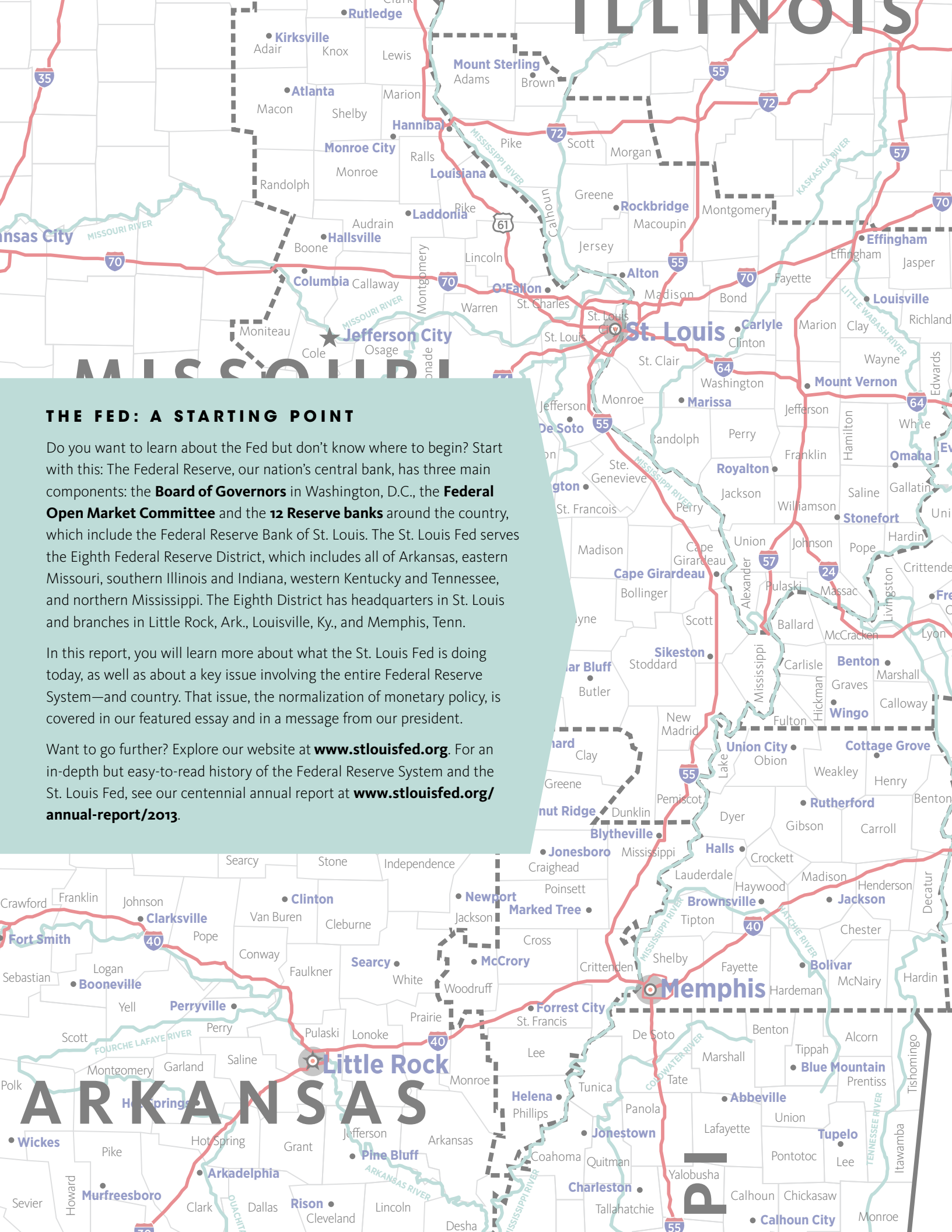




The Road to Normal

NEW DIRECTIONS IN MONETARY POLICY

FEDERAL RESERVE BANK OF ST. LOUIS
ANNUAL REPORT 2015



THE FED: A STARTING POINT

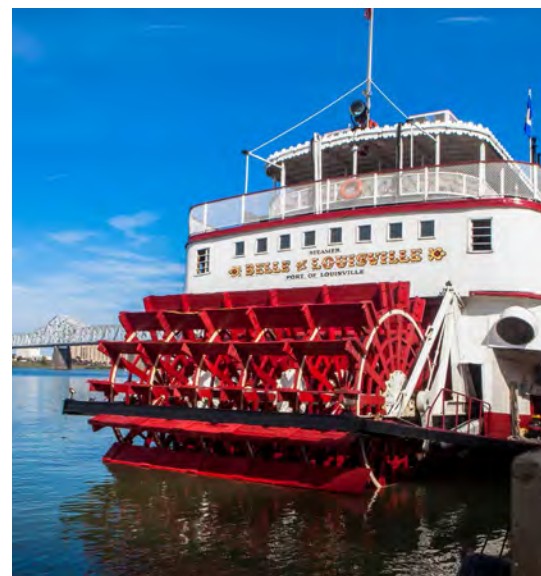
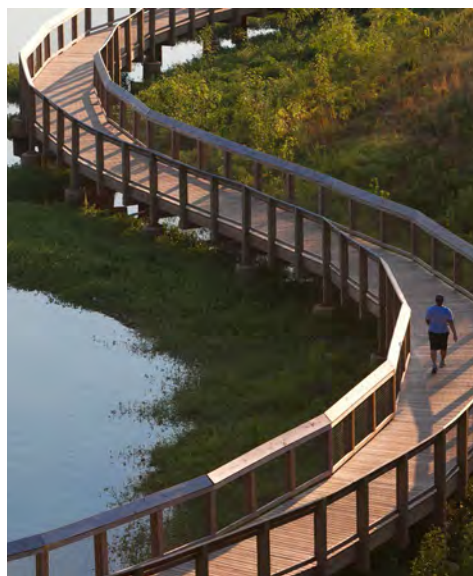
Do you want to learn about the Fed but don't know where to begin? Start with this: The Federal Reserve, our nation's central bank, has three main components: the **Board of Governors** in Washington, D.C., the **Federal Open Market Committee** and the **12 Reserve banks** around the country, which include the Federal Reserve Bank of St. Louis. The St. Louis Fed serves the Eighth Federal Reserve District, which includes all of Arkansas, eastern Missouri, southern Illinois and Indiana, western Kentucky and Tennessee, and northern Mississippi. The Eighth District has headquarters in St. Louis and branches in Little Rock, Ark., Louisville, Ky., and Memphis, Tenn.

In this report, you will learn more about what the St. Louis Fed is doing today, as well as about a key issue involving the entire Federal Reserve System—and country. That issue, the normalization of monetary policy, is covered in our featured essay and in a message from our president.

Want to go further? Explore our website at www.stlouisfed.org. For an in-depth but easy-to-read history of the Federal Reserve System and the St. Louis Fed, see our centennial annual report at www.stlouisfed.org/annual-report/2013.

Annual Report 2015

FEDERAL RESERVE BANK OF ST. LOUIS



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The Road to Normal

NECESSARY, EVEN IF WE GO IT ALONE

Until about seven years ago, the U.S. had not seen short-term nominal interest rates basically at zero since the Great Depression and World War II.¹ Historically, macroeconomists looked at that era as an aberration—a situation that was not the normal state of affairs for either the U.S. economy or most economies around the world. But that view is now challenged. Recent encounters with zero rates here in the U.S. and around the globe suggest that zero-interest-rate environments are long-lasting and that the macroeconomic experience in a zero-rate environment is not particularly good. Returning to a macroeconomic equilibrium that includes somewhat higher nominal interest rates may lead to better outcomes for the U.S. economy.

CONTINUED ON NEXT PAGE



James Bullard

During the 2007-2009 crisis, the Federal Open Market Committee (FOMC) set a target range for the federal funds rate at 0-0.25 percent. It remained there from December 2008 to December 2015, when the FOMC increased the target range by 25 basis points (to 0.25-0.5 percent). This step is ideally the first of many steps in the process of normalizing U.S. monetary policy.

From a global perspective, however, normalization is not occurring. While the U.S. has started increasing interest rates, most of the other major economies outside of China are still at zero (or even at negative

that economic conditions will evolve in a manner that will warrant only gradual increases in the federal funds rate; the federal funds rate is likely to remain, for some time, below levels that are expected to prevail in the longer run.”³ Furthermore, the FOMC has stated that it expects to wait until normalization is well-underway before starting to normalize the Fed’s balance sheet, which increased from about \$800 billion in 2006 to about \$4.5 trillion due to the Fed’s QE programs. (As a result of the exceptionally large balance sheet, the Fed has had to change tactics on how it operates in short-term interest rate markets. See the main essay in this annual report for more details.)

Why is normalization expected to take so long, and why isn’t the world normalizing monetary policy along with the Fed? The lack of inflation pressure helps address both questions. Inflation has been very low in the U.S. and in other major industrialized economies that are part of the Group of Seven (G-7), in part because of a commodity cycle in which energy prices have declined dramatically since mid-2014. Low inflation has been the major surprise of the era, given that central banks in these countries have implemented zero-interest rates and other supplemental types of monetary policy. Why higher inflation has not occurred so far despite these aggressive monetary policies is a topic of debate, causing macroeconomists to revisit their models.

But with inflation still low, one might ask, “Why normalize at all?” Although headline inflation remains low, inflation net of the decline in oil prices is reasonably close to the Fed’s 2 percent target. Moreover, forecasts suggest that headline inflation will move back to the target once oil prices stabilize. On the employment side of the Fed’s dual mandate, labor markets are now close to normal. Thus, a key reason for normalizing policy is that the FOMC’s goals regarding inflation and employment have essentially been met, while the policy settings remain far from normal.

Another reason to normalize is that staying at zero could cause distortions in the economy. For example, a major bubble in asset prices could result, and if the

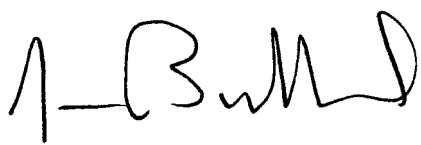
“Why is normalization expected to take so long, and why isn’t the world normalizing monetary policy along with the Fed? The lack of inflation pressure helps address both questions.”

interest rates) and are not planning to come off zero anytime soon. In fact, in addition to low interest rate policies, the European Central Bank is currently in the middle of an aggressive quantitative easing (QE) program, as is the Bank of Japan. If one believes that global markets are well-integrated, then global interest rates overall likely will remain close to zero for a long time.

Even if the Fed continues to raise interest rates, U.S. monetary policy will remain exceptionally accommodative through the medium term. In addition to stressing that policy decisions will be data-dependent,² the FOMC’s statement following its Dec. 16, 2015, meeting said, “The Committee expects

bubble bursts, a recession could follow—much like we saw during the mid-2000s. A second example of a distortion is that the very low rates of return on saving may be creating disincentives for saving. Tilting policy toward borrowers for such a long period of time, however, may not be optimal. Furthermore, the low returns on saving are hurting retirees and others who are counting on that income.⁴

A third reason for wanting to normalize policy goes back to the U.S. experience during 1984-2007. The U.S. had long expansions and relatively mild recessions then. That era was characterized by less volatility and faster growth than occurred in the 1970s. In addition, monetary policy was relatively well-understood in the 1984-2007 period, and policy was adjusted in both directions in response to economic shocks. In short, the U.S. macroeconomic equilibrium during that period—when nominal interest rates were higher—was associated with good economic outcomes. If we are unable to return to such a situation, it would be unclear how monetary policy would be implemented and what the new equilibrium would look like, specifically in terms of macroeconomic volatility.⁵ Prudent monetary policy, therefore, suggests moving monetary policy settings closer to normal.



James Bullard
President and CEO

ENDNOTES

- 1 The rate on three-month Treasury bills was near zero for much of the 1930s and early 1940s and was pegged at 3/8 percent from early 1942 to July 1947. See Carlson, Mark; Eggertsson, Gauti; and Mertens, Elmar. “Federal Reserve Experiences with Very Low Interest Rates: Lessons Learned,” FOMC Memo Dec. 5, 2008, at www.federalreserve.gov/monetarypolicy/files/FOMC20081212memo02.pdf.
- 2 For more on data dependency, see my column in the January 2016 issue of *The Regional Economist*, “What Does Data Dependence Mean?” at www.stlouisfed.org/publications/regional-economist/january-2016/what-does-data-dependence-mean, and in the January 2015 issue, “Liftoff: A Comparison of Two Normalization Cycles,” at www.stlouisfed.org/publications/regional-economist/january-2015/presidents-message.
- 3 See the FOMC statement on Dec. 16, 2015, at www.federalreserve.gov/newsevents/press/monetary/20151216a.htm.
- 4 See also my speech on June 26, 2014, “Income Inequality and Monetary Policy: A Framework with Answers to Three Questions,” at www.stlouisfed.org/~media/Files/PDFs/Bullard/remarks/Bullard_CFR_26June2014_Final.pdf.
- 5 For more discussion, see my speech on Nov. 12, 2015, “Permazero,” at www.stlouisfed.org/~media/Files/PDFs/Bullard/remarks/Bullard-Permazero-Cato-12Nov2015.pdf.



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FEATURED ESSAY

The Road to Normal

NEW DIRECTIONS IN MONETARY POLICY

By Stephen Williamson

Decisions made by the Federal Reserve System (the Fed) about monetary policy matter in important ways for all people living in the United States. Indeed, because of the size of the U.S. economy and the close financial ties between the U.S. and the rest of the world, the stance of Fed monetary policy matters for everyone on the globe.

The important role of the Fed in affecting economic outcomes for all U.S. residents was recognized in the Employment Act of 1946 and a 1978 amendment to that act (often called the Humphrey-Hawkins amendment). Congress assigned the Fed a dual mandate: to achieve “price stability” and “maximum employment.” In its Statement of Longer-Run Goals and Monetary Policy Strategy, the Federal Open Market Committee—or the FOMC, the main policymaking body of the Fed—stated that its goal, consistent with its price stability mandate, is an annual 2 percent rate of inflation, as measured by the rate of change in the **personal consumption expenditures (PCE) deflator**. Maximum employment is evaluated more broadly: A range of labor market and other indicators is considered, including the unemployment rate, employment growth and the growth rate in real gross domestic product (GDP).

Conventionally, the Fed acts to set a target for the **federal funds rate**—a very short-term interest rate (on overnight borrowing between financial institutions); to achieve the target, the Fed intervenes in financial markets by issuing money—reserves and currency—in exchange for U.S. Treasury securities. The federal funds rate, or fed funds rate, then affects all interest rates, including those on U.S. Treasury debt, mortgages, corporate bonds, credit cards and auto loans. Thus, conventional monetary policy has a direct

effect on all creditors and debtors—millions of households and businesses in the U.S. economy—simply through the effects of Fed actions on interest rates.

But there are additional effects. In controlling market interest rates, the Fed also influences aggregate spending, employment and inflation. Some of these effects are only temporary; some last for a long time. For example, there is wide agreement among economists that the effects of monetary policy on employment and the total output of goods and services produced and sold in the U.S. are only temporary—perhaps extending at most over a couple of years. But monetary policy can control inflation not just in the short run but also in the long run.

In response to the global financial crisis and the unusually slow recovery from the ensuing Great Recession, the Fed engaged in some unconventional monetary policies. These unusual policies consisted of a long period of close-to-zero interest rates, **forward guidance** and **quantitative easing**. Currently, the fed funds rate is much lower than it would be if the Fed were responding to macroeconomic conditions in the same way as it was prior to the Great Recession. As well, the Fed’s balance sheet is more than five times its size at the onset of the Great Recession, as the result of quantitative easing.

At its December 2015 meeting, the Fed embarked on a program of monetary policy normalization. What was abnormal about the policies of the previous seven or eight years? What exactly does normalization entail, and how long will it take? How will people be affected by normalization? The purpose of this article is to answer these questions and to ultimately weigh the arguments for and against normalization.

The Origins of Unconventional Monetary Policy in the U.S.

The Great Recession, dating from late 2007 to mid-2009, is generally understood as originating from severe disruption in the financial sector. Incentive problems in the mortgage market, created primarily by defects in the U.S. financial regulatory structure, led to the global financial crisis in late 2007 through

For definitions of terms in bold, see the **Glossary** on pp. 21-22.

early 2009. The crisis manifested itself in a collapse in the prices of U.S. real estate, which led to mortgage defaults and dysfunction in the financial markets that were closely tied to those mortgages. These markets were principally in **mortgage-backed securities (MBS)**, which used those securities as collateral, and in derivatives. Financial distress spread through tightly connected worldwide financial markets, culminating in the failure of Lehman Brothers and the near-collapse of other large U.S. financial institutions in the latter half of 2008.

As early as the late 19th century, there was a good understanding of crisis intervention by central banks to prevent or mitigate financial panic through central bank lending; this was well-articulated in the work of **Walter Bagehot** in 1873 in *Lombard Street*.¹ Nevertheless, the Fed appeared to forget these lessons during the Great Depression, which started in 1929. As has been frequently argued (for example, by economists Milton Friedman and Anna Schwartz in a book in 1963), the Fed did not use its lending powers wisely during that period, especially in the 1933 banking crisis.

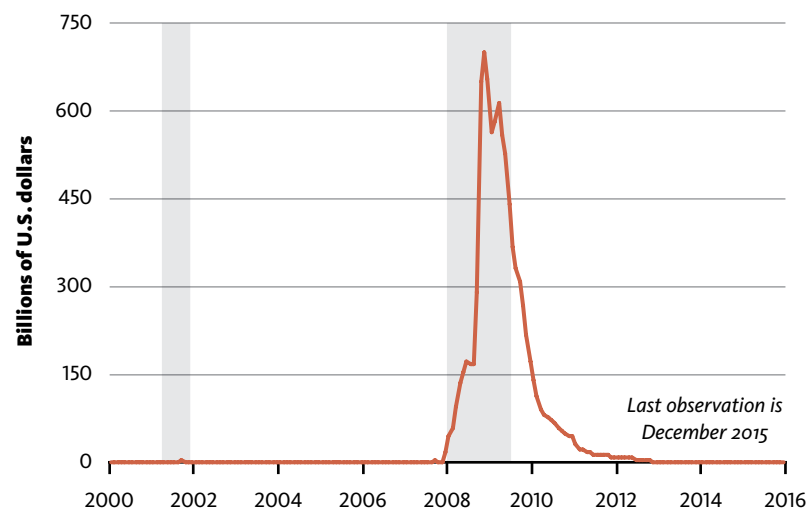
With the onset of the latest financial crisis, the Fed did not want to repeat the errors of the Great Depression; so, it responded aggressively in terms of lending to commercial banks and other financial institutions. Figure 1 shows total lending, which increased somewhat in the spring of 2008 before a substantial spike in the fall of 2008. Then, lending declined sharply so that, at the end of the Great Recession (the wider shaded area in the chart), total lending was about one-half what it was at its peak in the fall of 2008. By the beginning of 2013, lending had tapered off, reaching pre-Great Recession levels.

In addition to crisis lending, the Fed resorted to the use of conventional interest rate policy in response to the financial crisis. The Fed's target for the overnight fed funds rate was cut beginning in late 2007 and ultimately reached near-zero levels by the end of 2008, when the fed funds rate was targeted at a range of 0 to 0.25 percent. (See Figure 2.)

By the end of the Great Recession in mid-2009, the financial crisis had passed and so had much of the Fed's emergency lending programs. (See Figure 1.)

FIGURE 1

Total Lending from the Federal Reserve to Depository Institutions

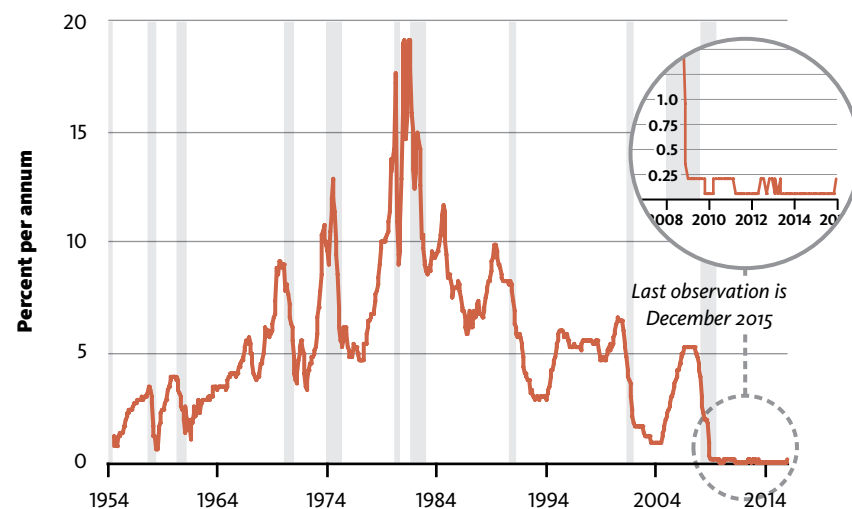


Sources: Federal Reserve Board and Federal Reserve Economic Data (FRED).

Note: Lending spiked as the Federal Reserve responded to the financial crisis but returned to pre-Great Recession levels by 2013. Shaded regions represent recessions.

FIGURE 2

Federal Funds Rate



Sources: Federal Reserve Board and Federal Reserve Economic Data (FRED).

Note: The federal funds rate target was cut in late 2007 in response to the financial crisis. The rate stayed at near-zero levels from December 2008 to December 2015. Shaded regions represent recessions.

But the 2007-2009 recession had been quite deep, so the Fed's interest rate policy was still on emergency setting, with the fed funds rate target remaining at 0 to 0.25 percent. As well, the Fed had begun experiments with two unconventional policy tools—forward guidance and quantitative easing.²

Forward guidance consists of promises made by the central bank concerning its future actions. Generally, modern macroeconomic theory makes a convincing case that monetary policy works more effectively when the central bank behaves systematically so that policy is well-understood by the public. This is certainly part of what forward guidance is about. If forward guidance

As of the end of the Great Recession, the Fed's forward guidance consisted of the following promise:

The Committee will maintain the target range for the federal funds rate at 0 to 1/4 percent and continues to anticipate that economic conditions are likely to warrant exceptionally low levels of the federal funds rate for an extended period.⁴

Such a promise seems consistent with Woodford's New Keynesian ideas about the role of forward guidance.

Quantitative easing (QE) is a central bank policy involving purchases of unconventional assets with somewhat unconventional goals in mind. Asset purchases are a conventional tool for monetary policy and have formed the cornerstone of Fed policy in normal times, at least since the founding of the FOMC in 1933. The Fed typically uses daily **open market operations**—the purchases and sales of short-term government securities (for example, a typical short-term government security is a 3-month Treasury bill, which matures three months from the date of issue)—to hit the overnight fed funds interest rate target set by the FOMC. Quantitative easing, which has typically been carried out when overnight interest rates are at or close to zero, involves the purchase of long-term assets (for example, 30-year Treasury bonds, which mature 30 years from the date of issue), and those assets need not be government-issued securities. The goal of quantitative easing is to lower the interest rates on long-term assets, rather than to lower short-term interest rates as with conventional easing. If quantitative easing works, it should reduce all long-term interest rates, including mortgage interest rates, for example.

The Fed began its first quantitative easing program, sometimes called QE1, in November 2008, before the end of the Great Recession. QE1 involved the purchase of long-term Treasury securities, agency securities and mortgage-backed securities. MBS are tradeable securities, backed by underlying private mortgages.

The recovery from the Great Recession proved to be unusually slow. Figure 3 shows a comparison of the recoveries following the 1981-82 recession—one of the more severe recessions in the post-World War II period

“If forward guidance is to work, the public must believe that the Fed’s statements about the future are not just cheap talk—the Fed’s promises must be credible.”

is to work, the public must believe that the Fed's statements about the future are not just cheap talk—the Fed's promises must be credible.



But there is more to forward guidance than that. In **New Keynesian** theory—as explained, for example, by economist Michael Woodford—the Fed has some policy leverage even when the nominal interest rate is at zero and can go no lower.³ Why? According to the theory, the Fed can make a promise to keep interest rates lower in the future *than it otherwise would*, and such a promise, if credible, will cause people to believe that inflation will be high in the future, causing them to borrow more and spend more today. Thus, New Keynesian theory recommends forward guidance as a means for the central bank to stimulate the economy by promising to be irresponsible in the future.



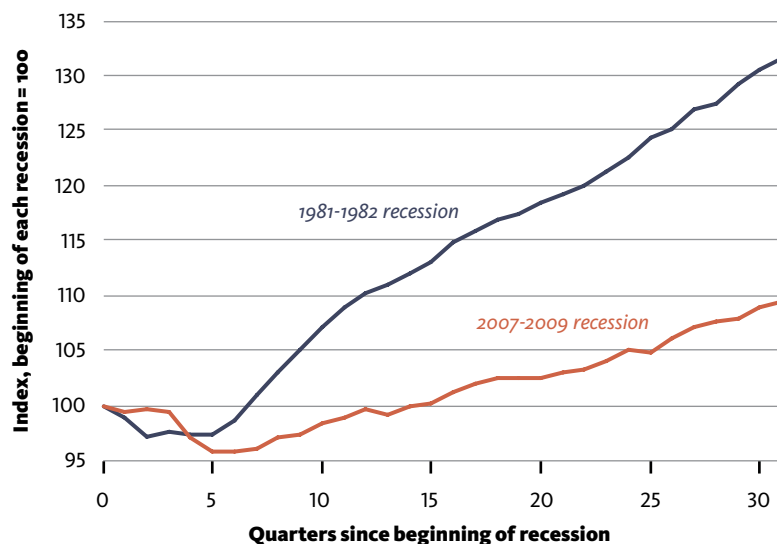
in the U.S.—and the Great Recession of 2007-09. The figure shows real GDP in each recession, scaled to 100 as of the beginning of the recession. As can be seen in the figure, it took about twice as long in the Great Recession for real GDP to attain its previous peak compared with real GDP performance in the recovery after the 1981-82 recession. Further, after more than seven years (30 quarters in the figure), the 1981-82 recovery was about 20 percent more advanced than was the recovery from the Great Recession.

The relatively weak recovery, in the face of interest rates that had been unusually low and after some unconventional policies had already been put into effect, spurred the Fed to engage in further accommodation. Because the range for the fed funds rate was already 0-0.25 percent, there were no remaining accommodative options other than unconventional monetary policies. In terms of forward guidance, the language in the FOMC's policy statements (released after each FOMC meeting) evolved over time, from the "extended period" language mentioned earlier, to promises to keep the fed funds rate in the 0-0.25 percent range at least until some calendar date in the future, to promises to keep the fed funds rate low at least until the unemployment rate had fallen below a 6.5 percent threshold (so long as projected inflation did not rise above 2.5 percent). In anticipation of crossing the unemployment rate threshold, in March 2014 the FOMC promised to keep the fed funds rate low for a "considerable time."⁵ As shown in Figure 2, the fed funds rate was close to zero for seven years, a **zero-interest-rate policy (ZIRP)** that was unprecedented in the modern period of U.S. monetary policy, which began in 1951.⁶

The Fed also continued with its QE policies after the Great Recession's official end, which was in June 2009. The QE1 program continued until March 2010. Then, in August 2010, the FOMC instituted a reinvestment program, which served to replace long-term assets in the Fed's portfolio as they matured. Any increase in the Fed's balance sheet through asset purchases ultimately is removed when the purchased assets mature; so, the reinvestment policy acted to keep the QE policy from undoing itself naturally. The reinvestment policy remains in effect today.

FIGURE 3

Real GDP during Two Recessions and Recoveries

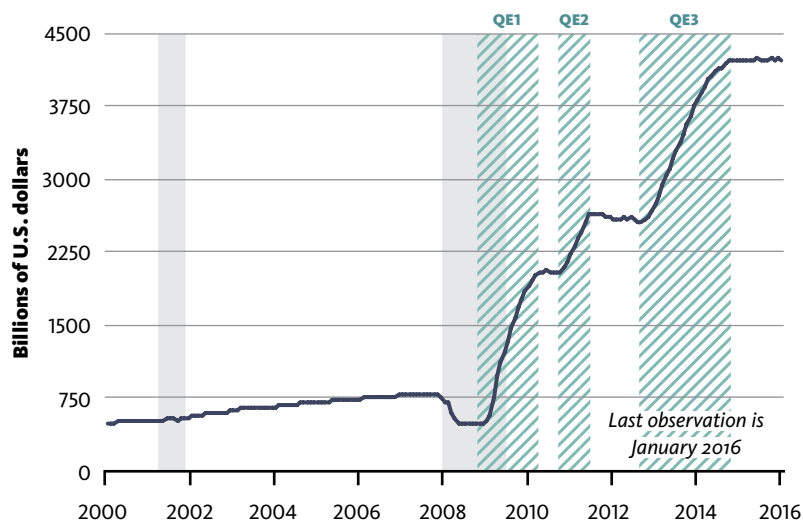


Sources: Bureau of Economic Analysis and Federal Reserve Economic Data (FRED).

Note: The recovery from the Great Recession has occurred much more slowly than the recovery from the 1981-1982 recession, one of the more severe post-WWII recessions.

FIGURE 4

Total Securities Held Outright by the Federal Reserve



Sources: Federal Reserve Board and Federal Reserve Economic Data (FRED).

Note: Through its quantitative easing (QE) programs, the Federal Reserve has significantly increased its security holdings from pre-Great Recession levels. Gray bars represent recessions.

From November 2010 to June 2011, the Fed executed QE2—the purchase of \$600 billion in long-term Treasury securities. This was followed by the “twist” program, from September 2011 to December 2012, under which the Fed sold short-term assets and purchased long-term assets, thus further lengthening the average maturity of the assets on its balance sheet. Finally, from September 2012 to October 2014, the Fed ran its QE3 program: a large-scale purchase of mortgage-backed securities and long-term Treasury securities.

Figure 4 shows total securities held by the Fed, which increased by more than fivefold from before the Great Recession until now. Note the large increases in the quantity of securities that correspond to QE1, QE2 and QE3. What is not reflected in the figure is the increase in the average maturity of the Fed’s portfolio. For example, at the end of 2007, about one-third of the Fed’s securities were in the form of short-term Treasury bills, but the Fed now holds none of those assets.

The large quantity of assets purchased by the Fed since 2008 had to be financed, of course, by an increase in the Fed’s liabilities. Figure 5 shows the stocks of currency in circulation, reserves held by financial institutions and **reverse repurchase agreements** (reverse

repos), which in total comprise essentially all Fed liabilities. The stock of currency has grown relatively smoothly since before the financial crisis, with a moderate increase during the crisis because of an increased appetite for safe U.S. currency in the world. But most of the increase in the Fed’s assets was reflected in a large increase in the stock of reserves. Before the financial crisis, in 2007, reserve balances were typically in the range of \$5 billion to \$10 billion, while the Jan. 27, 2016, level was about \$2.4 trillion. From late 2008 to December 2015, reserves bore interest, albeit at a low interest rate of 0.25 percent. This interest rate was increased to 0.5 percent on Dec. 17, 2015, and is expected to continue to rise (probably at a slow rate) in the future. Interest-bearing liabilities of the Fed also now include a substantial quantity of reverse repurchase agreements, which play a similar role to reserves, with some very important qualifications. Reverse repos will be discussed in more detail later in this article.

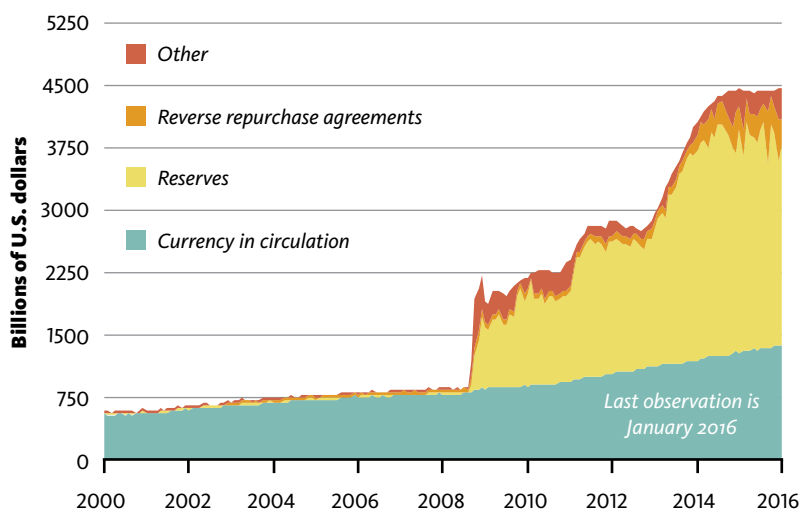
What Is Monetary Policy Normalization?

In the previous section, we detailed what has been unusual about the state of monetary policy in the United States—an abnormally long period of ZIRP, a very large Fed balance sheet, a Fed asset portfolio that is unusually long in maturity, and large holdings of MBS, which are essentially private assets. So, what will normalization entail?⁸ A good outline of the Fed’s planned normalization approach was in its “Policy Normalization Principles and Plans,” presented in September 2014.⁹ Three key elements were in the normalization plan:

1. Begin increases in short-term market interest rates—trigger **liftoff**, that is, an end to ZIRP. (The FOMC took this step in December 2015.)
2. Reduce the size of the balance sheet so that monetary policy works as it did before the Great Recession.
3. Transform the Fed’s asset holdings to a composition similar to those of pre-Great Recession times. This transformation will involve a reduction in the average maturity of assets and a transition to a portfolio consisting primarily of Treasury securities.



FIGURE 5
Federal Reserve Liabilities



Sources: Federal Reserve Board and Federal Reserve Economic Data (FRED).

Note: The Federal Reserve’s asset purchases were balanced, in large part, by increases in reserves and reverse repurchase agreements.



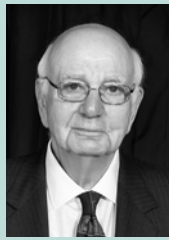


Some History of Unconventional Monetary Policy

Unconventional monetary policy, in practice, has taken two primary forms: forward guidance and quantitative easing (QE). With respect to forward guidance, macroeconomists have understood, at least since the revolution in macroeconomics that took place in the 1970s, that monetary policy works better if it is predictable and if the public believes what central bankers say. Forward guidance assigns an important role not only to what a central bank is doing in the present but to what central bankers say about what they are going to do in the future.

A historical example of forward guidance at work occurred during Paul Volcker's term as Fed chairman, from 1979 to 1987. Volcker determined early in his term that the inflation rate was too high in the United States. He clearly announced his intentions to reduce inflation and specified how the Fed would do it. Although the disinflation that occurred in the early 1980s was costly—there was a severe recession in 1981-82—the costs were temporary. Indeed, a widely held concern before the disinflation was that high inflation expectations were so well-entrenched that disinflation would take much longer than what actually transpired. Part of the credit for the shortness of the disinflationary period was that Volcker's statements were credible: People believed that he would actually do what he claimed he would do, and inflation expectations fell quickly as a result.

Though forward guidance has been an important part of the Fed's policy framework for a long time, it became increasingly important during and after the financial crisis. As evidence of this, for example, the FOMC's statement of Feb. 2, 2005 (when Alan Greenspan was Fed chairman), was 262 words long, the statement of Jan. 27, 2010, was 547 words, and the



Paul Volcker*

statement of Dec. 16, 2015, was 596 words. Clearly, the FOMC increasingly had much more to say, and the added words were primarily related to forward guidance.

The second element of unconventional monetary policy—of key importance in the United States after the financial crisis—is QE, which was first discussed and implemented in 2001 by the Bank of Japan. This early experiment could probably be more appropriately categorized as conventional monetary policy, rather than unconventional policy. In 2001, Japan had been following ZIRP (zero-interest-rate policy) for about six years and was experiencing a deflation—consumer prices were falling. The Bank of Japan engaged at that time in purchases of large quantities of short-term government securities in an attempt to increase inflation, but to no avail as the deflation continued.⁷ What the Bank of Japan had discovered was the **liquidity trap**—with ZIRP in place, an open market purchase of short-term government debt by the central bank should have no effect because zero-interest bank reserves are replacing zero-interest government debt in financial markets.

QE, if it is to have the potential to work, must involve purchases by the central bank of unconventional assets—either long-term government debt (instead of short-term) or assets that are not liabilities of the government. After the financial crisis, some central banks started conducting genuine QE in earnest. The Fed made large purchases of long-term government debt and mortgage-backed securities, the Bank of England had a large QE program, Switzerland had a very large QE program and the European Central Bank is still engaged in an active QE program.



Interest Rate Increases

In normal times, prior to the Great Recession, the New York Fed would control the fed funds rate, according to the directive from the FOMC, through daily open market operations. Monetary economists would describe this as a variant of a **channel system** for monetary policy implementation. Under a channel system, a central bank sets an interest rate at which it lends to financial institutions (the **discount rate** in the U.S.) and an interest rate on reserve balances in excess of **reserve requirements (IOER—interest on excess reserves)**, which is then the interest rate at which financial institutions lend to the central bank. Those two interest rates constitute, respectively, an upper bound on the overnight interest rate and a lower bound. In the U.S., no financial institution should want to borrow from another financial institution at an interest rate greater than the discount rate, nor would a financial institution lend at an interest rate less than

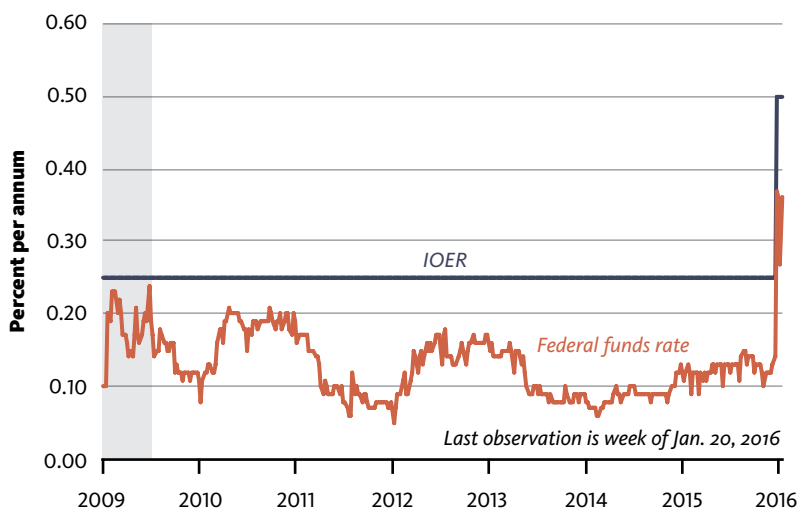
the interest rate on reserves. Under a channel system, the central bank targets an overnight interest rate to fall between the upper and lower bounds. Prior to the Great Recession, the Fed operated under a channel system with $IOER=0$.

When a central bank has a large quantity of excess interest-bearing reserves outstanding, monetary policy implementation works differently, as a **floor system**. In a smoothly functioning overnight credit market, with excess reserves outstanding, IOER should peg the overnight rate because market participants must be indifferent between lending to the central bank and lending to another financial institution overnight. If the U.S. overnight market worked this way, then liftoff would be an easy thing for the Fed to implement. An increase in the IOER would simply increase the fed funds rate one-for-one.

But the U.S. overnight credit market is not a smoothly functioning market. Figure 6 shows the fed funds rate and the IOER since the beginning of 2009. As is evident from the figure, there is a significant gap between the IOER and the fed funds rate. There are several factors that, researchers have argued, explain this gap, including regulatory costs associated with holding reserves for commercial banks, imperfect competition and the fact that government-sponsored enterprises (GSEs) do not receive interest on their reserve balances with the Fed.¹⁰ Because the gap is not well-understood, it is difficult to predict what will happen to this gap as market interest rates increase over time. As IOER increases, will the fed funds rate increase more or less in tandem? Will the interest rate margin between the IOER and the fed funds rate increase, or will it decrease?

To deal with this problem, the New York Fed experimented with an ON-RRP (**overnight reverse repurchase agreement**) facility. Since liftoff, the facility has served as a way to restrict the rate gap. The ON-RRP facility has an expanded set of counterparties, including money market mutual funds and GSEs. In a reverse repurchase agreement, one of these counterparties lends to the Fed, usually overnight, with the Fed posting some securities in its portfolio as collateral. The goal of the ON-RRP facility is to expand the set

FIGURE 6
Federal Funds Rate and Interest Rate on Excess Reserves



Sources: Federal Reserve Board and Federal Reserve Economic Data (FRED).

Note: While the interest rate on excess reserves should peg the federal funds rate, the latter rate has run consistently below the former. Many factors are argued by researchers as explanations for this interest rate gap. Such factors include regulatory costs associated with holding reserves for commercial banks, imperfect competition and the fact that government-sponsored enterprises do not receive interest on their reserve balances with the Fed. Shaded region represents recession.

of financial institutions that can hold interest-bearing Fed liabilities.

Under the FOMC's normalization plans, the FOMC will continue to set a 25-basis-point range for the fed funds rate, but with the IOER set at the top of the range and the ON-RRP rate at the bottom of the range. On a typical day, the New York Fed currently conducts a fixed-rate full-allotment auction of ON-RRP borrowing, that is, the New York Fed fixes the ON-RRP rate and lets the market determine the quantity of lending to the Fed at that rate. In principle, the ON-RRP interest rate should put a floor under the fed funds rate, with the IOER determining the ceiling on the fed funds rate. The system should then be a modified floor system—a floor with a subfloor—which will allow the Fed to tightly control the fed funds rate.

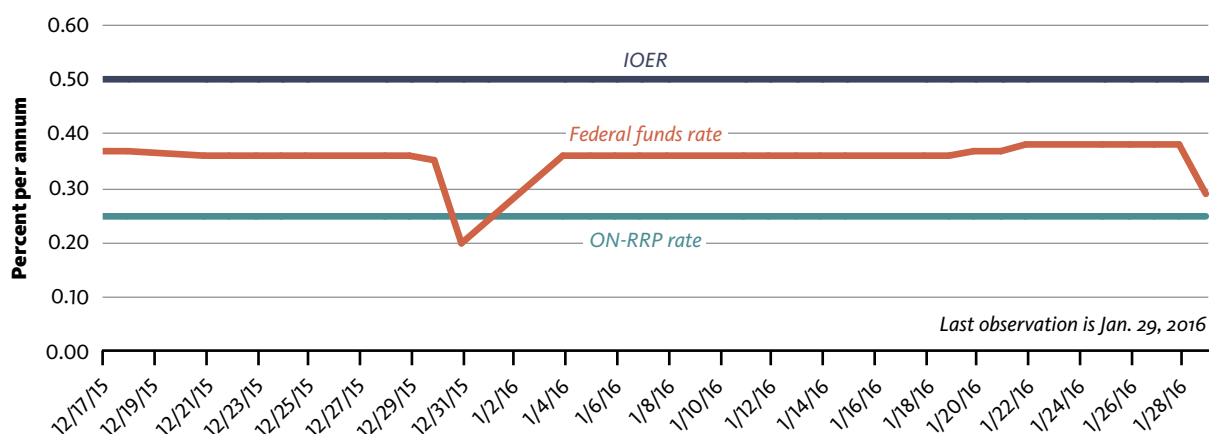
As shown in Figure 7, the Fed has been successful at targeting the fed funds rate between the ON-RRP rate, currently at 0.25 percent, and IOER, currently at 0.5 percent. (The departure of the fed funds rate from the target range on Dec. 31 occurred because of temporary technical reasons that may recur at the end of each quarter and which are not important to monetary policy.)

Balance Sheet Reduction and Transformation

In the FOMC's normalization plans, balance sheet reduction was projected to start taking place sometime after liftoff. Further, reduction will occur through the end of the reinvestment program; when reinvestment stops, the assets on the Fed's balance sheet will mature over time, and the balance sheet will gradually shrink in size. In the process, reserves will fall; the target balance sheet size will have been achieved when reserves fall to a small amount, on the order of what was outstanding before the Great Recession. Balance sheet reduction could occur through outright sales of the Fed's assets, but there are no plans for this.

How do reserves fall as the Fed's assets mature? Consider two possible cases. First, suppose that an MBS held by the Fed matures (either because the underlying mortgages mature, a mortgage holder refinances or a mortgage defaults), then the issuer of the MBS makes a payment to the Fed. Supposing that issuer is a GSE (Fannie Mae, for example), the Fed would then debit the reserve account of the GSE at the Fed by the amount of the payment. Effectively, the Fed tears up

FIGURE 7
A Floor and a Subfloor for the Federal Funds Rate



Sources: Federal Reserve Board and Haver Analytics.

Note: While the IOER should peg the federal funds rate with such a large stock of reserves still outstanding, various economic factors have led to the latter rate running consistently below the former. The ON-RRP rate, because ON-RRPs are available to a larger set of financial institutions than the set able to hold interest-bearing reserves with the Fed, should function as a secondary floor. The ON-RRP rate and the IOER have successfully bounded the federal funds rate since liftoff. The only departure from the bounds, on Dec. 31, was because of technical reasons that are unimportant to monetary policy. (Such reasons also explain the sudden drop on Jan. 29.)

Central Bank Balance Sheets

Although a central bank has some special functions that make it different, in many ways it works as private banks do. For example, the Fed has a balance sheet, consisting of assets on one side of the balance sheet and liabilities on the other side. Basic accounting says that

$$\text{Assets} = \text{Liabilities} + \text{Capital}$$

where capital is just the net worth of the Fed, in an accounting sense. Part of what makes the Fed different from a private bank is that it can never be insolvent. Even if the Fed had negative net worth, it would not be technically insolvent because the Fed's "liabilities," consisting mainly of currency and bank reserves, are not promises to pay in the same sense as the liabilities of a private commercial bank, for example.

In any case, the size of a bank's balance sheet is the total value of its assets—or the total value of its liabilities, including capital, because the balance sheet must balance. In normal times, the size of the Fed's balance sheet is determined essentially by the demand for U.S. currency in the world, as, for example, most of the Fed's liabilities were currency before the financial crisis. For any central bank, the potential size of the balance sheet is limited only by the assets that the central bank can buy and by the demand for its liabilities. Thus, in principle, the balance sheet can get very large as the result of quantitative easing, as long as banks are willing to hold the reserves (liabilities) that the central bank issues to buy more assets.

One useful measure of the size of a central bank's balance sheet is the ratio of the value of its assets to gross domestic product (GDP), in percentage terms. By this measure, the balance sheet of the Fed is currently neither the largest nor the smallest in the world: In the third quarter of 2015, it was about 25 percent of GDP. Two small-balance-sheet countries are Canada (5 percent of GDP) and Australia (about 10 percent). Countries with central bank balance sheets about on a scale with that of the U.S. are the U.K. (about 20 percent) and Denmark (close to 30 percent). Finally, two countries whose central banks have very large balance sheets are Japan (close to 75 percent of GDP) and Switzerland (just short of 100 percent).

the IOU of the GSE to the Fed (the MBS), and the Fed tears up the IOU of the Fed to the GSE (reserves); so, there are equal reductions in the Fed's assets and in its liabilities.

If the asset that matures is a Treasury security, then what happens is a little less obvious. When the Treasury security matures, there is a payment from the Treasury to the Fed, which occurs through a debiting of the Treasury's reserve account with the Fed. Again, there are equal reductions in the Fed's assets and liabilities, but in this case there is no reduction in reserve balances held in the private sector, which is what we care about. Such a reduction would occur, for example, if the Treasury wanted to replenish its reserve balances after paying down its debt with the Fed. The Treasury could do this, for example, by issuing new Treasury securities to a private-sector financial institution, which pays for those securities with reserve balances. This would then increase the reserve balances of the Treasury but reduce reserve balances held in the private sector. The ultimate effects would then be the same as for the mortgage-backed security example.

How long will the balance sheet take to normalize once reinvestment stops? Studies by economists within the Federal Reserve System suggest that this process could take seven years or more.¹¹ It will take even longer to reduce the average maturity of the Fed's assets to what it was before the Great Recession. And this is under the assumption that the Fed will not engage in more QE programs during the normalization process; so, potentially, normalization of the balance sheet could take a very long time.

Why Normalize?

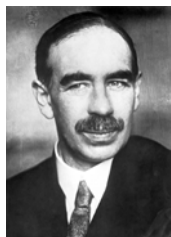
As discussed above, the Fed's monetary policy decisions are made in the context of the dual mandate, which comes from Congress. Normalization, if it is a good idea, should improve the Fed's ability to achieve its 2 percent inflation goal and maximum employment in the future. There are strong arguments that normalization is indeed a good idea; those arguments typically take two different forms: the New Keynesian view and the **Neo-Fisherian** view. These two views



invoke the ideas of two highly prominent economists from the early 20th century, John Maynard Keynes and Irving Fisher.

The New Keynesian View

New Keynesian (NK) ideas are a synthesis of the modern macroeconomic ideas that have been introduced in the past 45 years and older Keynesian ideas. Modern macroeconomics has emphasized the use of economic theory in macroeconomics, the role of forward-looking economic behavior and the importance of commitment by economic policymakers; older Keynesian ideas date back to Keynes' *General Theory of Employment, Interest, and Money* of 1936. NK economics was laid out in detail by Michael Woodford in 2003, and these NK ideas have been developed in the form of quantitative macroeconomic models that are widely used by central banks.¹²



John Maynard Keynes*

In basic simplified New Keynesian macroeconomic models, there are three economic relationships: (i) an *IS curve* that describes the relationship between expected output growth and the short-term interest rate; (ii) a *Phillips curve*, capturing a positive relationship between aggregate economic activity and the rate of inflation; and (iii) a *Taylor rule*, which describes how the central bank chooses its target nominal interest rate in response to observed inflation and unemployment.¹³ Basically, the Taylor rule states that the Fed's nominal interest rate target should increase when inflation rises relative to its target, and the target nominal interest rate should decrease if unemployment rises relative to the unemployment rate consistent with "full employment."¹⁴ This formally captures a policy rule reflecting the Fed's dual mandate—under the Taylor rule, the Fed ultimately cares about hitting an inflation target (2 percent per year) and an unemployment rate target. Then, it changes its nominal interest rate target to move the economy as close as possible to its ultimate targets, in a well-defined sense.

A Taylor rule actually fits reasonably well the historical behavior of the Fed. Figure 8 shows the fed funds rate, and the predictions of a Taylor rule fit to the data from 1987:Q4 to 2007:Q4.

Taylor Rule Specifics

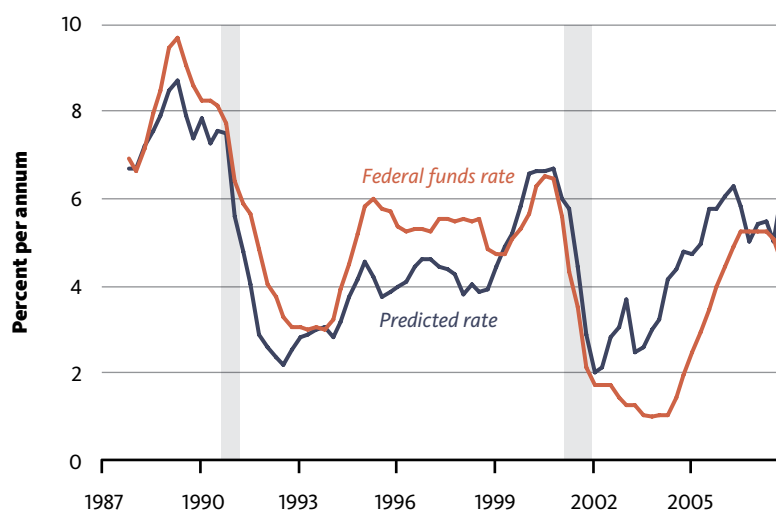
The actual Taylor rule used here takes the form

$$R = 2.16 + 1.15\pi - 1.51(u - u^*)$$

where R denotes the fed funds rate, π denotes the 12-month percentage change in the personal consumption expenditures (PCE) deflator, u is the unemployment rate and u^* is the natural rate of unemployment, as measured by the Congressional Budget Office (CBO). Thus, this estimated Taylor rule implies that, on average, during the period 1987:Q4–2007:Q4, the Fed increased the fed funds rate by 1.15 percentage points when the inflation rate increased by 1 percentage point and reduced the fed funds rate by 1.51 percentage points when the gap between the unemployment rate and the natural rate of unemployment (the CBO's estimate of the short-run rate of unemployment) increased by 1 percentage point.

FIGURE 8

Federal Funds Rate versus Rate Predicted by Taylor Rule (1987:Q4 to 2007:Q4)



Sources: Federal Reserve Board, Bureau of Labor Statistics, Bureau of Economic Analysis, Congressional Budget Office, Federal Reserve Economic Data (FRED) and author's calculations.

Note: The Taylor rule is a rule for setting a central bank's target nominal interest rate, given unemployment and inflation. The federal funds rate predictions from our Taylor rule, estimated using data from 1987:Q4 to 2007:Q4, fit the behavior of the actual federal funds rate relatively well over this period. Shaded regions represent recessions.

Figure 9 shows what would have happened if the Fed had behaved as it did during the period starting in 1987 and ending in 2007, when the Great Recession started. The figure shows the actual fed funds rate and the rate predicted by the Taylor rule, given the actual inflation rate and unemployment experienced from 2008 on. The Taylor rule predicts a negative fed funds rate for the period from the end of 2008 to the beginning of 2011. Because the fed funds rate cannot be negative, we can interpret this period as one in which the predicted fed funds rate is zero, given this Taylor rule. Thus, from late 2008 to early 2011, the Fed conformed to its previous behavior—if it could have achieved negative fed funds rates it would have done so, but this was not feasible.

However, Figure 9 shows the fed funds rate predicted by the Taylor rule rising above the actual fed funds rate in early 2011. If the Fed had been behaving in a pre-Great Recession fashion, liftoff would have occurred in early 2011, and the fed funds rate would

currently be above 2 percent rather than where it is—in the range of 0.25-0.5 percent.

Thus, an argument in favor of liftoff and normalization of monetary policy is:

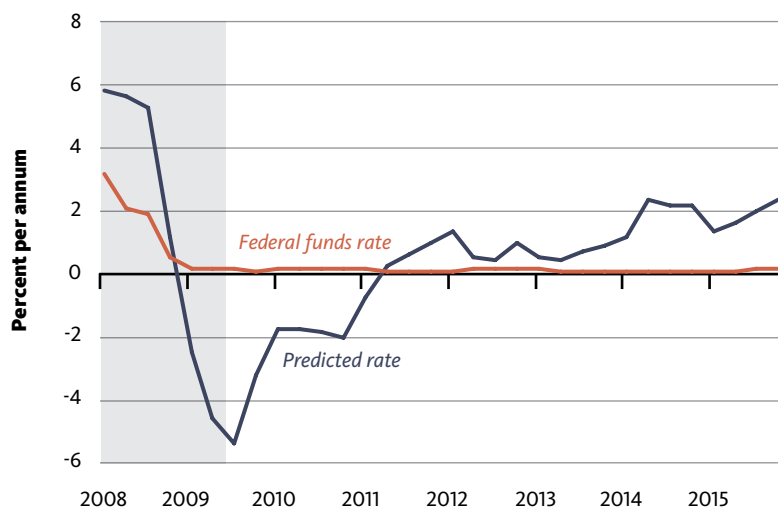
1. Monetary policy in the period 1987-2007 was successful at achieving the Fed's goals. Inflation was low and stable, and the recessions in 1990-1991 and in 2001 were relatively mild. Thus, conducting monetary policy as was done from 1987 to 2007 should produce good results.
2. The Great Recession may have been an extraordinary event, but if monetary policy had been conducted in the way it had been in the 1987-2007 period, then liftoff would have occurred in 2011. Thus, starting on the path to normalization in December 2015 was not premature—it was long overdue.

A counterargument is that the Fed was very close in late 2015 to achieving its goals. Figure 10 shows the 12-month percentage increase in the PCE deflator and in the PCE deflator excluding food and energy prices (or core PCE). Although both of these measures had been below the Fed's 2 percent target since early 2012, and the December 2015 measure for PCE inflation was 0.6 percent, we could argue that this recent low inflation was due to temporary factors—principally the large drop in oil prices that occurred in 2014 and into 2016. If we strip out food and energy prices, the core PCE shows 1.4 percent inflation for December, which is much closer to the 2 percent target. As well, the unemployment rate, at 5 percent for the last three months of 2015, was at the Congressional Budget Office's estimate of the natural rate of unemployment.

Further, a New Keynesian might argue, based on Phillips curve logic, that we should expect inflation to increase as the unemployment rate continues to fall. Thus, the Fed was very close in late 2015 to hitting its policy targets and should have come even closer in the immediate future without taking any policy action. According to this counterargument, we did not need to adhere to policies that worked in the past if current policy seemed to be doing fine.

FIGURE 9

Federal Funds Rate versus Rate Predicted by Taylor Rule (2008:Q1 to 2015:Q4)

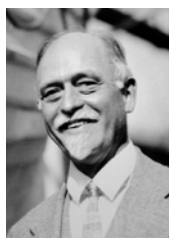


Sources: Federal Reserve Board, Bureau of Labor Statistics, Bureau of Economic Analysis, Congressional Budget Office, Federal Reserve Economic Data (FRED) and author's calculations.

Note: According to our Taylor rule estimate using data from 1987:Q4 to 2007:Q4, we should have lifted off in 2011, and the federal funds rate should be above 2 percent. Shaded region represents recession.

The Neo-Fisherian View

The Neo-Fisherian view is based on the relationship between inflation and nominal interest rates. As an aid in understanding the basic forces at work, suppose I am considering whether to acquire a particular asset. If the nominal interest rate I will receive from holding the asset is R , and the inflation rate over the period I hold the asset is i , then the real interest rate, that is, the real rate of return I receive on the asset, is $R - i$. However, at the time I acquire the asset, I do not know what the future inflation rate will be. In making my decision, I will make a forecast of inflation, i^e (my expected inflation rate) and base my decision about holding the asset on the expected real interest rate $R - i^e$.



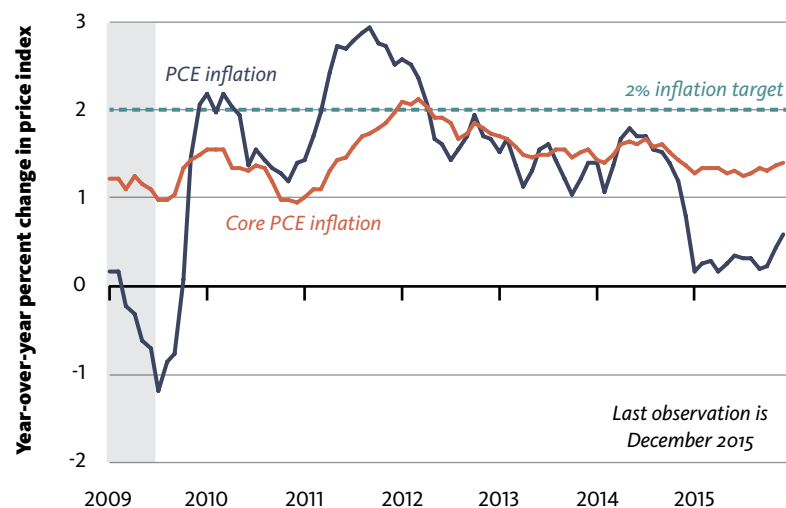
Irving Fisher*

Though there is sound macroeconomic theory and empirical evidence supporting the idea that monetary policy can affect real interest rates and real aggregate economic activity over the short run, that theory and empirical evidence also tell us that monetary policy has no effects on real interest rates in the long run. Therefore, for example, if the Fed lowers the nominal interest rate permanently, in the long run this will have the effect of leaving $R - i$ and $R - i^e$ unchanged, that is, a permanent reduction in the nominal interest rate simply reduces the inflation rate and expected inflation by the same amount, in the long run. This is called the *Fisher effect*: High (low) nominal interest rates tend to be associated with high (low) inflation.

Figure 11 shows a scatter plot of the 12-month inflation rate in the United States versus the fed funds rate for the period 1954-2015. In the figure, we can observe a strong positive correlation, consistent with the Fisher effect. Note the recent observations, since the end of 2008, when interest rates were very low; they are a cluster of points in the lower left of the scatter plot.

Recognizing the Fisher effect as an important force helps us understand what is going on in episodes where ZIRP has persisted for a long time. For example, Japan has had ZIRP (or very close to ZIRP) for about 20 years and has also experienced an average inflation rate of about zero over that period. It should not be

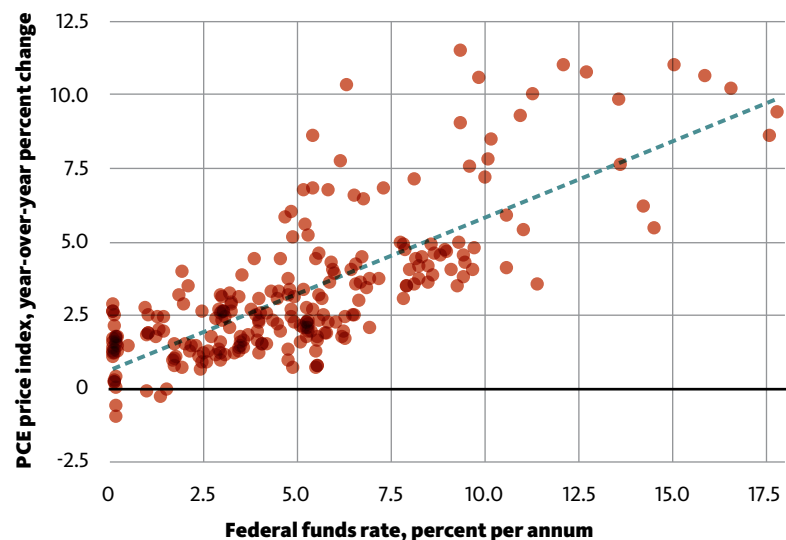
FIGURE 10
PCE Inflation



Sources: Bureau of Economic Analysis and Federal Reserve Economic Data (FRED).

Note: While inflation has continued to run below the 2 percent target over the past few years, the very low recent inflation rates can be attributed, in large part, to falling oil prices. Core inflation, which does not include food and energy prices, is much closer to the target. Shaded region represents recession.

FIGURE 11
PCE Inflation and the Federal Funds Rate
(1954:Q4 to 2015:Q4)

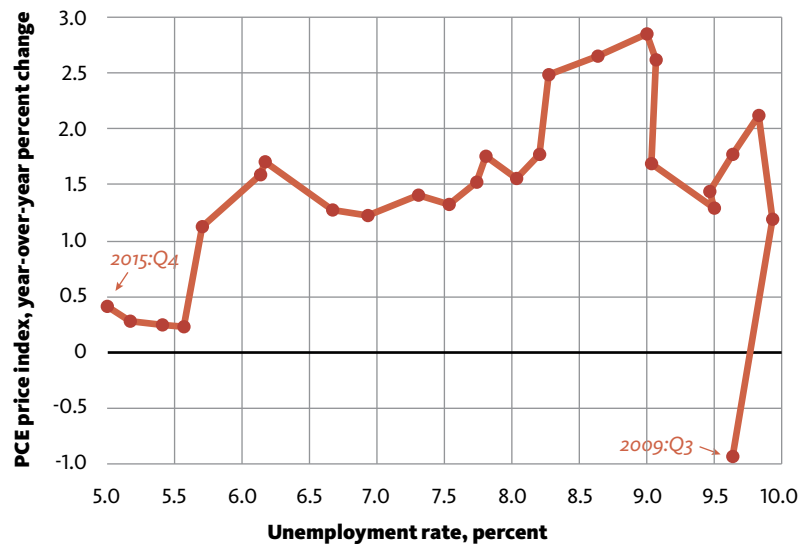


Sources: Bureau of Economic Analysis, Federal Reserve Board and Federal Reserve Economic Data (FRED).

Note: Consistent with the Fisher effect, a higher interest rate tends to be associated with a higher inflation rate. Also, note the observations from the recent era of zero-interest-rate policy, which form a cluster in the bottom left of the plot.

FIGURE 12

PCE Inflation and the Unemployment Rate (2009:Q3 to 2015:Q4)



Sources: Bureau of Economic Analysis, Bureau of Labor Statistics and Federal Reserve Economic Data (FRED).

Note: While Phillips curve reasoning predicts that a tighter labor market (represented by a movement leftward in the plot because such a movement corresponds to a lower unemployment rate) will result in higher inflation, the recent period of labor market tightening has been associated with lower inflation.

“The Great Recession may have been an extraordinary event, but if monetary policy had been conducted in the way it had been in the 1987-2007 period, then liftoff would have occurred in 2011. Thus, starting on the path to normalization in December 2015 was not premature—it was long overdue.”

surprising that inflation is low in the United States after seven years of ZIRP. Similarly, the low inflation and low nominal interest rates we currently see in the euro area, Switzerland, the U.K., Denmark and Sweden, among other countries, are consistent with a manifestation of the Fisher effect.

Recall that a counterargument (earlier) to the New Keynesian view for normalization is that, under the monetary policy settings prior to mid-December, the Fed was close to achieving its goals, with the only problem being that inflation was a bit on the low side. Further, according to the counterargument, the Phillips curve tells us that additional tightening in the labor market should have caused inflation to increase. But how has the Phillips curve been doing lately? Figure 12 shows a post-Great Recession scatter plot of the inflation rate versus the unemployment rate for the United States, with the line joining the points in sequence, from 2009:Q3 on the far right to 2015:Q4 on the far left. Instead of a Phillips curve with a negative slope, what we have observed is a positively sloped Phillips curve. As unemployment has been falling, so has the inflation rate.

It would, therefore, be surprising if the Phillips curve were to suddenly reassert itself (in the form of higher inflation) after this long period of falling unemployment and falling inflation, particularly in light of the long experience with ZIRP in Japan. While the Phillips curve is nonexistent in the recent U.S. data, it is also hard to find over other time periods and in other countries, as well. The Fisher effect, which we can see plainly in Figure 11, is a strong regularity across time periods and countries. An element of the Neo-Fisherian view is that, if ZIRP continues, it is very unlikely that we will see an increase in inflation—much more likely is the outcome in which the Fed continues to undershoot its 2 percent inflation target.¹⁵ This would be detrimental because predictable inflation is important for economic performance, as is the credibility of the Fed in delivering predictable inflation.

Even though the Fisher effect determines the effect of nominal interest rates on inflation in the long run, what if an increase in the nominal interest rate, under liftoff, causes inflation to fall even further below the



Glossary

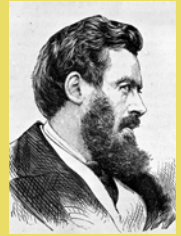
2 percent inflation target in the short run? Some recent research suggests that, even in conventional, mainstream New Keynesian macroeconomic models, this does not happen. Work by economist John Cochrane shows that a permanent increase in the nominal interest rate should lead to an increase in the inflation rate even in the short run.¹⁶ The effect is less than one-for-one initially and rises to one-for-one in the long run. Thus, Neo-Fisherism does not pertain to some peculiar set of macroeconomic models. In fact, conventional and widely used macroeconomic models have Neo-Fisherian properties.

Conclusion

After a long period of unconventional monetary policy, the Fed has embarked on a period of policy normalization, under which the fed funds rate target will ultimately return to normal levels, with the Fed's balance sheet shrinking in size. Support for the Fed's policy comes from both New Keynesian and Neo-Fisherian policy frameworks. Under the former framework, normalization is justified in that it forestalls excessive future inflation. Under the latter framework, normalization forestalls insufficient future inflation. In any case, the Fed's announced plan is that normalization will continue for a considerable time, at a gradual pace, and in a manner that responds to macroeconomic events as they unfold. ●

Research assistance was provided by Jonas Crews, a research analyst at the Federal Reserve Bank of St. Louis.

Bagehot, Walter: a British journalist who often wrote about economics in the mid-1800s. Perhaps most notable among his books was *Lombard Street: A Description of the Money Market*, in which he explained the worlds of banking and finance. Some of his ideas found their way into the Federal Reserve Act of 1913. For example, the Federal Reserve System was initially envisioned in the act as a means for the regional Federal Reserve banks to lend to banks in their districts, both in normal times and in emergencies.



Channel system: a monetary policy system that involves controlling a key market interest rate by bounding it between two central bank-controlled rates; the U.S. version of the channel system involves bounding the federal funds rate between the discount rate and the interest rate on excess reserves.

Discount rate: the interest rate at which the Federal Reserve lends to financial institutions in its role as lender of last resort; this rate serves as the ceiling for a channel system.

Federal funds rate: the interest rate at which financial institutions that have reserve accounts with the Fed lend to each other overnight. This lending is unsecured, that is, the borrower does not post collateral. Often referred to as the fed funds rate.

Floor system: a monetary policy system that exists when there is a large quantity of excess interest-bearing reserves outstanding, implying that the interest rate on excess reserves will theoretically serve as a floor that pegs the federal funds rate.

Forward guidance: the provision of promises by a central bank regarding its future actions, which, if deemed credible, can adjust people's views of the future and influence their economic activities; an example is the promise to hold the federal funds rate near zero for an extended period of time.

Interest rate on excess reserves (IOER): the interest rate received on reserves held at the Federal Reserve in excess of an institution's reserve requirement; this rate serves as the floor in both a channel system and a floor system.

Liftoff: the date at which the Fed raised the fed funds rate after seven years at practically zero. The FOMC took this action—the start of so-called normalization of monetary policy—on Dec. 16, 2015.

Liquidity trap: a situation in which an open market purchase of short-term government securities by the central bank increases the money supply but has no effect on market interest rates or any other economic variables.

Mortgage-backed security (MBS): a tradeable security backed by a bundle of private mortgages.

CONTINUED ON PAGE 22

Glossary



CONTINUED FROM PAGE 21

Neo-Fisherism: an economic doctrine that recognizes the Fisher effect—the positive effect of the nominal interest rate on inflation in the long run. Under Neo-Fisherian monetary policy, the central bank increases interest rates to increase inflation.

New Keynesianism: a synthesis of ideas from John Maynard Keynes (Old Keynesianism) and the post-1970 revolution in macroeconomics. In New Keynesian theory, the Phillips curve (a negative relationship between inflation and unemployment) is important.

Open market operations: the purchase (sale) of U.S. government securities, generally Treasury securities, from (to) financial institutions on the open market in order to increase (decrease) total reserves, therefore lowering (raising) the federal funds rate by influencing the supply of reserves available to be lent; these transactions serve as a way to effectively control the federal funds rate in a channel system.

Overnight reverse repurchase agreement: see *reverse repurchase agreement* below.

PCE deflator: a measure of the average level of prices in the economy, derived from aggregate consumer spending. The rate of change in the PCE (personal consumption expenditures) deflator is the key measure of inflation used by the Fed.

Quantitative easing: the purchase of unconventional, long-term assets (for example, mortgage-backed securities and long-term Treasury securities) by a central bank in order to directly reduce long-term interest rates.

Reserve requirement: the share of certain types of deposits that must be held in the form of reserves with the Fed by a depository institution.

Reverse repurchase agreement (RRP): the borrowing of funds by a central bank from a financial institution, generally **overnight (ON-RRP)**, with central bank-owned securities held by the financial institution as collateral until the funds are returned; this monetary policy tool serves as a way to expand the set of institutions that can hold interest-bearing Federal Reserve liabilities. The ON-RRP rate serves as a subfloor under the IOER (see above) in the U.S. floor system. Often referred to as **reverse repos**.

Zero-interest-rate policy (ZIRP): a monetary policy in which the central bank's key interest rate is held near zero; this policy represents the limit of conventional monetary policy because, once such a policy is enacted, open market operations cannot lower overnight interest rates.

ENDNOTES

- 1 See Bagehot.
- 2 Unconventional monetary policies are discussed in more detail in Williamson, 2014.
- 3 See Woodford's 2012 work.
- 4 See the June 2009 FOMC statement.
- 5 See March 2014 FOMC statement.
- 6 1951 marks the accord between the U.S. Treasury and the Fed that set up the modern institutional framework for monetary policy in the United States.
- 7 The Bank of Japan did increase long-term government bond purchases, but the size of the increase was quite small in comparison to more recent QE programs.
- 8 See Williamson's 2015 work "Monetary Policy Normalization in the United States" for further discussion of the normalization process.
- 9 See the FOMC's 2014 "Policy Normalization Principles and Plans."
- 10 See Martin, McAndrews, Palida and Skeie, as well as Williamson's 2015 work titled "Interest on Reserves, Interbank Lending, and Monetary Policy," for examinations of imperfect competition as an explanation for the interest rate gap. Also, an example of a GSE is the Federal National Mortgage Association, generally referred to as Fannie Mae.
- 11 See Williamson's 2015 work titled "Monetary Policy Normalization in the United States."
- 12 See Woodford's 2003 work.
- 13 See Clarida, Gali and Gertler for an example of a New Keynesian model. Also, the NK Phillips curve is actually a relationship between an "output gap" and the rate of inflation, but for our purposes we will take the unemployment rate as a measure of the output gap.
- 14 See Taylor.
- 15 See Bullard.
- 16 See Cochrane.

REFERENCES

- Bagehot, Walter. *Lombard Street: A Description of the Money Market*. London, U.K.: H.S. King, 1873.
- Bullard, James. “Permazero as a Possible Medium-Term Outcome for the U.S. and the G-7.” Presentation at the Federal Reserve Bank of Philadelphia, Dec. 4, 2015. See <https://www.stlouisfed.org/~media/Files/PDFs/Bullard/remarks/Bullard-Phil-Fed-Policy-Forum-4Dec2015.pdf>.
- Clarida, Richard; Galí, Jordi; and Gertler, Mark. “The Science of Monetary Policy: A New Keynesian Perspective.” *Journal of Economic Literature*, 1999, Vol. 37, No. 4, pp. 1,661-1,707. See <http://www.nyu.edu/econ/user/gertlerm/science.pdf>.
- Cochrane, John. “Do Higher Interest Rates Raise or Lower Inflation?” Unpublished manuscript, University of Chicago Booth School of Business, Oct. 24, 2015. See <http://faculty.chicagobooth.edu/john.cochrane/research/papers/fisher.pdf>.
- Federal Open Market Committee. *Statement*. June 24, 2009. See <http://www.federalreserve.gov/newsevents/press/monetary/20090624a.htm>.
- Federal Open Market Committee. *Statement*. March 19, 2014. See <http://www.federalreserve.gov/newsevents/press/monetary/20140319a.htm>.
- Federal Open Market Committee. “Policy Normalization Principles and Plans.” Sept. 17, 2014. See <http://www.federalreserve.gov/newsevents/press/monetary/20140917c.htm>.
- Friedman, Milton; and Schwartz, Anna. *A Monetary History of the United States, 1867-1960*. Princeton, N.J.: Princeton University Press, 1963.
- Keynes, John M. *The General Theory of Employment, Interest and Money*. London, U.K.: Macmillan, 1936.
- Martin, Antoine; McAndrews, James; Palida, Ali; and Skeie, David. “Federal Reserve Tools for Managing Rates and Reserves.” Federal Reserve Bank of New York *Staff Reports*, September 2013, No. 642. See https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr642.pdf.
- Taylor, John. “Discretion Versus Policy Rules in Practice.” *Carnegie-Rochester Series on Public Policy*, 1993, Vol. 39, pp. 195-214. See <https://web.stanford.edu/~johnhtayl/Papers/Discretion.PDF>.
- Williamson, Stephen. “Monetary Policy in the United States: A Brave New World?” Federal Reserve Bank of St. Louis *Review*, 2014, Vol. 96, No. 2, pp. 111-122. See <https://research.stlouisfed.org/publications/review/2014/q2/williamson.pdf>.
- Williamson, Stephen. “Monetary Policy Normalization in the United States.” Federal Reserve Bank of St. Louis *Review*, 2015, Vol. 97, No. 2, pp. 87-108. See <https://research.stlouisfed.org/publications/review/2015/q2/Williamson.pdf>.
- Williamson, Stephen. “Interest on Reserves, Interbank Lending, and Monetary Policy,” Working Paper 2015-024A, Federal Reserve Bank of St. Louis, September 2015. See <https://research.stlouisfed.org/wp/2015/2015-024.pdf>.
- Woodford, Michael. *Interest and Prices: Foundations of a Theory of Monetary Policy*. Princeton, N.J.: Princeton University Press, 2003.
- Woodford, Michael. “Methods of Policy Accommodation at the Interest-Rate Lower Bound.” Presented at the Federal Reserve Bank of Kansas City Economic Symposium, “The Changing Policy Landscape,” Jackson Hole, Wyo., Aug. 31, 2012. See <http://www.columbia.edu/~mw2230/JHole2012final.pdf>.



Our Work. Our People.

Our mission is to promote stable prices, encourage maximum sustainable economic growth and support financial stability. We approach this mission from a variety of directions.

For example, our economists conduct regional, national and international economic research. Other staff members supervise financial institutions to help ensure their safety and soundness. Financial services are provided to the District's banks and to the U.S. Treasury to keep the nation's payment system running efficiently. The Bank develops financial and economic education curricula and programs for pre-K through college and beyond. The St. Louis Fed also works within communities to foster innovation and partnerships in community development.

The numbers that follow provide a glimpse of our work and our people over the past year.

All numbers are as of Dec. 31, 2015.



1,212 employees, the majority of them at the District's headquarters in St. Louis and most of the rest at the three branches, in Little Rock, Ark., Louisville, Ky., and Memphis, Tenn.

Supervisor of **128** state-chartered banks, as well as **522** bank and savings and loan holding companies.

1.1 billion singles, fives, tens and other currency notes were inspected to ensure fitness for circulation — **128,480** pounds of which were no longer fit and shredded.

As fiscal agent to the U.S. Treasury and its Do Not Pay program, the St. Louis Fed helped federal agencies identify **\$7,260,123** of improper payments, helping eliminate payment error, waste, fraud and abuse.

The call-in and in-person information sessions hosted by the St. Louis Fed on recent financial and regulatory developments attracted a total audience of more than **15,000** bankers, regulators and other industry participants.



3,299 pieces of currency were removed from circulation by the Bank because they were suspected of being counterfeit.

Our economic database—Federal Reserve Economic Data, better known as FRED®—grew to **294,000** data series, available free of charge to all.

People from **194** countries used FRED in 2015.



The St. Louis Fed's economic research division was ranked:

No. 5 among research departments at all central banks around the world;

No. 31 among all research institutions around the U.S.; and

No. 53 among all research institutions around the world.

2 million

items of economic research from around the world that anyone can access at any time for free via IDEAS, the world's largest bibliographic database dedicated to economics

IDEAS is a RePEc (Research Papers in Economics) service hosted by the research division of the St. Louis Fed.

**econ
lowdown**

709,000 enrollments in the Bank's online economic education courses

459,975

students were reached through educators who attended our economic education programs.



40.7 million pageviews of the St. Louis Fed's websites (start at stlouisfed.org)

177,719 pageviews of our St. Louis Fed On the Economy blog

55,094 followers on Twitter
[@stlouisfed](https://twitter.com/stlouisfed) 

35,161 subscribers to our online and print publications

92,934 pageviews of The FRED Blog



12,579 people signed up for 41 workshops, conferences, speeches and other events sponsored by our community development department.

465 people attended Dialogue with the Fed events, our evening lecture series for the public.

12,700 people visited the *Inside the Economy*® Museum at the St. Louis Fed in its first full year of operation. The museum received the Association of Midwest Museums' 2015 *Best Practices Award*.



More than

10,000

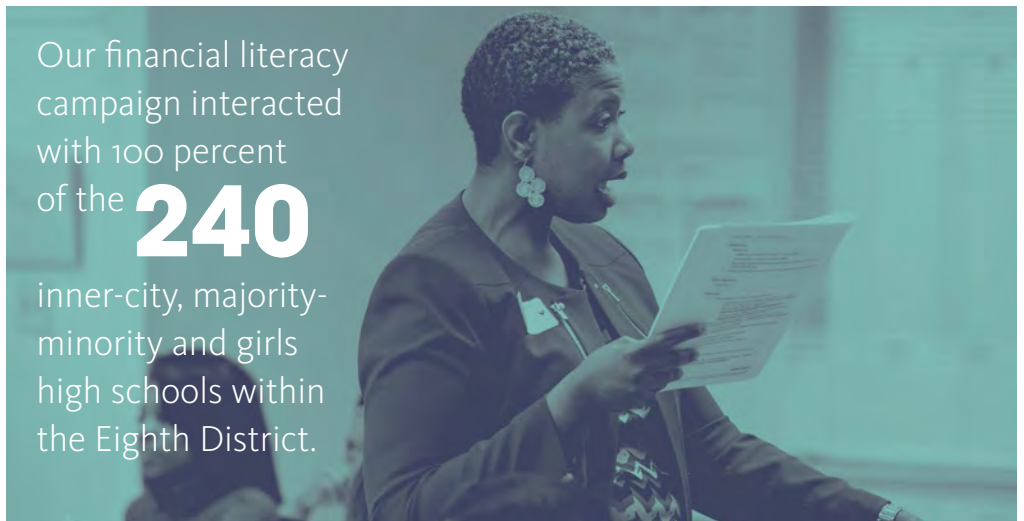
people across the country signed up for the new *myRA* (My Retirement Account), which the U.S. Treasury Department launched in late 2015 with the help of the St. Louis Fed's Treasury Relations and Support Office.



Our financial literacy campaign interacted with 100 percent of the

240

inner-city, majority-minority and girls high schools within the Eighth District.



12,723

people attended **127** presentations sponsored by our public speakers bureau.



180 tons

of various kinds of waste that in the past would have gone to landfills were recycled or composted.

\$211,920

donated by employees to the United Way of Greater St. Louis.

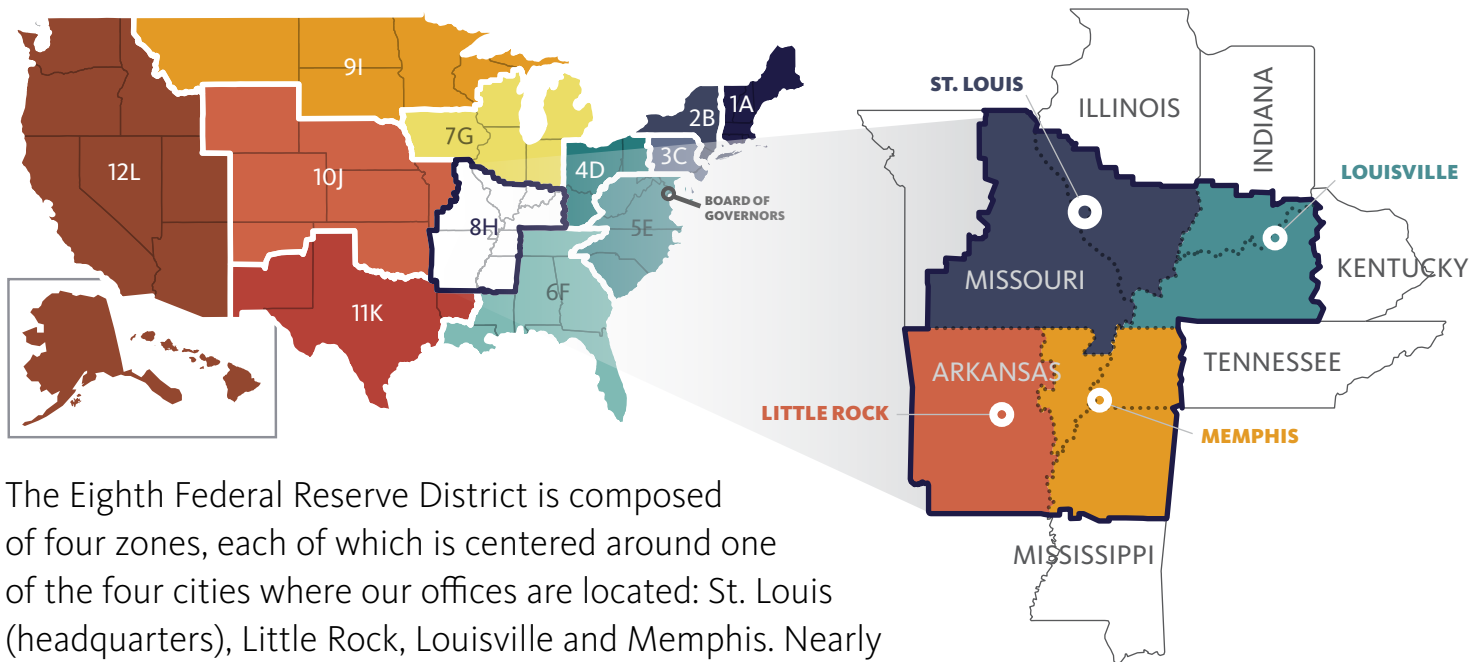
\$33,300

raised by employees to help support food banks and feeding programs for the needy in the St. Louis area.

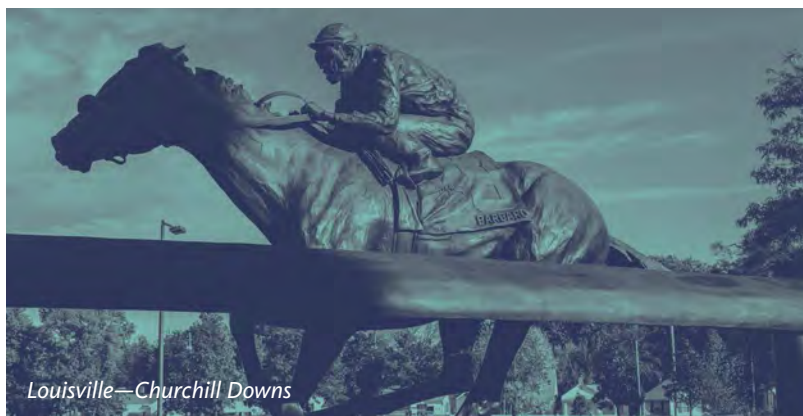
27,630

hours spent by internal auditors reviewing St. Louis Fed operations.

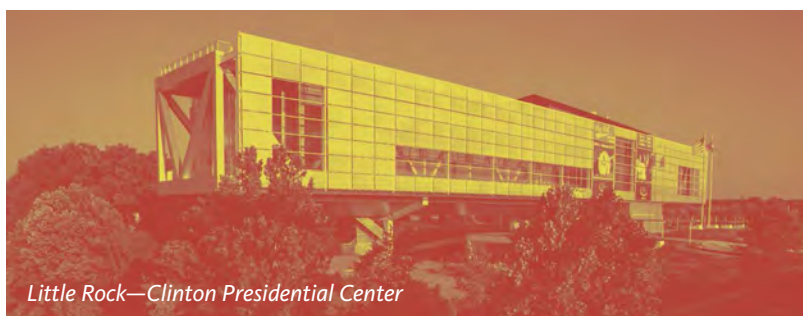
THE Eighth District—8H



The Eighth Federal Reserve District is composed of four zones, each of which is centered around one of the four cities where our offices are located: St. Louis (headquarters), Little Rock, Louisville and Memphis. Nearly 15 million people live in the Eighth Federal Reserve District.



Louisville—Churchill Downs



Little Rock—Clinton Presidential Center



Memphis—Orpheum Theatre



Our Leaders. Our Advisers.

The Federal Reserve's decentralized structure—the Board of Governors in Washington, D.C., and 12 independent Reserve banks around the country—ensures that the economic conditions of communities and industries across the map are taken into account in deciding monetary policy. The members of our boards of directors and our advisory councils are among the many voices of “Main Street” that we listen to. In addition, the St. Louis board provides governance oversight of management and approves management's allocation of resources to the Bank's activities.

On the following pages are board members from each of the four offices of the St. Louis Fed: St. Louis, Little Rock, Ark., Louisville, Ky., and Memphis, Tenn. Members of our advisory councils are also listed, as are officers of the Bank. (All lists are current as of April 8, 2016.) Finally, we salute those board members and advisory council members who have retired recently.

Chair's Message

As the chair of the Federal Reserve Bank of St. Louis, I take a keen interest in the Bank's decisions and actions. During my time serving on the board of directors, I have had the privilege of seeing first-hand how passionate the St. Louis Fed is about excellence through its commitment to service, its business planning and its quality, efficient operations.

I also appreciate the Bank on another level—the same level that those of you reading this can appreciate it and the same way that I will after my term on the board concludes—as an everyday consumer and citizen. That appreciation can be summed up in one word: confidence.

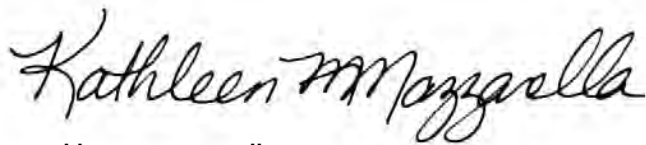
What I mean is that as we go about our daily lives, we can have confidence that the money we work hard to earn will maintain its value because an organization like the Federal Reserve is working diligently to foster a healthy, stable economy. The regional structure of the Fed, with 12 banks located in all parts of the nation, ensures that the economic conditions of “Main Street”—communities and industries from all regions of the country—are taken into account in monetary policy decision-making. Here in the Eighth District, our voice is well-represented by St. Louis Fed President James Bullard.

The St. Louis Fed serves a variety of constituents in supporting five areas outlined in the Bank's mission:

- advancing monetary policy focused on low inflation;
- performing effectively as the fiscal agent and depository of the U.S. Treasury;
- fostering safe and responsible banking practices;
- providing beneficial regional economic research, community development programs, and economic and financial education; and
- providing and promoting efficient, reliable and accessible payment services.

Finally, my experience on the board gives me confidence because I know that the staff members of the St. Louis Fed—whether they work in St. Louis, Little Rock, Louisville or Memphis—perform their duties with an ideal blend of discipline and innovation. The passion for excellence that I mentioned previously shines through in both the attitude and performance of the Bank's employees.

I am proud to say that when it comes to the St. Louis Fed and its contributions to a healthy economy and a stable financial system, confidence is high.



Kathleen M. Mazzarella
Chair of the Board of Directors
Federal Reserve Bank of St. Louis



Mazzarella is chairman, president and CEO of Graybar Electric Co. Inc.

PHOTO COURTESY GRAYBAR ELECTRIC CO.

St. Louis

BOARD OF DIRECTORS



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Kathleen M. Mazzarella
Chairman, President
and CEO, Graybar
Electric Co. Inc.
St. Louis



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D. Bryan Jordan

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Memphis, Tenn.



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Partner, Dover Dixon
Horne PLLC
Little Rock, Ark.



John N. Roberts III

President and CEO,
J.B. Hunt Transport
Services Inc.
Lowell, Ark.



Susan S. Stephenson

Co-Chairman
and President,
Independent Bank
Memphis, Tenn.



In June 2015, St. Louis Fed President James Bullard toured tech startups in St. Louis before addressing the Emerging Venture Leaders Summit.



CHAIRMAN

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President and CEO, Deltic
Timber Corp.
El Dorado, Ark.



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and Assistant Treasurer,
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Keith Glover

President and CEO,
Producers Rice Mill Inc.
Stuttgart, Ark.

Little Rock

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Pine Bluff, Ark.



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Community Partners
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Mark White

President and CEO,
Arkansas Blue Cross
and Blue Shield
Little Rock, Ark.



Robert Hopkins

Regional Executive,
Little Rock Branch,
Federal Reserve
Bank of St. Louis

At the University of Arkansas-Fort Smith in November 2015, President Bullard spoke about monetary policy at an event for the community before he, Robert Hopkins and other Fed executives toured the university's Baldor Technology Center.

Louisville

BOARD OF DIRECTORS



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 Treasurer, Koch
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Evansville, Ind.



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 President, The Malcolm
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Owensboro, Ky.



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 Chairman and CEO,
 Stock Yards Bank &
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Louisville, Ky.



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 The Greater
 Louisville Project
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Louisville, Ky.



Randy W. Schumaker
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 Aluminum Inc.
Russellville, Ky.



Nikki R. Jackson
 Regional Executive,
 Louisville Branch,
 Federal Reserve
 Bank of St. Louis



On a visit to New Albany, Ind., and Louisville in March 2016, President Bullard, Nikki Jackson and other Fed executives toured an industrial park on the site of an old Army ammo plant and met with regional economic leaders.



CHAIR
Carolyn Chism Hardy
 President and CEO,
 Chism Hardy
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 Collierville, Tenn.



Michael E. Cary
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 Carroll Bank and Trust
 Huntingdon, Tenn.



David T. Cochran Jr.
 Partner, CoCo Planting Co.
 Avon, Miss.

Memphis

BOARD OF DIRECTORS



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 National Bank of
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 Employment
 Professionals
 Tupelo, Miss.



Eric D. Robertson
 President, Community
 LIFT Corp.
 Memphis, Tenn.



Douglas Scarboro
 Regional Executive,
 Memphis Branch,
 Federal Reserve Bank
 of St. Louis

Civic leaders gathered at the Economic Club in Memphis in January 2016 to hear President Bullard, after which he, Douglas Scarboro and others from the Fed toured a business incubator specializing in digital startups.

Industry Councils

Council members represent a wide range of Eighth District industries and businesses and periodically report on economic conditions to help inform monetary policy deliberations.

Agribusiness Council

Meredith B. Allen

President and CEO, Staple Cotton
Cooperative Association
Greenwood, Miss.

Cecil C. “Barney” Barnett

Chairman, Algood Food Co.
Louisville, Ky.

John Rodgers Brashier

Vice President, Consolidated Catfish
Producers LLC
Isola, Miss.

Cynthia Edwards

Deputy Secretary, Arkansas Agriculture
Department
Little Rock, Ark.

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COO and Senior Vice President
of the Donald Danforth Plant
Science Center, and President of
the Bio Research & Development
Growth Park
St. Louis

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CEO and Founder, Ozark
Mountain Poultry
Rogers, Ark.

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Relations, Huber’s Orchard, Winery
& Vineyards
Borden, Ind.

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President, H&R Agri-Power
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Ted Longacre

CEO, Mesa Foods LLC
Louisville, Ky.

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Monsanto Co.
St. Louis

Health Care Council

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CEO, Esse Health
St. Louis

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of Health Policy and Management
Little Rock, Ark.

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Communications and Marketing,
BJC HealthCare
St. Louis

Diana Han

Chief Medical Officer, GE Appliances
& Lighting
Louisville, Ky.

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School of Public Health, University
of Memphis
Memphis, Tenn.

Susan L. Lang

CEO, HooPayz.com
St. Louis

Jason M. Little

President and CEO, Baptist Memorial
Health Care Corp.
Memphis, Tenn.

Robert “Bo” Ryall

President and CEO, Arkansas Hospital
Association
Little Rock, Ark.

Alan Wheatley

President, Retail Segment, Humana
Louisville, Ky.

Anthony Zipple

President and CEO, Seven Counties
Services Inc.
Louisville, Ky.

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Arkansas, Colliers International
Little Rock, Ark.

Katherine A. Deck

Director, Center for Business and
Economic Research at the University
of Arkansas
Fayetteville, Ark.

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President, Edwards Management Inc.,
Realtors
Memphis, Tenn.

David L. Hardy

Managing Director, CBRE | Louisville
Louisville, Ky.

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St. Louis

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Wakefield | Commercial Advisors
Memphis, Tenn.

Gregory J. Kozicz

President and CEO, Alberici Corp.
St. Louis

Lester T. Sanders

Realtor, Semonin Realtors
Louisville, Ky.

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Executive Director, Little Rock
Port Authority
Little Rock, Ark.

Michael D. Garriga

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Government Affairs, BNSF Railway
Memphis, Tenn.

Rhonda Hamm-Niebruegge

Director of Airports, Lambert
International Airport
St. Louis

David Keach

President and CEO, Gateway Truck
& Refrigeration
Collinsville, Ill.

Mike McCarthy

President, Terminal Railroad
Association of St. Louis
St. Louis

Mark L. McCloud

Chief Financial Officer, UPS Airlines
Louisville, Ky.

Judy R. McReynolds

Chairman, President and CEO,
ArcBest Corp.
Fort Smith, Ark.



Community Depository Institutions Advisory Council

The members meet twice a year to advise the St. Louis Fed's president on the credit, banking and economic conditions facing their institutions and communities. The council's chair also meets twice a year in Washington, D.C., with the Federal Reserve chair and governors.

Glenn D. Barks, Chairman

President and CEO, First Community
Credit Union
Chesterfield, Mo.

Jeffrey Dean Agee

President and CEO, First Citizens
National Bank
Dyersburg, Tenn.

Kevin Beckemeyer

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Eldorado, Ill.

Shaun Burke

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Karen Harbin

President and CEO, Commonwealth
Credit Union
Frankfort, Ky.

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President and CEO, Farmers &
Merchants Bank
Baldwyn, Miss.

Charles Horton

President and CEO, Fidelity
National Bank
West Memphis, Ark.

Jeffrey L. Lynch

President and CEO, Eagle Bank
and Trust
Little Rock, Ark.

Elizabeth G. McCoy

President and CEO, Planters Bank
Hopkinsville, Ky.

Dennis McIntosh

President and CEO, Ozarks Federal
Savings and Loan
Farmington, Mo.

Eric R. Olinger

President, Freedom Bancorp
Huntingburg, Ind.

Ann Cowley Wells

Chair and Co-CEO, Commonwealth
Bank and Trust Company
Louisville, Ky.

John Bucy

Executive Director, Northwest
Tennessee Development District
Martin, Tenn.

Terrance Clark

Co-Founder, Thrive
Helena, Ark.

Rex Duncan

Executive Director, Champion
Community Investments
Carbondale, Ill.

Brian Fogle

President and CEO, Community
Foundation of the Ozarks
Springfield, Mo.

Andy Fraizer

Executive Director, Indiana Association
for Community Economic
Development
Indianapolis, Ind.

Rita Green

Assistant Professor, Mississippi
State University
Mississippi State, Miss.

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Assistant Vice President and
Financial Empowerment Officer,
Old National Bank
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Christie McCravy

Executive Director, Louisville
Affordable Housing Trust Fund
Louisville, Ky.

Debra Moore

Director of Administration,
St. Clair County, Ill.
Belleville, Ill.

Martie North

Senior Vice President, Director of
Community Development/CRA,
Simmons First National Bank
Little Rock, Ark.

Kenneth Robinson

President/CEO, United Way of
the Mid-South
Memphis, Tenn.

Keith Sanders

Executive Director, The Lawrence
and Augusta Hager Educational
Foundation
Owensboro, Ky.

Margaret S. Sherraden

Founders Professor, University of
Missouri-St. Louis;
Research Professor, Washington
University in St. Louis
St. Louis

Sarina Strack

Senior Vice President and Director of
Compliance, Midwest Bank Centre
St. Louis

Deborah Temple

Senior Manager, Entrepreneurship,
Communities Unlimited Inc.
Pine Bluff, Ark.

Amy Whitehead

Director, Community Development
Institute and Center for Community
and Economic Development,
University of Central Arkansas
Conway, Ark.

Cassandra Williams

Vice President and Regional Branch
Administrator, Hope Federal
Credit Union
Memphis, Tenn.

Community Development Advisory Council

*The council keeps the St. Louis Fed's president
and staff informed about community
development in the Eighth District and
suggests ways for the Bank to support
local development efforts.*

Federal Advisory Council Representative

Retirees

FROM THE BOARDS
OF DIRECTORS AND
ADVISORY COUNCILS

The council is composed of one representative from each of the 12 Federal Reserve districts. Members confer with the Fed's Board of Governors at least four times a year on economic and banking developments and make recommendations on Fed System activities.

Ronald J. Kruszewski

Chairman and CEO, Stifel Financial Corp.
St. Louis

We express our gratitude to those members of the boards of directors and of our advisory councils who retired over the previous year.

From the Boards of Directors

St. Louis

William E. Chappel
Sonja Yates Hubbard
George Paz
Rakesh Sachdev

Little Rock

Ronald B. Jackson

Louisville

Jon A. Lawson

Memphis

Lisa McDaniel Hawkins
Charlie E. Thomas III

From the Industry Councils

Real Estate

Chuck Kavanaugh
Chuck Quick
Lynn B. Schenck

Transportation

Thomas Gerstle
James G. Powers
Paul Wellhausen

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Greg Ikemire
Larry W. Myers
Frank M. Padak
Steve Stafford

From the Community Development Advisory Council

David C. Howard Jr.
Joe Neri
Eric Robertson
Elizabeth Trotter
Keith Turbett
Johanna Wharton



James Bullard
President and CEO



David A. Sapanaro
First Vice President and
Chief Operating Officer

Bank Management Committee



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Senior Vice President



Karen L. Branding
Senior Vice President



Cletus C. Coughlin
Senior Vice President
and Chief of Staff to
the President



Nikki R. Jackson
Vice President and
Regional Executive,
Louisville Branch



Mary H. Karr
Senior Vice President,
General Counsel
and Secretary



Kathleen O'Neill Paese
Executive Vice President



Julie L. Stackhouse
Executive Vice President



Christopher J. Waller
Executive Vice President
and Director of
Research

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Vice President

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Timothy R. Heckler

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Limor Golan
Officer

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Officer

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Officer

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Officer

Guillaume A. Vandenbroucke
Officer

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Federal Reserve Bank of St. Louis

One Federal Reserve Bank Plaza
Broadway and Locust Street
St. Louis, MO 63102
314-444-8444

Little Rock Branch

Stephens Building
111 Center St., Ste. 1000
Little Rock, AR 72201
501-324-8300

Louisville Branch

National City Tower
101 S. Fifth St., Ste. 1920
Louisville, KY 40202
502-568-9200

Memphis Branch

200 N. Main St.
Memphis, TN 38103
901-531-5000

Lists of those on boards of directors and councils are as of April 8, 2016, as is the list of bank officers.

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Exploring Other Resources from the St. Louis Fed

The Federal Reserve Bank of St. Louis offers a wealth of information about the economy, economics, personal finance and related topics. We have something for everyone—researchers, teachers, business executives, market analysts, policymakers, bankers, community developers, students and, of course, the general public. Our information is available online, on paper and on your phone or tablet. And it's all free. Below are some of our resources.



Since the end of 2015, we've added 90,000 data series to FRED® (Federal Reserve Economic Data), bringing the total to 384,000 series available for downloading, tracking, graphing—or just viewing. Now in its 25th year, FRED is used by millions of people around the world. See <http://research.stlouisfed.org/fred2>.



Want to learn how to use FRED? A good teaching tool is The FRED Blog, where twice a week our economists show you step-by-step how they've created a custom data chart that pertains to their work. See <http://fredblog.stlouisfed.org>. In our other blog, St. Louis Fed On the Economy, the work of our economists and others at the St. Louis Fed is summarized three times a week. See www.stlouisfed.org/on-the-economy.



The Center for Household Financial Stability® opened three years ago, with the goals of researching and strengthening the balance sheets of American families. Read "The Quarterly Debt Monitor," "The Demographics of Wealth" and other reports from the center and watch related videos. Go to www.stlouisfed.org/hfs.



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