Janet Yellen: Navigating Uncharted Waters

No central bank anywhere on the planet...has the experience of successfully navigating a return home from the place in which we now find ourselves. No central bank—not, at least, the Federal Reserve—has ever been on this cruise before.

—Richard W. Fisher, President and CEO, Federal Reserve Bank of Dallas

In February 2017, Janet Yellen, entering her fourth and likely final year as chair of the Board of Governors of the U.S. Federal Reserve (the Fed), looked out at the Lincoln Memorial while reflecting on the Federal Open Market Committee’s tentative tightening of U.S. monetary policy. For Yellen, the modest year-end tightenings in 2015 and 2016 were first steps toward a normalization of U.S. monetary policy. She knew that short rates had been too low for too long—the federal funds rate had been near 0% for seven years—perhaps sowing the seeds for future financial crises, and that some upward movement in the federal funds rate would, all else equal, be desirable. She also yearned for the day when the Fed, rather than being the single largest holder of U.S. Treasury bonds, would once again have a boring, incoherent Treasury portfolio.

But Yellen was also aware of the mixed signals coming from the U.S. economy. Many indicators suggested that the U.S. economy was strong enough to weather a tightening of monetary policy. The labor market, for example, appeared to be heating up, adding over 12 million jobs in the five-year period from 2012 through 2016, its best performance since the 1990s. But other indicators—such as incredibly low Treasury yields and low commodity prices—pointed to a “secular stagnation,” which, if a reality, could require even looser monetary policy. Indeed, just a year earlier headline inflation was negative (deflation!), and inflation expectations were low (Figure 1). And the now well-established upward trend in the dollar would, all else equal, slow U.S. economic growth.

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1 The Federal Open Market Committee (FOMC) is the Fed committee that makes monetary policy. There are eight permanent positions on the FOMC—the seven Washington-based board members (political appointees who serve 14-year terms) plus the president of the Federal Reserve Bank of New York. All regional Fed presidents (who are not political appointees) participate in the process of making monetary policy, but only four (in addition to the permanent slots for the seven board members and the New York Fed president, the other four FOMC slots rotate among the other eight presidents of regional Feds).

2 The federal funds rate (or fed funds rate) is the interest rate at which depository institutions lend balances at the Federal Reserve to other depository institutions overnight.
Yellen also had to navigate the Fed’s communication strategy. Her predecessor, Ben Bernanke, had increased the clarity of the Fed’s public communications. One example was the FOMC press conference, a Bernanke Fed innovation implemented in 2012 that provided clarity that would have been unimaginable in Alan Greenspan’s Fed. In the 1980s, top economists (and the Fed) thought the only way for a central bank to steer the economy was to fool the public with “monetary surprises.” It was only in the 1990s that the Fed, under Greenspan, began to actually tell the public what current policy was; before that, the public had to guess. As the recovery from the 2001 recession took hold, Greenspan took another step toward clarity by telegraphing future policy changes; he promised slow but steady increases in the fed funds rate, a promise he made good on by implementing 14 straight 25-basis point increases in the fed funds rate to close out his tenure at the Fed. Transparency increased even more during the Bernanke Fed with the 2012 innovations of publishing the FOMC’s forecast four times a year and putting the chair before the public to explain the committee’s decisions, the wording of the statement, and its forecasts. Long gone were the early days of the Greenspan Fed, when the chair was able to say (as he did in a 1988 speech), “If I turn out to be particularly clear, you’ve probably misunderstood what I said.”

The days of Fed opacity were gone, and Yellen welcomed that. But her tenure could be characterized as giving the FOMC flexibility by providing the public with less guidance. In her first FOMC meeting as chair, she moved toward more ambiguity by announcing that the Fed would drop the quantitative criterion of a 6.5% unemployment rate that it had said, since December 2012, must be in place before it would begin to tighten policy. And in March 2015, she essentially said that future policy decisions would be data dependent. Guidance was useful only so long as guidance was useful.

With the greater openness and clarity came public dissension among FOMC members, unheard of during the Greenspan era but quite robust during Bernanke’s tenure. Under Yellen, the dissension had become a bit less collegial—after the March 2015 FOMC decision to leave the near-zero fed funds rate unchanged, Minneapolis Fed President Narayana Kocherlakota “attacked” her and St. Louis Fed President Jim Bullard argued that leaving interest rates at zero for so long risked inflating asset price bubbles with “devastating consequences.”

Figure 1. Headline inflation and inflation expectations.
In early 2017, Yellen was navigating uncharted waters along a number of dimensions. She had inherited an unruly FOMC. Over the past two years, some members publicly called for more expansionary Fed policy; others called for an end to the expansionary Fed policy; and still others worried aloud that Fed policy might be creating bubbles and risks to financial stability. And she faced at least three pressing questions: How, after the Fed’s balance sheet had expanded fourfold in a few short years, should the Fed guide the public through the eventual unwinding of that balance sheet? Relatedly, when should it begin to sell some of its $2.46 trillion in Treasury holdings? And were the December 2015 and December 2016 increases of the federal funds rate—the start of the first tightening phase in over a decade—the right decisions, or would the U.S. economy falter and force the Fed to reverse course? Before deciding on any of these, Yellen wanted to make sure she fully understood the factors affecting the current and prospective levels of U.S. long-term interest rates. She knew that to understand the present required knowledge of the past, so she began by revisiting the Greenspan and Bernanke years.


It was seemingly easy to be the chairman of the Federal Reserve from the mid-1980s through 2003 or so. Paul Volcker had done much of the heavy lifting on slaying inflation in the early 1980s, starting U.S. long-term interest rates on a beneficial downward march: long-term rates peaked at more than 15% in 1981 but by the end of 1985 were below 10%. In the 1990s, as long-term rates continued their secular decline, the United States experienced a surge in productivity growth, real GDP growth was impressively robust for such a mature economy, unemployment was low, and the federal budget actually went into surplus for a few years. Yes, recessions still occurred, but they appeared to be less frequent and less severe than in past decades. (See Exhibit 1 for basic economic indicators and Exhibit 3 for inflation measures.)

During the Greenspan Fed, long-term rates were fairly steady (in the 8% to 9% range) for a few years before heading south (Exhibit 2). Long rates increased on occasion—most notably when Greenspan pushed through a tightening of monetary policy as in 1994—but the longer-term trend was toward lower rates, and in the final Greenspan years, long-term interest rates had fallen to historically low levels of 4% to 5%.

One way for long-term interest rates to decline is for longer-term inflation expectations to fall. And fall they did: long-term inflation expectations, at about 4% when Greenspan took office, began to decline almost from the day he was sworn in (Exhibit 3, bottom chart). This unprecedented anchoring of long-term inflation expectations would be seen by some as Greenspan’s crowning achievement. William Poole, then-president of the Federal Reserve Bank of St. Louis, said that “market confidence in the Federal Reserve’s ability and willingness to maintain a low-trend rate of inflation has been a core characteristic of the Greenspan regime.”

Shorter-term inflation expectations were more volatile, possibly because of the occasional sharp movements in the price of oil, but those, too, appeared to be well contained. By the end of 2005, shorter-term inflation expectations had, roughly speaking, been at or below 2.5% for almost a decade.

Perhaps because of the job Greenspan—and Volcker before him—had done wresting inflation out of the economy, the volatility of interest rates dropped precipitously and then remained remarkably constant throughout Greenspan’s reign as chairman (Exhibit 4). With more muted fluctuations in interest rates, investors demanded less of a premium for protection against price and reinvestment risk, another factor reducing long-term rates. The reduced volatility was due in part to luck—for example, the U.S. economy had not been buffeted by adverse supply shocks—but the credibility of the Greenspan Fed also enabled long rates to be so stable.
Part of the Fed’s credibility stemmed from strong performance on the monetary policy front, but another important component was the increased communication between the Fed and the market. When Greenspan took over, market participants had to guess at what Fed policy was—even as it was occurring! Specifically, Fed watchers had to divine whether monetary policy was being tightened or loosened—that is, what the target federal funds rate actually was—by observing the type and size of the open-market operations that the New York Fed’s trading desk conducted. As William Poole said:

Before 1987, Fed decisions were not only murky to the market but at times even murky within the system, including within the FOMC. Moreover, before Greenspan many within the Fed believed that policy effectiveness depended on taking markets by surprise.

In February 1994, the Fed began announcing the target federal funds rate, so the public no longer needed to guess. And at about that time, a new form of policy had taken hold—“open mouth operations”—in which Greenspan or another Fed official would hint at policy changes before they occurred. Through open-mouth operations—and other important steps toward increased transparency—policy shocks were taken out of investors’ thought processes.3

The strong performance on the inflation front (Exhibit 3, top chart) and the concomitant general decrease in long-term interest rates did not occur because of a secular decline in growth prospects in the U.S. economy. Indeed, by the end of the Greenspan Fed real GDP growth had averaged a robust 3% for three decades (Exhibit 1).

Although the U.S. economy’s performance during the Greenspan era was widely hailed as impressive, there were some notable problem areas. One—a lax regulatory environment—was damning but will not be discussed here. Another problem area was the twin deficits. Greenspan had credited Robert Rubin and the Clinton administration with lowering the budget deficit—even driving it into surplus—so convincingly that nearly everyone foresaw eternal surpluses. Their efforts had truly made Greenspan’s work easier. Greenspan, too, believed that long-lived surpluses were a distinct possibility. Knowing Washington as he did, he knew the tides could turn quickly, but as late as mid-2001, his—and his staff’s—best guess was that “while the magnitudes of future federal unified budget surpluses are uncertain, they are highly likely to remain sizable for some time.”iv

But the 1990s budget surpluses quickly evaporated and turned into large, prolonged deficits (Exhibits 1 and 5). To be sure, the events of September 11, 2001, put pressure on the budget. But Greenspan also had to accept some of the blame for the shift to large deficits because when the federal funds rate was approaching zero, he had opined that a stimulative tax cut wouldn’t be harmful. What he really wanted was for economic growth to pick up enough to get short-term nominal rates away from zero—how would the Fed conduct monetary policy if short rates fell to zero? What he failed to count on (but in retrospect should have counted on) was that once the tax cut/high-spending genie got out of the bottle, there was no putting it back.

The current account deficit (Exhibit 6)—as it approached a troublingly large 5% of GDP in 2003 (and would exceed 6% by 2005)—brought less consternation but did concern the Greenspan Fed. Foreigners seemed willing to finance the huge deficit: foreign flows into U.S. securities exceeded the current account deficit most years. Greenspan often wondered if the large current account deficits prompted the inflows or if the

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large inflows produced the current account deficits.) If the huge inflows were financing investment, he would be less worried—there was nothing wrong with borrowing today to expand productive capacity tomorrow—but they appeared to coincide with surges in consumption and fiscal deficits. There was also some concern that the huge current account deficits were being financed by bond flows (rather than flows into equities or foreign direct investment), although Greenspan himself was not overly concerned because he, like almost everyone, believed the U.S. financial system could adequately intermediate funds. Little did he know that this basic belief in the efficacy of the U.S. financial system was, as it turned out, sorely mistaken.

The Bernanke Years (2003–January 2014)

Greenspan’s conundrum

Bernanke’s time at the Fed began in 2003 while Greenspan was still chairman. As a new governor at the Fed, Bernanke saw Greenspan keep the federal funds rate at the abnormally low level of 1% for over a year. That seemed to surprise many Fed watchers, but the reason was very simple: after more than a decade of fighting inflation, Greenspan actually wanted a bit more inflation. That apparent paradox derived from one very basic fact. Although the Fed technically had a variety of possible instruments with which to conduct monetary policy—and had used different instruments in the past—the federal funds rate had become the instrument of choice for the Greenspan Fed. With the fed funds rate at 1%, it was thought that there just wasn’t much room to lower it further in the event that the economy needed a stimulative push. Strong growth and a bit more inflation would naturally put upward pressure on short rates, allow the fed funds rates to move away from zero, and provide some much welcomed policy flexibility.

By early 2004, when it was clear that growth was strong and sustainable, Greenspan used open-mouth operations to signal that the Fed was about to engage in a tightening phase. Because this was well telegraphed and was presumed to be ongoing for a year or more, many (including Greenspan and Bernanke) assumed that long rates would move up sharply from their historic lows. As it happened, the Fed raised the fed funds rate slowly but surely to 3.25% by mid-2005. That tightening, especially in the context of surging oil prices, would usually result in higher long rates. But long rates remained stubbornly low, prompting Greenspan and Bernanke to ponder this conundrum.

A possible driver of the conundrum, put forward by then-Governor Bernanke, was that the world was awash in savings that exceeded desired investment. This “global saving glut” was eminently plausible but hard to verify quantitatively. There was a source of data—global capital flows data—that could possibly speak to an aspect of the global saving glut, but at the time, it was not clear how to interpret the capital flows data. Greenspan’s capital flows expert had been keeping him abreast of the very large positions foreign governments were taking in U.S. government bonds (see Exhibit 7 for recent data). Greenspan’s interest in these data began with the Asian Financial Crisis, and he kept an eye on these so-called official flows more as a timely way of tracking which emerging economies were doing well and building up foreign reserves—see Exhibit 8 on the massive reserve accumulation that occurred from 2002 through 2013—and which were drawing down reserves. But during the last few years of the Greenspan Fed, it seemed that many countries were adding to their foreign reserves, and in aggregate, these foreign official positions had become huge; by 2004, foreigners (including private foreign investors) had acquired more than half of all outstanding Treasury securities. If foreign governments held only short-term U.S. debt instruments, the impact on U.S. rates would be minimal—the

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4 For an analysis of the preconditions that, on average, lead to a more painful unwinding of a large current account deficit, see Caroline Freund and Frank Warnock, “Current Account Deficits in Industrial Countries: The Bigger They Are, the Harder They Fall?,” in G7 Current Account Imbalances: Sustainability and Adjustment, ed. Richard H. Clarida (Chicago: University of Chicago Press, 2007), 133–62.
markets at the short end of the yield curve were so deep and so closely tied to monetary policy instruments that it was hard to imagine that foreign flows could materially affect prices. But there was evidence that some foreign governments were moving out the yield curve into some of the longer-dated maturities.

At a July 2005 briefing, Senator Richard Shelby asked Greenspan if those foreign flows could affect long-term U.S. interest rates:

This committee has previously raised questions with you, Mr. Chairman, regarding the large Chinese and Japanese official holdings of U.S. Treasuries. Your report today indicates that data from Treasury indicates that demand for these securities from foreign official investors has ebbed during the first five months of this year. Obviously, the Chinese government announcement to switch to a currency basket in setting its peg could also affect that demand. Mr. Chairman, do you anticipate that long-term rates may be affected by the changes in foreign official demand, or do you expect such changes to unfold slowly over time and thus be absorbed into the market?5

In Greenspan’s response to the senator, he noted that foreign accumulation probably lowered long-term U.S. interest rates by fewer than 50 basis points, and so the unwinding of those positions, were it to occur, would only add a small amount to long rates. But he knew that the estimates he had in his back pocket included only those bonds held at the New York Fed on behalf of foreign governments. Because some governments avoided the New York Fed and because the actions of private foreign investors also mattered, he did not have a good sense of the true impact of foreign buying.5

The Bernanke Fed

Bernanke became chairman in early February 2006. He pledged continuity with the Greenspan era, and indeed he continued Greenspan’s measured, steady increases in the fed funds rate, slowly raising it to 5.25% by the summer. But soon thereafter, everything hit the fan. In late 2006, house prices (Exhibit 9) began to fall for the first time in decades. Growth expectations began to turn down almost immediately. Oil prices were, at the same time, skyrocketing, putting Bernanke, an advocate of inflation targeting, in a difficult situation. In 2008, he found himself wondering if he should tighten monetary policy to head off prospective inflation, or was the economy weakening quickly enough to naturally tame inflation (and, if so, would he have to loosen policy)?

The global financial crisis and the Fed’s quantitative easing responses

Events soon took over. The U.S. financial system, as it happened, was not sound. As in almost any banking crisis, too much of the lending in the preceding years was reckless, and the regulators were either ill-equipped to assess this or just uninterested. The United States—and the entire world, it seemed—was mired in a deep recession. Inflation, once worryingly high (so much so that there were food price-related riots in almost 30 countries in 2007–08), was now plummeting everywhere. And the U.S. federal budget, like budgets all over the world, was set to go deeper into deficit than at any time in recent memory.6

Bernanke would go down in history as the chairman who brought the Fed into uncharted waters (for it, at least). In the summer of 2007, the fed funds rate stood at 5.25%. Once the global financial crisis (GFC) began, Bernanke aggressively lowered the fed funds rate, quickly bringing it to near 0% by the end of 2008. In

November 2008, when the fed funds rate had reached the “zero lower bound” but the economy was still very weak and financial markets were reeling, the Fed began its attempt to directly influence long-term interest rates by making massive purchases of U.S. Treasury bonds, the first of the so-called quantitative easing (QE) measures. Those policies raised eyebrows but were largely seen as necessary to keep the U.S. (and world) economy from sliding into another Great Depression. The Fed also implemented an almost unfathomable campaign of new facilities to free up frozen credit markets and of credit easing to loosen monetary conditions even further. As the financial crisis went through its worst period—in fall 2008 and spring 2009—Bernanke had the Fed purchase over $1 trillion in mortgage-backed securities and Treasury securities in an unprecedented expansion of its balance sheet, all to try to stave off a depression. He referred to this as credit easing; the market preferred the term quantitative easing.

The GFC morphed into the eurozone debt crisis. This had a dual effect on the U.S. economy. On the one hand, the U.S. Treasury bond market was the beneficiary of safe-haven flows as investors realized that eurozone bonds were riskier than they had thought. On the other hand, uncertainty about the eurozone itself (was the monetary union going to dissolve?) led to uncertainty about the U.S. economy (would the U.S. financial system be dragged down by a disorderly breakup of the eurozone?). By late 2010, the U.S. economy had emerged from recession, but then it hit a soft patch, prompting Bernanke to announce that the Fed would embark on the unfathomable squared: QE2—the second round of quantitative easing in which the Fed would become the proud owner of another $600 billion in Treasury securities by the second quarter of 2011. Indeed, by some estimates, the Fed had surpassed the People’s Bank of China as the single largest holder of U.S. Treasury securities. (See Exhibit 10 for the increase in the size of the Fed’s balance sheet.)

Bernanke had received some criticism for QE1, but most people saw it as necessary to keep the U.S. economy (and maybe even the global economy) from depression. The reaction to QE2, however, was fundamentally different. Some in Congress almost immediately called for the abolishment of the Fed. William Gross, the legendary bond investor and head of Pacific Investment Management Co.—better known as PIMCO—likened QE2 to a Ponzi scheme and followed his words with actions: by March 2011, PIMCO, one of the largest bond investors in the world, had reduced its holdings of U.S. Treasury bonds to zero.

But Bernanke, undeterred, was not finished. In September 2011, in an effort to put additional downward pressure on long-term interest rates, he implemented “Operation Twist,” in which, in order to extend the average maturity of its holdings of securities, the Fed sold short-term Treasury securities and used the proceeds to purchase longer-term U.S. bonds. In September 2012, the Fed announced QE3: the FOMC would purchase $40 billion per month of agency mortgage-backed securities, while at the same time continuing Operation Twist and reinvesting many of its ongoing principal payments into agency mortgage-backed securities. All told, QE3 would increase Fed holdings of longer-term securities by about $85 billion per month. And how long would QE3 last? As Bernanke explained in December 2012, so long as inflation and inflation expectations remained contained, the Fed would keep the QE policies in place until the U.S. unemployment rate fell to 6.5%, a level not seen since the fall of 2008.

Why would the Fed aggressively purchase long-term Treasury bonds not just once (in the darkest days of the crisis) but again with QE2 (when the economy was “just” in a soft spot) and yet again with Operation Twist? And why would the FOMC initiate QE3’s move into mortgage-backed securities, a move Richmond Fed President Jeffrey Lacker derided as inappropriate credit policy that favored the very sector at the core of the GFC? Simple: Bernanke worried that long-term interest rates would not remain low, thus dampening any incipient improvement in economic activity. But he understood the substantial risks associated with a policy that was tantamount to monetizing the budget deficit. Monetizing the government’s budget deficit this way has been, for many countries, a sure path to high inflation. Bernanke knew this, and if he didn’t, he could ask any number of policymakers in countries ranging from Argentina to Zimbabwe.
The impact of these policies on the Fed’s balance sheet was striking. In August 2008, the Fed’s entire balance sheet totaled $895 billion. By mid-March 2015, the Fed owned almost double that in mortgage-backed securities alone ($1.74 trillion), as well as $2.46 trillion in Treasury bonds and notes, and had a bloated balance sheet that approached $4.5 trillion. Some were less than enamored with the Bernanke Fed’s policies. Prior to the announcement of QE3, Campbell Harvey, a leading finance professor, summarized results from a survey of CFOs:

This is stark evidence that QE3 would be a wasted effort...The CFOs are saying that it is naïve for the Fed to think that dropping interest rates will spur investment in current economic conditions...The survey’s bottom line is that the Fed has run out of bullets. The best thing they can do is to foster stability.

Some members of Congress thought so little of Bernanke’s policies that they introduced bills that, if enacted, would greatly change the nature of the Fed. The Sound Dollar Act of 2012 (H.R. 4180), introduced in the House by Joint Economic Committee Vice Chairman Kevin Brady, would change the Fed’s dual mandate of price stability and full employment to a more focused mandate on price stability. A more radical act (H.R. 1098), introduced by Ron Paul, would go even further by repealing the legal tender laws, ending the Fed’s monopoly on money creation, and allowing the private production and use of gold and silver as money.

H.R. 4180 would also give regional Federal Reserve Bank presidents greater clout in monetary policy decisions. How would they use that increased clout? Lacker, the president of the Richmond Fed who believed that current Fed policies might be harming the economy and should be scaled back, dissented frequently in FOMC meetings and felt that the Fed’s foray into mortgage-backed securities was wholly inappropriate:

I strongly opposed purchasing additional agency mortgage-backed securities. These purchases are intended to reduce borrowing rates for conforming home mortgages. Such purchases, as compared to purchases of an equivalent amount of U.S. Treasury securities, distort investment allocations and raise interest rates for other borrowers. Channeling the flow of credit to particular economic sectors is an inappropriate role for the Federal Reserve. As stated in the Joint Statement of the Department of Treasury and the Federal Reserve on March 23, 2009, “Government decisions to influence the allocation of credit are the province of the fiscal authorities.”

Other regional Fed presidents, such as Eric Rosengren of the Boston Fed, wanted the Fed to do more to support the struggling U.S. economy:

Mr. Rosengren likened the economy to a swimmer treading water and getting nowhere. “That calls for a more substantive action than we’ve taken to date,” he said. “We need a pro-growth monetary policy.” Treading water, he added, was “not sufficient.” Mr. Rosengren said the Fed should buy more mortgage-backed securities and possibly U.S. Treasury securities in an open-ended program, and stated that it will continue to buy bonds “until we start seeing some pretty significant improvements in growth and income.”

The Fed did just that a few weeks after Boston Fed President Rosengren’s comments when it announced QE3, the very policy that Richmond Fed President Lacker decried. Yet another FOMC member, Fed Governor Jeremy Stein, openly worried that the Fed’s policy of keeping interest rates persistently low might be causing a bubble in the junk bond market. Stein suggested that preemptive monetary policy might be appropriate if the...

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Fed were to believe that such a bubble would have systemic implications. Bernanke himself had also worried about the unintended consequences of asset purchases: “...asset purchases are a less well-understood tool...we'll be learning over time about how efficacious they are, about what costs they may carry with them in terms of unintended consequences...” Bernanke also noted that “if the [Fed’s] balance sheet gets indefinitely large...there would be potential risks in terms of financial stability, in terms of market functioning.”

The Bernanke Fed would go into the history books as being exceedingly aggressive, but some of its new facilities and policies were not gaining traction. As a result, money growth was not increasing as much as the Fed had hoped because banks were hoarding excess reserves (or were potential borrowers just disinterested in loans?), keeping the money multiplier from increasing (Exhibit 1). To be sure, credit markets had calmed down; for example, the spike in interbank lending rates during the crisis seemed to be a thing of the past (Exhibit 1). But the traction Bernanke had hoped for was not materializing.

Forward guidance

The Bernanke Fed was innovative on another front. At its January 2012 meeting, the FOMC published not only its forecasts for economic growth, inflation, and other important variables—something it began doing the year before—but also its forecast for the fed funds rate (see Exhibit 12 for the latest projections). In the Greenspan Fed, access to internal fed funds projections was granted on a need-to-know basis, even for staff economists; the thinking within the Fed had changed so dramatically that the public was now privy to the Fed’s forecast of its own future actions. This unprecedented amount of forward guidance was yet another attempt to keep long rates low: if the market knew that the Fed had no intention of raising the fed funds rate for the foreseeable future, that might be enough to keep long rates from rising.

And the forward guidance did not end with publishing forecasts of the fed funds rate. Like the previous five years, 2012 was a difficult one, and in the middle of the year the economy took a turn for the worse. At its April 2012 meeting, the FOMC was concerned that the housing market continued to be held down (by the large overhang of foreclosed and distressed properties, uncertainty about future home prices, and tight underwriting standards for mortgage loans) and that firms’ capital investment was slowing. Moreover, while labor market conditions seemed to be improving, there was far too much slack in the U.S. economy (Exhibit 13), and the official unemployment rate, the “underemployment” rate, and the number of people unemployed longer than six months were all too high (Exhibit 14).

The economic outlook worsened throughout the year and, in December 2012, Bernanke lamented about the human toll the crisis and the tepid recovery imposed:

[U]nemployment remains high. About 5 million people—more than 40 percent of the unemployed—have been without a job for six months or more, and millions more who say they would like full-time work have been able to find only part-time employment or have stopped looking entirely. The conditions now prevailing in the job market represent an enormous waste of human and economic potential.

Bernanke’s response was more guidance: he announced that so long as inflation and inflation expectations remained contained, the Fed would keep the QE policies in place until the U.S. unemployment rate fell to 6.5%. Specifically, the Fed’s quantitative guidance was that exceptionally low levels for the federal funds rate would likely be warranted “at least as long as the unemployment rate remains above 6½ percent, inflation over the period between one and two years ahead is projected to be no more than half a percentage point above the Committee’s 2 percent longer-run goal, and longer-term inflation expectations continue to be well anchored.”
By making such an announcement, Bernanke was indicating as clearly as he could that Fed policies would be hyper-supportive of the U.S. economy until things got better.

But the unemployment rate came down surprisingly quickly, and just six months later, in his June 2013 post-FOMC press conference, Bernanke surprised markets with “taper talk”:

If the incoming data are broadly consistent with this forecast (of gains in labor markets and inflation around 2 percent), the Committee currently anticipates that it would be appropriate to moderate the monthly pace of purchases later this year. And if the subsequent data remain broadly aligned with our current expectations for the economy, we would continue to reduce the pace of purchases in measured steps through the first half of next year, ending purchases around midyear.

The markets reacted to this taper talk with a “taper tantrum.” The tantrum subsided, but the fact remained: Janet Yellen would be taking over the Fed at a time when markets had become addicted to the Fed’s hypersupportive monetary policy.

Yellen’s Navigation

Yellen became chair of the Federal Reserve Board in early 2014. She was a longtime academic economist who also had ample Fed experience, having been a young staff economist at the board in the late 1970s, a board member in the mid-1990s, president of the San Francisco Fed from 2004 to 2010, and Bernanke’s vice chair on the board since late 2010.

An important issue for Yellen concerned the Fed’s exit strategy from its policies of a near-zero fed funds rate and a massive portfolio of Treasury bonds and mortgage-backed securities.

At her first post-FOMC press conference, in March 2014, Yellen ditched the 6.5% quantitative criteria, moved to vaguer guidance, and indicated that a tightening of the fed funds rate might come six months after the end of QE. As QE was set to end in fall 2014, this suggested a fed funds rate hike in spring 2015, much earlier than many had expected. At that same March 2014 meeting, the FOMC lowered its expectation of the fed funds rate that would prevail once the economy was on sure footing, essentially telling the market that policy rates would remain lower than usual far into the future. Thus the Yellen Fed’s first move was to allow for expansionary policy to last longer (by removing the quantitative criteria, the Fed could continue QE well after the unemployment rate fell below 6.5%) while simultaneously suggesting faster tightening than expected. Press reports were scathing—they used terms such as “disastrous,” “gaffe,” “error prone,” and “gone awry”—and at least one FOMC member was not impressed. Minneapolis Fed President Kocherlakota, in explaining his dissenting vote, said that the Fed had “damaged its credibility and created uncertainty that will weaken the U.S. economic recovery.”

A calmer assessment might be that although Yellen had seemingly taken a step back toward the opaqueness of the Greenspan Fed, removing the 6.5% criteria was sensible—the unemployment rate is not a very informative measure—and provided some much-needed flexibility. And markets needed to prepare for Fed tightening, which must occur at some point, so why not signal that the days of hypersupportive Fed policy were numbered?

In March 2015, Yellen moved further away from “forward guidance,” telling the post-FOMC press conference that “the initial increase in the [fed funds rate] target range will depend on the Committee’s assessment of incoming information.”

Translation: the Fed would embark on its first tightening phase since mid-2004 when the data told it to.
The Yellen Fed finally began the tightening phase in December 2015, when it increased the fed funds’ target range to 0.25-0.5% after holding it near zero for seven years. But at that time the data did not present a compelling case for tightening, as inflation was still far closer to zero than to the Fed’s 2% target and economic growth was, in the FOMC’s own words, “moderate.” Not surprisingly, prominent economists such as Paul Krugman and Larry Summers publicly called the tightening a mistake. As Krugman put it in January 2016: “[O]n the immediate question of whether the Fed should raise rates, we’re all agreed that it should not.” Thus, the long-awaited tightening phase had begun, but prominent economists were essentially predicting that the rate increase would do more harm than good which, if true, would put the Fed in the uncomfortable position of having to quickly reverse course (and possibly re-implementing QE programs). And Yellen seemed to take heed, only pushing through one more tightening at the end of 2016. Yes, the Fed was tightening monetary policy, but the first increases in the fed funds rate in a decade were decidedly modest.

One important part of the Fed’s data assessment was an understanding of the reason behind the historically low long-term interest rates. The Fed, even while starting to increase the fed funds rate, decided not to decrease the size of its massive Treasury and MBS portfolios; it would continue to roll over maturing Treasury securities and reinvest principal payments from its MBS portfolio. In deciding when the Fed should sell some of its Treasury holdings and if it should continue to increase the fed funds rate, Yellen had to assess whether low long rates were a reflection of coming gloom. If so, should the Fed stop tightening? Or were financial stability concerns, after years of zero short rates and artificially low long rates, enough to continue the tightening phase even in the face of weak data?

Yellen recognized that she needed to fully understand the factors affecting the current and prospective levels of U.S. long-term interest rates. How potential trends in inflation, growth, and other determinants of long rates would interact with the post-crisis environment weighed heavily on Yellen’s mind as she watched the sun set over the Lincoln Memorial.
### Exhibit 1

**Janet Yellen: Navigating Uncharted Waters**

**Economic Indicators**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross domestic product (billions of $)</td>
<td>2,774</td>
<td>5,760</td>
<td>9,879</td>
<td>15,129</td>
<td>18,037</td>
<td>18,567</td>
</tr>
<tr>
<td>Real GDP growth (%)</td>
<td>3.0</td>
<td>3.1</td>
<td>3.4</td>
<td>1.5</td>
<td>2.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Personal consumption expenditures (%) of GDP</td>
<td>61</td>
<td>64</td>
<td>66</td>
<td>68</td>
<td>68</td>
<td>69</td>
</tr>
<tr>
<td>Durable goods (%)</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Nondurable goods (%)</td>
<td>19</td>
<td>16</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Services (%)</td>
<td>34</td>
<td>39</td>
<td>43</td>
<td>45</td>
<td>46</td>
<td>47</td>
</tr>
<tr>
<td>Investment (%)</td>
<td>19</td>
<td>17</td>
<td>18</td>
<td>16</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>Net Exports (%)</td>
<td>-0.9</td>
<td>1.5</td>
<td>-3.0</td>
<td>-4.0</td>
<td>-2.9</td>
<td>-2.7</td>
</tr>
<tr>
<td>Exports (%)</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>12</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>Imports (%)</td>
<td>9</td>
<td>10</td>
<td>13</td>
<td>16</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Government spending (%) of GDP</td>
<td>21</td>
<td>20</td>
<td>19</td>
<td>20</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Federal surplus/deficit (%)</td>
<td>-3.4</td>
<td>-3.8</td>
<td>-0.6</td>
<td>-4.9</td>
<td>-2.5</td>
<td>-3.3</td>
</tr>
<tr>
<td>Federal receipts (%)</td>
<td>17.7</td>
<td>17.4</td>
<td>18.0</td>
<td>16.3</td>
<td>18.2</td>
<td>17.9</td>
</tr>
<tr>
<td>Federal outlays (%)</td>
<td>21.1</td>
<td>21.2</td>
<td>18.7</td>
<td>21.3</td>
<td>20.7</td>
<td>21.1</td>
</tr>
<tr>
<td>Nonfarm business sector (% change)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compensation per hour (%)</td>
<td>8.1</td>
<td>4.2</td>
<td>4.2</td>
<td>2.6</td>
<td>2.9</td>
<td>2.8</td>
</tr>
<tr>
<td>Output per hour (productivity) (%)</td>
<td>1.6</td>
<td>1.7</td>
<td>2.8</td>
<td>1.4</td>
<td>0.9</td>
<td>0.2</td>
</tr>
<tr>
<td>Unit labor costs (%)</td>
<td>6.4</td>
<td>2.5</td>
<td>1.3</td>
<td>1.2</td>
<td>2.0</td>
<td>2.6</td>
</tr>
<tr>
<td>Potential GDP (billions of $)</td>
<td>2,846</td>
<td>5,857</td>
<td>9,954</td>
<td>15,504</td>
<td>18,248</td>
<td>18,795</td>
</tr>
<tr>
<td>Natural Rate of Unemployment (%)</td>
<td>6.2</td>
<td>5.8</td>
<td>5.1</td>
<td>5.0</td>
<td>4.8</td>
<td>4.8</td>
</tr>
<tr>
<td>Unemployment Rate (%)</td>
<td>7.7</td>
<td>6.4</td>
<td>5.1</td>
<td>7.0</td>
<td>5.3</td>
<td>4.9</td>
</tr>
<tr>
<td>PCE Inflation (%)</td>
<td>6.9</td>
<td>3.2</td>
<td>1.8</td>
<td>2.0</td>
<td>0.3</td>
<td>1.1</td>
</tr>
</tbody>
</table>

**Notes:** Surplus/deficit data are for fiscal years. All data are annual averages.

Exhibit 2

Janet Yellen: Navigating Uncharted Waters

Long-Term U.S. Treasury Yield and the Federal Funds Rate

10-Year Treasury Note Yield at Constant Maturity
% p.a.

Federal Funds [effective] Rate
% p.a.

Last data point: January 2017.
Exhibit 3
Janet Yellen: Navigating Uncharted Waters

Inflation and Inflation Expectations

Notes: In the top graph, the thick line is core (i.e., excluding food and energy) PCE inflation and the thin line is headline PCE inflation. In the bottom graph, the thin line represents short-term (one year ahead) inflation expectations and the thick line represents long-term (annual average for subsequent 10 years) inflation expectations. Last data points: End-2016.
Exhibit 4
Janet Yellen: Navigating Uncharted Waters

Interest Rate Volatility

Interest Rate Volatility
rolling 36-month standard deviation of changes in long rates

Notes: Volatility is computed as the rolling 36-month standard deviation of month-to-month changes in 10-year Treasury rates. Last data point January 2017.

Data sources: Author calculations based on data from Haver Analytics and Federal Reserve Board.
Exhibit 5

Janet Yellen: Navigating Uncharted Waters

Federal Budget Balance: Actual and Structural (with Projections)

CBO 'Baseline' Budget Balance
Fiscal Year, % of GD

Source: Congressional Budget Office / Haver Analytics

Structural Budget Balance
Fiscal Year, % of Potential GD

Source: Congressional Budget Office / Haver Analytics
**Exhibit 6**

*Janet Yellen: Navigating Uncharted Waters*

**U.S. Balance of Payments (in billions of U.S. dollars)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Account Balance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade balance</td>
<td>-554</td>
<td>-537</td>
<td>-421</td>
<td>-463</td>
</tr>
<tr>
<td>Exports of goods and services</td>
<td>1,799</td>
<td>1,712</td>
<td>2,174</td>
<td>2,261</td>
</tr>
<tr>
<td>Imports of goods and services</td>
<td>1,704</td>
<td>2,259</td>
<td>2,680</td>
<td>2,762</td>
</tr>
<tr>
<td><strong>Primary Income balance</strong></td>
<td>45</td>
<td>135</td>
<td>211</td>
<td>182</td>
</tr>
<tr>
<td>Income receipts</td>
<td>453</td>
<td>719</td>
<td>766</td>
<td>783</td>
</tr>
<tr>
<td>Income payments</td>
<td>408</td>
<td>584</td>
<td>555</td>
<td>601</td>
</tr>
<tr>
<td><strong>Secondary Income Balance</strong></td>
<td>-77</td>
<td>-126</td>
<td>-127</td>
<td>-145</td>
</tr>
<tr>
<td><strong>Capital Account Balance</strong></td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Financial Account Balance</strong></td>
<td>-534</td>
<td>-481</td>
<td>-414</td>
<td>-195</td>
</tr>
<tr>
<td>US Acquisition of Foreign Financial Assets (ex derivatives)</td>
<td>749</td>
<td>-89</td>
<td>622</td>
<td>225</td>
</tr>
<tr>
<td>US direct investment abroad</td>
<td>248</td>
<td>333</td>
<td>382</td>
<td>349</td>
</tr>
<tr>
<td>US acquisition of portfolio assets</td>
<td>217</td>
<td>46</td>
<td>320</td>
<td>154</td>
</tr>
<tr>
<td>Foreign equities</td>
<td>114</td>
<td>13</td>
<td>182</td>
<td>203</td>
</tr>
<tr>
<td>Foreign debt securities</td>
<td>104</td>
<td>33</td>
<td>138</td>
<td>-49</td>
</tr>
<tr>
<td>US acquisition of &quot;other&quot; assets</td>
<td>287</td>
<td>-496</td>
<td>-82</td>
<td>-271</td>
</tr>
<tr>
<td>US acquisition of reserve assets</td>
<td>-2</td>
<td>29</td>
<td>3</td>
<td>-6</td>
</tr>
<tr>
<td>US Incurrence of Financial Liabilities (ex derivatives)</td>
<td>1,279</td>
<td>386</td>
<td>1,018</td>
<td>395</td>
</tr>
<tr>
<td>FDI in the US</td>
<td>226</td>
<td>243</td>
<td>249</td>
<td>379</td>
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<tr>
<td>Foreign acquisition of US portfolio assets</td>
<td>688</td>
<td>441</td>
<td>619</td>
<td>251</td>
</tr>
<tr>
<td>US equities</td>
<td>121</td>
<td>173</td>
<td>127</td>
<td>178</td>
</tr>
<tr>
<td>US debt securities</td>
<td>567</td>
<td>267</td>
<td>492</td>
<td>429</td>
</tr>
<tr>
<td>o/w acquisitions by foreign governments</td>
<td>208</td>
<td>452</td>
<td>239</td>
<td>-92</td>
</tr>
<tr>
<td>Foreign acquisition of &quot;other&quot; US assets</td>
<td>365</td>
<td>-298</td>
<td>151</td>
<td>-235</td>
</tr>
<tr>
<td>Financial derivatives (net)</td>
<td>#N/A</td>
<td>-6</td>
<td>-19</td>
<td>-25</td>
</tr>
<tr>
<td><strong>Statistical Discrepancy</strong></td>
<td>17</td>
<td>54</td>
<td>6</td>
<td>268</td>
</tr>
<tr>
<td><strong>Memo: Nominal GDP</strong></td>
<td>11,862</td>
<td>14,569</td>
<td>16,144</td>
<td>18,037</td>
</tr>
</tbody>
</table>

Notes: All data are annual averages. Balance of payments data were created using BPM6 standards.

### Exhibit 7

**Janet Yellen: Navigating Uncharted Waters**

Major Foreign Holders of U.S. Treasury Securities  
(in billions of U.S. dollars)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>1201</td>
<td>1122</td>
<td>1109</td>
</tr>
<tr>
<td>China, Mainland</td>
<td>1276</td>
<td>1246</td>
<td>1049</td>
</tr>
<tr>
<td>Ireland</td>
<td>110</td>
<td>264</td>
<td>275</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>246</td>
<td>250</td>
<td>261</td>
</tr>
<tr>
<td>Brazil</td>
<td>174</td>
<td>232</td>
<td>230</td>
</tr>
<tr>
<td>Switzerland</td>
<td>136</td>
<td>200</td>
<td>221</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>163</td>
<td>207</td>
<td>212</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>160</td>
<td>200</td>
<td>186</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>179</td>
<td>179</td>
<td>183</td>
</tr>
<tr>
<td>Taiwan</td>
<td>68</td>
<td>117</td>
<td>119</td>
</tr>
<tr>
<td>India</td>
<td>310</td>
<td>122</td>
<td>114</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>86</td>
<td>110</td>
<td>97</td>
</tr>
<tr>
<td>Belgium</td>
<td>64</td>
<td>75</td>
<td>87</td>
</tr>
<tr>
<td>Singapore</td>
<td>132</td>
<td>92</td>
<td>87</td>
</tr>
<tr>
<td>Germany</td>
<td>56</td>
<td>75</td>
<td>85</td>
</tr>
<tr>
<td>Canada</td>
<td>56</td>
<td>72</td>
<td>81</td>
</tr>
<tr>
<td>Grand Total</td>
<td>5841</td>
<td>6146</td>
<td>5944</td>
</tr>
</tbody>
</table>

Of which:

- **Foreign Official**  
  - Treasury Bills: 394  
  - T-Bonds & Notes: 3674

**Memo:** Fed Holdings  
2243 2462 2464

---

**Notes:** Estimated foreign holdings of U.S. Treasury marketable and nonmarketable bills, bonds, and notes are reported monthly under the Treasury International Capital (TIC) reporting system. Holdings of Treasury bonds and notes are included in the Form SLT, “Aggregate Holdings of Long-Term Securities by U.S. and Foreign Residents,” including preliminary SLT data for the most recent month. The data in this table are collected primarily from U.S.-based custodians. Since U.S. securities held in overseas custody accounts may not be attributed to the actual owners, the data may not provide a precise accounting of individual country ownership of Treasury securities (see TIC FAQ #7 at http://www.treasury.gov/resource-center/data-chart-center/tic/Pages/ticfaq1.aspx).

Data sources: Foreign holdings data are from Department of the Treasury/Federal Reserve Board. See http://www.treasury.gov/resource-center/data-chart-center/tic/Pages/ticsec2.aspx for full details. Memo item is from the Fed’s H.4.1 release.
Exhibit 8

Janet Yellen: Navigating Uncharted Waters

Global Foreign Reserves
(in trillions of U.S. dollars)

World: Total Foreign Exchange Holding

EOP, Tril.US

Source: International Monetary Fund / Haver Analytic
Exhibit 9
Janet Yellen: Navigating Uncharted Waters

Asset Prices
Exhibit 10
Janet Yellen: Navigating Uncharted Waters
The Fed’s Balance Sheet

Federal Reserve Securities Holdings
EOP, Mil.

Notes: Data are through January 2017, when the total size of the Fed’s balance sheet was $4,414 billion, of which securities holdings were $4,224 billion (96%), including $2,463 billion in Treasury securities and $1,755 billion in MBS (http://www.federalreserve.gov/releases/h41, accessed January 2017).
Exhibit 11

Janet Yellen: Navigating Uncharted Waters

Recent Conditions in Credit and Money Markets

Money Stock: M2

Year-over-year % change

Source: Federal Reserve Board, Haver Analytics

Money Multiplier

M2 / Monetary Base

Source: Haver Analytics

TED Spread

3-month eurodollar rate minus 3-month TBill rate

Source: Haver Analytics
Exhibit 12

Janet Yellen: Navigating Uncharted Waters


<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>Long-Run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GDP Growth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jun 2013</td>
<td>2.9–3.6</td>
<td></td>
<td></td>
<td>2.3–2.5</td>
</tr>
<tr>
<td>Dec 2015</td>
<td>2.1</td>
<td>2.3–2.5</td>
<td>2.3–2.5</td>
<td>1.8–2.3</td>
</tr>
<tr>
<td>Dec 2016</td>
<td>2.1</td>
<td>2.3–2.5</td>
<td>1.9–2.3</td>
<td>1.8–2.0</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jun 2013</td>
<td>5.8–6.2</td>
<td></td>
<td></td>
<td>5.2–6.0</td>
</tr>
<tr>
<td>Dec 2015</td>
<td>5.0</td>
<td>4.6–5.8</td>
<td>4.6–5.8</td>
<td>4.8–5.0</td>
</tr>
<tr>
<td>Dec 2016</td>
<td>5.0</td>
<td>4.6–5.8</td>
<td>4.5–4.6</td>
<td>4.7–5.0</td>
</tr>
<tr>
<td>PCE Inflation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jun 2013</td>
<td>1.6–2.0</td>
<td></td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>Dec 2015</td>
<td>0.4</td>
<td>1.5–1.7</td>
<td>1.5–1.7</td>
<td>2.0</td>
</tr>
<tr>
<td>Dec 2016</td>
<td>0.4</td>
<td>1.5–1.7</td>
<td>1.7–2.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Shown are “central tendency” projections, which are mean forecasts excluding the lowest and highest three forecasts. The top line in each cell is the projection as of June 19, 2013; the middle line is the projection as of December 16, 2015; and the bottom line is the projection as of December 14, 2016.

Note that at the December 2016 meeting, all FOMC members predicted further tightening, with the median view putting the end-of-2017 federal funds rate at almost 1.5%. The median view of the appropriate long-run level of the fed funds rate, which was 4% at the June 2013 meeting, was just 3% at the December 2016 meeting.

Exhibit 13
Janet Yellen: Navigating Uncharted Waters
Slack in the U.S. Economy

Real Gross Domestic Product
% Change - Year to Year  SAAR, Bill.Chm.2009

US Output Gap as Percent of Potential GDP
%

Sources: BEA, CBQ/Haver
Exhibit 14

Janet Yellen: Navigating Uncharted Waters

Labor Market Conditions

Un- and Underemployment Rate
Includes Marginally Attached & Part Time for Economic Reason

Unemployment Rate
Civilian, 16 yr +

Unemployed for 27 Weeks and Over: % of Civilians Unemployed
SA, %

Source: Bureau of Labor Statistics / Haver Analytic
Notes: The un- and underemployment rate, also known as the U-6 rate, includes the officially unemployed and also persons marginally attached to the labor force (who currently neither work nor are looking for work but indicate that they want and are available for a job and have looked for work sometime in the past 12 months) as well as persons employed part time for economic reasons (who want and are available for full-time work but have had to settle for a part-time schedule).


6 Federal Reserve Chairman Alan Greenspan presented the Federal Reserve Board’s Semiannual Monetary Policy Report to the Congress to the U.S. Senate Committee on Banking, Housing, and Urban Affairs on July 21, 2005, 109th Cong., 1st sess., 2005.


13 Harding.


16 http://krugmanblog.nymag.com/2016/01/02/testing-the-models.html (accessed Jan. 9, 2016)