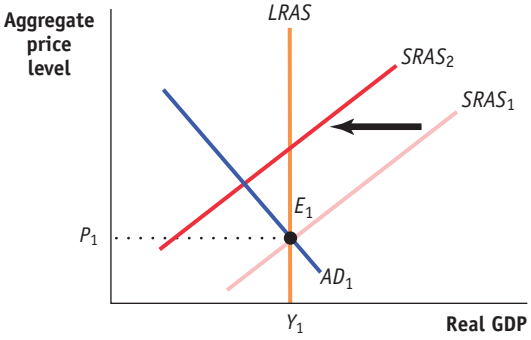
a. Is the economy facing an inflationary or a recessionary gap?

b. What policies can the government implement that might bring the economy back to long-run macroeconomic equilibrium? Illustrate with a diagram.

c. If the government did not intervene to close this gap, would the economy return to long-run macroeconomic equilibrium? Explain and illustrate with a diagram.

d. What are the advantages and disadvantages of the government implementing policies to close the gap?

14. In the accompanying diagram, the economy is in long-run macroeconomic equilibrium at point E_1 when an oil shock shifts the short-run aggregate supply curve to $SRAS_2$. Based on the diagram, answer the following questions.



a. How do the aggregate price level and aggregate output change in the short run as a result of the oil shock? What is this phenomenon known as?

b. What fiscal policies can the government use to address the effects of the supply shock? Use a diagram that shows the effect of policies chosen to address the change in real GDP. Use another diagram to show the effect of policies chosen to address the change in the aggregate price level.

c. Why do supply shocks present a dilemma for government policy makers?

15. The late 1990s in the United States were characterized by substantial economic growth with low inflation; that is, real GDP increased with little, if any, increase in the aggregate price level. Explain this experience using aggregate demand and aggregate supply curves. Illustrate with a diagram.

16. In each of the following cases, either a recessionary or inflationary gap exists. Assume that the aggregate supply curve is horizontal, so that the change in real GDP arising from a shift of the aggregate demand curve equals the size of the shift of the curve. Calculate both the change in government purchases of goods and services, and, alternatively, the change in government transfers necessary to close the gap.

a. Real GDP equals $100 billion, potential output equals $160 billion, and the marginal propensity to consume is 0.75.

b. Real GDP equals $250 billion, potential output equals $200 billion, and the marginal propensity to consume is 0.5.

c. Real GDP equals $180 billion, potential output equals $100 billion, and the marginal propensity to consume is 0.8.

17. Most macroeconomists believe it is a good thing that taxes act as automatic stabilizers and lower the size of the multiplier. However, a smaller multiplier means that the change in government purchases of goods and services, government transfers, or taxes necessary to close an inflationary or recessionary gap is larger. How can you explain this apparent inconsistency?

18. The accompanying table shows how consumers' marginal propensities to consume in a particular economy are related to their level of income.

Income range	Marginal propensity to consume
$0 – $20,000	0.9
$20,001 – $40,000	0.8
$40,001 – $60,000	0.7
$60,001 – $80,000	0.6
Above $80,000	0.5

a. Suppose the government engages in increased purchases of goods and services. For each of the income groups in the accompanying table, what is the value of the multiplier—that is, what is the "bang for the buck" from each dollar the government spends on government purchases of goods and services in each income group?

b. If the government needed to close a recessionary or inflationary gap, at which group should it primarily aim its fiscal policy of changes in government purchases of goods and services?

19. From 2003 to 2008, Eastlandia experienced large fluctuations in both aggregate consumer spending and disposable income, but wealth, the interest rate, and expected future disposable income did not change. The accompanying table shows the level of aggregate consumer spending and disposable income in

millions of dollars for each of these years. Use this information to answer the following questions.

Year	Disposable income (millions of dollars)	Consumer spending (millions of dollars)
2003	$100	$180
2004	350	380
2005	300	340
2006	400	420
2007	375	400
2008	500	500

a. Plot the aggregate consumption function for Eastlandia.

b. What is the marginal propensity to consume? What is the marginal propensity to save?

c. What is the aggregate consumption function?

20. From the end of 1995 to March 2000, the Standard and Poor's 500 (S&P 500) stock index, a broad measure of stock market prices, rose almost 150%, from 615.93 to a high of 1,527.46. From that time to September 10, 2001, the index fell 28.5% to 1,092.54. How do you think the movements in the stock index influenced both the growth in real GDP in the late 1990s and the concern about maintaining consumer spending after the terrorist attacks on September 11, 2001?

21. How will investment spending change as the following events occur?

a. The interest rate falls as a result of Federal Reserve policy.

b. The U.S. Environmental Protection Agency decrees that corporations must upgrade or replace their machinery in order to reduce their emissions of sulfur dioxide.

c. Baby boomers begin to retire in large numbers and reduce their savings, resulting in higher interest rates

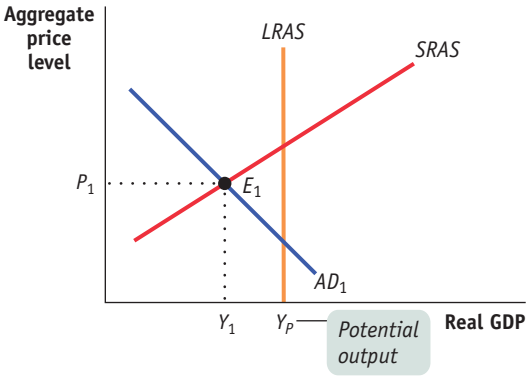
22. Explain how each of the following actions will affect the level of investment spending and unplanned inventory investment.

a. The Federal Reserve raises the interest rate.

b. There is a rise in the expected growth rate of real GDP.

c. A sizable inflow of foreign funds into the country lowers the interest rate.

23. The accompanying diagram shows the current macroeconomic situation for the economy of Albernia. You have been hired as an economic consultant to help the economy move to potential output, Y_P.

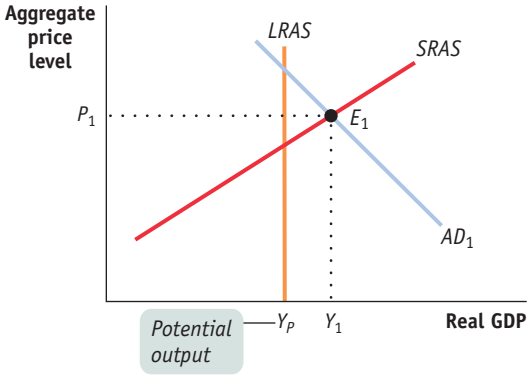


a. Is Albernia facing a recessionary or inflationary gap?

b. Which type of fiscal policy—expansionary or contractionary—would move the economy of Albernia to potential output, Y_P? What are some examples of such policies?

c. Use a diagram to illustrate the macroeconomic situation in Albernia after the successful fiscal policy has been implemented.

24. The accompanying diagram shows the current macroeconomic situation for the economy of Brittania; real GDP is Y_1, and the aggregate price level is P_1. You have been hired as an economic consultant to help the economy move to potential output, Y_P.



a. Is Brittania facing a recessionary or inflationary gap?

b. Which type of fiscal policy—expansionary or contractionary—would move the economy of Brittania to potential output, Y_P? What are some examples of such policies?

c. Illustrate the macroeconomic situation in Brittania with a diagram after the successful fiscal policy has been implemented.

25. An economy is in long-run macroeconomic equilibrium when each of the following aggregate demand shocks occurs. What kind of gap—inflationary or recessionary—will the economy face after the shock, and what type of fiscal policies would help move the economy back to potential output? How would your recommended fiscal policy shift the aggregate demand curve?

a. A stock market boom increases the value of stocks held by households.

b. Firms come to believe that a recession in the near future is likely.

c. Anticipating the possibility of war, the government increases its purchases of military equipment.

d. The quantity of money in the economy declines and interest rates increase.