section 6

Inflation, Unemployment, and Stabilization Policies

Jim Cramer's *Mad Money* is one of the most popular shows on CNBC, a cable TV network that specializes in business and financial news. Cramer, who mostly offers investment advice, is known for his sense of showmanship. But few viewers were prepared for his outburst on August 3, 2007, when he began screaming about what he saw as inadequate action from the Federal Reserve:

"Bernanke is being an academic! It is no time to be an academic. . . . **He has no idea how bad it is out there. He has no idea! He has no idea!** . . . and Bill Poole? Has no idea what it's like out there! . . . They're nuts! **They know nothing!** . . . The Fed is asleep! Bill Poole is a shame! He's shameful!!"

Who are Bernanke and Bill Poole? In the previous chapter we described the role of the Federal Reserve System, the U.S. central bank. At the time of Cramer's tirade, Ben Bernanke, a former Princeton professor of economics, was the chair of the Fed's Board of Governors, and William Poole, also a former economics professor, was the president of the Federal Reserve Bank of St. Louis. Both men, because of their positions, are members of the Federal Open Market Committee, which meets eight times a year to set monetary policy. In August 2007, Cramer was crying out for the Fed to change monetary policy in order to address what he perceived to be a growing financial crisis.

G. Paul Burnett/The New York Times/Redux

In August 2007, an agitated Jim Cramer demanded that the Fed do something to address the growing financial crisis.

Why was Cramer screaming at the Federal Reserve rather than, say, the U.S. Treasury—or, for that matter, the president? The answer is that the Fed's control of monetary policy makes it the first line of response to macroeconomic difficulties—very much including the financial crisis that had Cramer so upset. Indeed, within a few weeks the Fed swung into action with a dramatic reversal of its previous policies.

In Section 4, we developed the aggregate demand and supply model and introduced the use of fiscal policy to stabilize the economy. In Section 5, we introduced money, banking, and the Federal Reserve System, and began to look at how monetary policy is used to stabilize the economy. In this section, we use the models introduced in Sections 4 and 5 to further develop our understanding of stabilization policies (both fiscal and monetary), including their long-run effects on the economy. In addition, we introduce the Phillips curve—a short-run trade-off between unexpected inflation and unemployment—and investigate the role of expectations in the economy. We end the section with a brief summary of the history of macroeconomic thought and how the modern consensus view of stabilization policy has developed.

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

- Why governments calculate the cyclically adjusted budget balance
- Why a large public debt may be a cause for concern
- Why implicit liabilities of the government are also a cause for concern

Module 30 Long-run Implications of Fiscal Policy: Deficits and the Public Debt

In Module 20 we discussed how discretionary fiscal policy can be used to stabilize the economy in the short run. During a recession, an expansionary fiscal policy—raising government spending, lowering taxes, or both—can be used to shift the aggregate demand curve to the right. And when there are inflationary pressures in the economy, a contractionary fiscal policy—lowering government spending, raising taxes, or both—can be used to shift the aggregate demand curve to the left. But how do these policies affect the economy over a longer period of time? In this module we will look at some of the long-term effects of fiscal policy, including budget balance, debt, and liabilities.

The Budget Balance

Headlines about the government's budget tend to focus on just one point: whether the government is running a budget surplus or a budget deficit and, in either case, how big. People usually think of surpluses as good: when the federal government ran a record surplus in 2000, many people regarded it as a cause for celebration. Conversely, people usually think of deficits as bad: when the Congressional Budget Office projected a record federal deficit for 2009, many people regarded it as a cause for concern.

How do surpluses and deficits fit into the analysis of fiscal policy? Are deficits ever a good thing and surpluses a bad thing? To answer those questions, let's look at the causes and consequences of surpluses and deficits.

The Budget Balance as a Measure of Fiscal Policy

What do we mean by surpluses and deficits? The budget balance, which we have previously defined, is the difference between the government's tax revenue and its spending, both on goods and services and on government transfers, in a given year. That is, the budget balance—savings by government—is defined by Equation 30-1:

(30-1) $S_{Government} = T - G - TR$

where *T* is the value of tax revenues, *G* is government purchases of goods and services, and *TR* is the value of government transfers. A budget surplus is a positive budget balance, and a budget deficit is a negative budget balance.

Other things equal, expansionary fiscal policies—increased government purchases of goods and services, higher government transfers, or lower taxes—reduce the budget balance for that year. That is, expansionary fiscal policies make a budget surplus smaller or a budget deficit bigger. Conversely, contractionary fiscal policies—reduced government purchases of goods and services, lower government transfers, or higher taxes—increase the budget balance for that year, making a budget surplus bigger or a budget deficit smaller.

You might think this means that changes in the budget balance can be used to measure fiscal policy. In fact, economists often do just that: they use changes in the budget balance as a "quick-and-dirty" way to assess whether current fiscal policy is expansionary or contractionary. But they always keep in mind two reasons this quick-and-dirty approach is sometimes misleading:

- Two different changes in fiscal policy that have equal-size effects on the budget balance may have quite unequal effects on the economy. As we have already seen, changes in government purchases of goods and services have a larger effect on real GDP than equal-size changes in taxes and government transfers.
- Often, changes in the budget balance are themselves the result, not the cause, of fluctuations in the economy.

To understand the second point, we need to examine the effects of the business cycle on the budget.

The Business Cycle and the Cyclically Adjusted Budget Balance

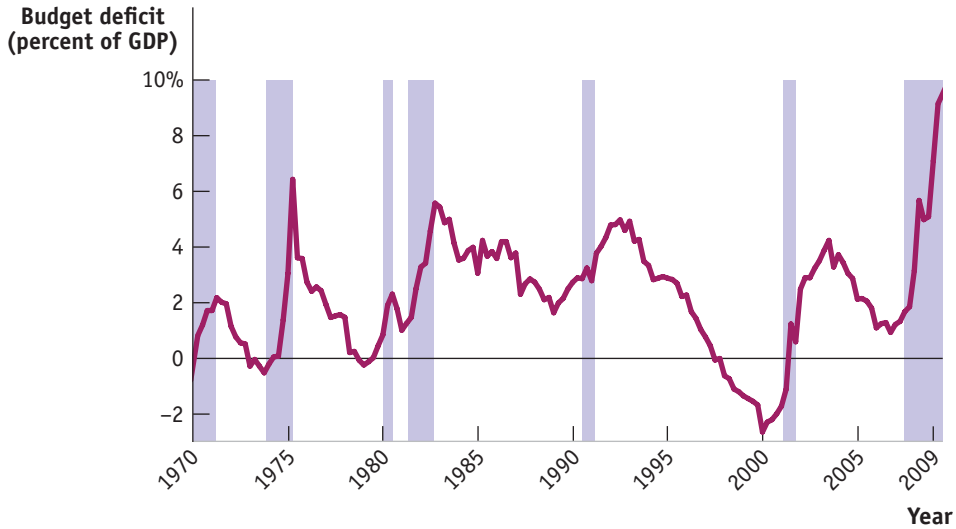
Historically, there has been a strong relationship between the federal government's budget balance and the business cycle. The budget tends to move into deficit when the economy experiences a recession, but deficits tend to get smaller or even turn into surpluses when the economy is expanding. Figure 30.1 shows the federal budget deficit as a percentage of GDP from 1970 to 2009. Shaded areas indicate recessions; unshaded areas indicate expansions. As you can see, the federal budget deficit increased around the time of each recession and usually declined during expansions. In fact, in the late

figure 30.1

The U.S. Federal Budget Deficit and the Business Cycle

The budget deficit as a percentage of GDP tends to rise during recessions (indicated by shaded areas) and fall during expansions.

Source: Bureau of Economic Analysis; National Bureau of Economic Research.



stages of the long expansion from 1991 to 2000, the deficit actually became negative—the budget deficit became a budget surplus.

The relationship between the business cycle and the budget balance is even clearer if we compare the budget deficit as a percentage of GDP with the unemployment rate, as we do in Figure 30.2. The budget deficit almost always rises when the unemployment rate rises and falls when the unemployment rate falls.

Is this relationship between the business cycle and the budget balance evidence that policy makers engage in discretionary fiscal policy? Not necessarily. It is largely automatic stabilizers that drive the relationship shown in Figure 30.2. As we learned in the discussion of automatic stabilizers in Module 21, government tax revenue tends to rise and some government transfers, like unemployment benefit payments, tend to fall when the economy expands. Conversely, government tax revenue tends to fall and some government transfers tend to rise when the economy contracts. So the budget tends to move toward surplus during expansions and toward deficit during recessions even without any deliberate action on the part of policy makers.

In assessing budget policy, it's often useful to separate movements in the budget balance due to the business cycle from movements due to discretionary fiscal policy changes. The former are affected by automatic stabilizers and the latter by deliberate changes in government purchases, government transfers, or taxes. It's important to realize that business-cycle effects on the budget balance are temporary: both recessionary gaps (in which real GDP is below potential output) and inflationary gaps (in which real GDP is above potential output) tend to be eliminated in the long run. Removing their effects on the budget balance sheds light on whether the government's taxing and spending policies are sustainable in the long run. In other words, do the government's tax policies yield enough revenue to fund its spending in the long run? As we'll learn shortly, this is a fundamentally more important question than whether the government runs a budget surplus or deficit in the current year.

The **cyclically adjusted budget balance** is an estimate of what the budget balance would be if real GDP were exactly equal to potential output.

To separate the effect of the business cycle from the effects of other factors, many governments produce an estimate of what the budget balance would be if there were neither a recessionary nor an inflationary gap. The **cyclically adjusted budget balance**

figure 30.2

The U.S. Federal Budget Deficit and the Unemployment Rate

There is a close relationship between the budget balance and the business cycle: a recession moves the budget balance toward deficit, but an expansion moves it toward surplus. Here, the unemployment rate serves as an indicator of the business cycle, and we should expect to see a higher unemployment rate associated with a higher budget deficit. This is confirmed by the figure: the budget deficit as a percentage of GDP moves closely in tandem with the unemployment rate.

Source: Bureau of Economic Analysis; Bureau of Labor Statistics.

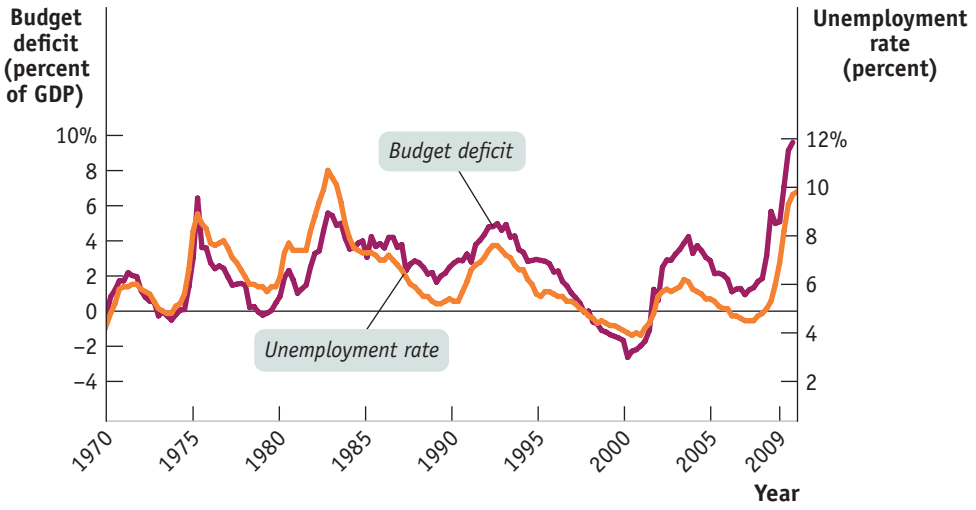
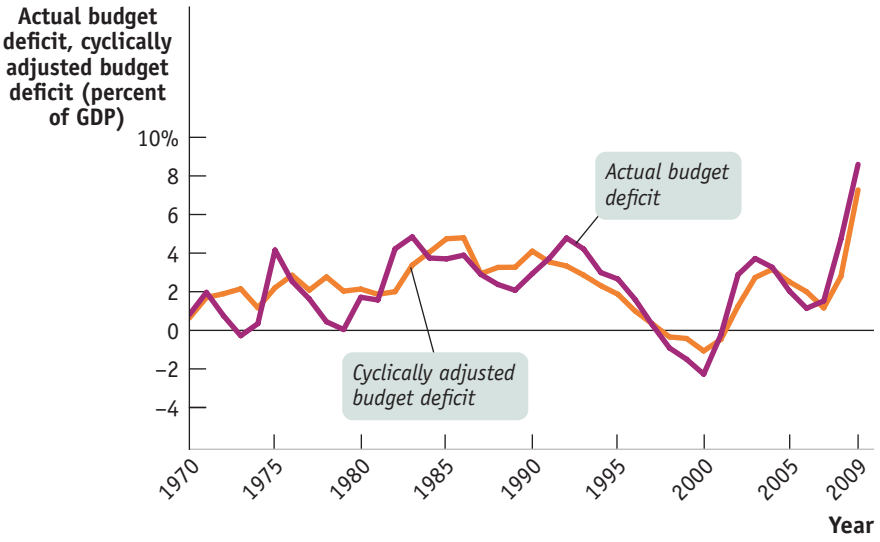


figure 30.3

The Actual Budget Deficit Versus the Cyclically Adjusted Budget Deficit

The cyclically adjusted budget deficit is an estimate of what the budget deficit would be if the economy were at potential output. It fluctuates less than the actual budget deficit, because years of large budget deficits also tend to be years when the economy has a large recessionary gap.

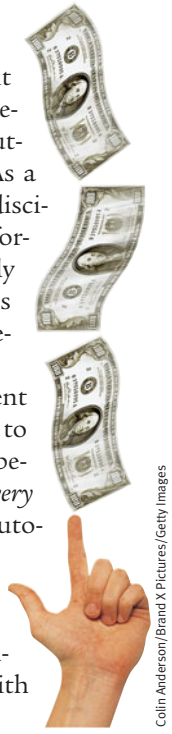
Source: Congressional Budget Office.



is an estimate of what the budget balance would be if real GDP were exactly equal to potential output. It takes into account the extra tax revenue the government would collect and the transfers it would save if a recessionary gap were eliminated—or the revenue the government would lose and the extra transfers it would make if an inflationary gap were eliminated.

Figure 30.3 shows the actual budget deficit and the Congressional Budget Office estimate of the cyclically adjusted budget deficit, both as a percentage of GDP, since 1970. As you can see, the cyclically adjusted budget deficit doesn't fluctuate as much as the actual budget deficit. In particular, large actual deficits, such as those of 1975 and 1983, are usually caused in part by a depressed economy.

Should the Budget Be Balanced?



Colin Anderson/Brand X Pictures/Getty Images

Persistent budget deficits can cause problems for both the government and the economy. Yet politicians are always tempted to run deficits because this allows them to cater to voters by cutting taxes without cutting spending or by increasing spending without increasing taxes. As a result, there are occasional attempts by policy makers to force fiscal discipline by introducing legislation—even a constitutional amendment—forbidding the government from running budget deficits. This is usually stated as a requirement that the budget be "balanced"—that revenues at least equal spending each fiscal year. Would it be a good idea to require a balanced budget annually?

Most economists don't think so. They believe that the government should only balance its budget on average—that it should be allowed to run deficits in bad years, offset by surpluses in good years. They don't believe the government should be forced to run a balanced budget *every year* because this would undermine the role of taxes and transfers as automatic stabilizers. As we learned earlier, the tendency of tax revenue to fall and transfers to rise when the economy contracts helps to limit the size of recessions. But falling tax revenue and rising transfer payments push the budget toward deficit. If constrained by a balanced-budget rule, the government would have to respond to this deficit with contractionary fiscal policies that would tend to deepen a recession.

A **fiscal year** runs from October 1 to September 30 and is labeled according to the calendar year in which it ends.

Public debt is government debt held by individuals and institutions outside the government.

Nonetheless, policy makers concerned about excessive deficits sometimes feel that rigid rules prohibiting—or at least setting an upper limit on—deficits are necessary.

Long-Run Implications of Fiscal Policy

During the 1990s, the Japanese government engaged in massive deficit spending in an effort to increase aggregate demand. That policy was partly successful: although Japan's economy was sluggish during the 1990s, it avoided a severe slump comparable to what happened to many countries in the 1930s. Yet the fact that Japan was running large deficits year after year made many observers uneasy, as Japan's debt—the accumulation of past deficits, net of surpluses—climbed to alarming levels. Now that we understand how government surpluses and deficits happen, let's take a closer look at their long-run effects on the economy.

Deficits, Surpluses, and Debt

When a family spends more than it earns over the course of a year, it has to raise the extra funds either by selling assets or by borrowing. And if a family borrows year after year, it will eventually end up with a lot of debt.

The same is true for governments. With a few exceptions, governments don't raise large sums by selling assets such as national parkland. Instead, when a government spends more than the tax revenue it receives—when it runs a budget deficit—it almost always borrows the extra funds. And governments that run persistent budget deficits end up with substantial debts.

To interpret the numbers that follow, you need to know a slightly peculiar feature of federal government accounting. For historical reasons, the U.S. government does not keep the books by calendar years. Instead, budget totals are kept by **fiscal years,** which run from October 1 to September 30 and are labeled by the calendar year in which they end. For example, fiscal 2009 began on October 1, 2008, and ended on September 30, 2009.

At the end of fiscal 2009, the U.S. federal government had total debt equal to $12 trillion. However, part of that debt represented special accounting rules specifying that the federal government as a whole owes funds to certain government programs, especially Social Security. We'll explain those rules shortly. For now, however, let's focus on **public debt:** government debt held by individuals and institutions outside the government. At the end of fiscal 2009, the federal government's public debt was "only" $7.6 trillion, or 53% of GDP. If we include the debts of state and local governments, total government public debt was approximately 69% of GDP.

U.S. federal government public debt at the end of fiscal 2009 was larger than it was at the end of fiscal 2008 because the federal government ran a budget deficit during fiscal 2009. A government that runs persistent budget deficits will experience a rising level of debt. Why is this a problem?

Problems Posed by Rising Government Debt

There are two reasons to be concerned when a government runs persistent budget deficits. We described one reason previously: when the government borrows funds in the financial markets, it is competing with firms that plan to borrow funds for investment spending. As a result, the government's borrowing may "crowd out" private investment spending, increasing interest rates and reducing the economy's long-run rate of growth.

The second reason: today's deficits, by increasing the government's debt, place financial pressure on future budgets. The impact of current deficits on future budgets is straightforward. Like individuals, governments must pay their bills, including interest payments on their accumulated debt. When a government is deeply in debt, those interest payments can be substantial. In fiscal 2009, the U.S. federal government paid

2.7% of GDP—$383 billion—in interest on its debt. And although this is a relatively large fraction of GDP, other countries pay even greater fractions of their GDP to service their debt. For example, in 2009, Greece paid interest of about 5.4% of GDP.

Other things equal, a government paying large sums in interest must raise more revenue from taxes or spend less than it would otherwise be able to afford—or it must borrow even more to cover the gap. And a government that borrows to pay interest on its outstanding debt pushes itself even deeper into debt. This process can eventually push a government to the point at which lenders question its ability to repay. Like consumers who have maxed out their credit cards, the government will find that lenders are unwilling to lend any more funds. The result can be that the government defaults on its debt—it stops paying what it owes. Default is often followed by deep financial and economic turmoil.

The idea of a government defaulting sounds far-fetched, but it is not impossible. In the 1990s, Argentina, a relatively high-income developing country, was widely praised for its economic policies—and it was able to borrow large sums from foreign lenders. By 2001, however, Argentina's interest payments were spiraling out of control, and the country stopped paying the sums that were due. Default creates havoc in a country's financial markets and badly shakes public confidence in both the government and the economy. Argentina's debt default was accompanied by a crisis in the country's banking system and a very severe recession. And even if a highly indebted government avoids default, a heavy debt burden typically forces it to slash spending or raise taxes, politically unpopular measures that can also damage the economy.

Quique Kierszenbaum/Getty Images

Lautario Palacios, 7, holds a sign that calls for politicians to stop robbing, during a January 9, 2002 demonstration in Buenos Aires, Argentina.

One question some people ask is: can't a government that has trouble borrowing just print money to pay its bills? Yes, it can, but this leads to another problem: inflation. In fact, budget problems are the main cause of very severe inflation, as we'll see later. The point for now is that governments do not want to find themselves in a position where the choice is between defaulting on their debts and inflating those debts away.

Concerns about the long-run effects of deficits need not rule out the use of fiscal policy to stimulate the economy when it is depressed. However, these concerns do mean that governments should try to offset budget deficits in bad years with budget surpluses in good years. In other words, governments should run a budget that is approximately balanced over time. Have they actually done so?

Deficits and Debt in Practice

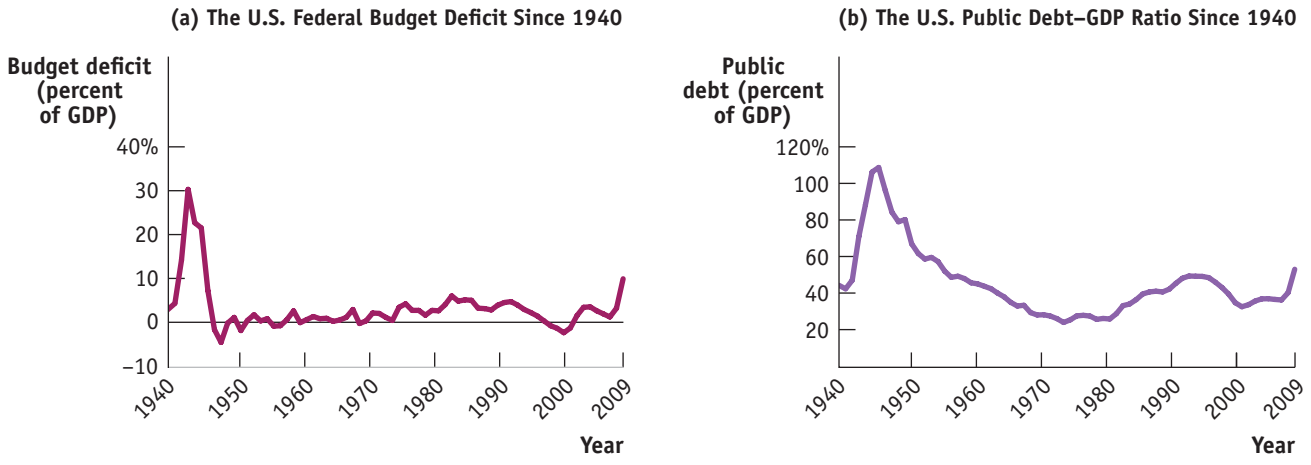
Figure 30.4 on the next page shows how the U.S. federal government's budget deficit and its debt have evolved since 1940. Panel (a) shows the federal deficit as a percentage of GDP. As you can see, the federal government ran huge deficits during World War II. It briefly ran surpluses after the war, but it has normally run deficits ever since, especially after 1980. This seems inconsistent with the advice that governments should offset deficits in bad times with surpluses in good times.

However, panel (b) of Figure 30.4 shows that these deficits have not led to runaway debt. To assess the ability of governments to pay their debt, we often use the **debt–GDP ratio,** the government's debt as a percentage of GDP. We use this measure, rather than simply looking at the size of the debt because GDP, which measures the size of the economy as a whole, is a good indicator of the potential taxes the government can collect. If the government's debt grows more slowly than GDP, the burden of paying that debt is actually falling compared with the government's potential tax revenue.

What we see from panel (b) is that although the federal debt has grown in almost every year, the debt–GDP ratio fell for 30 years after the end of World War II. This shows that the debt–GDP ratio can fall, even when debt is rising, as long as GDP grows faster than debt. Growth and inflation sometimes allow a government that runs persistent budget deficits to nevertheless have a declining debt–GDP ratio.

The **debt–GDP ratio** is the government's debt as a percentage of GDP.

figure 30.4 U.S. Federal Deficits and Debt

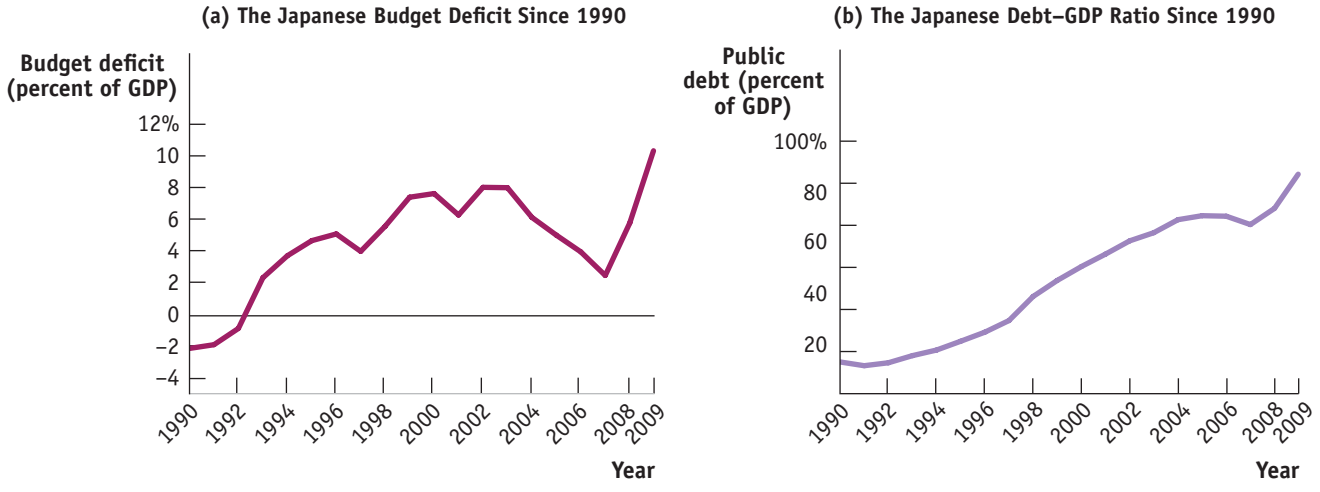


Panel (a) shows the U.S. federal budget deficit as a percentage of GDP since 1940. The U.S. government ran huge deficits during World War II and has usually run smaller deficits ever since. Panel (b) shows the U.S. debt–GDP ratio. Comparing panels (a) and (b), you can see that in many years the debt–GDP ratio has declined in spite of government deficits. This seeming paradox reflects the fact that the debt–GDP ratio can fall, even when debt is rising, as long as GDP grows faster than debt.

Source: Office of Management and Budget.

Still, a government that runs persistent *large* deficits will have a rising debt–GDP ratio when debt grows faster than GDP. Panel (a) of Figure 30.5 shows Japan's budget deficit as a percentage of GDP, and panel (b) shows Japan's debt–GDP ratio, both since 1990. As we have already mentioned, Japan began running large deficits in the early 1990s, a by-product of its effort to prop up aggregate demand with

figure 30.5 Japanese Deficits and Debt



Panel (a) shows the budget deficit of Japan as a percent of GDP since 1990 and panel (b) shows its debt–GDP ratio. The large deficits that the Japanese government began running in the early 1990s have led to a rapid rise in its debt–GDP ratio as debt has grown more quickly than GDP. This has led some analysts to express concern about the long-run fiscal health of the Japanese economy.

Source: International Monetary Fund.

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What Happened to the Debt from World War II?

As you can see from Figure 30.4, the government paid for World War II by borrowing on a huge scale. By the war's end, the public debt was more than 100% of GDP, and many people worried about how it could ever be paid off.

The truth is that it never was paid off. In 1946, the public debt was $242 billion; that number dipped slightly in the next few years, as the United States ran postwar budget surpluses, but the government budget went back into deficit in 1950 with the start of the Korean War. By 1962, the public debt was back up to $248 billion.

But by that time nobody was worried about the fiscal health of the U.S. government because the debt–GDP ratio had fallen by more than half. The reason? Vigorous economic growth, plus mild inflation, had led to a rapid rise in GDP. The experience was a clear lesson in the peculiar fact that modern governments can run deficits forever, as long as they aren't too large.

government spending. This has led to a rapid rise in the debt–GDP ratio. For this reason, some economic analysts are concerned about the long-run fiscal health of the Japanese economy.

Implicit Liabilities

Looking at Figure 30.4, you might be tempted to conclude that the U.S. federal budget is in fairly decent shape: the return to budget deficits after 2001, and large—but temporary—increases in government spending in response to the recession that began in 2007, caused the debt–GDP ratio to rise a bit, but that ratio is still low compared with both historical experience and some other wealthy countries. In fact, however, experts on long-run budget issues view the situation of the United States (and other countries with high public debt, such as Japan and Greece) with alarm. The reason is the problem of *implicit liabilities*. **Implicit liabilities** are spending promises made by governments that are effectively a debt despite the fact that they are not included in the usual debt statistics.

Implicit liabilities are spending promises made by governments that are effectively a debt despite the fact that they are not included in the usual debt statistics.

The largest implicit liabilities of the U.S. government arise from two transfer programs that principally benefit older Americans: Social Security and Medicare. The third-largest implicit liability, Medicaid, benefits low-income families. In each of these cases, the government has promised to provide transfer payments to future as well as current beneficiaries. So these programs represent a future debt that must be honored, even though the debt does not currently show up in the usual statistics. Together, these three programs currently account for almost 40% of federal spending.

The implicit liabilities created by these transfer programs worry fiscal experts. Figure 30.6 on the next page shows why. It shows actual spending on Social Security and on Medicare and Medicaid as percentages of GDP from 1962 to 2008, with Congressional Budget Office projections of spending through 2083. According to these projections, spending on Social Security will rise substantially over the next few decades and spending on the two health care programs will soar. Why?

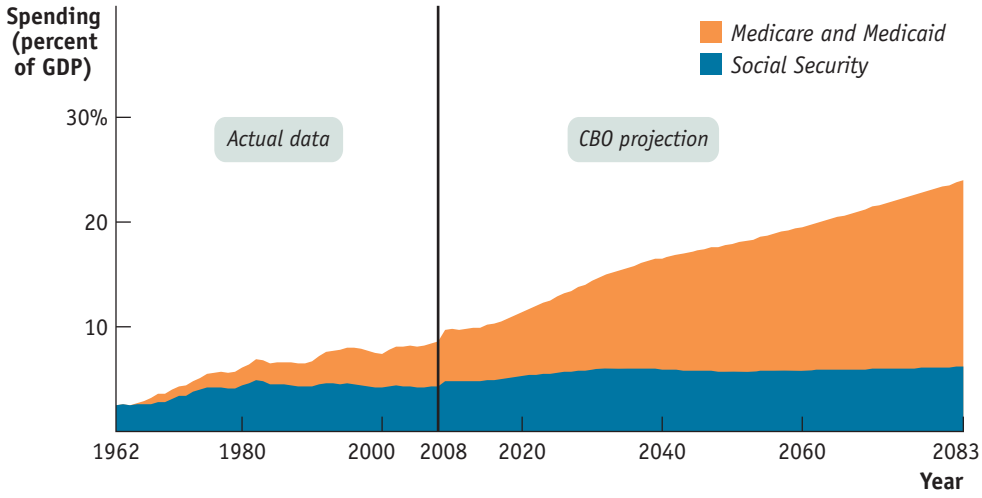
In the case of Social Security, the answer is demography. Social Security is a "pay-as-you-go" system: current workers pay payroll taxes that fund the benefits of current retirees. So demography—specifically, the ratio of the number of retirees drawing benefits to the number of workers paying into Social Security—has a major impact on Social Security's finances. There was a huge surge in the U.S. birth rate between 1946 and 1964, the years of the baby boom. Baby boomers are currently of working age—which means they are paying taxes, not collecting benefits. As the baby boomers retire, they will stop earning income that is taxed and start collecting benefits. As a result, the ratio of retirees receiving benefits to workers paying into the Social Security system will rise. In 2008, there were 31 retirees receiving benefits for every 100 workers paying into

figure 30.6

Future Demands on the Federal Budget

This figure shows Congressional Budget Office projections of spending on social insurance programs as a share of GDP. Partly as a result of an aging population, but mainly because of rising health care costs, these programs are expected to become much more expensive over time, posing problems for the federal budget.

Source: Congressional Budget Office.



the system. By 2030, according to the Social Security Administration, that number will rise to 46; by 2050, it will rise to 48; and by 2080 that number will be 51. This will raise benefit payments relative to the size of the economy.

The aging of the baby boomers, by itself, poses only a moderately sized long-run fiscal problem. The projected rise in Medicare and Medicaid spending is a much more serious concern. The main story behind projections of higher Medicare and Medicaid spending is the long-run tendency of health care spending to rise faster than overall spending, both for government-funded and for private-funded health care.

To some extent, the implicit liabilities of the U.S. government are already reflected in debt statistics. We mentioned earlier that the government had a total debt of $12 trillion at the end of fiscal 2009, but that only $7.6 trillion of that total was owed to the public. The main explanation for that discrepancy is that both Social Security and part of Medicare (the hospital insurance program) are supported by *dedicated taxes:* their expenses are paid out of special taxes on wages. At times, these dedicated taxes yield more revenue than is needed to pay current benefits. In particular, since the mid-1980s the Social Security system has been taking in more revenue than it currently needs in order to prepare for the retirement of the baby boomers. This surplus in the Social Security system has been used to accumulate a *Social Security trust fund,* which was $2.5 trillion at the end of fiscal 2009.

The money in the trust fund is held in the form of U.S. government bonds, which are included in the $12 trillion in total debt. You could say that there's something funny about counting bonds in the Social Security trust fund as part of government debt. After all, these bonds are owed by one part of the government (the government outside the Social Security system) to another part of the government (the Social Security system itself). But the debt corresponds to a real, if implicit, liability: promises by the government to pay future retirement benefits. So many economists argue that the gross debt of $12 trillion, the sum of public debt and government debt held by Social Security and other trust funds, is a more accurate indication of the government's fiscal health than the smaller amount owed to the public alone.

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Argentina's Creditors Take a Haircut

As we mentioned earlier, the idea that a government's debt can reach a level at which the government can't pay its creditors can seem far-fetched. In the United States, government debt is usually regarded as the safest asset there is.

But countries *do* default on their debts—they fail to repay the money they borrowed. In 1998, Russia defaulted on its bonds, triggering a worldwide panic in financial markets. In 2001, in the biggest default of modern times, the government of Argentina stopped making payments on $81 billion in debt.

How did the Argentine default happen? During much of the 1990s, the country was experiencing an economic boom and the government was easily able to borrow money from abroad. Although deficit spending led to rising government debt, few considered this a problem. In 1998, however, the country slid into an economic slump that reduced tax revenues, leading to much larger deficits. Foreign lenders, increasingly nervous about the country's ability to repay, became unwilling to lend more except at very high interest rates. By 2001, the country was caught in a vicious circle: to cover its deficits and pay off old loans as they came due, it was forced to borrow at much higher interest rates, and the escalating interest rates on new borrowing made the deficits even bigger.

Argentine officials tried to reassure lenders by raising taxes and cutting government spending. But they were never able to balance the budget due to the continuing recession and the negative multiplier impact of their contractionary fiscal policies. These strongly contractionary fiscal policies drove the country deeper into recession. Late in 2001, facing popular protests, the Argentine government collapsed, and the country defaulted on its debt.

Creditors can take individuals who fail to pay debts to court. The court, in turn, can seize the debtors' assets and force them to pay part of future earnings to their creditors. But when a country defaults, it's different. Its creditors can't send in the police to seize the country's assets. They must negotiate a deal with the country for partial repayment. The only leverage creditors have in these negotiations is the defaulting government's fear that if it fails to reach a settlement, its reputation will suffer and it will be unable to borrow in the future. (A report by Reuters, the news agency, on Argentina's debt negotiations was headlined "Argentina to unhappy bondholders: so sue.") It took three years for Argentina to reach an agreement with its creditors because the new Argentine government was determined to strike a hard bargain. And it did. Here's how Reuters described the settlement reached in March 2005: "The deal, which exchanged new paper valued at around 32 cents for every dollar in default, was the biggest 'haircut,' or loss on principal, for investors of any sovereign bond restructuring in modern times." Let's put this into English: Argentina forced its creditors to trade their "sovereign bonds"—debts of a sovereign nation, that is, Argentina—for new bonds worth only 32% as much. Such a reduction in the value of debt is known as a "haircut."

It's important to avoid two misconceptions about this "haircut." First, you might be tempted to think that because Argentina ended up paying only a fraction of the sums it owed, it paid a small price for default. In fact, Argentina's default accompanied one of the worst economic slumps of modern times, a period of mass unemployment, soaring poverty, and widespread unrest. Second, it's tempting to dismiss the Argentine story as being of little relevance to countries like the United States. After all, aren't we more responsible than that? But Argentina wouldn't have been able to borrow so much in the first place if its government hadn't been well regarded by international lenders. In fact, as late as 1998 Argentina was widely admired for its economic management. What Argentina's slide into default shows is that concerns about the long-run effects of budget deficits are not at all academic. Due to its large and growing debt–GDP ratio, one recession pushed Argentina over the edge into economic collapse.

Module 30 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Why is the cyclically adjusted budget balance a better measure of the long-run sustainability of government policies than the actual budget balance?
2. Explain why states required by their constitutions to balance their budgets are likely to experience more severe economic fluctuations than states not held to that requirement.

3. Explain how each of the following events would affect the public debt or implicit liabilities of the U.S. government, other things equal. Would the public debt or implicit liabilities be greater or smaller?
   a. The growth rate of real GDP increases.
   b. Retirees live longer.
   c. Tax revenue decreases.
   d. The government borrows to pay interest on its current public debt.
4. Suppose the economy is in a slump and the current public debt is quite large. Explain the trade-off of short-run versus long-run objectives that policy makers face when deciding whether or not to engage in deficit spending.

Tackle the Test: Multiple-Choice Questions

1. If government spending exceeds tax revenues, which of the following is necessarily true? There is a
   I. positive budget balance.
   II. budget deficit.
   III. recession.
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. Which of the following fiscal policies is expansionary?

	Taxes	*Government spending*
a.	increase by $100 million	increases by $100 million
b.	decrease by $100 million	decreases by $100 million
c.	increase by $100 million	decreases by $100 million
d.	decrease by $100 million	increases by $100 million
e.	both (a) and (d)	

3. The cyclically adjusted budget deficit is an estimate of what the budget balance would be if real GDP were
   a. greater than potential output.
   b. equal to nominal GDP.
   c. equal to potential output.
   d. falling.
   e. calculated during a recession.
4. During a recession in the United States, what happens automatically to tax revenues and government spending?

	Tax revenues	*Government spending*
a.	increase	increases
b.	decrease	decreases
c.	increase	decreases
d.	decrease	increases
e.	decrease	does not change

5. Which of the following is a reason to be concerned about persistent budget deficits?
   a. crowding out
   b. government default
   c. the opportunity cost of future interest payments
   d. higher interest rates leading to decreased long-run growth
   e. all of the above

Tackle the Test: Free-Response Questions

1. Consider the information provided below for the hypothetical country of Zeta.
   Tax revenues = 2,000
   Government purchases of goods and services = 1,500
   Government transfers = 1,000
   Real GDP = 20,000
   Potential output = 18,000
   a. Is the budget balance in Zeta positive or negative? What is the amount of the budget balance?
   b. Zeta is currently in what phase of the business cycle? Explain.
   c. Is Zeta implementing the appropriate fiscal policy given the current state of the economy? Explain.
   d. How does Zeta's cyclically adjusted budget deficit compare with its actual budget deficit? Explain.

Answer (8 points)

1 point: Negative

1 point: –500

1 point: Expansion

1 point: Real GDP > potential output

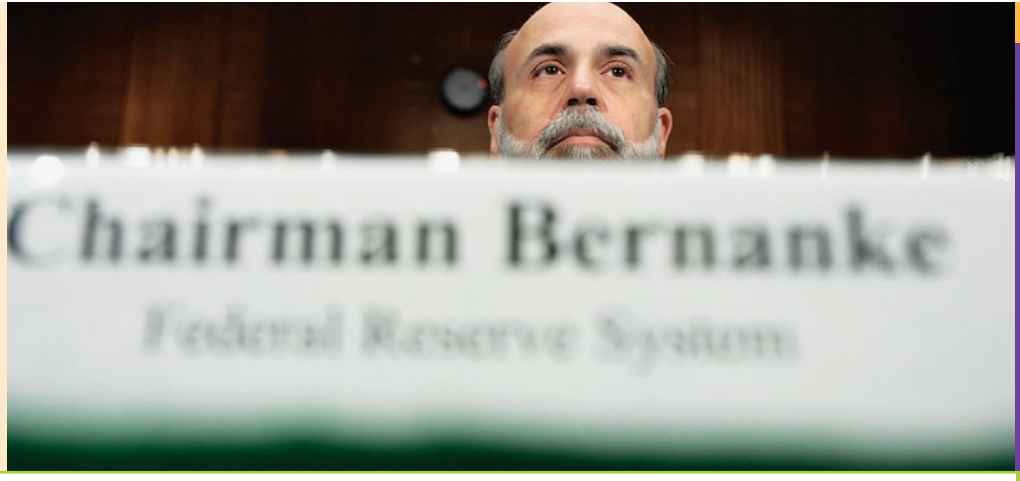
1 point: No

1 point: Zeta is running a budget deficit during an expansion.

1 point: It is larger.

1 point: Because if real GDP equaled potential output, tax revenues would be lower and government transfers would be higher.

2. In Module 29 you learned about the market for loanable funds, which is intimately related to our current topic of budget deficits. Use a correctly labeled graph of the market for loanable funds to illustrate the effect of a persistent budget deficit. Identify and explain the effect persistent budget deficits can have on private investment.



What you will learn in this Module:

- How the Federal Reserve implements monetary policy, moving the interest rate to affect aggregate output
- Why monetary policy is the main tool for stabilizing the economy

Module 31 Monetary Policy and the Interest Rate

In Modules 28 and 29 we developed models of the money market and the loanable funds market. We also saw how these two markets are consistent and related. In the short run, the interest rate is determined in the money market and the loanable funds market adjusts in response to changes in the money market. However, in the long run, the interest rate is determined by matching the supply and demand of loanable funds that arise when real GDP equals potential output. Now we are ready to use these models to explain how the Federal Reserve can use monetary policy to stabilize the economy in the short run.

Monetary Policy and the Interest Rate

Let's examine how the Federal Reserve can use changes in the money supply to change the interest rate. Figure 31.1 on the next page shows what happens when the Fed increases the money supply from $\overline{M}_1$ to $\overline{M}_2$. The economy is originally in equilibrium at E_1, with the equilibrium interest rate r_1 and the money supply $\overline{M}_1$. An increase in the money supply by the Fed to $\overline{M}_2$ shifts the money supply curve to the right, from MS_1 to MS_2, and leads to a fall in the equilibrium interest rate to r_2. Why? Because r_2 is the only interest rate at which the public is willing to hold the quantity of money actually supplied, $\overline{M}_2$. So an increase in the money supply drives the interest rate down. Similarly, a reduction in the money supply drives the interest rate up. By adjusting the money supply up or down, the Fed can set the interest rate.

In practice, at each meeting the Federal Open Market Committee decides on the interest rate to prevail for the next six weeks, until its next meeting. The Fed sets a **target federal funds rate,** a desired level for the federal funds rate. This target is then enforced by the Open Market Desk of the Federal Reserve Bank of New York, which adjusts the money supply through *open-market operations*—the purchase or sale of Treasury bills—until the actual federal funds rate equals the target rate. The other tools of monetary policy, lending through the discount window and changes in reserve requirements, aren't used on a regular basis (although the Fed used discount window lending in its efforts to address the 2008 financial crisis).

The Federal Reserve can move the interest rate through open-market operations that shift the money supply curve. In practice, the Fed sets a **target federal funds rate** and uses open-market operations to achieve that target.

figure 31.1

The Effect of an Increase in the Money Supply on the Interest Rate

The Federal Reserve can lower the interest rate by increasing the money supply. Here, the equilibrium interest rate falls from r_1 to r_2 in response to an increase in the money supply from $\overline{M}_1$ to $\overline{M}_2$. In order to induce people to hold the larger quantity of money, the interest rate must fall from r_1 to r_2.

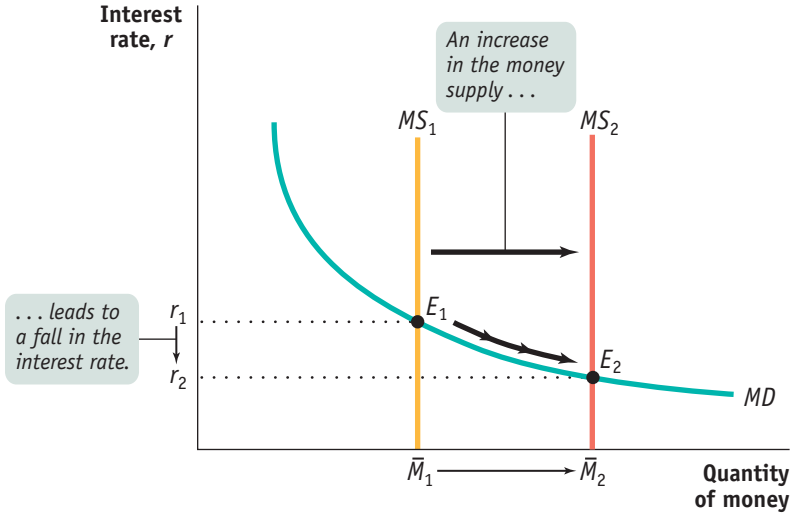
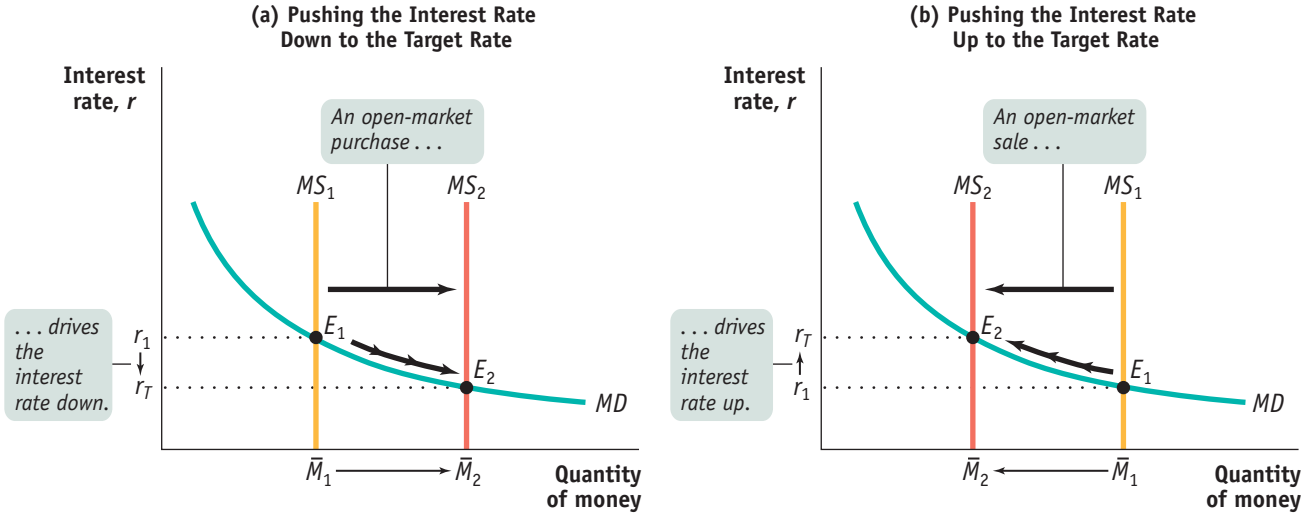


Figure 31.2 shows how interest rate targeting works. In both panels, r_T is the target federal funds rate. In panel (a), the initial money supply curve is MS_1 with money supply $\overline{M}_1$, and the equilibrium interest rate, r_1, is above the target rate. To lower the interest rate to r_T, the Fed makes an open-market purchase of Treasury bills, which leads to an increase in the money supply via the money multiplier. This is illustrated in

figure 31.2 Setting the Federal Funds Rate



The Federal Reserve sets a target for the federal funds rate and uses open-market operations to achieve that target. In both panels the target rate is r_T. In panel (a) the initial equilibrium interest rate, r_1, is above the target rate. The Fed increases the money supply by making an open-market purchase of Treasury bills, pushing the money supply curve rightward, from MS_1 to MS_2, and driving the interest rate down to r_T. In panel (b) the initial equilibrium interest rate, r_1, is below the target rate. The Fed reduces the money supply by making an open-market sale of Treasury bills, pushing the money supply curve leftward, from MS_1 to MS_2, and driving the interest rate up to r_T.

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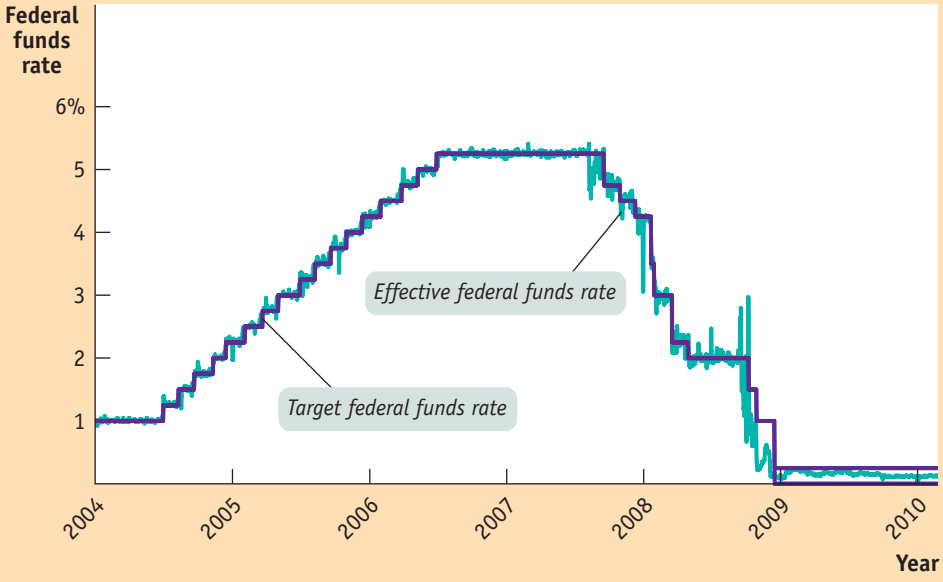
The Fed Reverses Course

During the summer of 2007, many called for a change in Federal Reserve policy. At first the Fed remained unmoved. On August 7, 2007, the Federal Open Market Committee decided to stand pat, making no change in its interest rate policy. The official statement did, however, concede that "financial markets have been volatile in recent weeks" and that "credit conditions have become tighter for some households and businesses."

Just three days later, the Fed issued a special statement basically assuring market players that it was paying attention, and on August 17 it issued another statement declaring that it was "monitoring the situation," which is Fed-speak for "we're getting nervous." And on September 18, the Fed did what CNBC analyst Jim Cramer wanted: it cut the target federal funds rate "to help forestall some of the adverse effects on the broader economy that might otherwise arise from the disruptions in financial markets." In effect, it conceded that Cramer's worries were at least partly right.

It was the beginning of a major change in monetary policy. The figure shows two interest rates from the beginning of 2004 to early 2010: the target federal funds rate decided by the Federal Open Market Committee, which dropped in a series of steps starting in September 2007, and the average effective rate that prevailed in the market each day. The figure shows that the interest rate cut six weeks after Cramer's diatribe was only the first of several cuts. As you can see, this was a reversal of previous policy: previously the Fed had generally been raising rates, not reducing them, out of concern that inflation might become a problem. But starting in September 2007, fighting the financial crisis took priority. By the way, notice how beginning on December 16, 2008, it looks as if there are two target federal funds rates. What happened? The Federal Open Market Committee set a target *range* for the federal funds rate, between 0% and 0.25%, starting on that date. That target range was still in effect at the time of writing.

The figure also shows that that the Fed doesn't always hit its target. There were a number of days, especially in 2008, when the actual federal funds rate was significantly above or below the target rate. But these episodes didn't last long, and overall the Fed got what it wanted, at least as far as short-term interest rates were concerned.



panel (a) by the rightward shift of the money supply curve from MS_1 to MS_2 and an increase in the money supply to $\overline{M}_2$. This drives the equilibrium interest rate *down* to the target rate, r_T.

Panel (b) shows the opposite case. Again, the initial money supply curve is MS_1 with money supply $\overline{M}_1$. But this time the equilibrium interest rate, r_1, is below the target federal funds rate, r_T. In this case, the Fed will make an open-market sale of Treasury bills, leading to a fall in the money supply to $\overline{M}_2$ via the money multiplier. The money supply curve shifts leftward from MS_1 to MS_2, driving the equilibrium interest rate *up* to the target federal funds rate, r_T.

Monetary Policy and Aggregate Demand

We have seen how fiscal policy can be used to stabilize the economy. Now we will see how monetary policy—changes in the money supply or the interest rate, or both—can play the same role.

Expansionary monetary policy is monetary policy that increases aggregate demand.

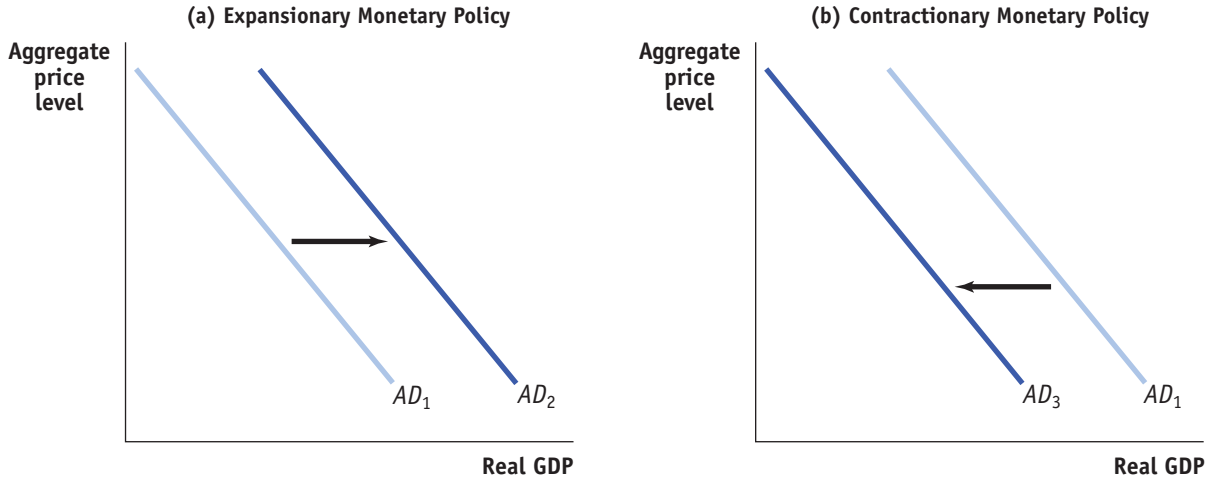
Contractionary monetary policy is monetary policy that reduces aggregate demand.

Expansionary and Contractionary Monetary Policy

Previously we said that monetary policy shifts the aggregate demand curve. We can now explain how that works: through the effect of monetary policy on the interest rate.

Suppose that the Federal Reserve expands the money supply. As we've seen, this leads to a lower interest rate. A lower interest rate, in turn, will lead to more investment spending, which will lead to higher real GDP, which will lead to higher consumer spending, and so on through the multiplier process. So the total quantity of goods and services demanded at any given aggregate price level rises when the quantity of money increases, and the *AD* curve shifts to the right. Monetary policy that shifts the *AD* curve to the right, as illustrated in panel (a) of Figure 31.3, is known as **expansionary monetary policy.**

figure 31.3 Monetary Policy and Aggregate Demand



An *expansionary monetary policy,* shown in panel (a), shifts the aggregate demand curve to the right from AD_1 to AD_2. A *contractionary monetary policy,* shown in panel (b), shifts the aggregate demand curve to the left, from AD_1 to AD_3.

Suppose, alternatively, that the Federal Reserve contracts the money supply. This leads to a higher interest rate. The higher interest rate leads to lower investment spending, which leads to lower real GDP, which leads to lower consumer spending, and so on. So the total quantity of goods and services demanded falls when the money supply is reduced, and the *AD* curve shifts to the left. Monetary policy that shifts the *AD* curve to the left, as illustrated in panel (b) of Figure 31.3, is called **contractionary monetary policy.**

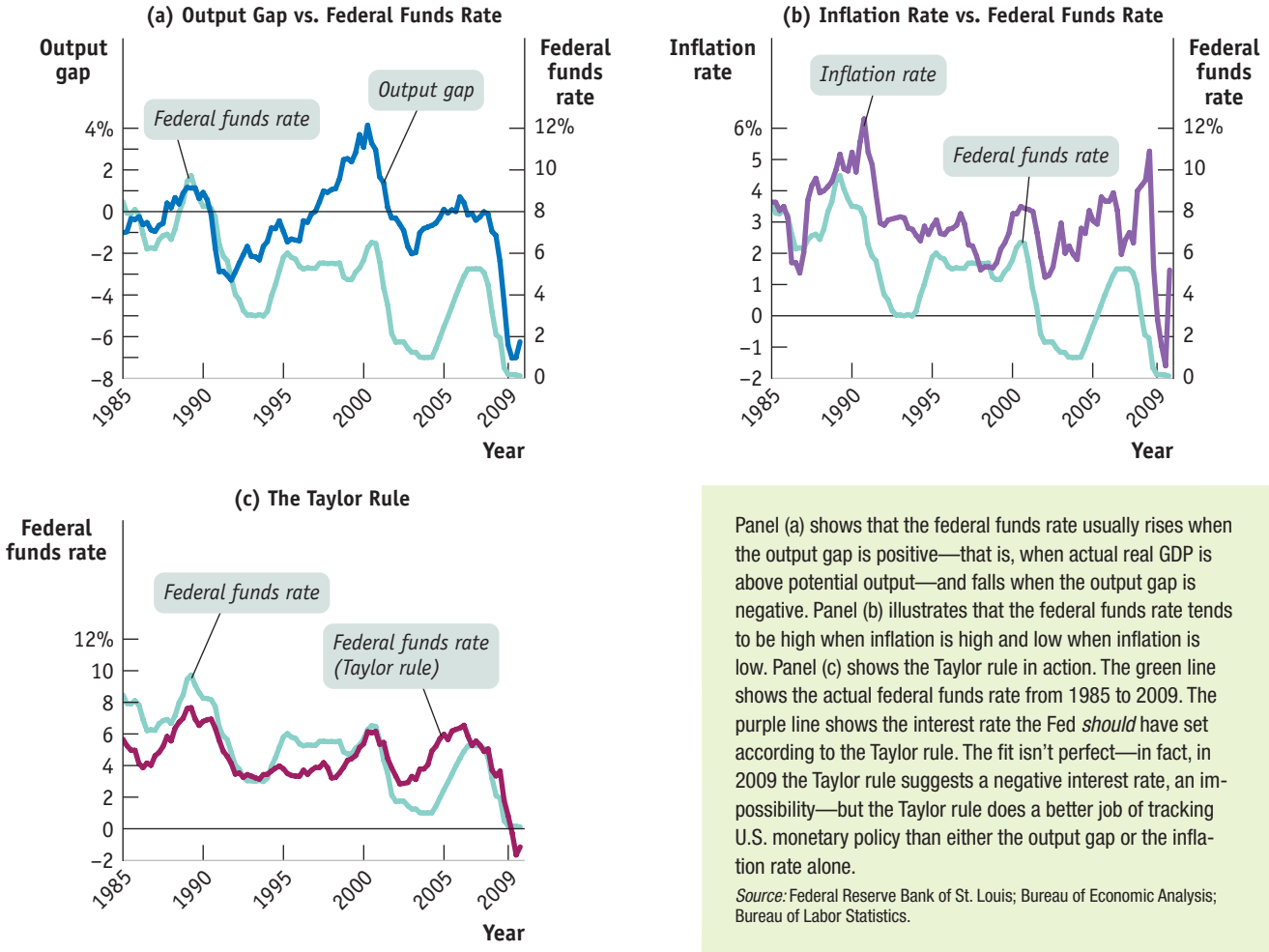
Monetary Policy in Practice

We have learned that policy makers try to fight recessions. They also try to ensure *price stability*: low (though usually not zero) inflation. Actual monetary policy reflects a combination of these goals.

In general, the Federal Reserve and other central banks tend to engage in expansionary monetary policy when actual real GDP is below potential output. Panel (a) of Figure 31.4 shows the U.S. output gap, which we defined as the percentage difference between actual real GDP and potential output, versus the federal funds rate since 1985. (Recall that the output gap is positive when actual real GDP exceeds potential output.)

figure 31.4

Tracking Monetary Policy Using the Output Gap, Inflation, and the Taylor Rule



Panel (a) shows that the federal funds rate usually rises when the output gap is positive—that is, when actual real GDP is above potential output—and falls when the output gap is negative. Panel (b) illustrates that the federal funds rate tends to be high when inflation is high and low when inflation is low. Panel (c) shows the Taylor rule in action. The green line shows the actual federal funds rate from 1985 to 2009. The purple line shows the interest rate the Fed *should* have set according to the Taylor rule. The fit isn't perfect—in fact, in 2009 the Taylor rule suggests a negative interest rate, an impossibility—but the Taylor rule does a better job of tracking U.S. monetary policy than either the output gap or the inflation rate alone.

Source: Federal Reserve Bank of St. Louis; Bureau of Economic Analysis; Bureau of Labor Statistics.

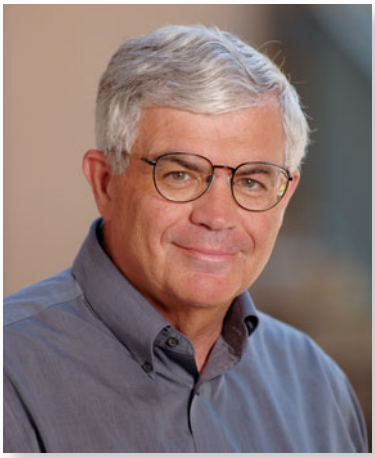
As you can see, the Fed has tended to raise interest rates when the output gap is rising—that is, when the economy is developing an inflationary gap—and cut rates when the output gap is falling. The big exception was the late 1990s, when the Fed left rates steady for several years even as the economy developed a positive output gap (which went along with a low unemployment rate).

One reason the Fed was willing to keep interest rates low in the late 1990s was that inflation was low. Panel (b) of Figure 31.4 compares the inflation rate, measured as the rate of change in consumer prices excluding food and energy, with the federal funds rate. You can see how low inflation during the mid-1990s and early 2000s helped encourage loose monetary policy both in the late 1990s and in 2002–2003.

In 1993, Stanford economist John Taylor suggested that monetary policy should follow a simple rule that takes into account concerns about both the business cycle and inflation. The **Taylor rule for monetary policy** is a rule for setting the federal funds rate that takes into account both the inflation rate and the output gap. He also suggested that actual monetary policy often looks as if the Federal Reserve was, in fact, more or less following the proposed rule. The rule Taylor originally suggested was as follows:

$$\text{Federal funds rate} = 1 + (1.5 \times \text{inflation rate}) + (0.5 \times \text{output gap})$$

The **Taylor rule for monetary policy** is a rule for setting the federal funds rate that takes into account both the inflation rate and the output gap.



Courtesy of John Taylor

Stanford economist John Taylor suggested a simple rule for monetary policy.

Panel (c) of Figure 31.4 compares the federal funds rate specified by the Taylor rule with the actual federal funds rate from 1985 to 2009. With the exception of 2009, the Taylor rule does a pretty good job at predicting the Fed's actual behavior—better than looking at either the output gap alone or the inflation rate alone. Furthermore, the direction of changes in interest rates predicted by an application of the Taylor rule to monetary policy and the direction of changes in actual interest rates have always been the same—further evidence that the Fed is using some form of the Taylor rule to set monetary policy. But, what happened in 2009? A combination of low inflation and a large and negative output gap briefly put the Taylor's rule of prediction of the federal funds into negative territory. But a negative federal funds rate is, of course, impossible. So the Fed did the best it could—it cut rates aggressively and the federal funds rate fell to almost zero.

Monetary policy, rather than fiscal policy, is the main tool of stabilization policy. Like fiscal policy, it is subject to lags: it takes time for the Fed to recognize economic problems and time for monetary policy to affect the economy. However, since the Fed moves much more quickly than Congress, monetary policy is typically the preferred tool.

Inflation Targeting

The Federal Reserve tries to keep inflation low but positive. The Fed does not, however, explicitly commit itself to achieving any particular rate of inflation, although it is widely believed to prefer inflation at around 2% per year.

By contrast, a number of other central banks *do* have explicit inflation targets. So rather than using the Taylor rule to set monetary policy, they instead announce the inflation rate that they want to achieve—the *inflation target*—and set policy in an attempt to hit that target. This method of setting monetary policy is called **inflation targeting**. The central bank of New Zealand, which was the first country to adopt inflation targeting, specified a range for that target of 1% to 3%. Other central banks commit themselves to achieving a specific number. For example, the Bank of England is supposed to keep inflation at 2%. In practice, there doesn't seem to be much difference between these versions: central banks with a target range for inflation seem to aim for the middle of that range, and central banks with a fixed target tend to give themselves considerable wiggle room.

One major difference between inflation targeting and the Taylor rule is that inflation targeting is forward-looking rather than backward-looking. That is, the Taylor rule adjusts monetary policy in response to *past* inflation, but inflation targeting is based on a forecast of *future* inflation.

Advocates of inflation targeting argue that it has two key advantages, *transparency* and *accountability*. First, economic uncertainty is reduced because the public knows the objective of an inflation-targeting central bank. Second, the central bank's success can be judged by seeing how closely actual inflation rates have matched the inflation target, making central bankers accountable.

Critics of inflation targeting argue that it's too restrictive because there are times when other concerns—like the stability of the financial system—should take priority over achieving any particular inflation rate. Indeed, in late 2007 and early 2008 the Fed cut interest rates much more than either the Taylor rule or inflation targeting would have dictated because it feared that turmoil in the financial markets would lead to a major recession (which it did, in fact).

Many American macroeconomists have had positive things to say about inflation targeting—including Ben Bernanke, the current chair of the Federal Reserve. At the time of this writing, however, there were no moves to have the Fed adopt an explicit inflation target, and during normal times it still appears to set monetary policy by applying a loosely defined version of the Taylor rule.

Inflation targeting occurs when the central bank sets an explicit target for the inflation rate and sets monetary policy in order to hit that target.

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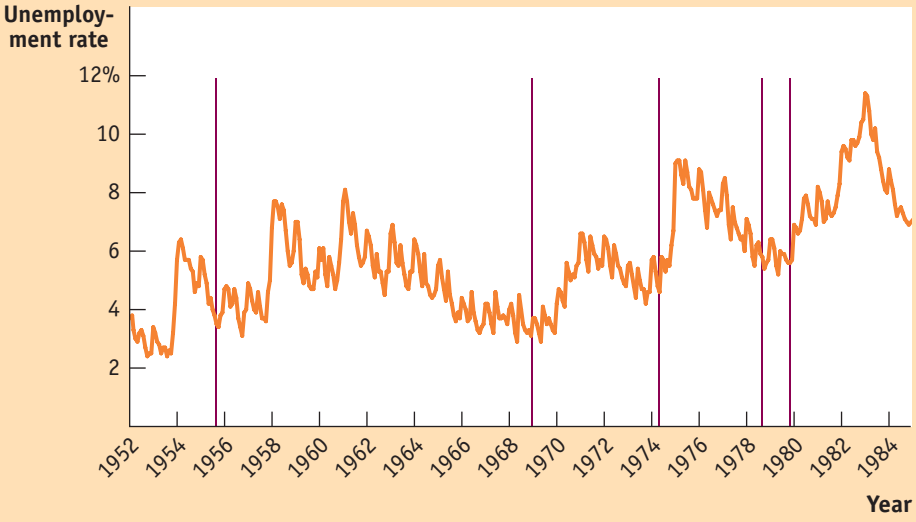
What the Fed Wants, the Fed Gets

What's the evidence that the Fed can actually cause an economic contraction or expansion? You might think that finding such evidence is just a matter of looking at what happens to the economy when interest rates go up or down. But it turns out that there's a big problem with that approach: the Fed usually changes interest rates in an attempt to tame the business cycle, raising rates if the economy is expanding and reducing rates if the economy is slumping. So in the actual data, it often looks as if low interest rates go along with a weak economy and high rates go along with a strong economy.

In a famous 1994 paper titled "Monetary Policy Matters," the macroeconomists Christina Romer and David Romer solved this problem by focusing on episodes in which monetary policy *wasn't* a reaction to the business cycle. Specifically, they used minutes from the Federal Open Market Committee and other sources to identify episodes "in which the Federal Reserve in effect decided to attempt to create a recession to reduce inflation." Contractionary monetary policy is sometimes used to eliminate inflation that has become *embedded* in the economy, rather than just as a tool of macroeconomic stabilization. In this case, the Fed needs to create a recessionary gap—not just eliminate an inflationary gap—to wring embedded inflation out of the economy.

The figure shows the unemployment rate between 1952 and 1984 (orange) and identifies five dates on which, according to Romer and Romer, the Fed decided that it wanted a recession (vertical red lines). In four out of the five cases, the decision to contract the economy was followed, after a modest lag, by a rise in the unemployment rate. On average, Romer and Romer found, the unemployment rate rises by 2 percentage points after the Fed decides that unemployment needs to go up.

So yes, the Fed gets what it wants.



Module 31 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Assume that there is an increase in the demand for money at every interest rate. Using a diagram, show what effect this will have on the equilibrium interest rate for a given money supply.
2. Now assume that the Fed is following a policy of targeting the federal funds rate. What will the Fed do in the situation described in question 1 to keep the federal funds rate unchanged? Illustrate with a diagram.
3. Suppose the economy is currently suffering from a recessionary gap and the Federal Reserve uses an expansionary monetary policy to close that gap. Describe the short-run effect of this policy on the following.
   a. the money supply curve
   b. the equilibrium interest rate
   c. investment spending
   d. consumer spending
   e. aggregate output

Tackle the Test: Multiple-Choice Questions

1. At each meeting of the Federal Open Market Committee, the Federal Reserve sets a target for which of the following?
   I. the federal funds rate
   II. the prime interest rate
   III. the market interest rate
   a. I only
   b. II only
   c. III only
   d. I and III only
   e. I, II, and III

2. Which of the following actions can the Fed take to decrease the equilibrium interest rate?
   a. increase the money supply
   b. increase money demand
   c. decrease the money supply
   d. decrease money demand
   e. both (a) and (d)

3. Contractionary monetary policy attempts to _____ aggregate demand by _____ interest rates.
   a. decrease increasing
   b. increase decreasing
   c. decrease decreasing
   d. increase increasing
   e. increase maintaining

4. Which of the following is a goal of monetary policy?
   a. zero inflation
   b. deflation
   c. price stability
   d. increased potential output
   e. decreased actual real GDP

5. When implementing monetary policy, the Federal Reserve attempts to achieve
   a. an explicit target inflation rate.
   b. zero inflation.
   c. a low rate of deflation.
   d. a low, but positive inflation rate.
   e. 4–5% inflation.

Tackle the Test: Free-Response Questions

1. a. Give the equation for the Taylor rule.
   b. How well does the Taylor rule fit the Fed's actual behavior? Explain.
   c. What does the Taylor rule predict will happen when the inflation rate increases? Explain.
   d. What does the Taylor rule predict will happen if the economy sinks further into a recession? Explain.

Answer (7 points)

1 point: Federal funds rate = 1 + (1.5 × inflation rate) + (0.5 × output gap)

1 point: Not exactly, but fairly well

1 point: It does better than any one measure alone, and it has always correctly predicted the direction of change of interest rates.

1 point: The federal funds rate will increase.

1 point: According to the equation, the federal funds rate increases by 1.5 percentage points for every one percentage point increase in inflation. OR, the Taylor rule predicts contractionary monetary policy during periods of inflation.

1 point: The federal funds rate will decrease.

1 point: According to the equation, the federal funds rate decreases by 0.5 percentage points for every one percentage point decrease in the output gap, as from –1% to –2%, indicating a deeper recession. OR, the Taylor rule predicts expansionary monetary policy during periods of recession.

2. a. What can the Fed do with each of its tools to implement expansionary monetary policy during a recession?
   b. Use a correctly labeled graph of the money market to explain how the Fed's use of expansionary monetary policy affects interest rates in the short run.
   c. Explain how the interest rate changes you graphed in part b affect aggregate supply and demand in the short run.
   d. Use a correctly labeled aggregate demand and supply graph to illustrate how expansionary monetary policy affects aggregate output in the short run.

What you will learn in this Module:

- The effects of an inappropriate monetary policy
- The concept of monetary neutrality and its relationship to the long-term economic effects of monetary policy

Module 32
Money, Output, and Prices in the Long Run

In the previous module we discussed how expansionary and contractionary monetary policy can be used to stabilize the economy. The Federal Reserve can use its monetary policy tools to change the money supply and cause the equilibrium interest rate in the money market to increase or decrease. But what if a central bank pursues a monetary policy that is not appropriate? That is, what if a central bank pursues expansionary policy during an expansion or contractionary policy during a recession? In this module we consider how a counter-productive action by a central bank can actually destabilize the economy in the short run. We also introduce the long-run effects of monetary policy. As we learned in the last section, the money market (where monetary policy has its effect on the money supply) determines the interest rate only in the short run. In the long run, the interest rate is determined in the market for loanable funds. Here we look at long-run adjustments and consider the long-run effects of monetary policy.

Money, Output, and Prices

Because of its expansionary and contractionary effects, monetary policy is generally the policy tool of choice to help stabilize the economy. However, not all actions by central banks are productive. In particular, as we'll see later, central banks sometimes print money not to fight a recessionary gap but to help the government pay its bills, an action that typically destabilizes the economy.

What happens when a change in the money supply pushes the economy away from, rather than toward, long-run equilibrium? The economy is self-correcting in the long run: a demand shock has only a temporary effect on aggregate output. If the demand shock is the result of a change in the money supply, we can make a stronger statement: in the long run, changes in the quantity of money affect the aggregate price level, but they do not change real aggregate output or the interest rate. To see why, let's look at what happens if the central bank permanently increases the money supply.

Short-Run and Long-Run Effects of an Increase in the Money Supply

To analyze the long-run effects of monetary policy, it's helpful to think of the central bank as choosing a target for the money supply rather than for the interest rate. In assessing the effects of an increase in the money supply, we return to the analysis of the long-run effects of an increase in aggregate demand.

Figure 32.1 shows the short-run and long-run effects of an increase in the money supply when the economy begins at potential output, Y_1. The initial short-run aggregate supply curve is $SRAS_1$, the long-run aggregate supply curve is *LRAS*, and the initial aggregate demand curve is AD_1. The economy's initial equilibrium is at E_1, a point of both short-run and long-run macroeconomic equilibrium because it is on both the short-run and the long-run aggregate supply curves. Real GDP is at potential output, Y_1.

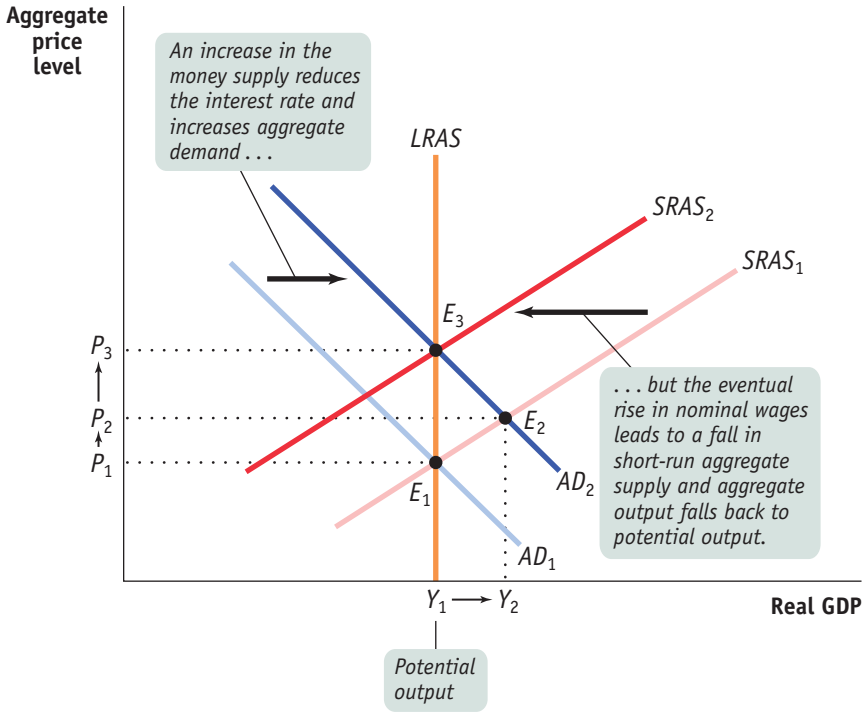
Now suppose there is an increase in the money supply. Other things equal, an increase in the money supply reduces the interest rate, which increases investment spending, which leads to a further rise in consumer spending, and so on. So an increase in the money supply increases the quantity of goods and services demanded, shifting the *AD* curve rightward to AD_2. In the short run, the economy moves to a new short-run macroeconomic equilibrium at E_2. The price level rises from P_1 to P_2, and real GDP rises from Y_1 to Y_2. That is, both the aggregate price level and aggregate output increase in the short run.

But the aggregate output level Y_2 is above potential output. As a result, nominal wages will rise over time, causing the short-run aggregate supply curve to shift leftward. This process stops only when the *SRAS* curve ends up at $SRAS_2$ and the economy ends up at point E_3, a point of both short-run and long-run macroeconomic equilibrium. The long-run effect of an increase in the money supply, then, is that the aggregate price level has increased from P_1 to P_3, but aggregate output is back at potential

figure 32.1

The Short-Run and Long-Run Effects of an Increase in the Money Supply

An increase in the money supply generates a positive short-run effect, but no long-run effect, on real GDP. Here, the economy begins at E_1, a point of short-run and long-run macroeconomic equilibrium. An increase in the money supply shifts the *AD* curve rightward, and the economy moves to a new short-run equilibrium at E_2 and a new real GDP of Y_2. But E_2 is not a long-run equilibrium: Y_2 exceeds potential output, Y_1, leading over time to an increase in nominal wages. In the long run, the increase in nominal wages shifts the short-run aggregate supply curve leftward, to a new position at $SRAS_2$. The economy reaches a new short-run and long-run macroeconomic equilibrium at E_3 on the *LRAS* curve, and output falls back to potential output, Y_1. The only long-run effect of an increase in the money supply is an increase in the aggregate price level from P_1 to P_3.



output, Y_1. In the long run, a monetary expansion raises the aggregate price level but has no effect on real GDP.

If the money supply decreases, the story we have just told plays out in reverse. Other things equal, a decrease in the money supply raises the interest rate, which decreases investment spending, which leads to a further decrease in consumer spending, and so on. So a decrease in the money supply decreases the quantity of goods and services demanded at any given aggregate price level, shifting the aggregate demand curve to the left. In the short run, the economy moves to a new short-run macroeconomic equilibrium at a level of real GDP below potential output and a lower aggregate price level. That is, both the aggregate price level and aggregate output decrease in the short run. But what happens over time? When the aggregate output level is below potential output, nominal wages fall. When this happens, the short-run aggregate supply curve shifts rightward. This process stops only when the *SRAS* curve ends up at a point of both short-run and long-run macroeconomic equilibrium. The long-run effect of a decrease in the money supply, then, is that the aggregate price level decreases, but aggregate output is back at potential output. In the long run, a monetary contraction decreases the aggregate price level but has no effect on real GDP.

Monetary Neutrality

How much does a change in the money supply change the aggregate price level in the long run? The answer is that a change in the money supply leads to a proportional change in the aggregate price level in the long run. For example, if the money supply falls 25%, the aggregate price level falls 25% in the long run; if the money supply rises 50%, the aggregate price level rises 50% in the long run.

How do we know this? Consider the following thought experiment: suppose all prices in the economy—prices of final goods and services and also factor prices, such as nominal wage rates—double. And suppose the money supply doubles at the same time. What difference does this make to the economy in real terms? None. All real variables in the economy—such as real GDP and the real value of the money supply (the amount of goods and services it can buy)—are unchanged. So there is no reason for anyone to behave any differently.

We can state this argument in reverse: if the economy starts out in long-run macroeconomic equilibrium and the money supply changes, restoring long-run macroeconomic equilibrium requires restoring all real values to their original values. This includes restoring the real value of the money supply to its original level. So if the money supply falls 25%, the aggregate price level must fall 25%; if the money supply rises 50%, the price level must rise 50%; and so on.

This analysis demonstrates the concept known as **monetary neutrality,** in which changes in the money supply have no real effects on the economy. In the long run, the only effect of an increase in the money supply is to raise the aggregate price level by an equal percentage. Economists argue that *money is neutral in the long run.*

This is, however, a good time to recall the dictum of John Maynard Keynes: "In the long run we are all dead." In the long run, changes in the money supply don't have any effect on real GDP, interest rates, or anything else except the price level. But it would be foolish to conclude from this that the Fed is irrelevant. Monetary policy does have powerful real effects on the economy in the short run, often making the difference between recession and expansion. And that matters a lot for society's welfare.

Changes in the Money Supply and the Interest Rate in the Long Run

In the short run, an increase in the money supply leads to a fall in the interest rate, and a decrease in the money supply leads to a rise in the interest rate. Module 29 explained that in the long run it's a different story: changes in the money supply don't affect the interest rate at all. Here we'll review that story and discuss the reasons behind it in greater detail.

According to the concept of **monetary neutrality,** changes in the money supply have no real effects on the economy.

figure 32.2

The Long-Run Determination of the Interest Rate

In the short run, an increase in the money supply from $\overline{M}_1$ to $\overline{M}_2$ pushes the interest rate down from r_1 to r_2 and the economy moves to E_2, a short-run equilibrium. In the long run, however, the aggregate price level rises in proportion to the increase in the money supply, leading to an increase in money demand at any given interest rate in proportion to the increase in the aggregate price level, as shown by the shift from MD_1 to MD_2. The result is that the quantity of money demanded at any given interest rate rises by the same amount as the quantity of money supplied. The economy moves to long-run equilibrium at E_3 and the interest rate returns to r_1.

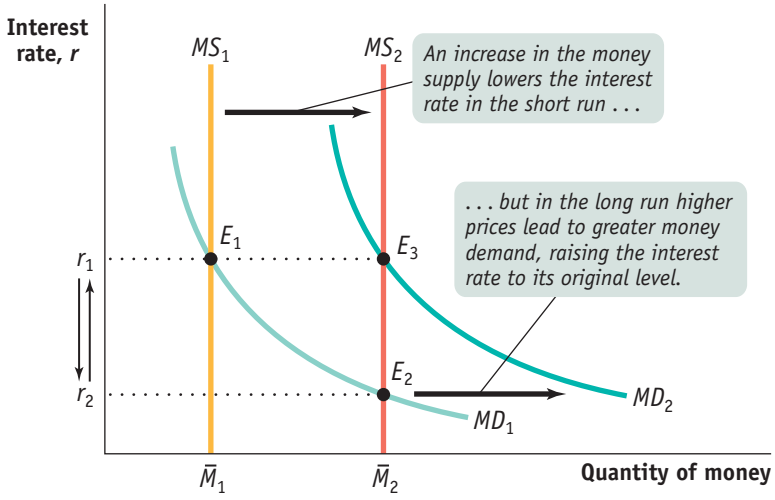


Figure 32.2 shows the money supply curve and the money demand curve before and after the Fed increases the money supply. We assume that the economy is initially at E_1, in long-run macroeconomic equilibrium at potential output, and with money supply $\overline{M}_1$. The initial equilibrium interest rate, determined by the intersection of the money demand curve MD_1 and the money supply curve MS_1, is r_1.

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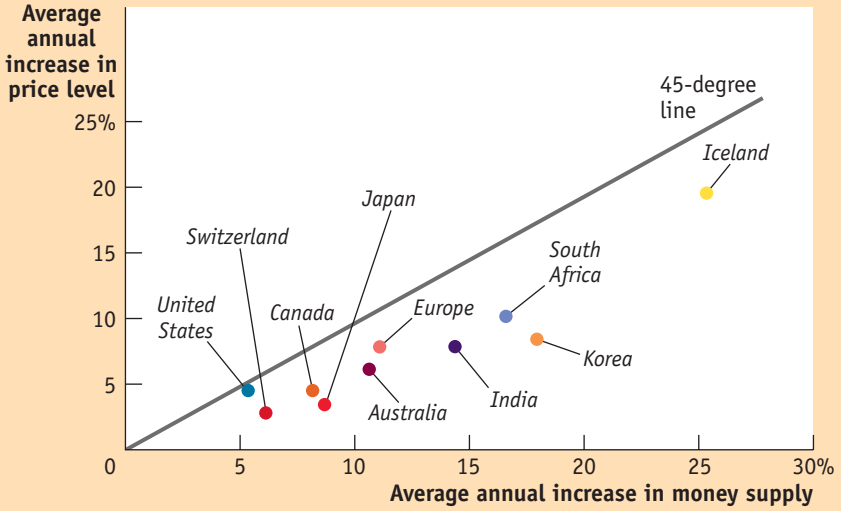
International Evidence of Monetary Neutrality

These days monetary policy is quite similar among wealthy countries. Each major nation (or, in the case of the euro, the eurozone) has a central bank that is insulated from political pressure. All of these central banks try to keep the aggregate price level roughly stable, which usually means inflation of at most 2% to 3% per year.

But if we look at a longer period and a wider group of countries, we see large differences in the growth of the money supply. Between 1970 and the present, the money supply rose only a few percentage points per year in countries such as Switzerland and the United States, but rose much more rapidly in some poorer countries, such as South Africa. These differences allow us to see whether it is really true that increases in the money supply lead, in the long run, to equal percentage increases in the aggregate price level.

The figure shows the annual percentage increases in the money supply and average annual increases in the aggregate price level—that is, the average rate of inflation—for a sample of countries during the period 1970–2007, with each point representing a country. If the relationship between increases in the money supply and changes in the aggregate price level were exact, the points would lie precisely on a 45-degree line. In fact, the relationship isn't exact because other factors besides money affect the aggregate price level. But the scatter of points clearly lies close to a 45-degree line, showing a more or less proportional relationship between money and the aggregate price level. That is, the data support the concept of monetary neutrality in the long run.



Now suppose the money supply increases from $\overline{M}_1$ to $\overline{M}_2$. In the short run, the economy moves from E_1 to E_2 and the interest rate falls from r_1 to r_2. Over time, however, the aggregate price level rises, and this raises money demand, shifting the money demand curve rightward from MD_1 to MD_2. The economy moves to a new long-run equilibrium at E_3, and the interest rate rises to its original level of r_1.

How do we know that the long-run equilibrium interest rate is the original interest rate, r_1? Because the eventual increase in money demand is proportional to the increase in money supply, thus counteracting the initial downward effect on interest rates. Let's follow the chain of events to see why. With monetary neutrality, an increase in the money supply is matched by a proportional increase in the price level in the long run. If the money supply rises by, say, 50%, the price level will also rise by 50%. Changes in the price level, in turn, cause proportional changes in the demand for money. So a 50% increase in the money supply raises the aggregate price level by 50%, which increases the quantity of money demanded at any given interest rate by 50%. Thus, at the initial interest rate of r_1, the quantity of money demanded rises exactly as much as the money supply, and r_1 is again the equilibrium interest rate. In the long run, then, changes in the money supply do not affect the interest rate.

Module 32 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Suppose the economy begins in long-run macroeconomic equilibrium. What is the long-run effect on the aggregate price level of a 5% increase in the money supply? Explain.
2. Again supposing the economy begins in long-run macroeconomic equilibrium, what is the long-run effect on the interest rate of a 5% increase in the money supply? Explain.

Tackle the Test: Multiple-Choice Questions

1. In the long run, changes in the quantity of money affect which of the following?
   I. real aggregate output
   II. interest rates
   III. the aggregate price level
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. An increase in the money supply will lead to which of the following in the short run?
   a. higher interest rates
   b. decreased investment spending
   c. decreased consumer spending
   d. increased aggregate demand
   e. lower real GDP
3. A 10% decrease in the money supply will change the aggregate price level in the long run by
   a. zero.
   b. less than 10%.
   c. 10%.
   d. 20%.
   e. more than 20%.
4. Monetary neutrality means that, in the long run, changes in the money supply
   a. can not happen.
   b. have no effect on the economy.
   c. have no real effect on the economy.
   d. increase real GDP.
   e. change real interest rates.
5. A graph of percentage increases in the money supply and average annual increases in the price level for various countries provides evidence that
   a. changes in the two variables are exactly equal.
   b. the money supply and aggregate price level are unrelated.
   c. money neutrality holds only in wealthy countries.
   d. monetary policy is ineffective.
   e. money is neutral in the long run.

Tackle the Test: Free-Response Questions

1. Assume the central bank increases the quantity of money by 25%, even though the economy is initially in both short-run and long-run macroeconomic equilibrium. Describe the effects, in the short run and in the long run (giving numbers where possible), on the following:
   a. aggregate output
   b. the aggregate price level
   c. the real value of the money supply (its purchasing power for goods and services)
   d. the interest rate

2. a. Draw a correctly labeled graph of aggregate demand and supply showing an economy in long-run macroeconomic equilibrium.
   b. On your graph, show what happens in the short run if the central bank increases the money supply to pay off a government deficit. Explain.
   c. On your graph, show what will happen in the long run. Explain.

Answer (8 points)

1 point: Aggregate output rises in the short run.

1 point: Aggregate output falls back to potential output in the long run.

1 point: The aggregate price level rises in the short run (by less than 25%).

1 point: The aggregate price level rises by 25% in the long run.

1 point: The real value of the money supply increases in the short run.

1 point: The real value of the money supply does not change (relative to its original value) in the long run.

1 point: The interest rate falls in the short run.

1 point: The interest rate rises back to its original level in the long run.


RBZ unveils $100 trillion note

Herald Reporter

THE Reserve Bank of Zimbabwe has introduced a new family of trillion-dollar banknotes in denominations of $100 trillion, $50 trillion, $20 trillion and $10 trillion that go into circulation today, starting with the $10 trillion note.

The $20 trillion, $50 trillion and $100 trillion notes will be introduced gradually.

In a statement yesterday, the Reserve Bank of Zimbabwe said the notes would ensure that those in formal employment withdraw their salaries with minimal hassle.

"It is a move meant to ensure that the public has access to their money from banks," the Reserve Bank of Zimbabwe has introduced a new family of banknotes which will gradually come into circulation, starting with the ZS10 trillion," read the statement from the RBZ.

With effect from January 12, workers can now withdraw their entire January salary in cash as long as they produce their current payslips.

The new notes have the same security features as the existing ones: a colour shift stripe with RBZ printed on it, the Zimbabwe Bird colour shift on the front, and see-through of the values on either side which are in perfect register.

The $10 trillion note has the image of the RBZ Building and the Conical Tower at the Great Zimbabwe National Monuments.

The $100 trillion note has the image of a buffalo and the Victoria Falls, the $50 trillion the Kariba Dam spilling and an elephant, while a mineworker drilling in an underground shaft and the GMB grain silos appear on the new $20 trillion note.

RBZ last week introduced $10 billion, $20 billion and $50 billion notes with a view to enabling workers to access their full salaries.

THE new $10 trillion, $20 trillion, $50 trillion and $100 trillion banknotes which go into circulation in phases beginning today. The introduction of the higher denomination notes is meant to ensure that those in formal employment can withdraw their salaries with minimal hassle.

Ex-Rhodies charged with training bandits

Module 33 Types of Inflation, Disinflation, and Deflation

What you will learn in this Module:

- The classical model of the price level
- Why efforts to collect an inflation tax by printing money can lead to high rates of inflation and even hyperinflation
- The types of inflation: cost-push and demand-pull

We have seen that monetary policy affects economic welfare in the short-run. Let's take a closer look at two phenomena that involve monetary policy: inflation and deflation.

Money and Inflation

In the summer of 2008, the African nation of Zimbabwe achieved the unenviable distinction of having the world's highest inflation rate: 11 million percent a year. Although the United States has not experienced the inflation levels that some countries have seen, in the late 1970s and early 1980s, consumer prices were rising at an annual rate as high as 13%. The policies that the Federal Reserve instituted to reduce this high level led to the deepest recession since the Great Depression. As we'll see later, moderate levels of inflation such as those experienced in the United States—even the double-digit inflation of the late 1970s—can have complex causes. Very high inflation, the type suffered by Zimbabwe, is associated with rapid increases in the money supply while the causes of moderate inflation, the type experienced in the United States, are quite different.

To understand what causes inflation, we need to revisit the effect of changes in the money supply on the overall price level. Then we'll turn to the reasons why governments sometimes increase the money supply very rapidly.

The Classical Model of Money and Prices

We learned that in the short run an increase in the money supply increases real GDP by lowering the interest rate and stimulating investment spending and consumer spending. However, in the long run, as nominal wages and other sticky prices rise, real GDP falls back to its original level. So in the long run, an increase in the money supply does not change real GDP. Instead, other things equal, it leads to an equal percentage rise in the overall price level; that is, the prices of all goods and services in the economy, including nominal wages and the prices of intermediate goods, rise by the same percentage as

Author's Image Ltd/Alamy

The Turkish currency is the *lira*. When Turkey made 1,000,000 "old" lira equivalent to 1 "new" lira, real GDP was unaffected because of the neutrality of money.

the money supply. And when the overall price level rises, the aggregate price level—the prices of all final goods and services—rises as well. As a result, a change in the *nominal* money supply, *M,* leads in the long run to a change in the aggregate price level, *P,* that leaves the *real* quantity of money, *M/P,* at its original level. As a result, there is no long-run effect on aggregate demand or real GDP. For example, when Turkey dropped six zeros from its currency, the Turkish lira, in January 2005, Turkish real GDP did not change. The only thing that changed was the number of zeros in prices: instead of something costing 2,000,000 lira, it cost 2 lira.

This is, to repeat, what happens in the long run. When analyzing large changes in the aggregate price level, however, macroeconomists often find it useful to ignore the distinction between the short run and the long run. Instead, they work with a simplified model in which the effect of a change in the money supply on the aggregate price level takes place instantaneously rather than over a long period of time. You might be concerned about this assumption given the emphasis we've placed on the difference between the short run and the long run. However, for reasons we'll explain shortly, this is a reasonable assumption to make in the case of high inflation.

The simplified model in which the real quantity of money, *M/P,* is always at its long-run equilibrium level is known as the **classical model of the price level** because it was commonly used by "classical" economists prior to the influence of John Maynard Keynes. To understand the classical model and why it is useful in the context of high inflation, let's revisit the *AD–AS* model and what it says about the effects of an increase in the money supply. (Unless otherwise noted, we will always be referring to changes in the *nominal* supply of money.)

Figure 33.1 reviews the effects of an increase in the money supply according to the *AD–AS* model. The economy starts at E_1, a point of short-run and long-run macroeconomic equilibrium. It lies at the intersection of the aggregate demand curve, AD_1, and the short-run aggregate supply curve, $SRAS_1$. It also lies on the long-run aggregate supply curve, *LRAS*. At E_1, the equilibrium aggregate price level is P_1.

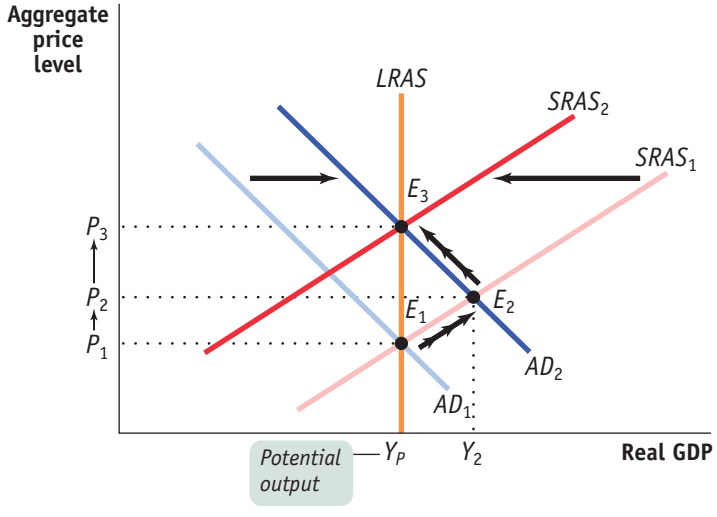
According to the **classical model of the price level,** the real quantity of money is always at its long-run equilibrium level.

Now suppose there is an increase in the money supply. This is an expansionary monetary policy, which shifts the aggregate demand curve to the right, to AD_2, and moves the economy to a new short-run macroeconomic equilibrium at E_2. Over time, however,

figure 33.1

The Classical Model of the Price Level

Starting at E_1, an increase in the money supply shifts the aggregate demand curve rightward, as shown by the movement from AD_1 to AD_2. There is a new short-run macroeconomic equilibrium at E_2 and a higher price level at P_2. In the long run, nominal wages adjust upward and push the *SRAS* curve leftward to $SRAS_2$. The total percent increase in the price level from P_1 to P_3 is equal to the percent increase in the money supply. In the *classical model of the price level,* we ignore the transition period and think of the price level as rising to P_3 immediately. This is a good approximation under conditions of high inflation.



nominal wages adjust upward in response to the rise in the aggregate price level, and the *SRAS* curve shifts to the left, to $SRAS_2$. The new long-run macroeconomic equilibrium is at E_3, and real GDP returns to its initial level. The long-run increase in the aggregate price level from P_1 to P_3 is proportional to the increase in the money supply. As a result, in the long run changes in the money supply have no effect on the real quantity of money, M/P, or on real GDP. In the long run, money—as we learned—is *neutral.*

The classical model of the price level ignores the short-run movement from E_1 to E_2, assuming that the economy moves directly from one long-run equilibrium to another long-run equilibrium. In other words, it assumes that the economy moves directly from E_1 to E_3 and that real GDP never changes in response to a change in the money supply. In effect, in the classical model the effects of money supply changes are analyzed as if the short-run as well as the long-run aggregate supply curves were vertical.

In reality, this is a poor assumption during periods of low inflation. With a low inflation rate, it may take a while for workers and firms to react to a monetary expansion by raising wages and prices. In this scenario, some nominal wages and the prices of some goods are sticky in the short run. As a result, under low inflation there is an upward-sloping *SRAS* curve, and changes in the money supply can indeed change real GDP in the short run.

Denise Bober

With a low inflation rate, it may take a while for workers and firms to react to a monetary expansion by raising wages and prices.

But what about periods of high inflation? In the face of high inflation, economists have observed that the short-run stickiness of nominal wages and prices tends to vanish. Workers and businesses, sensitized to inflation, are quick to raise their wages and prices in response to changes in the money supply. This implies that under high inflation there is a quicker adjustment of wages and prices of intermediate goods than occurs in the case of low inflation. So the short-run aggregate supply curve shifts leftward more quickly and there is a more rapid return to long-run equilibrium under high inflation. As a result, the classical model of the price level is much more likely to be a good approximation of reality for economies experiencing persistently high inflation.

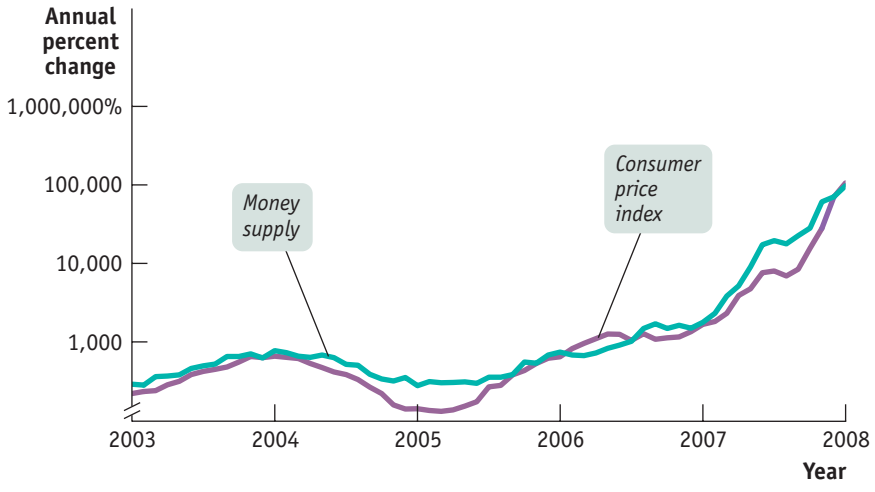
The consequence of this rapid adjustment of all prices in the economy is that in countries with persistently high inflation, changes in the money supply are quickly translated into changes in the inflation rate. Let's look at Zimbabwe. Figure 33.2 shows

figure 33.2

Money Supply Growth and Inflation in Zimbabwe

This figure, drawn on a logarithmic scale, shows the annual rates of change of the money supply and the price level in Zimbabwe from 2003 through January 2008. The surges in the money supply were quickly reflected in a roughly equal surge in the price level.

Source: Reserve Bank of Zimbabwe.



the annual rate of growth in the money supply and the annual rate of change of consumer prices from 2003 through January 2008. As you can see, the surge in the growth rate of the money supply coincided closely with a roughly equal surge in the inflation rate. Note that to fit these very large percentage increases—exceeding 100,000 percent—onto the figure, we have drawn the vertical axis using a logarithmic scale.

In late 2008, Zimbabwe's inflation rate reached 231 million percent. What leads a country to increase its money supply so much that the result is an inflation rate in the millions of percent?

The Inflation Tax

Modern economies use fiat money—pieces of paper that have no intrinsic value but are accepted as a medium of exchange. In the United States and most other wealthy countries, the decision about how many pieces of paper to issue is placed in the hands of a central bank that is somewhat independent of the political process. However, this independence can always be taken away if politicians decide to seize control of monetary policy.

So what is to prevent a government from paying for some of its expenses not by raising taxes or borrowing but simply by printing money? Nothing. In fact, governments, including the U.S. government, do it all the time. How can the U.S. government do this, given that the Federal Reserve, not the U.S. Treasury, issues money? The answer is that the Treasury and the Federal Reserve work in concert. The Treasury issues debt to finance the government's purchases of goods and services, and the Fed *monetizes* the debt by creating money and buying the debt back from the public through open-market purchases of Treasury bills. In effect, the U.S. government can and does raise revenue by printing money.

For example, in February 2010, the U.S. monetary base—bank reserves plus currency in circulation—was $559 billion larger than it had been a year earlier. This occurred because, over the course of that year, the Federal Reserve had issued $559 billion in money or its electronic equivalent and put it into circulation mainly through open-market operations. To put it another way, the Fed created money out of thin air and used it to buy valuable government securities from the private sector. It's true that the U.S. government pays interest on debt owned by the Federal Reserve—but the Fed, by law, hands the interest payments it receives on government debt back to the Treasury, keeping only enough to fund its own operations. In effect, then, the Federal Reserve's actions enabled the government to pay off $559 billion in outstanding government debt by printing money.

An alternative way to look at this is to say that the right to print money is itself a source of revenue. Economists refer to the revenue generated by the government's right to print money as *seignorage,* an archaic term that goes back to the Middle Ages. It refers to the right to stamp gold and silver into coins, and charge a fee for doing so, that medieval lords—seigneurs, in France—reserved for themselves.

Seignorage accounts for only a tiny fraction (less than 1%) of the U.S. government's budget. Furthermore, concerns about seignorage don't have any influence on the Federal Reserve's decisions about how much money to print; the Fed is worried about inflation and unemployment, not revenue. But this hasn't always been true, even in the United States: both sides relied on seignorage to help cover budget deficits during the Civil War. And there have been many occasions in history when governments turned to their printing presses as a crucial source of revenue. According to the usual scenario, a government finds itself running a large budget deficit—and lacks either the competence or the political will to eliminate this deficit by raising taxes or cutting spending. Furthermore, the government can't borrow to cover the gap because potential lenders won't extend loans, given the fear that the government's weakness will continue and leave it unable to repay its debts.

In such a situation, governments end up printing money to cover the budget deficit. But by printing money to pay its bills, a government increases the quantity of money in circulation. And as we've just seen, increases in the money supply translate into equally

large increases in the aggregate price level. So printing money to cover a budget deficit leads to inflation.

Who ends up paying for the goods and services the government purchases with newly printed money? The people who currently hold money pay. They pay because inflation erodes the purchasing power of their money holdings. In other words, a government imposes an **inflation tax,** a reduction in the value of the money held by the public, by printing money to cover its budget deficit and creating inflation.

An **inflation tax** is a reduction in the value of money held by the public caused by inflation.

It's helpful to think about what this tax represents. If the inflation rate is 5%, then a year from now $1 will buy goods and services worth only about $0.95 today. So a 5% inflation rate in effect imposes a tax rate of 5% on the value of all money held by the public.

But why would any government push the inflation tax to rates of hundreds or thousands of percent? We turn next to the process by which high inflation turns into explosive hyperinflation.

The Logic of Hyperinflation

Inflation imposes a tax on individuals who hold money. And, like most taxes, it will lead people to change their behavior. In particular, when inflation is high, people will try to avoid holding money and will instead substitute real goods as well as interest-bearing assets for money. During the German hyperinflation, people began using eggs or lumps of coal as a medium of exchange. They did this because lumps of coal maintained their real value over time but money didn't. Indeed, during the peak of German hyperinflation, people often burned paper money, which was less valuable than wood. Moreover, people don't just reduce their nominal money holdings—they reduce their *real* money holdings, cutting the amount of money they hold so much that it actually has less purchasing power than the amount of money they would hold if inflation were low. Why? Because the more real money holdings they have, the greater the real amount of resources the government captures from them through the inflation tax.

Keystone/ Getty Images

In the 1920s, hyperinflation made German currency worth so little that children made kites from banknotes.

We are now prepared to understand how countries can get themselves into situations of extreme inflation. High inflation arises when the government must print a large quantity of money, imposing a large inflation tax, to cover a large budget deficit.

Now, the seignorage collected by the government over a short period—say, one month—is equal to the change in the money supply over that period. Let's use M to represent the money supply and the symbol Δ to mean "monthly change in." Then:

(33-1) Seignorage = ΔM

The money value of seignorage, however, isn't very informative by itself. After all, the whole point of inflation is that a given amount of money buys less and less over time. So it's more useful to look at *real* seignorage, the revenue created by printing money divided by the price level, P:

(33-2) Real seignorage = $\Delta M/P$

Equation 33-2 can be rewritten by dividing and multiplying by the current level of the money supply, M, giving us:

(33-3) Real seignorage = $(\Delta M/M) \times (M/P)$

or

Real seignorage = Rate of growth of the money supply × Real money supply

But as we've just explained, in the face of high inflation the public reduces the real amount of money it holds, so that the far right-hand term in Equation 33-3, M/P, gets smaller. Suppose that the government needs to print enough money to pay for a given quantity of goods and services—that is, it needs to collect a given *real* amount of seignorage. Then, as people hold smaller amounts of real money due to a high rate of inflation, the government has to respond by accelerating the rate of growth of the money supply, $\Delta M/M$. This will lead to an even higher rate of inflation. And people will respond to this new higher rate of inflation by reducing their real money holdings, M/P, yet again. As the process becomes self-reinforcing, it can easily spiral out of control. Although the amount of real seignorage that the government must ultimately collect to pay off its deficit does not change, the inflation rate the government needs to impose to collect that amount rises. So the government is forced to increase the money supply more rapidly, leading to an even higher rate of inflation, and so on.

Here's an analogy: imagine a city government that tries to raise a lot of money with a special fee on taxi rides. The fee will raise the cost of taxi rides, and this will cause people to turn to substitutes, such as walking or taking the bus. As taxi use declines, the government finds that its tax revenue declines and it must impose a higher fee to raise the same amount of revenue as before. You can imagine the ensuing vicious circle: the government imposes fees on taxi rides, which leads to less taxi use, which causes the government to raise the fee on taxi rides, which leads to even less taxi use, and so on.

iStockphoto

Substitute the real money supply for taxi rides and the inflation rate for the increase in the fee on taxi rides, and you have the story of hyperinflation. A race develops

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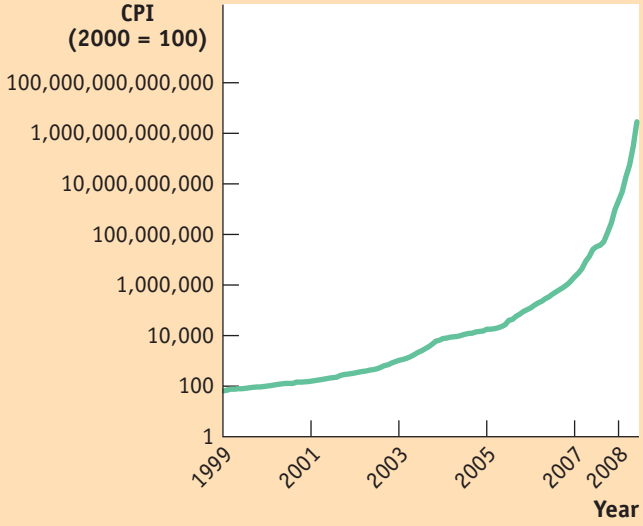
Zimbabwe's Inflation

Zimbabwe offers a recent example of a country experiencing very high inflation. Figure 33.2 showed that surges in Zimbabwe's money supply growth were matched by almost simultaneous surges in its inflation rate. But looking at rates of change doesn't give a true feel for just how much prices went up.

The figure here shows Zimbabwe's consumer price index from 1999 to June 2008, with the 2000 level set equal to 100. As in Figure 33.2, we use a logarithmic scale, which lets us draw equal-sized percent changes as the same size. Over the course of about nine years, consumer prices rose by approximately 4.5 trillion percent.

Why did Zimbabwe's government pursue policies that led to runaway inflation? The reason boils down to political instability, which in turn had its roots in Zimbabwe's history. Until the 1970s, Zimbabwe had been ruled by its small white minority; even after the shift to majority rule, many of the country's farms remained in the hands of whites. Eventually Robert Mugabe, Zimbabwe's president, tried to solidify his position by seizing these farms and turning them over to his political supporters. But because this seizure disrupted production, the result was to undermine the country's economy and its tax base. It became impossible for the country's government to balance its budget either by raising taxes or by cutting spending. At the same time, the regime's instability left Zimbabwe unable to borrow money in world markets. Like many others before it, Zimbabwe's government turned to the printing press to cover the gap—leading to massive inflation.



between the government printing presses and the public: the presses churn out money at a faster and faster rate to try to compensate for the fact that the public is reducing its real money holdings. At some point the inflation rate explodes into hyperinflation, and people are unwilling to hold any money at all (and resort to trading in eggs and lumps of coal). The government is then forced to abandon its use of the inflation tax and shut down the printing presses.

Moderate Inflation and Disinflation

The governments of wealthy, politically stable countries like the United States and Britain don't find themselves forced to print money to pay their bills. Yet over the past 40 years both countries, along with a number of other nations, have experienced uncomfortable episodes of inflation. In the United States, the inflation rate peaked at 13% in 1980. In Britain, the inflation rate reached 26% in 1975. Why did policy makers allow this to happen?

Using the aggregate demand and supply model, we can see that there are two possible changes that can lead to an increase in the aggregate price level: a decrease in aggregate supply or an increase in aggregate demand. Inflation that is caused by a significant increase in the price of an input with economy-wide importance is called **cost-push inflation.** For example, it is argued that the oil crisis in the 1970s led to an increase in energy prices in the United States, causing a leftward shift of the aggregate supply curve, increasing the aggregate price level. However, aside from crude oil, it is difficult to think of examples of inputs with economy-wide importance that experience significant price increases.

Inflation that is caused by an increase in aggregate demand is known as **demand-pull inflation**. When a rightward shift of the aggregate demand curve leads to an increase in the aggregate price level, the economy experiences demand-pull inflation. This is sometimes referred to by the phrase "too much money chasing too few goods," which means that the aggregate demand for goods and services is outpacing the aggregate supply and driving up the prices of goods.

In the short run, policies that produce a booming economy also tend to lead to higher inflation, and policies that reduce inflation tend to depress the economy. This creates both temptations and dilemmas for governments.

Imagine yourself as a politician facing an election in a year, and suppose that inflation is fairly low at the moment. You might well be tempted to pursue expansionary policies that will push the unemployment rate down, as a way to please voters, even if your economic advisers warn that this will eventually lead to higher inflation. You might also be tempted to find different economic advisers, who will tell you not to worry: in politics, as in ordinary life, wishful thinking often prevails over realistic analysis.

Conversely, imagine yourself as a politician in an economy suffering from inflation. Your economic advisers will probably tell you that the only way to bring inflation down is to push the economy into a recession, which will lead to temporarily higher unemployment. Are you willing to pay that price? Maybe not.

This political asymmetry—inflationary policies often produce short-term political gains, but policies to bring inflation down carry short-term political costs—explains how countries with no need to impose an inflation tax sometimes end up with serious inflation problems. For example, that 26% rate of inflation in Britain was largely the result of the British government's decision in 1971 to pursue highly expansionary monetary and fiscal policies. Politicians disregarded warnings that these policies would be inflationary and were extremely reluctant to reverse course even when it became clear that the warnings had been correct.

But why do expansionary policies lead to inflation? To answer that question, we need to look first at the relationship between output and unemployment.

Cost-push inflation is inflation that is caused by a significant increase in the price of an input with economy-wide importance.

Demand-pull inflation is inflation that is caused by an increase in aggregate demand.

The Output Gap and the Unemployment Rate

Earlier we introduced the concept of *potential output,* the level of real GDP that the economy would produce once all prices had fully adjusted. Potential output typically grows steadily over time, reflecting long-run growth. However, as we learned from the aggregate demand–aggregate supply model, actual aggregate output fluctuates around potential output in the short run: a recessionary gap arises when actual aggregate output falls short of potential output; an inflationary gap arises when actual aggregate output exceeds potential output. Recall that the percentage difference between the actual level of real GDP and potential output is called the *output gap.* A positive or negative output gap occurs when an economy is producing more than or less than what would be "expected" because all prices have not yet adjusted. And wages, as we've learned, are the prices in the labor market.

Meanwhile, we learned that the unemployment rate is composed of cyclical unemployment and natural unemployment, the portion of the unemployment rate unaffected by the business cycle. So there is a relationship between the unemployment rate and the output gap. This relationship is defined by two rules:

- When actual aggregate output is equal to potential output, the actual unemployment rate is equal to the natural rate of unemployment.
- When the output gap is positive (an inflationary gap), the unemployment rate is *below* the natural rate. When the output gap is negative (a recessionary gap), the unemployment rate is *above* the natural rate.

In other words, fluctuations of aggregate output around the long-run trend of potential output correspond to fluctuations of the unemployment rate around the natural rate.

This makes sense. When the economy is producing less than potential output—when the output gap is negative—it is not making full use of its productive resources. Among the resources that are not fully used is labor, the economy's most important resource. So we would expect a negative output gap to be associated with unusually high unemployment. Conversely, when the economy is producing more than potential output, it is temporarily using resources at higher-than-normal rates. With this positive output gap, we would expect to see lower-than-normal unemployment.

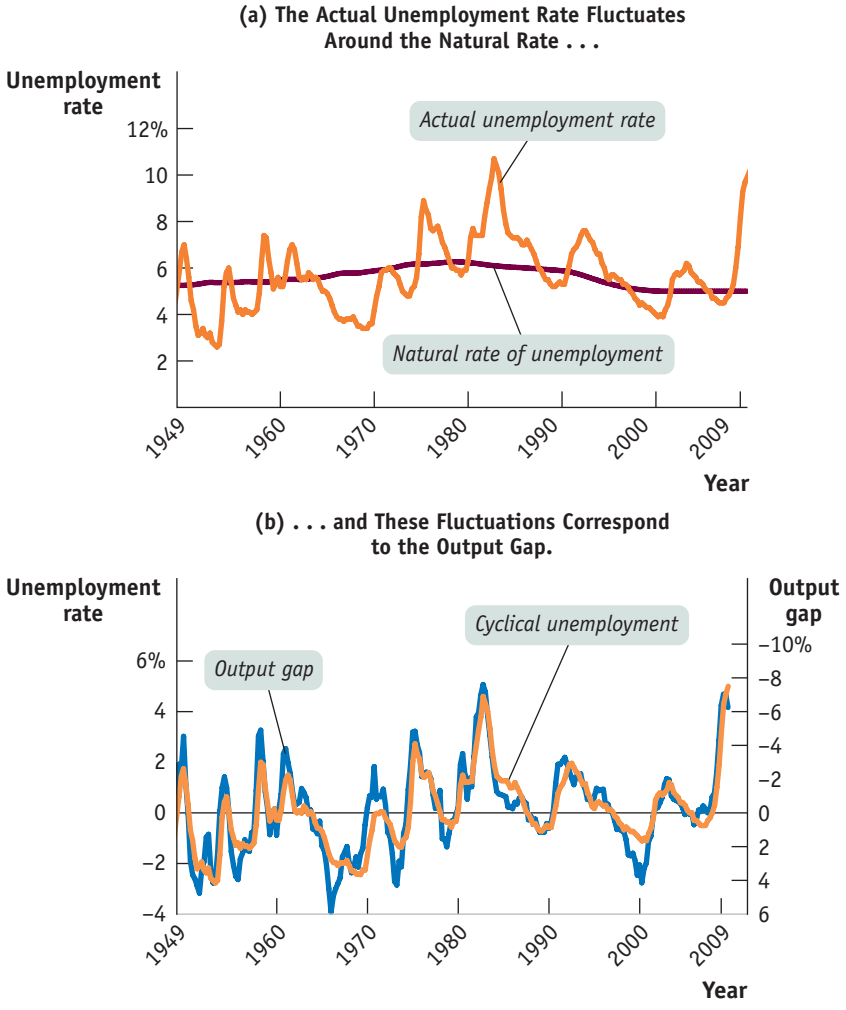
Figure 33.3 confirms this rule. Panel (a) shows the actual and natural rates of unemployment, as estimated by the Congressional Budget Office (CBO). Panel (b) shows two series. One is cyclical unemployment: the difference between the actual unemployment rate and the CBO estimate of the natural rate of unemployment, measured on the left. The other is the CBO estimate of the output gap, measured on the right. To make the relationship clearer, the output gap series is inverted—shown upside down—so that the line goes down if actual output rises above potential output and up if actual output falls below potential output. As you can see, the two series move together quite closely, showing the strong relationship between the output gap and cyclical unemployment. Years of high cyclical unemployment, like 1982 or 2009, were also years of a strongly negative output gap. Years of low cyclical unemployment, like the late 1960s or 2000, were also years of a strongly positive output gap.

figure 33.3

Cyclical Unemployment and the Output Gap

Panel (a) shows the actual U.S. unemployment rate from 1949 to 2009, together with the Congressional Budget Office estimate of the natural rate of unemployment. The actual rate fluctuates around the natural rate, often for extended periods. Panel (b) shows cyclical unemployment—the difference between the actual unemployment rate and the natural rate of unemployment—and the output gap, also estimated by the CBO. The unemployment rate is measured on the left vertical axis, and the output gap is measured with an inverted scale on the right vertical axis. With an inverted scale, it moves in the same direction as the unemployment rate: when the output gap is positive, the actual unemployment rate is below its natural rate; when the output gap is negative, the actual unemployment rate is above its natural rate. The two series track one another closely, showing the strong relationship between the output gap and cyclical unemployment.

Source: Congressional Budget Office; Bureau of Labor Statistics; Bureau of Economic Analysis.



Module 33 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Suppose there is a large increase in the money supply in an economy that previously had low inflation. As a consequence, aggregate output expands in the short run. What does this say about situations in which the classical model of the price level applies?
2. Suppose that all wages and prices in an economy are indexed to inflation. Can there still be an inflation tax?

Tackle the Test: Multiple-Choice Questions

1. The real quantity of money is
   I. equal to M/P.
   II. the money supply adjusted for inflation.
   III. higher in the long run when the Fed buys government securities.
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III

2. In the classical model of the price level
   a. only the short-run aggregate supply curve is vertical.
   b. both the short-run and long-run aggregate supply curves are vertical.
   c. only the long-run aggregate supply curve is vertical.
   d. both the short-run aggregate demand and supply curves are vertical.
   e. both the long-run aggregate demand and supply curves are vertical.

3. The classical model of the price level is most applicable in
   a. the United States.
   b. periods of high inflation.
   c. periods of low inflation.
   d. recessions.
   e. depressions.

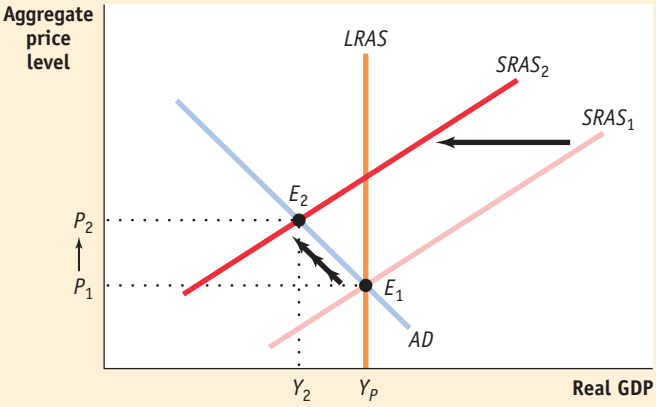
4. An inflation tax is
   a. imposed by governments to offset price increases.
   b. paid directly as a percentage of the sale price on purchases.
   c. the result of a decrease in the value of money held by the public.
   d. generally levied by states rather than the federal government.
   e. higher during periods of low inflation.

5. Revenue generated by the government's right to print money is known as
   a. seignorage.
   b. an inflation tax.
   c. hyperinflation.
   d. fiat money.
   e. monetary funds.

Tackle the Test: Free-Response Questions

1. Use a correctly labeled aggregate supply and demand graph to illustrate cost-push inflation. Give an example of what might cause cost-push inflation in the economy.

Answer (9 points)



1 point: Aggregate price level on vertical axis and real GDP on horizontal axis

1 point: *AD* downward sloping and labeled

1 point: *SRAS* upward sloping and labeled

1 point: *LRAS* vertical and labeled

1 point: Potential output labeled at horizontal intercept of *LRAS*

1 point: Long-run macroeconomic equilibrium aggregate price level labeled on vertical axis at intersection of *SRAS*, *LRAS*, and *AD*

1 point: Leftward shift of the *SRAS* curve

1 point: Higher equilibrium aggregate price level at new intersection of *SRAS* and *AD*

1 point: This could be caused by anything that would shift the short-run aggregate supply curve to the left, such as an increase in the price of energy, labor, or another input with economy-wide importance.

2. Draw a correctly labeled aggregate demand and supply graph showing an economy in long-run macroeconomic equilibrium. On your graph, show the effect of an increase in the money supply, according to the classical model of the price level.

Module 34 Inflation and Unemployment: The Phillips Curve

What you will learn in this Module:

- What the Phillips curve is and the nature of the short-run trade-off between inflation and unemployment
- Why there is no long-run trade-off between inflation and unemployment
- Why expansionary policies are limited due to the effects of expected inflation
- Why even moderate levels of inflation can be hard to end
- Why deflation is a problem for economic policy and leads policy makers to prefer a low but positive inflation rate

The Short-Run Phillips Curve

We've just seen that expansionary policies lead to a lower unemployment rate. Our next step in understanding the temptations and dilemmas facing governments is to show that there is a short-run trade-off between unemployment and inflation—lower unemployment tends to lead to higher inflation, and vice versa. The key concept is that of the *Phillips curve.*

The origins of this concept lie in a famous 1958 paper by the New Zealand–born economist Alban W. H. Phillips. Looking at historical data for Britain, he found that when the unemployment rate was high, the wage rate tended to fall, and when the unemployment rate was low, the wage rate tended to rise. Using data from Britain, the United States, and elsewhere, other economists soon found a similar apparent relationship between the unemployment rate and the rate of inflation—that is, the rate of change in the aggregate price level. For example, Figure 34.1 on the next page shows the U.S. unemployment rate and the rate of consumer price inflation over each subsequent year from 1955 to 1968, with each dot representing one year's data.

Looking at evidence like Figure 34.1, many economists concluded that there is a negative short-run relationship between the unemployment rate and the inflation rate, represented by the **short-run Phillips curve,** or *SRPC.* (We'll explain the difference between the short-run and the long-run Phillips curve soon.) Figure 34.2 on the next page shows a hypothetical short-run Phillips curve.

Early estimates of the short-run Phillips curve for the United States were very simple: they showed a negative relationship between the unemployment rate and the inflation rate, without taking account of any other variables. During the 1950s and 1960s this simple approach seemed, for a while, to be adequate. And this simple relationship is clear in the data in Figure 34.1.

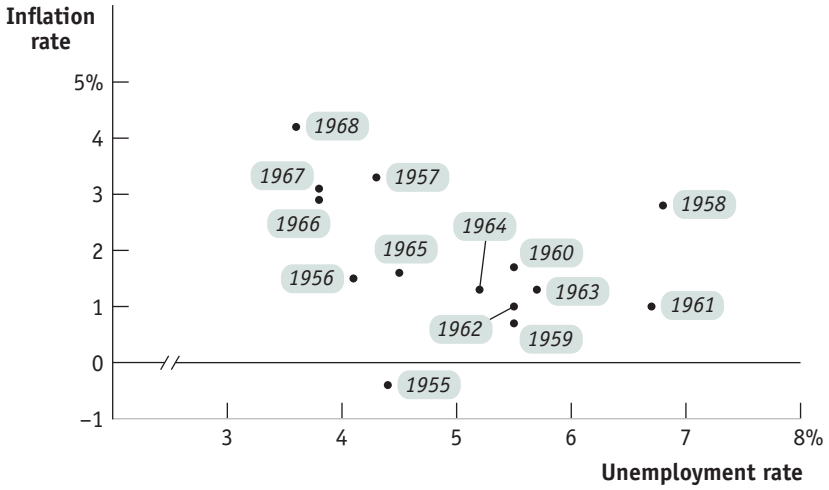
The **short-run Phillips curve** is the negative short-run relationship between the unemployment rate and the inflation rate.

figure 34.1

Unemployment and Inflation, 1955–1968

Each dot shows the average U.S. unemployment rate for one year and the percentage increase in the consumer price index over the subsequent year. Data like this lay behind the initial concept of the Phillips curve.

Source: Bureau of Labor Statistics.



Even at the time, however, some economists argued that a more accurate short-run Phillips curve would include other factors. Previously, we discussed the effect of *supply shocks,* such as sudden changes in the price of oil, that shift the short-run aggregate supply curve. Such shocks also shift the short-run Phillips curve: surging oil prices were an important factor in the inflation of the 1970s and also played an important role in the acceleration of inflation in 2007–2008. In general, a negative supply shock shifts *SRPC* up, as the inflation rate increases for every level of the unemployment rate, and a positive supply shock shifts it down as the inflation rate falls for every level of the unemployment rate. Both outcomes are shown in Figure 34.3.

But supply shocks are not the only factors that can change the inflation rate. In the early 1960s, Americans had little experience with inflation as inflation rates had been low for decades. But by the late 1960s, after inflation had been steadily increasing for a number of years, Americans had come to expect future inflation. In 1968

figure 34.2

The Short-Run Phillips Curve

The short-run Phillips curve, *SRPC,* slopes downward because the relationship between the unemployment rate and the inflation rate is negative.

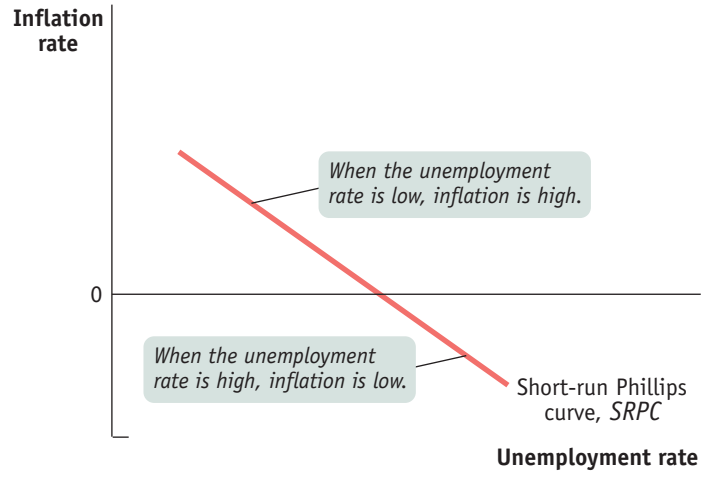
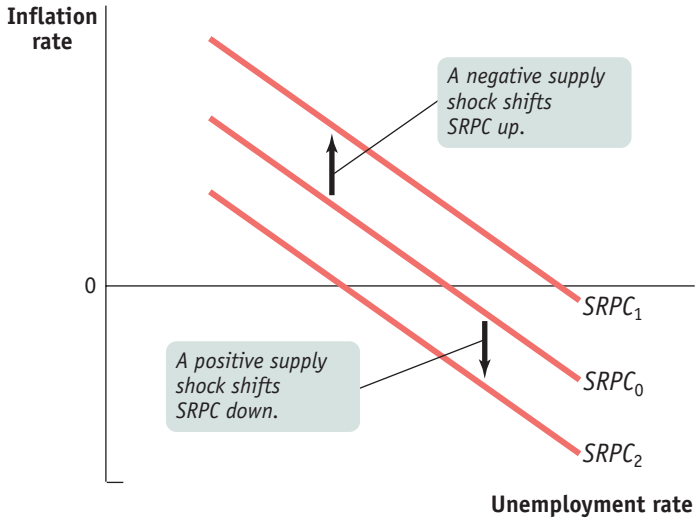


figure 34.3

The Short-Run Phillips Curve and Supply Shocks

A negative supply shock shifts the *SRPC* up, and a positive supply shock shifts the *SRPC* down.



two economists—Milton Friedman of the University of Chicago and Edmund Phelps of Columbia University—independently set forth a crucial hypothesis: that expectations about future inflation directly affect the present inflation rate. Today most economists accept that the *expected inflation rate*—the rate of inflation that employers and workers expect in the near future—is the most important factor, other than the unemployment rate, affecting inflation.

Inflation Expectations and the Short-Run Phillips Curve

The expected rate of inflation is the rate that employers and workers expect in the near future. One of the crucial discoveries of modern macroeconomics is that changes in the expected rate of inflation affect the short-run trade-off between unemployment and inflation and shift the short-run Phillips curve.

Why do changes in expected inflation affect the short-run Phillips curve? Put yourself in the position of a worker or employer about to sign a contract setting the worker's wages over the next year. For a number of reasons, the wage rate they agree to will be higher if everyone expects high inflation (including rising wages) than if everyone expects prices to be stable. The worker will want a wage rate that takes into account future declines in the purchasing power of earnings. He or she will also want a wage rate that won't fall behind the wages of other workers. And the employer will be more willing to agree to a wage increase now if hiring workers later will be even more expensive. Also, rising prices will make paying a higher wage rate more affordable for the employer because the employer's output will sell for more.

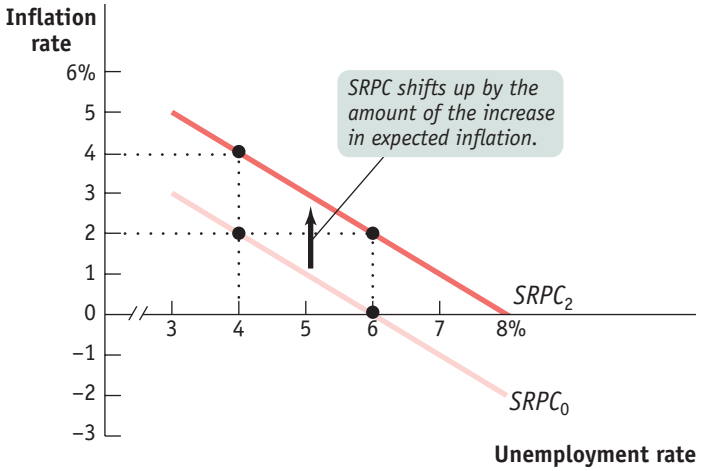
For these reasons, an increase in expected inflation shifts the short-run Phillips curve upward: the actual rate of inflation at any given unemployment rate is higher when the expected inflation rate is higher. In fact, macroeconomists believe that the relationship between changes in expected inflation and changes in actual inflation is one-to-one. That is, when the expected inflation rate increases, the actual inflation rate at any given unemployment rate will increase by the same amount. When the expected inflation rate falls, the actual inflation rate at any given level of unemployment will fall by the same amount.

Figure 34.4 on the next page shows how the expected rate of inflation affects the short-run Phillips curve. First, suppose that the expected rate of inflation is 0%. $SRPC_0$ is the short-run Phillips curve when the public expects 0% inflation. According to

figure 34.4

Expected Inflation and the Short-Run Phillips Curve

An increase in expected inflation shifts the short-run Phillips curve up. $SRPC_0$ is the initial short-run Phillips curve with an expected inflation rate of 0%; $SRPC_2$ is the short-run Phillips curve with an expected inflation rate of 2%. Each additional percentage point of expected inflation raises the actual inflation rate at any given unemployment rate by 1 percentage point.



$SRPC_0$, the actual inflation rate will be 0% if the unemployment rate is 6%; it will be 2% if the unemployment rate is 4%.

Alternatively, suppose the expected rate of inflation is 2%. In that case, employers and workers will build this expectation into wages and prices: at any given unemployment rate, the actual inflation rate will be 2 percentage points higher than it would be

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From the Scary Seventies to the Nifty Nineties

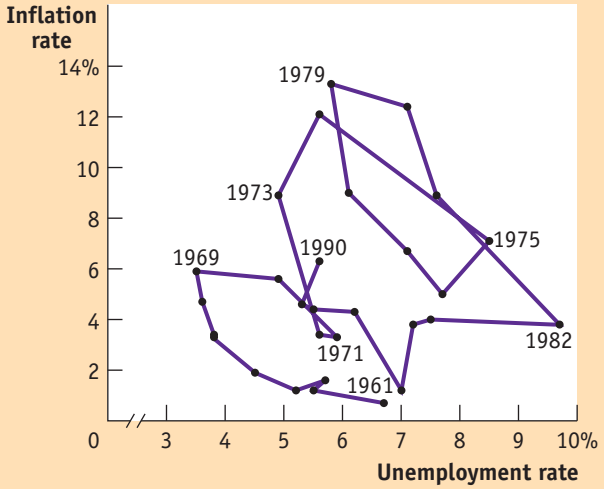
Figure 34.1 showed that the American experience during the 1950s and 1960s supported the belief in the existence of a short-run Phillips curve for the U.S. economy, with a short-run trade-off between unemployment and inflation.

After 1969, however, that relationship appeared to fall apart according to the data. The figure here plots the course of U.S. unemployment and inflation rates from 1961 to 1990. As you can see, the course looks more like a tangled piece of yarn than like a smooth curve.

Through much of the 1970s and early 1980s, the economy suffered from a combination of above-average unemployment rates coupled with inflation rates unprecedented in modern American history. This condition came to be known as *stagflation*—for stagnation combined with high inflation. In the late 1990s, by contrast, the economy was experiencing a blissful combination of low unemployment and low inflation. What explains these developments?

Part of the answer can be attributed to a series of negative supply shocks that the U.S. economy suffered during the 1970s. The price of oil, in particular, soared as wars and revolutions in the Middle East led to a reduction in oil supplies and as oil-exporting countries deliberately curbed production to drive up prices. Compounding the oil price shocks, there was also a slowdown in labor productivity growth. Both of these factors shifted the short-run Phillips curve upward. During the 1990s, by contrast, supply shocks were positive. Prices of oil and other raw materials were generally falling, and productivity growth accelerated. As a result, the short-run Phillips curve shifted downward.

Equally important, however, was the role of expected inflation. As mentioned earlier, inflation accelerated during the 1960s. During the 1970s, the public came to expect high inflation, and this also shifted the short-run Phillips curve up. It took a sustained and costly effort during the 1980s to get inflation back down. The result, however, was that expected inflation was very low by the late 1990s, allowing actual inflation to be low even with low rates of unemployment.



if people expected 0% inflation. $SRPC_2$, which shows the Phillips curve when the expected inflation rate is 2%, is $SRPC_0$ shifted upward by 2 percentage points at every level of unemployment. According to $SRPC_2$, the actual inflation rate will be 2% if the unemployment rate is 6%; it will be 4% if the unemployment rate is 4%.

What determines the expected rate of inflation? In general, people base their expectations about inflation on experience. If the inflation rate has hovered around 0% in the last few years, people will expect it to be around 0% in the near future. But if the inflation rate has averaged around 5% lately, people will expect inflation to be around 5% in the near future.

Since expected inflation is an important part of the modern discussion about the short-run Phillips curve, you might wonder why it was not in the original formulation of the Phillips curve. The answer lies in history. Think back to what we said about the early 1960s: at that time, people were accustomed to low inflation rates and reasonably expected that future inflation rates would also be low. It was only after 1965 that persistent inflation became a fact of life. So only then did it become clear that expected inflation would play an important role in price-setting.

Inflation and Unemployment in the Long Run

The short-run Phillips curve says that at any given point in time there is a trade-off between unemployment and inflation. According to this view, policy makers have a choice: they can choose to accept the price of high inflation in order to achieve low unemployment, or they can reject high inflation and pay the price of high unemployment. In fact, during the 1960s many economists believed that this trade-off represented a real choice.

However, this view was greatly altered by the later recognition that expected inflation affects the short-run Phillips curve. In the short run, expectations often diverge from reality. In the long run, however, any consistent rate of inflation will be reflected in expectations. If inflation is consistently high, as it was in the 1970s, people will come to expect more of the same; if inflation is consistently low, as it has been in recent years, that, too, will become part of expectations. So what does the trade-off between inflation and unemployment look like in the long run, when actual inflation is incorporated into expectations? Most macroeconomists believe that there is, in fact, no long-run trade-off. That is, it is not possible to achieve lower unemployment in the long run by accepting higher inflation. To see why, we need to introduce another concept: the *long-run Phillips curve*.

The Long-Run Phillips Curve

Figure 34.5 on the next page reproduces the two short-run Phillips curves from Figure 34.4, $SRPC_0$ and $SRPC_2$. It also adds an additional short-run Phillips curve, $SRPC_4$, representing a 4% expected rate of inflation. In a moment, we'll explain the significance of the vertical long-run Phillips curve, *LRPC*.

Suppose that the economy has, in the past, had a 0% inflation rate. In that case, the current short-run Phillips curve will be $SRPC_0$, reflecting a 0% expected inflation rate. If the unemployment rate is 6%, the actual inflation rate will be 0%.

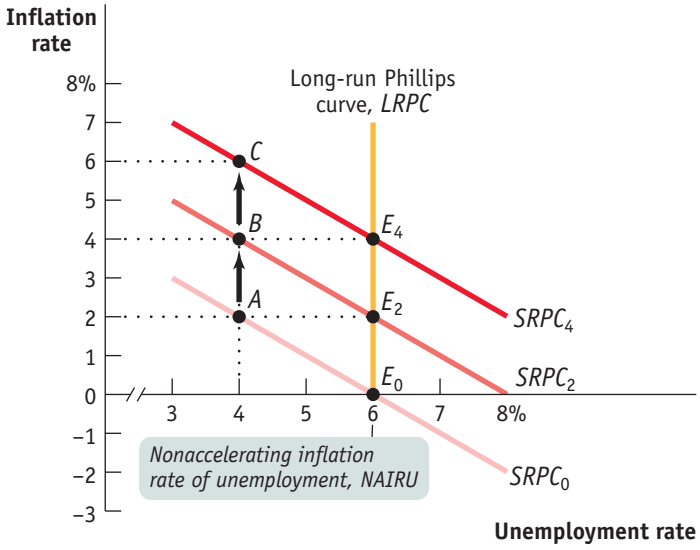
Also suppose that policy makers decide to trade off lower unemployment for a higher rate of inflation. They use monetary policy, fiscal policy, or both to drive the unemployment rate down to 4%. This puts the economy at point *A* on $SRPC_0$, leading to an actual inflation rate of 2%.

Over time, the public will come to expect a 2% inflation rate. *This increase in inflationary expectations will shift the short-run Phillips curve upward* to $SRPC_2$. Now, when the unemployment rate is 6%, the actual inflation rate will be 2%. Given this new short-run Phillips curve, policies adopted to keep the unemployment rate at 4% will lead to a 4% actual inflation rate—point *B* on $SRPC_2$—rather than point *A* with a 2% actual inflation rate.

figure 34.5

The NAIRU and the Long-Run Phillips Curve

$SRPC_0$ is the short-run Phillips curve when the expected inflation rate is 0%. At a 4% unemployment rate, the economy is at point *A* with an actual inflation rate of 2%. The higher inflation rate will be incorporated into expectations, and the *SRPC* will shift upward to $SRPC_2$. If policy makers act to keep the unemployment rate at 4%, the economy will be at *B* and the actual inflation rate will rise to 4%. Inflationary expectations will be revised upward again, and *SRPC* will shift to $SRPC_4$. At a 4% unemployment rate, the economy will be at *C* and the actual inflation rate will rise to 6%. Here, an unemployment rate of 6% is the NAIRU, or nonaccelerating inflation rate of unemployment. As long as unemployment is at the NAIRU, the actual inflation rate will match expectations and remain constant. An unemployment rate below 6% requires ever-accelerating inflation. The long-run Phillips curve, *LRPC,* which passes through E_0, E_2, and E_4, is vertical: no long-run trade-off between unemployment and inflation exists.



The **nonaccelerating inflation rate of unemployment,** or **NAIRU,** is the unemployment rate at which inflation does not change over time.

The **long-run Phillips curve** shows the relationship between unemployment and inflation after expectations of inflation have had time to adjust to experience.

Eventually, the 4% actual inflation rate gets built into expectations about the future inflation rate, and the short-run Phillips curve shifts upward yet again to $SRPC_4$. To keep the unemployment rate at 4% would now require accepting a 6% actual inflation rate, point *C* on $SRPC_4$, and so on. In short, a persistent attempt to trade off lower unemployment for higher inflation leads to *accelerating* inflation over time.

To avoid accelerating inflation over time, the unemployment rate must be high enough that the actual rate of inflation matches the expected rate of inflation. This is the situation at E_0 on $SRPC_0$: when the expected inflation rate is 0% and the unemployment rate is 6%, the actual inflation rate is 0%. It is also the situation at E_2 on $SRPC_2$: when the expected inflation rate is 2% and the unemployment rate is 6%, the actual inflation rate is 2%. And it is the situation at E_4 on $SRPC_4$: when the expected inflation rate is 4% and the unemployment rate is 6%, the actual inflation rate is 4%. As we'll learn shortly, this relationship between accelerating inflation and the unemployment rate is known as the *natural rate hypothesis.*

Andy sacks/Stone Getty Images

The non-accelerating inflation rate of unemployment, or NAIRU, is the unemployment rate at which inflation does not change over time.

The unemployment rate at which inflation does not change over time—6% in Figure 34.5—is known as the **nonaccelerating inflation rate of unemployment,** or **NAIRU** for short. Keeping the unemployment rate below the NAIRU leads to ever-accelerating inflation and cannot be maintained. Most macroeconomists believe that there is a NAIRU and that there is no long-run trade-off between unemployment and inflation.

We can now explain the significance of the vertical line *LRPC.* It is the **long-run Phillips curve,** the relationship between unemployment and inflation in the long run, after expectations of inflation have had time to adjust to experience. It is vertical because any unemployment rate below the NAIRU leads to ever-accelerating inflation. In other words, the long-run Phillips curve shows that there are limits to expansionary policies because an unemployment rate below the NAIRU cannot be maintained in the long run. Moreover there is a corresponding point we have not yet emphasized: any unemployment rate above the NAIRU leads to decelerating inflation.

The Natural Rate of Unemployment, Revisited

Recall the concept of the natural rate of unemployment, the portion of the unemployment rate unaffected by the swings of the business cycle. Now we have introduced the concept of the *NAIRU*. How do these two concepts relate to each other?

The answer is that the NAIRU is another name for the natural rate. The level of unemployment the economy "needs" in order to avoid accelerating inflation is equal to the natural rate of unemployment.

In fact, economists estimate the natural rate of unemployment by looking for evidence about the NAIRU from the behavior of the inflation rate and the unemployment rate over the course of the business cycle. For example, the way major European countries learned, to their dismay, that their natural rates of unemployment were 9% or more was through unpleasant experience. In the late 1980s, and again in the late 1990s, European inflation began to accelerate as European unemployment rates, which had been above 9%, began to fall, approaching 8%.

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The Great Disinflation of the 1980s

As we've mentioned several times, the United States ended the 1970s with a high rate of inflation, at least by its own peacetime historical standards—13% in 1980. Part of this inflation was the result of one-time events, especially a world oil crisis. But expectations of future inflation at 10% or more per year appeared to be firmly embedded in the economy.

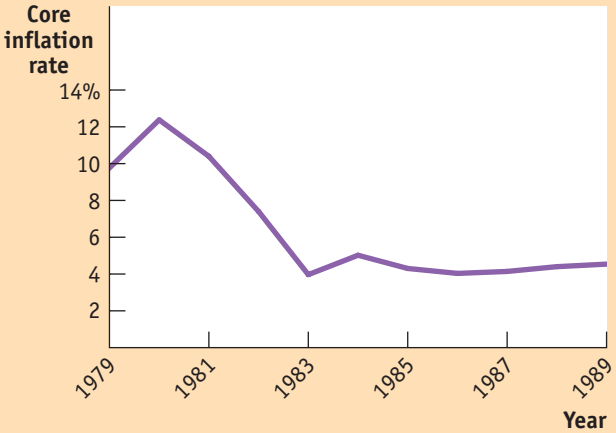
By the mid-1980s, however, inflation was running at about 4% per year. Panel (a) of the figure shows the annual rate of change in the "core" consumer price index (CPI)—also called the *core inflation rate.* This index, which excludes volatile energy and food prices, is widely regarded as a better indicator of underlying inflation trends than the overall CPI. By this measure, inflation fell from about 12% at the end of the 1970s to about 4% by the mid-1980s.

How was this disinflation achieved? At great cost. Beginning in late 1979, the Federal Reserve imposed strongly contractionary monetary policies, which pushed the economy into its worst recession since the Great Depression. Panel (b) shows the Congressional Budget Office estimate of the U.S. output gap from 1979 to 1989: by 1982, actual output was 7% below potential output, corresponding to an unemployment rate of more than 9%. Aggregate output didn't get back to potential output until 1987.

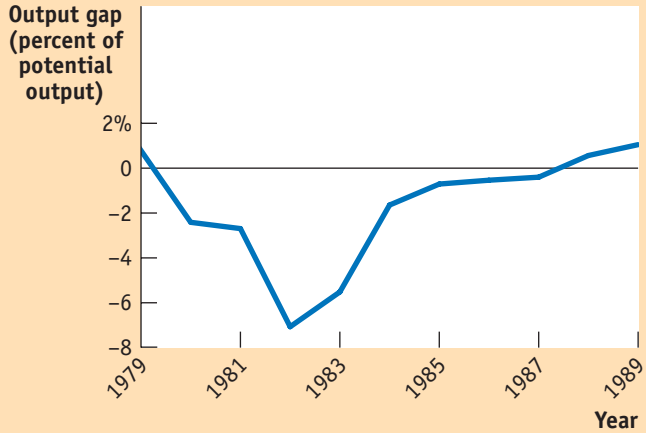
Our analysis of the Phillips curve tells us that a temporary rise in unemployment, like that of the 1980s, is needed to break the cycle of inflationary expectations. Once expectations of inflation are reduced, the economy can return to the natural rate of unemployment at a lower inflation rate. And that's just what happened.

At what cost? If you add up the output gaps over 1980–1987, you find that the economy sacrificed approximately 18% of an average year's output over the period. If we had to do the same thing today, that would mean giving up roughly $2.6 trillion worth of goods and services.

(a) The Core Inflation Rate in the United States Came Down in the 1980s . . .



(b) . . . but Only at the Expense of a Huge Sacrifice of Output and High Unemployment.



In Figure 33.3 we cited Congressional Budget Office estimates of the U.S. natural rate of unemployment. The CBO has a model that predicts changes in the inflation rate based on the deviation of the actual unemployment rate from the natural rate. Given data on actual unemployment and inflation, this model can be used to deduce estimates of the natural rate—and that's where the CBO numbers come from.

The Costs of Disinflation

Through experience, policy makers have found that bringing inflation down is a much harder task than increasing it. The reason is that once the public has come to expect continuing inflation, bringing inflation down is painful.

A persistent attempt to keep unemployment below the natural rate leads to accelerating inflation that becomes incorporated into expectations. To reduce inflationary expectations, policy makers need to run the process in reverse, adopting contractionary policies that keep the unemployment rate above the natural rate for an extended period of time. The process of bringing down inflation that has become embedded in expectations is known as *disinflation*.

Disinflation can be very expensive. The U.S. retreat from high inflation at the beginning of the 1980s appears to have cost the equivalent of about 18% of a year's real GDP, the equivalent of roughly $2.6 trillion today. The justification for paying these costs is that they lead to a permanent gain. Although the economy does not recover the short-term production losses caused by disinflation, it no longer suffers from the costs associated with persistently high inflation. In fact, the United States, Britain, and other wealthy countries that experienced inflation in the 1970s eventually decided that the benefit of bringing inflation down was worth the required suffering—the large reduction in real GDP in the short term.

Some economists argue that the costs of disinflation can be reduced if policy makers explicitly state their determination to reduce inflation. A clearly announced, credible policy of disinflation, they contend, can reduce expectations of future inflation and so shift the short-run Phillips curve downward. Some economists believe that the clear determination of the Federal Reserve to combat the inflation of the 1970s was credible enough that the costs of disinflation, huge though they were, were lower than they might otherwise have been.

Deflation

Before World War II, *deflation*—a falling aggregate price level—was almost as common as inflation. In fact, the U.S. consumer price index on the eve of World War II was 30% lower than it had been in 1920. After World War II, inflation became the norm in all countries. But in the 1990s, deflation reappeared in Japan and proved difficult to reverse. Concerns about potential deflation played a crucial role in U.S. monetary policy in the early 2000s and again in late 2008. In fact, in late 2008, the U.S. experienced a brief period of deflation.

Why is deflation a problem? And why is it hard to end?

Debt Deflation

Deflation, like inflation, produces both winners and losers—but in the opposite direction. Due to the falling price level, a dollar in the future has a higher real value than a dollar today. So lenders, who are owed money, gain under deflation because the real value of borrowers' payments increases. Borrowers lose because the real burden of their debt rises.

In a famous analysis at the beginning of the Great Depression, Irving Fisher claimed that the effects of deflation on borrowers and lenders can worsen an economic slump. Deflation, in effect, takes real resources away from borrowers and redistributes them to lenders. Fisher argued that borrowers, who lose from deflation, are typically short of cash and will be forced to cut their spending sharply when their debt burden rises.

Lenders, however, are less likely to increase spending sharply when the values of the loans they own rise. The overall effect, said Fisher, is that deflation reduces aggregate demand, deepening an economic slump, which, in a vicious circle, may lead to further deflation. The effect of deflation in reducing aggregate demand, known as **debt deflation,** probably played a significant role in the Great Depression.

Debt deflation is the reduction in aggregate demand arising from the increase in the real burden of outstanding debt caused by deflation.

There is a **zero bound** on the nominal interest rate: it cannot go below zero.

A **liquidity trap** is a situation in which conventional monetary policy is ineffective because nominal interest rates are up against the zero bound.

Effects of Expected Deflation

Like expected inflation, expected deflation affects the nominal interest rate. Consider Figure 29.6 from Section 5 (repeated here as Figure 34.6), which demonstrates how expected inflation affects the equilibrium interest rate. As shown, the equilibrium nominal interest rate is 4% if the expected inflation rate is 0%. Clearly, if the expected inflation rate is −3%—if the public expects deflation at 3% per year—the equilibrium nominal interest rate will be 1%.

But what would happen if the expected rate of inflation were −5%? Would the nominal interest rate fall to −1%, meaning that lenders are paying borrowers 1% on their debt? No. Nobody would lend money at a negative nominal rate of interest because they could do better by simply holding cash. This illustrates what economists call the **zero bound** on the nominal interest rate: it cannot go below zero.

This zero bound can limit the effectiveness of monetary policy. Suppose the economy is depressed, with output below potential output and the unemployment rate above the natural rate. Normally, the central bank can respond by cutting interest rates so as to increase aggregate demand. If the nominal interest rate is already zero, however, the central bank cannot push it down any further. Banks refuse to lend and consumers and firms refuse to spend because, with a negative inflation rate and a 0% nominal interest rate, holding cash yields a positive real rate of return. Any further increases in the monetary base will either be held in bank vaults or held as cash by individuals and firms, without being spent.

A situation in which conventional monetary policy to fight a slump—cutting interest rates—can't be used because nominal interest rates are up against the zero bound is known as a **liquidity trap.** A liquidity trap can occur whenever there is a sharp reduction in demand for loanable funds—which is exactly what happened during the Great

figure 34.6

The Fisher Effect

D_0 and S_0 are the demand and supply curves for loanable funds when the expected future inflation rate is 0%. At an expected inflation rate of 0%, the equilibrium nominal interest rate is 4%. An increase in expected future inflation pushes both the demand and supply curves upward by 1 percentage point for every percentage point increase in expected future inflation. D_{10} and S_{10} are the demand and supply curves for loanable funds when the expected future inflation rate is 10%. The 10 percentage point increase in expected future inflation raises the equilibrium nominal interest rate to 14%. The expected real interest rate remains at 4%, and the equilibrium quantity of loanable funds also remains unchanged.

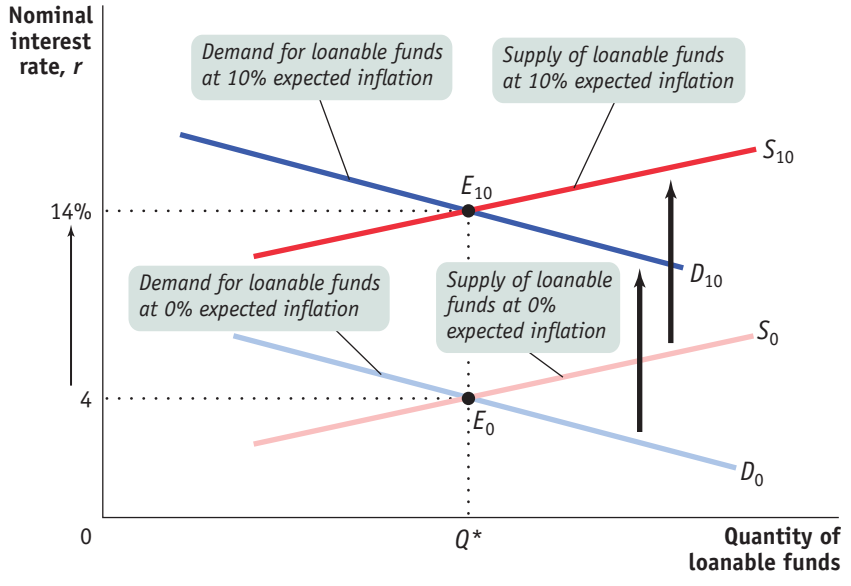
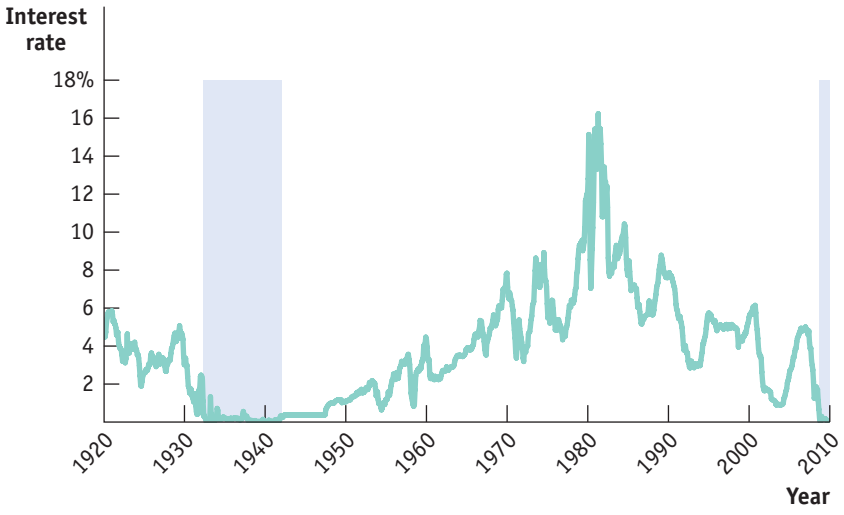


figure 34.7

The Zero Bound in U.S. History

This figure shows U.S. short-term interest rates, specifically the interest rate on three-month Treasury bills, since 1920. As shown by the shaded area at left, for much of the 1930s, interest rates were very close to zero, leaving little room for expansionary monetary policy. After World War II, persistent inflation generally kept rates well above zero. However, in late 2008, in the wake of the housing bubble bursting and the financial crisis, the interest rate on three-month Treasury bills was again virtually zero.

Source: Federal Reserve Bank of St. Louis.



Depression. Figure 34.7 shows the interest rate on short-term U.S. government debt from 1920 to January 2010. As you can see, starting in 1933 and ending when World War II brought a full economic recovery, the U.S. economy was either close to or up against the zero bound. After World War II, when inflation became the norm around the world, the zero bound problem largely vanished as the public came to expect inflation rather than deflation.

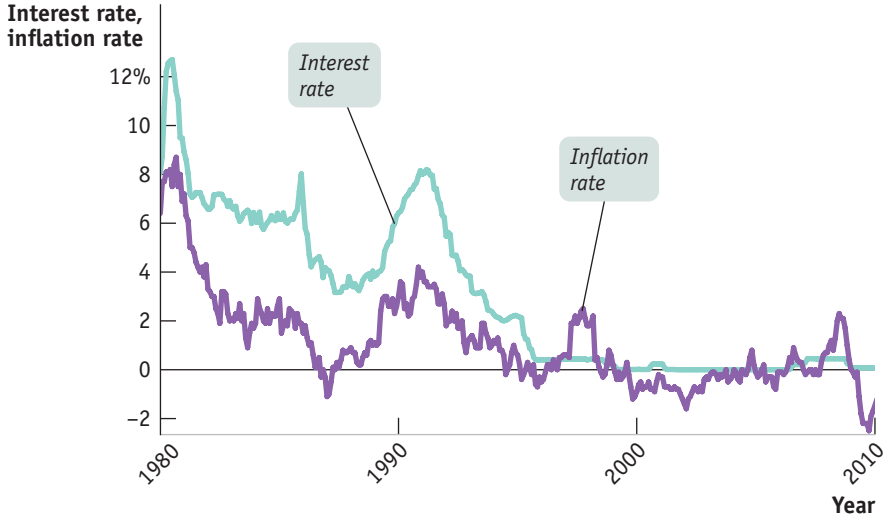
However, the recent history of the Japanese economy, shown in Figure 34.8, provides a modern illustration of the problem of deflation and the liquidity trap. Japan experienced a huge boom in the prices of both stocks and real estate in the late 1980s, and then saw both bubbles burst. The result was a prolonged period of economic stagnation, the so-called Lost Decade, which gradually reduced the inflation rate and eventually led to persistent deflation. In an effort to fight the weakness of the economy, the

figure 34.8

Japan's Lost Decade

A prolonged economic slump in Japan led to deflation from the late 1990s on. The Bank of Japan responded by cutting interest rates—but eventually ran up against the zero bound.

Source: Japanese Ministry of Internal Affairs and Communications, Statistics Bureau; Bank of Japan.



Bank of Japan—the equivalent of the Federal Reserve—repeatedly cut interest rates. Eventually, it arrived at the "ZIRP": the zero interest rate policy. The "call money rate," the equivalent of the U.S. federal funds rate, was literally set equal to zero. Because the economy was still depressed, it would have been desirable to cut interest rates even further. But that wasn't possible: Japan was up against the zero bound.

In 2008 and 2009, the Federal Reserve also found itself up against the zero bound. In the aftermath of the bursting of the housing bubble and the ensuing financial crisis, the interest on short-term U.S. government debt had fallen to virtually zero.

Module 34 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Explain how the short-run Phillips curve illustrates the negative relationship between cyclical unemployment and the actual inflation rate for a given level of the expected inflation rate.
2. Why is there no long-run trade-off between unemployment and inflation?
3. Why is disinflation so costly for an economy? Are there ways to reduce these costs?
4. Why won't anyone lend money at a negative nominal rate of interest? How can this pose problems for monetary policy?

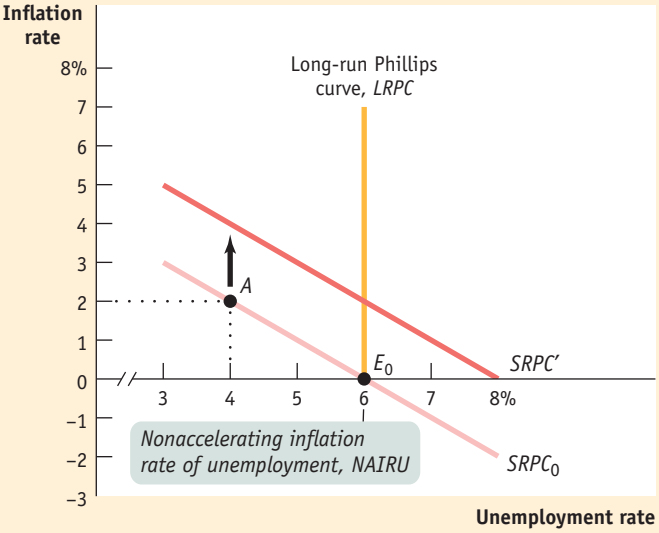
Tackle the Test: Multiple-Choice Questions

1. The long-run Phillips curve is
   I. the same as the short-run Phillips curve.
   II. vertical.
   III. the short-run Phillips curve plus expected inflation.
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. The short-run Phillips curve shows a _____ relationship between _____.
   a. negative — the aggregate price level and aggregate output
   b. positive — the aggregate price level and aggregate output
   c. negative — unemployment and inflation
   d. positive — unemployment and aggregate output
   e. positive — unemployment and the aggregate price level
3. An increase in expected inflation will shift
   a. the short-run Phillips curve downward.
   b. the short-run Phillips curve upward.
   c. the long-run Phillips curve upward.
   d. the long-run Phillips curve downward.
   e. neither the short-run nor the long-run Phillips curve.
4. Bringing down inflation that has become embedded in expectations is called
   a. deflation.
   b. negative inflation.
   c. anti-inflation.
   d. unexpected inflation.
   e. disinflation.
5. Debt deflation is
   a. the effect of deflation in decreasing aggregate demand.
   b. an idea proposed by Irving Fisher.
   c. a contributing factor in causing the Great Depression.
   d. due to differences in how borrowers/lenders respond to inflation losses/gains.
   e. all of the above.

Tackle the Test: Free-Response Questions

1. a. Draw a correctly labeled graph showing a short-run Phillips curve with an expected inflation rate of 0% and the corresponding long-run Phillips curve.
   b. On your graph, label the nonaccelerating inflation rate of unemployment.
   c. On your graph, show what happens in the long run if the government decides to decrease the unemployment rate below the nonaccelerating inflation rate of unemployment. Explain.

Answer (8 points)



1 point: Vertical axis labeled "Inflation rate"

1 point: Horizontal axis labeled "Unemployment rate"

1 point: Downward sloping curve labeled *"$SRPC_0$"*

1 point: Vertical curve labeled *"LRPC"*

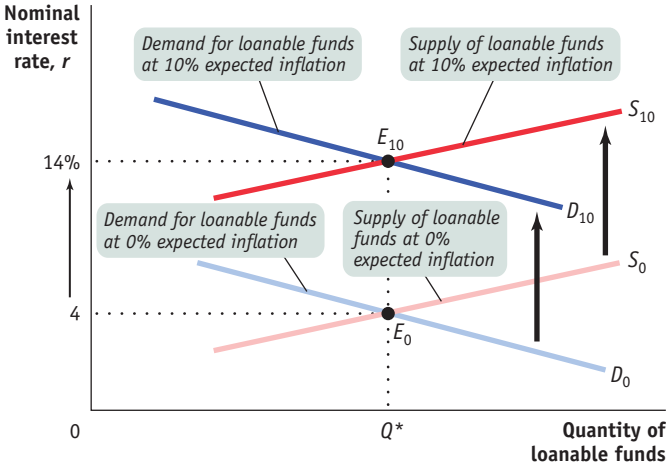
1 point: $SRPC_0$ crosses horizontal axis where it crosses *LRPC*

1 point: *NAIRU* is labeled where $SRPC_0$ crosses *LRPC* and horizontal axis

1 point: New *SRPC* is labeled, for example as *"SRAS'"*, and shown above the original $SRPC_0$

1 point: When the unemployment rate moves below the *NAIRU*, it creates inflation and moves the economy to a point such as *A*. This leads to positive inflationary expectations, which shift the *SRPC* up as shown by *SRPC'*.

2. Consider the accompanying diagram.



a. What is the nominal interest rate if expected inflation is 0%?
b. What would the nominal interest rate be if the expected inflation rate were –2%? Explain.
c. What would the nominal interest rate be if the expected inflation rate were –6%? Explain.
d. What would a negative nominal interest rate mean for lenders? How much lending would take place at a negative nominal interest rate? Explain.
e. What effect does a nominal interest rate of zero have on monetary policy? What is this situation called?

Module 35 History and Alternative Views of Macroeconomics

What you will learn in this Module:

- Why classical macroeconomics wasn't adequate for the problems posed by the Great Depression
- How Keynes and the experience of the Great Depression legitimized macroeconomic policy activism
- What monetarism is and its views about the limits of discretionary monetary policy
- How challenges led to a revision of Keynesian ideas and the emergence of the new classical macroeconomics

Classical Macroeconomics

The term *macroeconomics* appears to have been coined in 1933 by the Norwegian economist Ragnar Frisch. The timing, during the worst year of the Great Depression, was no accident. Still, there were economists analyzing what we now consider macroeconomic issues—the behavior of the aggregate price level and aggregate output—before then.

Money and the Price Level

Previously, we described the *classical model of the price level.* According to the classical model, prices are flexible, making the aggregate supply curve vertical even in the short run. In this model, an increase in the money supply leads, other things equal, to a proportional rise in the aggregate price level, with no effect on aggregate output. As a result, increases in the money supply lead to inflation, and that's all. Before the 1930s, the classical model of the price level dominated economic thinking about the effects of monetary policy.

Did classical economists really believe that changes in the money supply affected only aggregate prices, without any effect on aggregate output? Probably not. Historians of economic thought argue that before 1930 most economists were aware that changes in the money supply affected aggregate output as well as aggregate prices in the short run—or, to use modern terms, they were aware that the short-run aggregate supply curve sloped upward. But they regarded such short-run effects as unimportant, stressing the long run instead. It was this attitude that led John Maynard Keynes to scoff at the focus on the long run, in which, as he said, "we are all dead."

The Business Cycle

Classical economists were, of course, also aware that the economy did not grow smoothly. The American economist Wesley Mitchell pioneered the quantitative study of business cycles. In 1920, he founded the National Bureau of Economic Research, an independent, nonprofit organization that to this day has the official role of declaring the beginnings of recessions and expansions. Thanks to Mitchell's work, the *measurement* of business cycles was well advanced by 1930. But there was no widely accepted *theory* of business cycles.

In the absence of any clear theory, views about how policy makers should respond to a recession were conflicting. Some economists favored expansionary monetary and fiscal policies to fight a recession. Others believed that such policies would worsen the slump or merely postpone the inevitable. For example, in 1934 Harvard's Joseph Schumpeter, now famous for his early recognition of the importance of technological change, warned that any attempt to alleviate the Great Depression with expansionary monetary policy "would, in the end, lead to a collapse worse than the one it was called in to remedy." When the Great Depression hit, the policy making process was paralyzed by this lack of consensus. In many cases, economists now believe, policy makers took steps in the wrong direction.

Necessity was, however, the mother of invention. As we'll explain next, the Great Depression provided a strong incentive for economists to develop theories that could serve as a guide to policy—and economists responded.

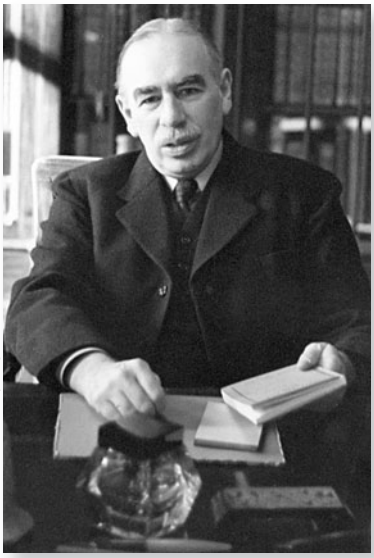
The Great Depression and the Keynesian Revolution

The Great Depression demonstrated, once and for all, that economists cannot safely ignore the short run. Not only was the economic pain severe, it threatened to destabilize societies and political systems. In particular, the economic plunge helped Adolf Hitler rise to power in Germany.

The whole world wanted to know how this economic disaster could be happening and what should be done about it. But because there was no widely accepted theory of the business cycle, economists gave conflicting and, we now believe, often harmful advice. Some believed that only a huge change in the economic system—such as having the government take over much of private industry and replace markets with a command economy—could end the slump. Others argued that slumps were natural—even beneficial—and that nothing should be done.

Some economists, however, argued that the slump both could have and should have been cured—without giving up on the basic idea of a market economy. In 1930, the British economist John Maynard Keynes compared the problems of the U.S. and British economies to those of a car with a defective alternator. Getting the economy running, he argued, would require only a modest repair, not a complete overhaul.

Nice metaphor. But what was the nature of the trouble?



Tim Gidel/ 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 part of the political spectrum.

Keynes's Theory

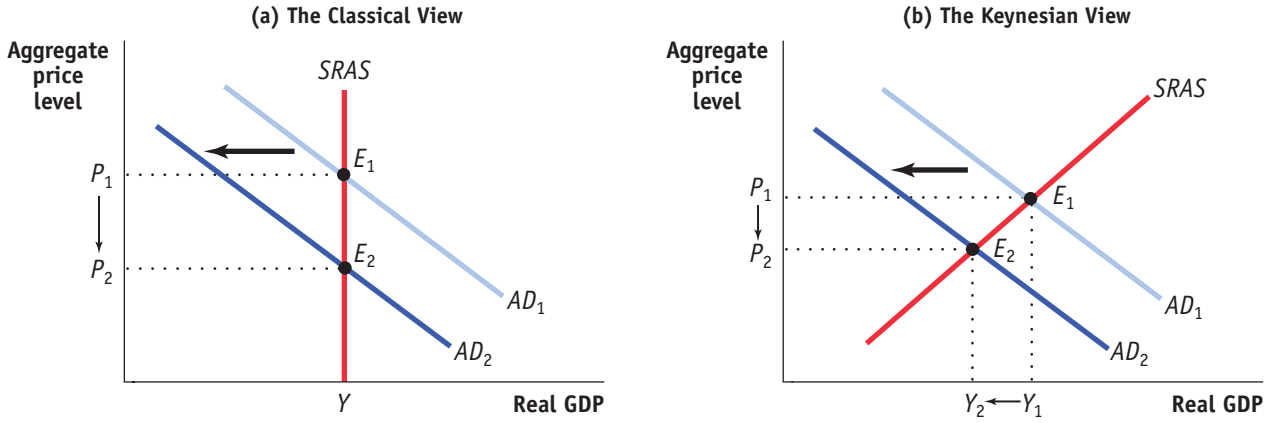
In 1936, Keynes presented his analysis of the Great Depression—his explanation of what was wrong with the economy's alternator—in a book titled *The General Theory of Employment, Interest, and Money.* In 1946, the great American economist Paul Samuelson wrote that "it is a badly written book, poorly organized. . . . Flashes of insight and intuition intersperse tedious algebra. . . . We find its analysis to be obvious and at the same time new. In short, it is a work of genius." *The General Theory* isn't easy reading, but it stands with Adam Smith's *The Wealth of Nations* as one of the most influential books on economics ever written.

As Samuelson's description suggests, Keynes's book is a vast stew of ideas. Keynesian economics mainly reflected two innovations. First, Keynes emphasized the short-run

effects of shifts in aggregate demand on aggregate output, rather than the long-run determination of the aggregate price level. As Keynes's famous remark about being dead in the long run suggests, until his book appeared most economists had treated short-run macroeconomics as a minor issue. Keynes focused the attention of economists on situations in which the short-run aggregate supply curve slopes upward and shifts in the aggregate demand curve affect aggregate output and employment as well as aggregate prices.

Figure 35.1 illustrates the difference between Keynesian and classical macroeconomics. Both panels of the figure show the short-run aggregate supply curve, *SRAS;* in both it is assumed that for some reason the aggregate demand curve shifts leftward from AD_1 to AD_2—let's say in response to a fall in stock market prices that leads households to reduce consumer spending.

figure 35.1 Classical Versus Keynesian Macroeconomics



One important difference between classical and Keynesian economics involves the short-run aggregate supply curve. Panel (a) shows the classical view: the *SRAS* curve is vertical, so shifts in aggregate demand affect the aggregate price level but not aggregate output. Panel (b) shows the Keynesian view: in the short run the *SRAS* curve slopes upward, so shifts in aggregate demand affect aggregate output as well as aggregate prices.

Panel (a) shows the classical view: the short-run aggregate supply curve is vertical. The decline in aggregate demand leads to a fall in the aggregate price level, from P_1 to P_2, but no change in aggregate output. Panel (b) shows the Keynesian view: the short-run aggregate supply curve slopes upward, so the decline in aggregate demand leads to both a fall in the aggregate price level, from P_1 to P_2, and a fall in aggregate output, from Y_1 to Y_2. As we've already explained, many classical macroeconomists would have agreed that panel (b) was an accurate story in the short run—but they regarded the short run as unimportant. Keynes disagreed. (Just to be clear, there isn't any diagram that looks like panel (b) of Figure 35.1 in Keynes's *General Theory.* But Keynes's discussion of aggregate supply, translated into modern terminology, clearly implies an upward-sloping *SRAS* curve.)

Second, classical economists emphasized the role of changes in the money supply in shifting the aggregate demand curve, paying little attention to other factors. Keynes, however, argued that other factors, especially changes in "animal spirits"—these days usually referred to with the bland term *business confidence*—are mainly responsible for business cycles. Before Keynes, economists often argued that a decline in business confidence would have no effect on either the aggregate price level or aggregate output, as long as the money supply stayed constant. Keynes offered a very different picture.

Macroeconomic policy activism is the use of monetary and fiscal policy to smooth out the business cycle.

Keynes's ideas have penetrated deeply into the public consciousness, to the extent that many people who have never heard of Keynes, or have heard of him but think they disagree with his theory, use Keynesian ideas all the time. For example, suppose that a business commentator says something like this: "Because of a decline in business confidence, investment spending slumped, causing a recession." Whether the commentator knows it or not, that statement is pure Keynesian economics.

Keynes himself more or less predicted that his ideas would become part of what "everyone knows." In another famous passage, this from the end of *The General Theory,* he wrote: "Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist."

Policy to Fight Recessions

The main practical consequence of Keynes's work was that it legitimized **macroeconomic policy activism**—the use of monetary and fiscal policy to smooth out the business cycle.

Macroeconomic policy activism wasn't something completely new. Before Keynes, many economists had argued for using monetary expansion to fight economic downturns—though others were fiercely opposed. Some economists had even argued that temporary budget deficits were a good thing in times of recession—though others disagreed strongly. In practice, during the 1930s many governments followed policies that we would now call Keynesian. In the United States, the administration of Franklin Roosevelt engaged in modest deficit spending in an effort to create jobs.

But these efforts were half-hearted. Roosevelt's advisers were deeply divided over the appropriate policies to adopt. In fact, in 1937 Roosevelt gave in to advice from

fyi

The End of the Great Depression

It would make a good story if Keynes's ideas had led to a change in economic policy that brought the Great Depression to an end. Unfortunately, that's not what happened. Still, the way the Depression ended did a lot to convince economists that Keynes was right.

The basic message many of the young economists who adopted Keynes's ideas in the 1930s took from his work was that economic recovery requires aggressive fiscal expansion—deficit spending on a large scale to create jobs. And that is what they eventually got, but it wasn't because politicians were persuaded. Instead, what happened was a very large and expensive war, World War II.

The figure here shows the U.S. unemployment rate and the federal budget deficit as a share of GDP from 1930 to 1947. As you can see, deficit spending during the 1930s was on a modest scale. In 1940, as the risk of war grew larger, the United States began a large military buildup, and the budget moved deep into deficit. After the attack on Pearl Harbor on December 7, 1941, the country began deficit spending on an enormous scale: in fiscal 1943, which began in July 1942, the deficit was 30% of GDP. Today that would be a deficit of $4.3 trillion.

And the economy recovered. World War II wasn't intended as a Keynesian fiscal policy, but it demonstrated that expansionary fiscal policy can, in fact, create jobs in the short run.

non-Keynesian economists who urged him to balance the budget and raise interest rates, even though the economy was still depressed. The result was a renewed slump.

Today, by contrast, there is broad consensus about the useful role monetary and fiscal policy can play in fighting recessions. The 2004 Economic Report of the President was issued by a conservative Republican administration that was generally opposed to government intervention in the economy. Yet its view on economic policy in the face of recession was far more like that of Keynes than like that of most economists before 1936.

It would be wrong, however, to suggest that Keynes's ideas have been fully accepted by modern macroeconomists. In the decades that followed the publication of *The General Theory,* Keynesian economics faced a series of challenges, some of which succeeded in modifying the macroeconomic consensus in important ways.

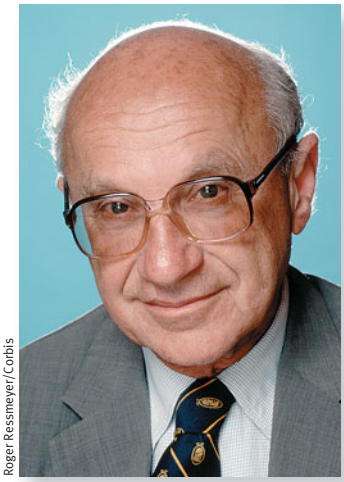
Challenges to Keynesian Economics

Keynes's ideas fundamentally changed the way economists think about business cycles. They did not, however, go unquestioned. In the decades that followed the publication of *The General Theory,* Keynesian economics faced a series of challenges. As a result, the consensus of macroeconomists retreated somewhat from the strong version of Keynesianism that prevailed in the 1950s. In particular, economists became much more aware of the limits to macroeconomic policy activism.

The Revival of Monetary Policy

Keynes's *General Theory* suggested that monetary policy wouldn't be very effective in depression conditions. Many modern macroeconomists agree: earlier we introduced the concept of a *liquidity trap,* a situation in which monetary policy is ineffective because the interest rate is down against the zero bound. In the 1930s, when Keynes wrote, interest rates were, in fact, very close to 0%. (The term *liquidity trap* was first introduced by the British economist John Hicks in a 1937 paper, "Mr. Keynes and the Classics: A Suggested Interpretation," that summarized Keynes's ideas.)

But even when the era of near-0% interest rates came to an end after World War II, many economists continued to emphasize fiscal policy and downplay the usefulness of monetary policy. Eventually, however, macroeconomists reassessed the importance of monetary policy. A key milestone in this reassessment was the 1963 publication of *A Monetary History of the United States, 1867–1960* by Milton Friedman, of the University of Chicago, and Anna Schwartz, of the National Bureau of Economic Research. Friedman and Schwartz showed that business cycles had historically been associated with fluctuations in the money supply. In particular, the money supply fell sharply during the onset of the Great Depression. Friedman and Schwartz persuaded many, though not all, economists that the Great Depression could have been avoided if the Federal Reserve had acted to prevent that monetary contraction. They persuaded most economists that monetary policy should play a key role in economic management.


Roger Ressmeyer/Corbis


David Sharkbone

Milton Friedman and his co-author Anna Schwartz played a key role in convincing macroeconomists of the importance of monetary policy.

The revival of interest in monetary policy was significant because it suggested that the burden of managing the economy could be shifted away from fiscal policy—meaning that economic management could largely be taken out of the hands of politicians. Fiscal policy, which must involve changing tax rates or government spending, necessarily involves political choices. If the government tries to stimulate the economy by cutting taxes, it must decide whose taxes will be cut. If it tries to stimulate the economy with government spending, it must decide what to spend the money on.

Monetarism asserts that GDP will grow steadily if the money supply grows steadily.

Discretionary monetary policy is the use of changes in the interest rate or the money supply to stabilize the economy.

Monetary policy, in contrast, does not involve such choices: when the central bank cuts interest rates to fight a recession, it cuts everyone's interest rate at the same time. So a shift from relying on fiscal policy to relying on monetary policy makes macroeconomics a more technical, less political issue. In fact, monetary policy in most major economies is set by an independent central bank that is insulated from the political process.

Monetarism

After the publication of *A Monetary History,* Milton Friedman led a movement, called *monetarism,* that sought to eliminate macroeconomic policy activism while maintaining the importance of monetary policy. **Monetarism** asserted that GDP will grow steadily if the money supply grows steadily. The monetarist policy prescription was to have the central bank target a constant rate of growth of the money supply, such as 3% per year, and maintain that target regardless of any fluctuations in the economy.

It's important to realize that monetarism retained many Keynesian ideas. Like Keynes, Friedman asserted that the short run is important and that short-run changes in aggregate demand affect aggregate output as well as aggregate prices. Like Keynes, he argued that policy should have been much more expansionary during the Great Depression.

Monetarists argued, however, that most of the efforts of policy makers to smooth out the business cycle actually make things worse. We have already discussed concerns over the usefulness of *discretionary fiscal policy*—changes in taxes or government spending, or both—in response to the state of the economy. As we explained, government perceptions about the economy often lag behind reality, and there are further lags in changing fiscal policy and in its effects on the economy. As a result, discretionary fiscal policies intended to fight a recession often end up feeding a boom, and vice versa. According to monetarists, **discretionary monetary policy,** changes in the interest rate or the money supply by the central bank in order to stabilize the economy, faces the same problem of lags as fiscal policy, but to a lesser extent.

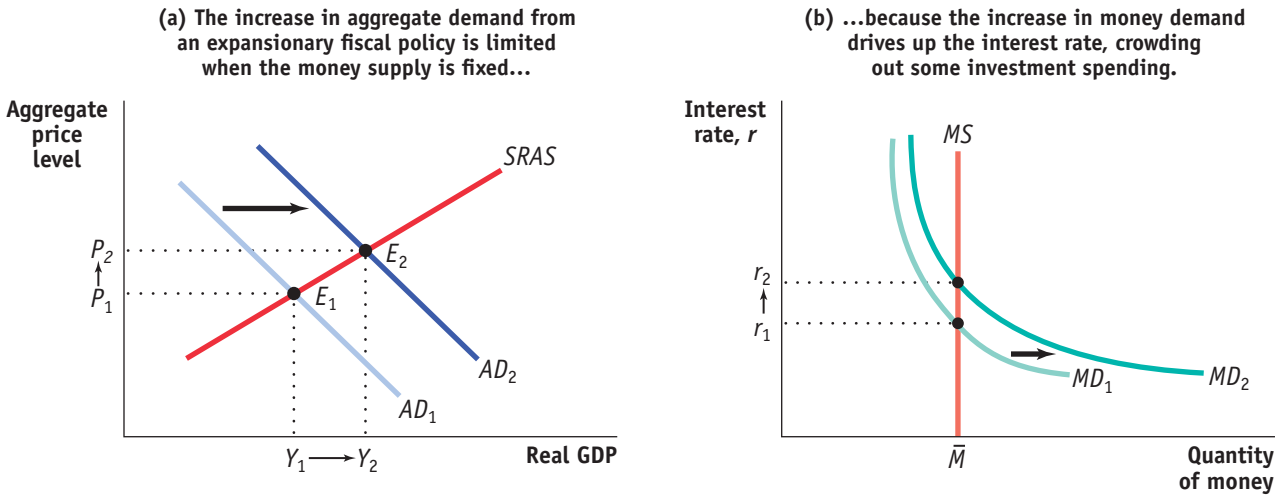
Friedman also argued that if the central bank followed his advice and refused to change the money supply in response to fluctuations in the economy, fiscal policy would be much less effective than Keynesians believed. Earlier we analyzed the phenomenon of *crowding out,* in which government deficits drive up interest rates and lead to reduced investment spending. Friedman and others pointed out that if the money supply is held fixed while the government pursues an expansionary fiscal policy, crowding out will limit the effect of the fiscal expansion on aggregate demand.

Figure 35.2 illustrates this argument. Panel (a) shows aggregate output and the aggregate price level. AD_1 is the initial aggregate demand curve and *SRAS* is the short-run aggregate supply curve. At the initial equilibrium, E_1, the level of aggregate output is Y_1 and the aggregate price level is P_1. Panel (b) shows the money market. *MS* is the money supply curve and MD_1 is the initial money demand curve, so the initial interest rate is r_1.

Now suppose the government increases purchases of goods and services. We know that this will shift the *AD* curve rightward, as illustrated by the shift from AD_1 to AD_2; that aggregate output will rise, from Y_1 to Y_2, and that the aggregate price level will rise, from P_1 to P_2. Both the rise in aggregate output and the rise in the aggregate price level will, however, increase the demand for money, shifting the money demand curve rightward from MD_1 to MD_2. This drives up the equilibrium interest rate to r_2. Friedman's point was that this rise in the interest rate reduces investment spending, partially offsetting the initial rise in government spending. As a result, the rightward shift of the *AD* curve is smaller than multiplier analysis indicates. And Friedman argued that with a constant money supply, the multiplier is so small that there's not much point in using fiscal policy.

But Friedman didn't favor activist monetary policy either. He argued that the problem of time lags that limit the ability of discretionary fiscal policy to stabilize the

figure 35.2 Fiscal Policy with a Fixed Money Supply



In panel (a) an expansionary fiscal policy shifts the *AD* curve rightward, driving up both the aggregate price level and aggregate output. However, this leads to an increase in the demand for money. If the money supply is held fixed, as in panel (b), the increase in money demand drives up the interest rate, reducing investment spending and offsetting part of the fiscal expansion. So the shift of the *AD* curve is less than it would otherwise be: fiscal policy becomes less effective when the money supply is held fixed.

economy also apply to discretionary monetary policy. Friedman's solution was to put monetary policy on "autopilot." The central bank, he argued, should follow a **monetary policy rule,** a formula that determines its actions and leaves it relatively little discretion. During the 1960s and 1970s, most monetarists favored a monetary policy rule of slow, steady growth in the money supply. Underlying this view was the **Quantity Theory of Money,** which relies on the concept of the **velocity of money,** the ratio of nominal GDP to the money supply. Velocity is a measure of the number of times the average dollar bill in the economy turns over per year between buyers and sellers (e.g., I tip the Starbucks barista a dollar, she uses it to buy lunch, and so on). This concept gives rise to the *velocity equation:*

(35-1) $M \times V = P \times Y$

Where M is the money supply, V is velocity, P is the aggregate price level, and Y is real GDP.

Monetarists believed, with considerable historical justification, that the velocity of money was stable in the short run and changed only slowly in the long run. As a result, they claimed, steady growth in the money supply by the central bank would ensure steady growth in spending, and therefore in GDP.

Monetarism strongly influenced actual monetary policy in the late 1970s and early 1980s. It quickly became clear, however, that steady growth in the money supply didn't ensure steady growth in the economy: the velocity of money wasn't stable enough for such a simple policy rule to work. Figure 35.3 shows how events eventually undermined the monetarists' view. The figure shows the velocity of money, as measured by the ratio of nominal GDP to M1, from 1960 to the middle of 2009. As you can see, until 1980, velocity followed a fairly smooth, seemingly predictable trend. After the Fed began to adopt monetarist ideas in the late 1970s and early 1980s, however, the velocity of money began moving erratically—probably due to financial market innovations.

A **monetary policy rule** is a formula that determines the central bank's actions.

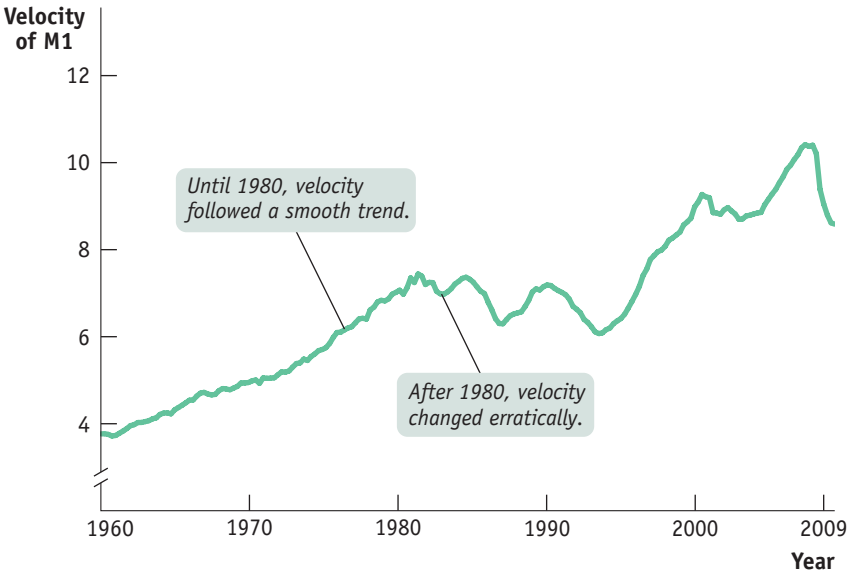
The **Quantity Theory of Money** emphasizes the positive relationship between the price level and the money supply. It relies on the velocity equation ($M \times V = P \times Y$).

The **velocity of money** is the ratio of nominal GDP to the money supply. It is a measure of the number of times the average dollar bill is spent per year.

figure 35.3

The Velocity of Money

From 1960 to 1980, the velocity of money was stable, leading monetarists to believe that steady growth in the money supply would lead to a stable economy. After 1980, however, velocity began moving erratically, undermining the case for traditional monetarism. As a result, traditional monetarism fell out of favor.
Source: Bureau of Economic Analysis; Federal Reserve Bank of St. Louis.



Traditional monetarists are hard to find among today's macroeconomists. As we'll see later, however, the concern that originally motivated the monetarists—that too much discretionary monetary policy can actually destabilize the economy—has become widely accepted.

Inflation and the Natural Rate of Unemployment

At the same time that monetarists were challenging Keynesian views about how macroeconomic policy should be conducted, other economists—some, but not all, monetarists—were emphasizing the limits to what activist macroeconomic policy could achieve.

In the 1940s and 1950s, many Keynesian economists believed that expansionary fiscal policy could be used to achieve full employment on a permanent basis. In the 1960s, however, many economists realized that expansionary policies could cause problems with inflation, but they still believed policy makers could choose to trade off low unemployment for higher inflation even in the long run.

In 1968, however, Edmund Phelps of Columbia University and Milton Friedman, working independently, proposed the concept of the natural rate of unemployment. In Module 34 we saw that the natural rate of unemployment is also the nonaccelerating inflation rate of unemployment, or NAIRU. According to the **natural rate hypothesis,** because inflation is eventually embedded in expectations, to avoid accelerating inflation over time, the unemployment rate must be high enough that the actual inflation rate equals the expected rate of inflation. Attempts to keep the unemployment rate below the natural rate will lead to an ever-rising inflation rate.

The natural rate hypothesis limits the role of activist macroeconomic policy compared to earlier theories. Because the government can't keep unemployment below the natural rate, its task is not to keep unemployment low but to keep it *stable*—to prevent large fluctuations in unemployment in either direction.

According to the **natural rate hypothesis,** to avoid accelerating inflation over time, the unemployment rate must be high enough that the actual inflation rate equals the expected inflation rate.

The Friedman–Phelps hypothesis made a strong prediction: that the apparent trade-off between unemployment and inflation would not survive an extended period of rising prices. Once inflation was embedded in the public's expectations, inflation would continue even in the face of high unemployment. Sure enough, that's exactly what happened in the 1970s. This accurate prediction was one of the triumphs of

macroeconomic analysis, and it convinced the great majority of economists that the natural rate hypothesis was correct. In contrast to traditional monetarism, which declined in influence as more evidence accumulated, the natural rate hypothesis has become almost universally accepted among macroeconomists, with a few qualifications. (Some macroeconomists believe that at very low or negative rates of inflation the hypothesis doesn't work.)

The Political Business Cycle

One final challenge to Keynesian economics focused not on the validity of the economic analysis but on its political consequences. A number of economists and political scientists pointed out that activist macroeconomic policy lends itself to political manipulation.

Statistical evidence suggests that election results tend to be determined by the state of the economy in the months just before the election. In the United States, if the economy is growing rapidly and the unemployment rate is falling in the six months or so before Election Day, the incumbent party tends to be re-elected even if the economy performed poorly in the preceding three years.

This creates an obvious temptation to abuse activist macroeconomic policy: pump up the economy in an election year, and pay the price in higher inflation and/or higher unemployment later. The result can be unnecessary instability in the economy, a **political business cycle** caused by the use of macroeconomic policy to serve political ends.

An often-cited example is the combination of expansionary fiscal and monetary policy that led to rapid growth in the U.S. economy just before the 1972 election and a sharp acceleration in inflation after the election. Kenneth Rogoff, a respected macroeconomist who served as chief economist at the International Monetary Fund, proclaimed Richard Nixon, the president at the time, "the all-time hero of political business cycles."

Justin Sullivan/Getty Images

Election results tend to be determined by the state of the economy in the months just before the election.

One way to avoid a political business cycle is to place monetary policy in the hands of an independent central bank, insulated from political pressure. The political business cycle is also a reason to limit the use of discretionary fiscal policy to extreme circumstances.

Rational Expectations, Real Business Cycles, and New Classical Macroeconomics

As we have seen, one key difference between classical economics and Keynesian economics is that classical economists believed that the short-run aggregate supply curve is vertical, but Keynes emphasized the idea that the aggregate supply curve slopes upward in the short run. As a result, Keynes argued that demand shocks—shifts in the aggregate demand curve—can cause fluctuations in aggregate output.

The challenges to Keynesian economics that arose in the 1950s and 1960s—the renewed emphasis on monetary policy and the natural rate hypothesis—didn't question the view that an increase in aggregate demand leads to a rise in aggregate output in the short run nor that a decrease in aggregate demand leads to a fall in aggregate output in the short run. In the 1970s and 1980s, however, some economists developed an approach to the business cycle known as **new classical macroeconomics,** which returned to the classical view that shifts in the aggregate demand curve affect only the aggregate price level, not aggregate output. The new approach evolved in two steps. First, some economists challenged traditional arguments about the slope of the short-run aggregate supply curve based on the concept of *rational expectations.* Second, some economists suggested that changes in productivity caused economic fluctuations, a view known as *real business cycle theory.*

A **political business cycle** results when politicians use macroeconomic policy to serve political ends.

New classical macroeconomics is an approach to the business cycle that returns to the classical view that shifts in the aggregate demand curve affect only the aggregate price level, not aggregate output.

Rational expectations is the view that individuals and firms make decisions optimally, using all available information.

According to **new Keynesian economics,** market imperfections can lead to price stickiness for the economy as a whole.

Real business cycle theory claims that fluctuations in the rate of growth of total factor productivity cause the business cycle.

Rational Expectations

In the 1970s, a concept known as *rational expectations* had a powerful impact on macroeconomics. **Rational expectations,** a theory originally introduced by John Muth in 1961, is the view that individuals and firms make decisions optimally, using all available information.

For example, workers and employers bargaining over long-term wage contracts need to estimate the inflation rate they expect over the life of that contract. Rational expectations says that in making estimates of future inflation, they won't just look at past rates of inflation; they will also take into account available information about monetary and fiscal policy. Suppose that prices didn't rise last year, but that the monetary and fiscal policies announced by policy makers made it clear to economic analysts that there would be substantial inflation over the next few years. According to rational expectations, long-term wage contracts will be adjusted today to reflect this future inflation, even though prices didn't rise in the past.

Rational expectations can make a major difference to the effects of government policy. According to the original version of the natural rate hypothesis, a government attempt to trade off higher inflation for lower unemployment would work in the short run but would eventually fail because higher inflation would get built into expectations. According to rational expectations, we should remove the word *eventually:* if it's clear that the government intends to trade off higher inflation for lower unemployment, the public will understand this, and expected inflation will immediately rise.

In the 1970s, Robert Lucas of the University of Chicago, in a series of highly influential papers, used this logic to argue that monetary policy can change the level of unemployment only if it comes as a surprise to the public. If his analysis was right, monetary policy isn't useful in stabilizing the economy after all. In 1995 Lucas won the Nobel Prize in economics for this work, which remains widely admired. However, many—perhaps most—macroeconomists, especially those advising policy makers, now believe that his conclusions were overstated. The Federal Reserve certainly thinks that it can play a useful role in economic stabilization.

Why, in the view of many macroeconomists, doesn't the rational expectations hypothesis accurately describe how the economy behaves? **New Keynesian economics,** a set of ideas that became influential in the 1990s, provides an explanation. It argues that market imperfections interact to make many prices in the economy temporarily sticky. For example, one new Keynesian argument points out that monopolists don't have to be too careful about setting prices exactly "right": if they set a price a bit too high, they'll lose some sales but make more profit on each sale; if they set the price too low, they'll reduce the profit per sale but sell more. As a result, even small costs to changing prices can lead to substantial price stickiness and make the economy as a whole behave in a Keynesian fashion.

Over time, new Keynesian ideas combined with actual experience have reduced the practical influence of the rational expectations concept. Nonetheless, the idea of rational expectations served as a useful caution for macroeconomists who had become excessively optimistic about their ability to manage the economy.

Real Business Cycles

Earlier we introduced the concept of *total factor productivity,* the amount of output that can be generated with a given level of factor inputs. Total factor productivity grows over time, but that growth isn't smooth. In the 1980s, a number of economists argued that slowdowns in productivity growth, which they attributed to pauses in technological progress, are the main cause of recessions. **Real business cycle theory** claims that fluctuations in the rate of growth of total factor productivity cause the business cycle. Believing that the aggregate supply curve is vertical, real business cycle theorists attribute the source of business cycles to shifts of the aggregate supply curve: a recession occurs when a slowdown in productivity growth shifts the aggregate supply curve leftward, and a recovery occurs when a pickup in productivity

growth shifts the aggregate supply curve rightward. In the early days of real business cycle theory, the theory's proponents denied that changes in aggregate demand had any effect on aggregate output.

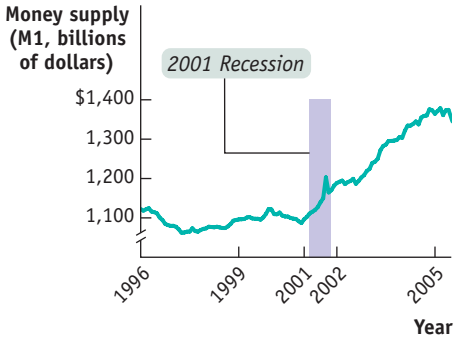
This theory was strongly influential, as shown by the fact that two of the founders of real business cycle theory, Finn Kydland of Carnegie Mellon University and Edward Prescott of the Federal Reserve Bank of Minneapolis, won the 2004 Nobel Prize in economics. The current status of real business cycle theory, however, is somewhat similar to that of rational expectations. The theory is widely recognized as having made valuable contributions to our understanding of the economy, and it serves as a useful caution against too much emphasis on aggregate demand. But many of the real business cycle theorists themselves now acknowledge that their models need an upward-sloping aggregate supply curve to fit the economic data—and that this gives aggregate demand a potential role in determining aggregate output. And as we have seen, policy makers strongly believe that aggregate demand policy has an important role to play in fighting recessions.

Module 35 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. The figure below shows the behavior of M1 before, during, and after the 2001 recession. What would a classical economist have said about the Fed's policy?



2. What would the figure above have looked like if the Fed had been following a monetarist policy since 1996?
3. Now look at Figure 35.3, which shows the path of the velocity of money. What problems do you think the United States would have had since 1996 if the Fed had followed a monetarist policy?
4. In addition to praising aggressive monetary policy, the 2004 Economic Report of the President says that "tax cuts can boost economic activity by raising after-tax income and enhancing incentives to work, save, and invest." Which part is a Keynesian statement and which part is not? Explain your answer.
5. In early 2001, as it became clear that the United States was experiencing a recession, the Fed stated that it would fight the recession with an aggressive monetary policy. By 2004, most observers concluded that this aggressive monetary expansion should be given credit for ending the recession.
   a. What would rational expectations theorists say about this conclusion?
   b. What would real business cycle theorists say?

Tackle the Test: Multiple-Choice Questions

1. Which of the following was an important point emphasized in Keynes's influential work?
   I. In the short run, shifts in aggregate demand affect aggregate output.
   II. Animal spirits are an important determinant of business cycles.
   III. In the long run we're all dead.
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. Which of the following is a central point of monetarism?
   a. Business cycles are associated with fluctuations in money demand.
   b. Activist monetary policy is the best way to address business cycles.
   c. Discretionary monetary policy is effective while discretionary fiscal policy is not.
   d. The Fed should follow a monetary policy rule.
   e. All of the above.
3. The natural rate hypothesis says that the unemployment rate should be
   a. below the NAIRU.
   b. high enough that the actual rate of inflation equals the expected rate.
   c. as close to zero as possible.
   d. 5%.
   e. left wherever the economy sets it.
4. The main difference between the classical model of the price level and Keynesian economics is that
   a. the classical model assumes a vertical short-run aggregate supply curve.
   b. Keynesian economics assumes a vertical short-run aggregate supply curve.
   c. the classical model assumes an upward sloping long-run aggregate supply curve.
   d. Keynesian economics assumes a vertical long-run aggregate supply curve.
   e. the classical model assumes aggregate demand can not change in the long run.
5. That fluctuations in total factor productivity growth cause the business cycle is the main tenet of which theory?
   a. Keynesian
   b. classical
   c. rational expectations
   d. real business cycle
   e. natural rate

Tackle the Test: Free-Response Questions

1. a. According to monetarism, business cycles are associated with fluctuations in what?
   b. Does monetarism advocate discretionary fiscal policy? Discretionary monetary policy?
   c. What monetary policy does monetarism suggest?
   d. What is the velocity equation? Define each of the terms in the velocity equation.
   e. Use the velocity equation to explain the major conclusion of monetarism.
2. For each of the following economic theories, identify its fundamental conclusion.
   a. the classical model of the price level
   b. Keynesian economics
   c. monetarism
   d. the natural rate hypothesis
   e. rational expectations
   f. real business cycle theory

Answer (10 points)

1 point: The money supply

1 point: No

1 point: No

1 point: A monetary policy rule

1 point: $M \times V = P \times Y$

1 point: M is the money supply.

1 point: V is the velocity of money.

1 point: P is the aggregate price level.

1 point: Y is real GDP.

1 point: Since V is stable, a steady growth of M will lead to a steady growth in GDP.

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

- The elements of the modern macroeconomic consensus
- The main remaining disputes

Module 36 The Modern Macroeconomic Consensus

The Modern Consensus

As we've seen, there were intense debates about macroeconomics in the 1960s, 1970s, and 1980s. More recently, however, things have settled down. The age of macroeconomic controversy is by no means over, but there is now a broad consensus about several crucial macroeconomic issues.

To understand the modern consensus, where it came from, and what still remains in dispute, we'll look at how macroeconomists have changed their answers to five key questions about macroeconomic policy. The five questions, and the answers given by macroeconomists over the past 70 years, are summarized in Table 36.1 on the next page. (In the table, new classical economics is subsumed under classical economics, and new Keynesian economics is subsumed under the modern consensus.) Notice that classical macroeconomics said no to each question; basically, classical macroeconomists didn't think macroeconomic policy could accomplish very much. But let's go through the questions one by one.

Is Expansionary Monetary Policy Helpful in Fighting Recessions?

As we've seen, classical macroeconomists generally believed that expansionary monetary policy was ineffective or even harmful in fighting recessions. In the early years of Keynesian economics, macroeconomists weren't against monetary expansion during recessions, but they tended to believe that it was of doubtful effectiveness. Milton Friedman and his followers convinced economists that monetary policy was effective after all.

Nearly all macroeconomists now agree that monetary policy can be used to shift the aggregate demand curve and to reduce economic instability. The classical view that

table **36.1**

Five Key Questions About Macroeconomic Policy

	Classical macroeconomics	Keynesian macroeconomics	Monetarism	Modern consensus
Is expansionary monetary policy helpful in fighting recessions?	No	Not very	Yes	Yes, except in special circumstances
Is expansionary fiscal policy effective in fighting recessions?	No	Yes	No	Yes
Can monetary and/or fiscal policy reduce unemployment in the long run?	No	Yes	No	No
Should fiscal policy be used in a discretionary way?	No	Yes	No	No, except in special circumstances
Should monetary policy be used in a discretionary way?	No	Yes	No	Still in dispute

changes in the money supply affect only aggregate prices, not aggregate output, has few supporters today. The view once held by some Keynesian economists—that changes in the money supply have little effect—has equally few supporters. Now, it is generally agreed that monetary policy is ineffective only in the case of a liquidity trap.

Is Expansionary Fiscal Policy Effective in Fighting Recessions?

Classical macroeconomists were, if anything, even more opposed to fiscal expansion than to monetary expansion. Keynesian economists, on the other hand, gave fiscal policy a central role in fighting recessions. Monetarists argued that fiscal policy was ineffective as long as the money supply was held constant. But that strong view has become relatively rare.

Most macroeconomists now agree that fiscal policy, like monetary policy, can shift the aggregate demand curve. Most macroeconomists also agree that the government should not seek to balance the budget regardless of the state of the economy: they agree that the role of the budget as an automatic stabilizer helps keep the economy on an even keel.

Can Monetary and/or Fiscal Policy Reduce Unemployment in the Long Run?

Classical macroeconomists didn't believe the government could do anything about unemployment. Some Keynesian economists moved to the opposite extreme, arguing that expansionary policies could be used to achieve a permanently low unemployment rate, perhaps at the cost of some inflation. Monetarists believed that unemployment could not be kept below the natural rate.

Almost all macroeconomists now accept the natural rate hypothesis and agree on the limitations of monetary and fiscal policy. They believe that effective monetary and fiscal policy can limit the size of fluctuations of the actual unemployment rate around the natural rate but can't keep unemployment below the natural rate.

Should Fiscal Policy Be Used in a Discretionary Way?

As we've already seen, views about the effectiveness of fiscal policy have gone back and forth, from rejection by classical macroeconomists, to a positive view by Keynesian economists, to a negative view once again by monetarists. Today, most macroeconomists believe

that tax cuts and spending increases are at least somewhat effective in increasing aggregate demand.

Many, but not all, macroeconomists, believe that *discretionary fiscal policy* is usually counterproductive: the lags in adjusting fiscal policy mean that, all too often, policies intended to fight a slump end up intensifying a boom.

As a result, the macroeconomic consensus gives monetary policy the lead role in economic stabilization. Discretionary fiscal policy plays the leading role only in special circumstances when monetary policy is ineffective, such as those facing Japan during the 1990s when interest rates were at or near the zero bound and the economy was in a liquidity trap.

Should Monetary Policy Be Used in a Discretionary Way?

Classical macroeconomists didn't think that monetary policy should be used to fight recessions; Keynesian economists didn't oppose discretionary monetary policy, but they were skeptical about its effectiveness. Monetarists argued that discretionary monetary policy was doing more harm than good. Where are we today? This remains an area of dispute. Today there is a broad consensus among macroeconomists on these points:

- Monetary policy should play the main role in stabilization policy.
- The central bank should be independent, insulated from political pressures, in order to avoid a political business cycle.
- Discretionary fiscal policy should be used sparingly, both because of policy lags and because of the risks of a political business cycle.

There are, however, debates over how the central bank should set its policy. Should the central bank be given a simple, clearly defined target for its policies, or

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Supply-Side Economics

During the 1970s, a group of economic writers began propounding a view of economic policy that came to be known as "supply-side economics." The core of this view was the belief that reducing tax rates, and so increasing the incentives to work and invest, would have a powerful positive effect on the growth rate of potential output. The supply-siders urged the government to cut taxes without worrying about matching spending cuts: economic growth, they argued, would offset any negative effects from budget deficits. Some supply-siders even argued that a cut in tax *rates* would have such a miraculous effect on economic growth that tax *revenues*—the total amount taxpayers pay to the government—would actually rise. That is, some supply-siders argued that the United States was on the wrong side of the *Laffer curve,* a hypothetical relationship between tax rates and total tax revenue that slopes upward (meaning higher taxes bring higher tax revenues) at low tax rates but turns downward (meaning higher taxes bring lower tax revenues) when tax rates are very high.

In the 1970s, supply-side economics was enthusiastically supported by the editors of the *Wall Street Journal* and other figures in the media, and it became popular with politicians. In 1980, Ronald Reagan made supply-side economics the basis of his presidential campaign.

Because supply-side economics emphasizes supply rather than demand, and because the supply-siders themselves are harshly critical of Keynesian economics, it might seem as if supply-side theory belongs in our discussion of new classical macroeconomics. But unlike rational expectations and real business cycle theory, supply-side economics is generally dismissed by economic researchers.

The main reason for this dismissal is lack of evidence. Almost all economists agree that tax cuts increase incentives to work and invest, but attempts to estimate these incentive effects indicate that at current U.S. tax levels they aren't nearly strong enough to support the strong claims made by supply-siders. In particular, the supply-side doctrine implies that large tax cuts, such as those implemented by Ronald Reagan in the early 1980s, should sharply raise potential output. Yet estimates of potential output by the Congressional Budget Office and others show no sign of an acceleration in growth after the Reagan tax cuts.

should it be given discretion to manage the economy as it sees fit? Should the central bank consider the management of asset prices, such as stock prices and real estate prices, part of its responsibility? And what actions should the central bank undertake when interest rates have hit the zero bound and conventional monetary policy has reached its limits?

Central Bank Targets It may sound funny to say this, but it's often not clear exactly what the Federal Reserve, the central bank of the United States, is trying to achieve. Clearly it wants a stable economy with price stability, but there isn't any document setting out the Fed's official view about exactly how stable the economy should be or what the inflation rate should be.

This is not necessarily a bad thing. Experienced staff at the Fed generally believe that the absence of specific guidelines gives the central bank flexibility in coping with economic events and that history proves the Fed uses that flexibility well. In practice, chairs of the Fed tend to stay in office for a long time—William McChesney Martin was chair from 1951 to 1970, and Alan Greenspan, appointed in 1987, served as chair until 2006. These long-serving chairs acquire personal credibility that reassures the public that the central bank's power will be used well.

Andrew Holt/Getty Images

The Bank of England has a mandate to keep inflation at around 2%.

Central banks in some other countries have adopted formal guidelines. Some American economists—including some members of the Federal Reserve Board of Governors—believe that the United States should follow suit. The best-known example of a central bank using formal guidelines is the Bank of England. Until 1997, the Bank of England was simply an arm of the British Treasury Department, with no independence. When it became an independent organization like the Federal Reserve, it was given a mandate to achieve an inflation target of 2.5%. (In 2003, that target was changed to 2%.)

While inflation targeting is now advocated by many macroeconomists, others believe that such a rule can limit the ability of the central bank to respond to events, such as a stock market crash or a world financial crisis.

Unlike the Bank of England, the Fed doesn't have an explicit inflation target. However, it is widely believed to want an inflation rate of about 2%. Once the economy has moved past the current recession and financial crisis, there is likely to be renewed debate about whether the Fed should adopt an explicit inflation target.

Asset Prices During the 1990s, many economists warned that the U.S. stock market was losing touch with reality—share prices were much higher than could be justified given realistic forecasts of companies' future profits. Among these economists was Alan Greenspan, then chair of the Federal Reserve, who warned about "irrational exuberance" in a famous speech. In 2000, the stock market headed downward, taking the economy with it. Americans who had invested in the stock market suddenly felt poorer and so cut back on spending, helping push the economy into a recession.

Seth Joel/Photographer's Choice RF/Getty Images

When the housing market fell in 2006, people began to question whether the central bank should concern itself with extreme movements in asset prices such as homes.

Just a few years later the same thing happened in the housing market, as home prices climbed above levels that were justified by the incomes of home buyers and the cost of renting rather than buying. This time, however, Alan Greenspan dismissed concerns about a bubble as "most unlikely." But it turned out that there was indeed a bubble, which popped in 2006, leading to a financial crisis, and which pushed the economy into yet another recession.

These events highlighted a long-standing debate over monetary policy: should the central bank restrict its concerns to inflation and possibly unemployment, or should it also try to prevent extreme movements in asset prices, such as the average price of stocks or the average price of houses?

One view is that the central bank shouldn't try to second-guess the value investors place on assets like stocks or houses, even if it suspects that those prices are getting out of line. That is, the central bank shouldn't raise interest rates to curb stock prices or housing prices if overall consumer price inflation remains low. If an overvalued stock market eventually falls and depresses aggregate demand, the central bank can deal with that by cutting interest rates.

The alternative view warns that after a bubble bursts—after overvalued asset prices fall to earth—it may be difficult for monetary and fiscal policy to offset the effects on aggregate demand. After having seen the Japanese economy struggle for years with deflation in the aftermath of the collapse of its bubble economy, proponents of this view argue that the central bank should act to rein in irrational exuberance when it is happening, even if consumer price inflation isn't a problem.

The 2001 recession and the recession that started in 2007 gave ammunition to both sides in this debate, which shows no sign of ending.

Unconventional Monetary Policies In 2008, responding to a growing financial crisis, the Federal Reserve began engaging in highly unconventional monetary policy. The Fed normally conducts monetary policy through open-market operations in which it buys and sells short-term U.S. government debt in order to influence interest rates. We have also seen that in 2008, faced with severe problems in the financial markets, the Fed vastly expanded its operations. It lent huge sums to a wide variety of financial institutions, and it began large-scale purchases of private assets, including commercial paper (short-term business debts) and assets backed by home mortgages.

These actions and similar actions by other central banks, such as the Bank of Japan, were controversial. Supporters of the moves argued that extraordinary action was necessary to deal with the financial crisis and to cope with the liquidity trap that the economy had fallen into. But skeptics questioned both the effectiveness of the moves and whether the Fed was taking on dangerous risks. However, with interest rates up against the zero bound, it's not clear that the Fed had any other alternative but to turn unconventional. Future attitudes toward unconventional monetary policy will probably depend on how the Fed's efforts play out.

The Clean Little Secret of Macroeconomics

It's important to keep the debates we have just described in perspective. Macroeconomics has always been a contentious field, much more so than microeconomics. There will always be debates about appropriate policies. But the striking thing about current debates is how modest the differences among macroeconomists really are. The clean little secret of modern macroeconomics is how much consensus economists have reached over the past 70 years.

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After the Bubble

In the 1990s, many economists worried that stock prices were irrationally high, and these worries proved justified. Starting in 2000, the NASDAQ, an index made up largely of technology stocks, began declining, ultimately losing two-thirds of its peak value. And in 2001 the plunge in stock prices helped push the United States into recession.

The Fed responded with large, rapid interest rate cuts. But should it have tried to burst the stock bubble when it was happening?

Many economists expected the aftermath of the 1990s stock market bubble to settle, once and for all, the question of whether central banks should concern themselves about asset prices. But the test results came out ambiguous, failing to settle the issue.

If the Fed had been unable to engineer a recovery—if the U.S. economy had slid into a liquidity trap like that of Japan—critics of the Fed's previous inaction would have had a very strong case. But the recession was, in fact, short: the National Bureau of Economic Research says that the recession began in March 2001 and ended in November 2001.

Furthermore, if the Fed had been able to produce a quick, strong recovery, its inaction during the 1990s would have been strongly vindicated. Unfortunately, that didn't happen either. Although the economy began recovering in late 2001, the recovery was initially weak—so weak that employment continued to drop until the summer of 2003. Also, the fact that the Fed had to cut the federal funds rate to only 1%—uncomfortably close to 0%—suggested that the U.S. economy had come dangerously close to a liquidity trap.

In other words, the events of 2001–2003 probably intensified the debate over monetary policy and asset prices, rather than resolving it.

Module 36 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. What debates has the modern consensus resolved? What debates has it not resolved?

Tackle the Test: Multiple-Choice Questions

1. Which of the following is an example of an opinion on which economists have reached a broad consensus?
   I. The natural rate hypothesis holds true.
   II. Discretionary fiscal policy is usually counterproductive.
   III. Monetary policy is effective, especially in a liquidity trap.
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. In the first FYI box of this module (p. 357) you learned about supply-side economics. Which of the following is stressed by supply siders?
   a. Taxes should be increased.
   b. Lower taxes will lead to lower tax revenues.
   c. It is important to increase incentives to work, save, and invest.
   d. The economy operates on the upward-sloping section of the Laffer curve.
   e. Supply side views are widely supported by empirical evidence.
3. Which of the following is true regarding central bank targets?
   a. The Fed has an explicit inflation target.
   b. All central banks have explicit inflation targets.
   c. No central banks have explicit inflation targets.
   d. The Fed clearly does not have an implicit inflation target.
   e. Economists are split regarding the need for explicit inflation targets.
4. The Fed's main concerns are
   a. inflation and unemployment.
   b. inflation and asset prices.
   c. inflation, asset prices, and unemployment.
   d. asset prices and unemployment.
   e. inflation and the value of the dollar.
5. The "clean little secret of macroeconomics" is that
   a. microeconomics is even more contentious than macroeconomics.
   b. debate among macroeconomists has ended.
   c. economists have reached a significant consensus.
   d. macroeconomics has progressed much more than microeconomics in the past 70 years.
   e. economists have identified how to prevent future business cycles.

Tackle the Test: Free-Response Questions

1. What is the consensus view of macroeconomists on each of the following:
   a. monetary policy and aggregate demand
   b. when monetary policy is ineffective
   c. fiscal policy and aggregate demand
   d. a balanced budget mandate
   e. the effectiveness of discretionary fiscal policy

Answer (5 points)

1 point: Monetary policy can shift aggregate demand in the short run.

1 point: Monetary policy is ineffective when in a liquidity trap.

1 point: Fiscal policy can shift aggregate demand.

1 point: This is not a good idea. Fluctuations in the budget act as an automatic stabilizer for the economy.

1 point: It is usually counterproductive (for example, due to lags in implementation).

2. On the basis of the description of the Laffer curve in the FYI box on supply-side economics on page 357, draw a correctly labeled graph of the Laffer curve. Use an "x" to identify a point on the curve at which a reduction in tax rates would lead to increased tax revenue.

Section 6 Review

Summary

1. Some of the fluctuations in the budget balance are due to the effects of the business cycle. In order to separate the effects of the business cycle from the effects of discretionary fiscal policy, governments estimate the **cyclically adjusted budget balance,** an estimate of the budget balance if the economy were at potential output.
2. U.S. government budget accounting is calculated on the basis of **fiscal years.** Persistent budget deficits have long-run consequences because they lead to an increase in **public debt.** This can be a problem for two reasons. Public debt may crowd out investment spending, which reduces long-run economic growth. And in extreme cases, rising debt may lead to government default, resulting in economic and financial turmoil.
3. A widely used measure of fiscal health is the **debt–GDP ratio.** This number can remain stable or fall even in the face of moderate budget deficits if GDP rises over time. However, a stable debt–GDP ratio may give a misleading impression that all is well because modern governments often have large **implicit liabilities.** The largest implicit liabilities of the U.S. government come from Social Security, Medicare, and Medicaid, the costs of which are increasing due to the aging of the population and rising medical costs.
4. **Expansionary monetary policy** reduces the interest rate by increasing the money supply. This increases investment spending and consumer spending, which in turn increases aggregate demand and real GDP in the short run. **Contractionary monetary policy** raises the interest rate by reducing the money supply. This reduces investment spending and consumer spending, which in turn reduces aggregate demand and real GDP in the short run.
5. The Federal Reserve and other central banks try to stabilize their economies, limiting fluctuations of actual output to around potential output, while also keeping inflation low but positive. Under the **Taylor rule for monetary policy,** the target interest rate rises when there is inflation, or a positive output gap, or both; the target interest rate falls when inflation is low or negative, or when the output gap is negative, or both. Some central banks engage in **inflation targeting,** which is a forward-looking policy rule, whereas the Taylor rule is a backward-looking policy rule. In practice, the Fed appears to operate on a loosely defined version of the Taylor rule. Because monetary policy is subject to fewer implementation lags than fiscal policy, it is the preferred policy tool for stabilizing the economy.
6. In the long run, changes in the money supply affect the aggregate price level but not real GDP or the interest rate. Data show that the concept of **monetary neutrality** holds: changes in the money supply have no real effect on the economy in the long run.
7. In analyzing high inflation, economists use the **classical model of the price level,** which says that changes in the money supply lead to proportional changes in the aggregate price level even in the short run.
8. Governments sometimes print money in order to finance budget deficits. When they do, they impose an **inflation tax,** generating tax revenue equal to the inflation rate times the money supply, on those who hold money. Revenue from the real inflation tax, the inflation rate times the real money supply, is the real value of resources captured by the government. In order to avoid paying the inflation tax, people reduce their real money holdings and force the government to increase inflation to capture the same amount of real inflation tax revenue. In some cases, this leads to a vicious circle of a shrinking real money supply and a rising rate of inflation, leading to hyperinflation and a fiscal crisis.
9. A positive output gap is associated with lower-than-normal unemployment; a negative output gap is associated with higher-than-normal unemployment.
10. Countries that don't need to print money to cover government deficits can still stumble into moderate inflation, either because of political opportunism or because of wishful thinking.
11. At a given point in time, there is a downward-sloping relationship between unemployment and inflation known as the **short-run Phillips curve.** This curve is shifted by changes in the expected rate of inflation. The **long-run Phillips curve,** which shows the relationship between unemployment and inflation once expectations have had time to adjust, is vertical. It defines the **nonaccelerating inflation rate of unemployment,** or **NAIRU,** which is equal to the natural rate of unemployment.
12. Once inflation has become embedded in expectations, getting inflation back down can be difficult because **disinflation** can be very costly, requiring the sacrifice of large amounts of aggregate output and imposing high levels of unemployment. However, policy makers in the United States and other wealthy countries were willing to pay that price of bringing down the high inflation of the 1970s.

13. Deflation poses several problems. It can lead to **debt deflation,** in which a rising real burden of outstanding debt intensifies an economic downturn. Also, interest rates are more likely to run up against the **zero bound** in an economy experiencing deflation. When this happens, the economy enters a **liquidity trap,** rendering conventional monetary policy ineffective.
14. Classical macroeconomics asserted that monetary policy affected only the aggregate price level, not aggregate output, and that the short run was unimportant. By the 1930s, measurement of business cycles was a well-established subject, but there was no widely accepted theory of business cycles.
15. **Keynesian economics** attributed the business cycle to shifts of the aggregate demand curve, often the result of changes in business confidence. Keynesian economics also offered a rationale for **macroeconomic policy activism.**
16. In the decades that followed Keynes's work, economists came to agree that monetary policy as well as fiscal policy is effective under certain conditions. **Monetarism** is a doctrine that called for a **monetary policy rule** as opposed to **discretionary monetary policy.** The argument of monetarists—based on a belief that the **velocity of money** was stable—that GDP would grow steadily if the money supply grew steadily, was influential for a time but was eventually rejected by many macroeconomists.
17. The **natural rate hypothesis** became almost universally accepted, limiting the role of macroeconomic policy to stabilizing the economy rather than seeking a permanently low unemployment rate. Fears of a **political business cycle** led to a consensus that monetary policy should be insulated from politics.
18. **Rational expectations** suggests that even in the short run there might not be a tradeoff between inflation and unemployment because expected inflation would change immediately in the face of expected changes in policy. **Real business cycle theory** claims that changes in the rate of growth of total factor productivity are the main cause of business cycles. Both of these versions of **new classical macroeconomics** received wide attention and respect, but policy makers and many economists haven't accepted the conclusion that monetary and fiscal policy are ineffective in changing aggregate output.
19. **New Keynesian economics** argues that market imperfections can lead to price stickiness, so that changes in aggregate demand have effects on aggregate output after all.
20. The modern consensus is that monetary and fiscal policy are both effective in the short run but that neither can reduce the unemployment rate in the long run. Discretionary fiscal policy is considered generally unadvisable, except in special circumstances.
21. There are continuing debates about the appropriate role of monetary policy. Some economists advocate the explicit use of an inflation target, but others oppose it. There's also a debate about whether monetary policy should take steps to manage asset prices and what kind of unconventional monetary policy, if any, should be adopted to address a liquidity trap.

Key Terms

Cyclically adjusted budget balance, p. 298
Fiscal year, p. 300
Public debt, p. 300
Debt–GDP ratio, p. 301
Implicit liabilities, p. 303
Target federal funds rate, p. 307
Expansionary monetary policy, p. 310
Contractionary monetary policy, p. 310
Taylor rule for monetary policy, p. 311
Inflation targeting, p. 312
Monetary neutrality, p. 317
Classical model of the price level, p. 322
Inflation tax, p. 325
Cost-push inflation, p. 327
Demand-pull inflation, p. 327
Short-run Phillips curve, p. 331
Nonaccelerating inflation rate of unemployment (NAIRU), p. 336
Long-run Phillips curve, p. 336
Debt deflation, p. 339
Zero bound, p. 339
Liquidity trap, p. 339
Macroeconomic policy activism, p. 346
Monetarism, p. 348
Discretionary monetary policy, p. 348
Monetary policy rule, p. 349
Quantity Theory of Money, p. 349
Velocity of money, p. 349
Natural rate hypothesis, p. 350
Political business cycle, p. 351
New classical macroeconomics, p. 351
Rational expectations, p. 352
New Keynesian economics, p. 352
Real business cycle theory, p. 352

Problems

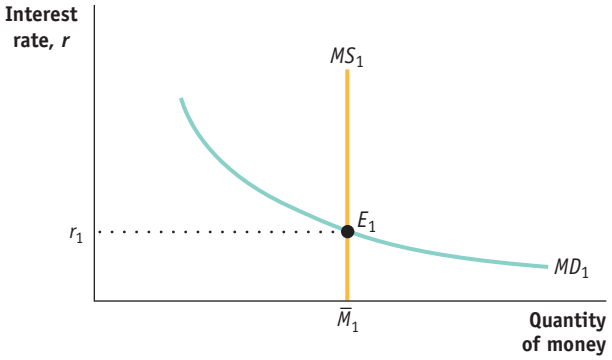
1. The government's budget surplus in Macroland has risen consistently over the past five years. Two government policy makers disagree as to why this has happened. One argues that a rising budget surplus indicates a growing economy; the other argues that it shows that the government is using contractionary fiscal policy. Can you determine which policy maker is correct? If not, why not?

2. You are an economic adviser to a candidate for national office. She asks you for a summary of the economic consequences of a balanced-budget rule for the federal government and for your recommendation on whether she should support such a rule. How do you respond?

3. In which of the following cases does the size of the government's debt and the size of the budget deficit indicate potential problems for the economy?
   a. The government's debt is relatively low, but the government is running a large budget deficit as it builds a high-speed rail system to connect the major cities of the nation.
   b. The government's debt is relatively high due to a recently ended deficit-financed war, but the government is now running only a small budget deficit.
   c. The government's debt is relatively low, but the government is running a budget deficit to finance the interest payments on the debt.

4. Unlike households, governments are often able to sustain large debts. For example, in September 2007, the U.S. government's total debt reached $9 trillion, approximately 64% of GDP. At the time, according to the U.S. Treasury, the average interest rate paid by the government on its debt was 5.0%. However, running budget deficits becomes hard when very large debts are outstanding.
   a. Calculate the dollar cost of the annual interest on the government's total debt assuming the interest rate and debt figures cited above.
   b. If the government operates on a balanced budget before interest payments are taken into account, at what rate must GDP grow in order for the debt–GDP ratio to remain unchanged?
   c. Calculate the total increase in national debt if the government incurs a deficit of $200 billion in fiscal year 2008. Assume that the only other change to the government's total debt arises from interest payments on the current debt of $9 trillion.
   d. At what rate must GDP grow in order for the debt–GDP ratio to remain unchanged when the deficit in fiscal year 2008 is $200 billion?
   e. Why is the debt–GDP ratio the preferred measure of a country's debt rather than the dollar value of the debt? Why is it important for a government to keep this number under control?

5. In the economy of Eastlandia, the money market is initially in equilibrium when the economy begins to slide into a recession.
   a. Using the accompanying diagram, explain what will happen to the interest rate if the central bank of Eastlandia keeps the money supply constant at $\overline{M}_1$.



   b. If the central bank is instead committed to maintaining an interest rate target of r_1, then as the economy slides into recession, how should the central bank react? Using your diagram from part a, demonstrate the central bank's reaction.

6. Continuing from equilibrium E_1 in the previous problem, now suppose that in the economy of Eastlandia the central bank decides to decrease the money supply.
   a. Using the diagram in problem 5, explain what will happen to the interest rate in the short run.
   b. What will happen to the interest rate in the long run?

7. An economy is in long-run macroeconomic equilibrium with an unemployment rate of 5% when the government passes a law requiring the central bank to use monetary policy to lower the unemployment rate to 3% and keep it there. How could the central bank achieve this goal in the short run? What would happen in the long run? Illustrate with a diagram.

8. In the following examples, would the classical model of the price level be relevant?
   a. There is a great deal of unemployment in the economy and no history of inflation.
   b. The economy has just experienced five years of hyperinflation.
   c. Although the economy experienced inflation in the 10% to 20% range three years ago, prices have recently been stable and the unemployment rate has approximated the natural rate of unemployment.

9. Answer the following questions about the (real) inflation tax, assuming that the price level starts at 1.
   a. Maria Moneybags keeps $1,000 in her sock drawer for a year. Over the year, the inflation rate is 10%. What is the real inflation tax paid by Maria for this year?

b. Maria continues to keep the $1,000 in her drawer for a second year. What is the real value of this $1,000 at the beginning of the second year? Over the year, the inflation rate is again 10%. What is the real inflation tax paid by Maria for the second year?

c. For a third year, Maria keeps the $1,000 in the drawer. What is the real value of this $1,000 at the beginning of the third year? Over the year, the inflation rate is again 10%. What is the real inflation tax paid by Maria for the third year?

d. After three years, what is the cumulative real inflation tax paid?

e. Redo parts a through d with an inflation rate of 25%. Why is hyperinflation such a problem?

10. Concerned about the crowding-out effects of government borrowing on private investment spending, a candidate for president argues that the United States should just print money to cover the government's budget deficit. What are the advantages and disadvantages of such a plan?

11. The accompanying table provides data from the United States on the average annual rates of unemployment and inflation. Use the numbers to construct a scatter plot similar to Figure 34.1. Discuss why, in the short run, the unemployment rate rises when inflation falls.

Year	Unemployment rate	Inflation rate
2000	4.0%	3.4%
2001	4.7	2.8
2002	5.8	1.6
2003	6.0	2.3
2004	5.5	2.7
2005	5.1	3.4
2006	4.6	3.2
2007	4.6	2.9

Source: IMF.

12. In the modern world, central banks are free to increase or reduce the money supply as they see fit. However, some people harken back to the "good old days" of the gold standard. Under the gold standard, the money supply could expand only when the amount of available gold increased.

a. Under the gold standard, if the velocity of money was stable when the economy was expanding, what would have had to happen to keep prices stable?

b. Why would modern macroeconomists consider the gold standard a bad idea?

13. Monetarists believed for a period of time that the velocity of money was stable within a country. However, with financial innovation, the velocity began shifting around erratically after 1980. As would be expected, the velocity of money is different across countries depending upon the sophistication of their financial systems—velocity of money tends to be higher in countries with developed financial systems. The accompanying table provides money supply and GDP information in 2005 for six countries.

Country	National currency	M1 (billions in national currency)	Nominal GDP (billions in national currency)
Egypt	Egyptian pounds	101	539
South Korea	Korean won	77,274	806,622
Thailand	Thai baht	863	7,103
United States	U.S. dollars	1,369	12,456
Kenya	Kenyan pounds	231	1,415
India	Indian rupees	7,213	35,314

Source: Datastream.

a. Calculate the velocity of money for each of the countries. The accompanying table shows GDP per capita for each of these countries in 2005 in U.S. dollars.

Country	Nominal GDP per capita (U.S. dollars)
Egypt	$1,270
South Korea	16,444
Thailand	2,707
United States	41,886
Kenya	572
India	710

Source: IMF.

b. Rank the countries in descending order of per capita income and velocity of money. Do wealthy countries or poor countries tend to "turn over" their money more times per year? Would you expect that wealthy countries have more sophisticated financial systems?

14. Module 35 explains that Kenneth Rogoff proclaimed Richard Nixon "the all-time hero of political business cycles." Using the table of data below from the Economic Report of the President, explain why Nixon may have earned that title. (*Note:*

Nixon entered office in January 1969 and was reelected in November 1972. He resigned in August 1974.)

Year	Government receipts (billions of dollars)	Government spending (billions of dollars)	Government budget balance (billions of dollars)	M1 growth	M2 growth	3-month Treasury bill rate
1969	$186.9	$183.6	$3.2	3.3%	3.7%	6.68%
1970	192.8	195.6	–2.8	5.1	6.6	6.46
1971	187.1	210.2	–23.0	6.5	13.4	4.35
1972	207.3	230.7	–23.4	9.2	13.0	4.07
1973	230.8	245.7	–14.9	5.5	6.6	7.04

15. The economy of Albernia is facing a recessionary gap, and the leader of that nation calls together five of its best economists representing the classical, Keynesian, monetarist, real business cycle, and modern consensus views of the macroeconomy. Explain what policies each economist would recommend and why.

16. Which of the following policy recommendations, if any, are consistent with the classical, Keynesian, monetarist, and/or modern consensus views of the macroeconomy?

a. Since the long-run growth of GDP is 2%, the money supply should grow at 2%.

b. Decrease government spending in order to decrease inflationary pressure.

c. Increase the money supply in order to alleviate a recessionary gap.

d. Always maintain a balanced budget.

e. Decrease the budget deficit as a percent of GDP when facing a recessionary gap.

17. Using a set of graphs as in Figure 35.2, show how a monetarist can argue that a contractionary fiscal policy may not lead to the desired fall in real GDP given a fixed money supply. Explain.