

Janet L Yellen: Perspectives on monetary policy

Speech by Ms Janet L Yellen, Vice Chair of the Board of Governors of the Federal Reserve System, at the Boston Economic Club Dinner, Boston, Massachusetts, 6 June 2012.

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Good evening. I'm honored to have the opportunity to address the Boston Economic Club and I'm grateful to Chip Case for inviting me to speak to you tonight. As most of you probably know, Chip was one of the first economists to document worrisome signs of a housing bubble in parts of the United States. After sounding an early alarm in 2003, Chip watched the bubble grow and was prescient in anticipating the very serious toll that its unwinding would impose on the economy. Chip recognized that declining house prices would affect not just residential construction but also consumer spending, the ability of households to borrow, and the health of the financial system. In light of these pervasive linkages, the repeat sales house price index that bears Chip's name is one of the most closely watched of all U.S. economic indicators. Indeed, as I will discuss this evening, prolonged weakness in the housing sector remains one of several serious headwinds facing the U.S. economy. Given these headwinds, I believe that a highly accommodative monetary policy will be needed for quite some time to help the economy mend. Before continuing, let me emphasize that my remarks reflect my own views and not necessarily those of others in the Federal Reserve System.

Economic conditions and the outlook

In my remarks tonight, I will describe my perspective on monetary policy. To begin, however, I'll highlight some of the current conditions and key features of the economic outlook that shape my views. To anticipate the main points, the economy appears to be expanding at a moderate pace. The unemployment rate is almost 1 percentage point lower than it was a year ago, but we are still far from full employment. Looking ahead, I anticipate that significant headwinds will continue to restrain the pace of the recovery so that the remaining employment gap is likely to close only slowly. At the same time, inflation (abstracting from the transitory effects of movements in oil prices) has been running near 2 percent over the past two years, and I expect it to remain at or below the Federal Open Market Committee's (the FOMC's) 2 percent objective for the foreseeable future. As always, considerable uncertainty attends the outlook for both growth and inflation; events could prove either more positive or negative than what I see as the most likely outcome. That said, as I will explain, I consider the balance of risks to be tilted toward a weaker economy.

Starting with the labor market, conditions have gradually improved over the past year, albeit at an uneven pace. Average monthly payroll gains picked up from about 145,000 in the second half of 2011 to 225,000 during the first quarter of this year. However, these gains fell back to around 75,000 a month in April and May. The deceleration of payroll employment from the first to the second quarter was probably exacerbated by some combination of seasonal adjustment difficulties and an unusually mild winter that likely boosted employment growth earlier in the year. Payback for that earlier strength probably accounts for some of the weakness we've seen recently. Smoothing through these fluctuations, the average pace of job creation for the year to date, as well as recent unemployment benefit claims data and other indicators, appear to be consistent with an economy expanding at only a moderate rate, close to its potential.

Such modest growth would imply little additional progress in the near term in improving labor market conditions, which remain very weak. Currently, the unemployment rate stands around 3 percentage points above where it was at the onset of the recession – a figure that is stark enough as it is, but does not even take account of the millions more who have left the labor

force or who would have joined under more normal circumstances in the past four years. All told, only about half of the collapse in private payroll employment in 2008 and 2009 has been reversed. A critical question for monetary policy is the extent to which these numbers reflect a shortfall from full employment versus a rise in structural unemployment. While the magnitude of structural unemployment is uncertain, I read the evidence as suggesting that the bulk of the rise during the recession was cyclical, not structural in nature.

Consider figure 1, which presents three indicators of labor market slack. The black solid line is the unemployment gap, defined as the difference between the actual unemployment rate and the Congressional Budget Office (CBO) estimate of the rate consistent with inflation remaining stable over time. The red dashed line is an index of the difficulty households perceive in finding jobs, based on results from a survey conducted by the Conference Board. And the red dotted line is an index of firms' ability to fill jobs, based on a survey conducted by the National Federation of Independent Business. All three measures show similar cyclical movements over the past 20 years, and all now stand at very high levels. This similarity runs counter to claims that the CBO's and other estimates of the unemployment gap overstate the true amount of slack by placing insufficient weight on structural explanations, such as a reduced efficiency of matching workers to jobs, for the rise in unemployment since 2007. If that were the case, why would firms now find it so easy to fill positions? Other evidence also points to the dominant role of cyclical forces in the recent rise in unemployment: job losses have been widespread, rather than being concentrated in the construction and financial sectors, and the co-movement of job vacancies and unemployment over the past few years does not appear to be unusual.¹

As I mentioned, I expect several factors to restrain the pace of the recovery and the corresponding improvement in the labor market going forward. The housing sector remains a source of very significant headwinds. Housing has typically been a driver of economic recoveries, and we have seen some modest improvement recently, but continued uncertainties over the direction of house prices, and very restricted mortgage credit availability for all but the most creditworthy buyers, will likely weigh on housing demand for some time to come. When housing demand does pick up more noticeably, the huge overhang of both unoccupied dwellings and homes in the foreclosure pipeline will likely allow a good deal of that demand to be met for a time without a sizeable expansion in homebuilding. Moreover, the enormous toll on household wealth resulting from the collapse of house prices – almost a 35 percent decline from its 2006 peak, according to the Case-Shiller index – imposes ongoing restraint on consumer spending, and the loss of home equity has impaired many households' ability to borrow.

A second headwind that will likely become more important over coming months relates to fiscal policy. At the federal level, stimulus-related policies are scheduled to wind down, while both defense and nondefense purchases are expected to decline in inflation-adjusted terms over the next several years. Toward the end of this year, important decisions regarding the extension of current federal tax and budget policies loom. I will return to the associated uncertainties and their potentially detrimental effects later.

A third factor weighing on the outlook is the likely sluggish pace of economic growth abroad. Strains in global financial markets have resurfaced in recent months, reflecting renewed uncertainty about the resolution of the European situation. Risk premiums on sovereign debt and other securities have risen again in many European countries, while European banks continue to face pressure to shrink their balance sheets. Even without a further intensification of stresses, the slowdown in economic activity in Europe will likely hold back U.S. export growth. Moreover, the perceived risks surrounding the European situation are already having

¹ For further discussion of evidence of labor market slack, see Janet L. Yellen (2012), "The Economic Outlook and Monetary Policy," speech delivered at the Money Marketeters of New York University, New York, April 11.

a meaningful effect on financial conditions here in the United States, further weighing on the prospects for U.S. growth.

Given these formidable challenges, most private sector forecasters expect only gradual improvement in the labor market and I share their view. Figure 2 shows the unemployment rate together with the median forecast from last month's Survey of Professional Forecasters (SPF), the dashed blue line.² The figure also shows the central tendency of the unemployment projections that my FOMC colleagues and I made at our April meeting: Those projections reflect our assessments of the economic outlook given our own individual judgments about the appropriate path of monetary policy. Included in the figure as well is the central tendency of FOMC participants' estimates of the longer-run normal unemployment rate, which ranges from 5.2 percent to 6 percent. Like private forecasters, most FOMC participants expect the unemployment rate to remain well above its longer-run normal value over the next several years.

Of course, considerable uncertainty attends this outlook: The shaded area provides an estimate of the 70 percent confidence interval for the future path of the unemployment rate based on historical experience and model simulations.³ Its width suggests that these projections could be quite far off, in either direction. Nevertheless, the figure shows that labor market slack at present is so large that even a very large and favorable forecast error would not change the conclusion that slack will likely remain substantial for quite some time.

Turning to inflation, figure 3 summarizes private and FOMC forecasts. Overall consumer price inflation has fluctuated quite a bit in recent years, largely reflecting movements in prices for oil and other commodities. In early 2011 and again earlier this year, prices of crude oil, and thus of gasoline, rose noticeably. Smoothing through these fluctuations, inflation as measured by the price index for personal consumption expenditures (PCE) averaged near 2 percent over the past two years. In recent weeks, however, oil and gasoline prices have moderated and are now showing through to the headline inflation figures. Looking ahead, most FOMC participants at the time of our April meeting expected inflation to be at, or a bit below, our long-run objective of 2 percent through 2014; private forecasters on average also expect inflation to be close to 2 percent. As with unemployment, uncertainty around the inflation projection is substantial.

In the view of some observers, the stability of inflation in the face of high unemployment in recent years constitutes evidence that much of the remaining unemployment is structural and not cyclical. They reason that if there were truly substantial slack in the labor market, simple accelerationist "Phillips curve" models would predict more noticeable downward pressure on inflation. However, substantial cross-country evidence suggests that, in low-inflation environments, inflation is notably less responsive to downward pressure from labor market slack than it is when inflation is elevated. In other words, the short-run Phillips curve may

² The SPF released in May provides forecasts on a quarterly basis through mid-2013 and annual projections beyond that date. To construct quarterly forecasts through the end of 2014, I interpolate the annual projections.

³ The forecast confidence interval is generated using stochastic simulations of the Federal Reserve staff's FRB/US model. Specifically, a baseline is constructed centered on the median of the SPF projections released in May, and then the model is repeatedly simulated with shocks drawn from the set of historical disturbances experienced over the period from 1968 to 2011. Similar estimates of forecast confidence intervals would be obtained if the intervals were instead constructed using the actual historical forecast errors of private forecasters; for further discussion, see table 2 of the FOMC's Summary of Economic Projections, an addendum to the April Federal Open Market Committee minutes, available at Board of Governors of the Federal Reserve System (2012), "Minutes of the Federal Open Market Committee, April 24–25, 2012," press release, May 16.

flatten out.⁴ One important reason for this non-linearity, in my view, is downward nominal wage rigidity – that is, the reluctance or inability of many firms to cut nominal wages.

The solid blue bars in figure 4 present a snapshot of the distribution of nominal wage changes for individual jobs during the depth of the current labor market slump, based on data collected by the Bureau of Labor Statistics.⁵ For comparison, the dashed red line presents a hypothetical distribution of wage changes, using a normal distribution that approximates the actual distribution of wage changes greater than zero. The distribution of actual wage changes shows that a relatively high percentage of workers saw no change in their nominal wage, and relatively few experienced modest wage cuts. This pile-up phenomenon at zero suggests that, even when the unemployment rate was around 10 percent, many firms were reluctant to cut nominal wage rates. In the absence of this barrier, nominal gains in wages and unit labor costs would have likely been even more subdued given the severity of the economic downturn, with the result that inflation would probably now be running at a lower rate.

Anchored inflation expectations are another reason why inflation has remained close to 2 percent in the face of very low resource utilization. As shown in figure 5, survey measures of longer-horizon inflation expectations have remained nearly constant since the mid-1990s even as actual inflation has fluctuated. As a result, the current slump has not generated the downward spiral of falling expected and actual inflation that a simple accelerationist model of inflation might have predicted. Indeed, keeping inflation expectations from declining has been an important success of monetary policy over the past few years. At the same time, the fact that longer-term inflation expectations have not risen above 2 percent has also proved extremely valuable, for it has freed the FOMC to take strong actions to support the economic recovery without greatly worrying that higher energy and commodity prices would become ingrained in inflation and inflation expectations, as they did in the 1970s.

While my modal outlook calls for only a gradual reduction in labor market slack and a stable pace of inflation near the FOMC's longer-run objective of 2 percent, I see substantial risks to this outlook, particularly to the downside. As I mentioned before, even without any political gridlock, fiscal policy is bound to become substantially less accommodative from early 2013 on. However, federal fiscal policy could turn even more restrictive if the Congress does not reach agreement on several important tax and budget policy issues before the end of this year; in fact, the CBO recently warned that the potential hit to gross domestic product (GDP) growth could be sufficient to push the economy into recession in 2013.⁶ The deterioration of financial conditions in Europe of late, coupled with notable declines in global equity markets, also serve as a reminder that highly destabilizing outcomes cannot be ruled out. Finally, besides these clearly identifiable sources of risk, there remains the broader issue that

⁴ The simplest accelerationist version of the Phillips curve relates the *change* in inflation to the *level* of labor market slack; more-complicated versions also highlight the influence of inflation expectations, changes in marginal production costs, and other factors. Evidence for the United States and other countries that the sensitivity of inflation to resource slack may be nonlinear can be found in André Meier (2010), "Still Minding the Gap – Inflation Dynamics during Episodes of Persistent Large Output Gaps," IMF Working Paper WP/10/189 (Washington: International Monetary Fund, August).

⁵ The data shown in figure 4 refers to the change in wages over the twelve months to March 2010. See Bruce Fallick, Michael Lettau, and William Wascher (2011), "Downward Nominal Wage Rigidity in the United States during the Great Recession," unpublished manuscript, November. Similar results, based on a different source of data, are reported in Mary Daly, Bart Hobijn, and Brian Lucking (2012), "Why has Wage Growth Stayed Strong?" Federal Reserve Bank of San Francisco, *FRBSF Economic Letter* 2012-10, April 2. I have explored the implications of downward nominal rigidity for the Phillips curve and stabilization policy in greater depth in Janet L. Yellen and George A. Akerlof (2006), "Stabilization Policy: A Reconsideration," *Economic Inquiry*, vol. 44 (January), pp. 1–22.

⁶ See Congressional Budget Office (2012), "*Economic Effects of Reducing the Fiscal Restraint That Is Scheduled to Occur in 2013* (PDF)", (Washington: CBO, May).

economic forecasters have repeatedly overestimated the strength of the recovery and so still may be too optimistic about the prospects that growth will strengthen.

Although I view the bulk of the increase in unemployment since 2007 as cyclical, I am concerned that it could become a permanent problem if the recovery were to stall. In this economic downturn, the fraction of the workforce unemployed for six months or more has climbed much more than in previous recessions, and remains at a remarkably high level. Continued high unemployment could wreak long-term damage by eroding the skills and labor force attachment of workers suffering long-term unemployment, thereby turning what was initially cyclical into structural unemployment. This risk provides another important reason to support the recovery by maintaining a highly accommodative stance of monetary policy.

The conduct of policy with unconventional tools

Now turning to monetary policy, I will begin by discussing the FOMC's reliance on unconventional tools to address the disappointing pace of recovery. I will then elaborate my rationale for supporting a highly accommodative policy stance.

As you know, since late 2008, the FOMC's standard policy tool, the target federal funds rate, has been maintained at the zero lower bound. To provide further accommodation, we have employed two unconventional tools to support the recovery – extended forward guidance about the future path of the federal funds rate, and large-scale asset purchases and other balance sheet actions that have greatly increased the size and duration of the Federal Reserve's portfolio.

These two tools have become increasingly important because the recovery from the recession has turned out to be persistently slower than either the FOMC or private forecasters anticipated. Figure 6 illustrates the magnitude of the disappointment by comparing Blue Chip forecasts for real GDP growth made two years ago with ones made earlier this year. As shown by the dashed blue line, private forecasters in early 2010 anticipated that real GDP would expand at an average annual rate of just over 3 percent from 2010 through 2014. However, actual growth in 2011 and early 2012 has turned out to be much weaker than expected, and, as indicated by the dotted red line, private forecasters now anticipate only a modest acceleration in real activity over the next few years.

In response to the evolving outlook, the FOMC has progressively added policy accommodation using both of its unconventional tools. For example, since the federal funds rate target was brought down to a range of 0 to 1/4 percent in December 2008, the FOMC has gradually adjusted its forward guidance about the anticipated future path of the federal funds rate. In each meeting statement from March 2009 through June 2011, the Committee indicated its expectation that economic conditions “are likely to warrant exceptionally low levels of the federal funds rate for an extended period.”⁷ At the August 2011 meeting, the Committee decided to provide more specific information about the likely time horizon by substituting the phrase “at least through mid-2013” for the phrase “for an extended period”; at the January 2012 meeting, this horizon was extended to “at least through late 2014.”⁸ Has this guidance worked? Figure 7 illustrates how dramatically forecasters' expectations of future short-term interest rates have changed. As the dashed blue line indicates, the Blue Chip consensus forecast made in early 2010 anticipated that the Treasury-bill rate would now stand at close to 3-1/2 percent; today, in contrast, private forecasters expect short-term interest rates to remain very low in 2014.

⁷ See, for example, Board of Governors of the Federal Reserve System (2009), “FOMC Statement,” press release, March 18.

⁸ See Board of Governors of the Federal Reserve System (2011), “FOMC Statement,” press release, August 9; and Board of Governors of the Federal Reserve System (2012), “FOMC Statement,” press release, January 25.

Of course, much of this revision in interest rate projections would likely have occurred in the absence of explicit forward guidance; given the deterioration in projections of real activity due to the unanticipated persistence of headwinds, and the continued subdued outlook for inflation, forecasters would naturally have anticipated a greater need for the FOMC to provide continued monetary accommodation. However, I believe the changes over time in the language of the FOMC statement, coupled with information provided by Chairman Bernanke and others in speeches and congressional testimony, helped the public understand better the Committee's likely policy response given the slower-than-expected economic recovery. As a result, forecasters and market participants appear to have marked down their expectations for future short-term interest rates by more than they otherwise would have, thereby putting additional downward pressure on long-term interest rates, improving broader financial conditions, and lending support to aggregate demand.

The FOMC has also provided further monetary accommodation over time by altering the size and composition of the Federal Reserve's securities holdings, shown in figure 8. The expansion in the volume of securities held by the Federal Reserve is shown in the left panel of the figure. During 2009 and early 2010, the Federal Reserve purchased about \$1.4 trillion in agency mortgage-backed securities and agency debt securities and about \$300 billion in longer-term Treasury securities. In November 2010, the Committee initiated an additional \$600 billion in purchases of longer-term Treasury securities, which were completed at the end of June of last year. Last September, the FOMC decided to implement the "Maturity Extension Program," which affected the maturity composition of our Treasury holdings as shown in the right panel. Through this program, the FOMC is extending the average maturity of its securities holdings by selling \$400 billion of Treasury securities with remaining maturities of 3 years or less and purchasing an equivalent amount of Treasury securities with remaining maturities of 6 to 30 years. These transactions are currently scheduled to be completed at the end of this month.

Research by Federal Reserve staff and others suggests that our balance sheet operations have had substantial effects on longer-term Treasury yields, principally by reducing term premiums on longer-dated Treasury securities.⁹ Figure 9 provides an estimate, based on Federal Reserve Board staff calculations, of the cumulative reduction of the term premium on 10-year Treasury securities from the three balance sheet programs. These results suggest that our portfolio actions are currently keeping 10-year Treasury yields roughly 60 basis points lower than they otherwise would be.¹⁰ Other evidence suggests that this downward

⁹ The term premium on a longer-dated Treasury security is defined as the return that investors expect to earn on holding this security in excess of the return from rolling over short-dated Treasury securities, such as three-month Treasury bills. For estimates of the Federal Reserve's balance-sheet actions on long-term interest rates, see Canlin Li and Min Wei (forthcoming), "Term Structure Modeling with Supply Factors and the Federal Reserve's Large Scale Asset Purchase Programs," Finance and Economics Discussion Series (Washington: Board of Governors of the Federal Reserve System); Joseph Gagnon, Matthew Raskin, Julie Remache, and Brian Sack (2010), "Large-Scale Asset Purchases by the Federal Reserve: Did they Work? (PDF)" Staff Report no. 441 (New York: Federal Reserve Bank of New York, March); Hess Chung, Jean-Philippe Laforte, David Reifschneider, and John Williams (2012), "Have We Underestimated the Likelihood and Severity of Zero Lower Bound Events?" supplement, *Journal of Money, Credit and Banking*, vol. 44 (S1, February), 47–82; Arvind Krishnamurthy and Annette Vissing-Jorgensen (2011), "The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy," *Brookings Papers on Economic Activity*, Fall, 215–65, www.brookings.edu/about/projects/bpea/editions/fall-2011; and James Hamilton and Jing Cynthia Wu (2012), "The Effectiveness of Alternative Monetary Policy Tools in a Zero Lower Bound Environment," *Journal of Money, Credit and Banking*, vol. 44 Issue Supplement s1 (February), 3–46. Estimates of the effects of large-scale asset purchases in the United Kingdom are provided in Michael Joyce, Matthew Tong, and Robert Woods (2011), "The United Kingdom's Quantitative Easing Policy: Design, Operation and Impact (PDF)," *Bank of England Quarterly Bulletin*, Third Quarter, 200–12.

¹⁰ The estimates shown in figure 9 employ the methodology discussed by Li and Wei, "Term Structure Modeling with Supply Factors," in note 10. These calculations require an assumption for market participants' expectations for the future path of the Federal Reserve's portfolio at different points in time, both in the past and going forward; accordingly, the estimates are somewhat sensitive to alternative assumptions for market

pressure has had favorable spillover effects on other financial markets, leading to lower long-term borrowing costs for households and firms, higher equity valuations, and other improvements in financial conditions that in turn have supported consumption, investment, and net exports. Because the term premium effect depends on both the Federal Reserve's current and expected future asset holdings, most of this effect – without further actions – will likely wane over the next few years as the effect depends less and less on the current elevated level of the balance sheet and increasingly on the level of holdings during and after the normalization of our portfolio.¹¹

The rationale for highly accommodative policy

I have already noted that, in my view, an extended period of highly accommodative policy is necessary to combat the persistent headwinds to recovery. I will next explain how I've reached this policy judgment. In evaluating the stance of policy, I find the prescriptions from simple policy rules a logical starting point. A wide range of such rules has been examined in the academic literature, the most famous of which is that proposed by John Taylor in his 1993 study.¹² Rules of the general sort proposed by Taylor (1993) capture well our statutory mandate to promote maximum employment and price stability by prescribing that the federal funds rate should respond to the deviation of inflation from its longer-run goal and to the output gap, given that the economy should be at or close to full employment when the output gap – the difference between actual GDP and an estimate of potential output – is closed. Moreover, research suggests that such simple rules can be reasonably robust to uncertainty about the true structure of the economy, as they perform well in a variety of models.¹³ Today, I will consider the prescriptions of two such benchmark rules – Taylor's 1993 rule, and a variant that is twice as responsive to economic slack. In my view, this latter rule is more consistent with the FOMC's commitment to follow a balanced approach to promoting our dual mandate, and so I will refer to it as the "balanced-approach" rule.¹⁴

To show the prescriptions these rules would have called for at the April FOMC meeting, I start with an illustrative baseline outlook constructed using the projections for unemployment,

expectations. In estimating the current and future effect of the Federal Reserve's securities holdings on term premiums, market participants are assumed to have expectations consistent with the illustrative baseline discussed in note 16 and the exit principles outlined by the FOMC in June 2011 (see note 18). In particular, investors are assumed to expect that the overall size and composition of the portfolio will remain roughly constant from the end of 2012:Q2 through late 2014 because principal payments on the Federal Reserve's security holdings will be reinvested until a few months prior to the liftoff of the federal funds rate assumed in the illustrative baseline. At that point, the portfolio is assumed to begin to contract through redemptions and, after the assumed liftoff of the federal funds rate, through sales of mortgage-backed securities that bring the Federal Reserve's holdings of such securities to zero over a three-to-five-year period. As a result, the size of the portfolio returns to normal within a few years after liftoff.

¹¹ The term premium effect also wanes over time because the size of the effect depends on the expected difference between the actual size of the balance sheet now and in the future and its normal size, where the latter is rising steadily over time, primarily as a result of the trend growth in currency.

¹² See John B. Taylor (1993), "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, vol. 39 (December), pp. 195–214.

¹³ See the discussion in John B. Taylor and John C. Williams (2011), "Simple and Robust Rules for Monetary Policy," in Benjamin M. Friedman and Michael Woodford, eds., *Handbook of Monetary Economics*, vol. 3B, (San Diego: North Holland), pp. 829–60.

¹⁴ The balanced-approach rule is defined as $R_t = 2 + p_t + 0.5(p_t - 2) + 1.0Y_t$. In this expression, R is the federal funds rate, p is the percent change in the headline personal consumption expenditures price index from four quarters earlier, and Y is the output gap. In a recent speech, I dubbed this rule "Taylor (1999)," as John Taylor described the rule in a paper published that year. Since Taylor's own strong preference is for his original rule – Taylor (1993) – I now refer to the later rule as the "balanced-approach rule."

inflation, and the federal funds rate that FOMC participants reported in April.¹⁵ I then employ the dynamics of one of the Federal Reserve's economic models, the FRB/US model, to solve for the joint paths of these three variables if the short-term interest rate had instead been set according to the Taylor (1993) rule or the balanced-approach rule, subject, in both cases, to the zero lower bound constraint on the federal funds rate. The dashed red line in figure 10 shows the resulting path for the federal funds rate under Taylor (1993) and the solid blue line with open circles illustrates the corresponding path using the balanced-approach rule.¹⁶ In both simulations, the private sector fully understands that monetary policy follows the particular rule in force.¹⁷ Figure 10 shows that the Taylor rule calls for monetary policy to tighten immediately, while the balanced-approach rule prescribes raising the federal funds rate in the fourth quarter of 2014 – the earliest date consistent with the FOMC's current forward guidance of “exceptionally low levels for the federal funds rate at least through late 2014.”

Although simple rules provide a useful starting point in determining appropriate policy, they by no means deserve the “last word” – especially in current circumstances. An alternative approach, also illustrated in figure 10, is to compute an “optimal control” path for the federal funds rate using an economic model – FRB/US, in this case. Such a path is chosen to minimize the value of a specific “loss function” conditional on a baseline forecast of economic conditions. The loss function attempts to quantify the social costs resulting from deviations of inflation from the Committee's longer-run goal and from deviations of unemployment from its longer-run normal rate.¹⁸ The solid green line with dots in figure 10 shows the “optimal control” path for the federal funds rate, again conditioned on the illustrative baseline outlook.¹⁹ This policy involves keeping the federal funds rate close to zero until late 2015, four quarters longer than the balanced-approach rule prescription and several years longer than the Taylor rule. Importantly, optimal control calls for a later lift-off date even though this

¹⁵ The baseline paths for unemployment and inflation track the midpoint of the central tendency of the Committee's projections through 2014, and thereafter gradually converge to values consistent with participants' long-run projections. Similarly, the baseline path for the federal funds rate stays near zero through late 2014 and then rises steadily back to the long-run value expected by most participants. While these assumptions are consistent with recent FOMC statements, both the assumed date of liftoff and the longer-run pace of tightening are merely illustrative and are not based on any internal FOMC deliberations. For further details on the construction of the baseline, see Yellen, “The Economic Outlook and Monetary Policy,” in note 2.

¹⁶ Because both rules respond to the output gap, the projections for the unemployment rate need to be converted into a path for the output gap. The output gap is approximated using Okun's law; specifically, $Y_t = 2.3(5.6 - U_t)$, where 2.3 is the estimated value of the Okun's law coefficient and 5.6 is the assumed value of the non-accelerating inflation rate of unemployment, or NAIRU.

¹⁷ In the simulations, the Federal Reserve's balance sheet is assumed to evolve in accordance with the exit strategy principles that the FOMC agreed upon at the June 2011 meeting. See Board of Governors of the Federal Reserve System (2011), “Minutes of the Federal Open Market Committee, June 21–22, 2011,” press release, July 12.

¹⁸ Under this approach, the central bank's plans are assumed to be completely transparent and credible to the public. In particular, both the policymaker and private agents are assumed to act as if they have perfect foresight about the evolution of the economy, including the future path of monetary policy, in that they ignore the possibility of unanticipated future shocks to the economy. This assumption of “certainty equivalence” is commonly used but is not an intrinsic feature of optimal control techniques. Indeed, the fully optimal policy under uncertainty involves the specification of a complete set of state-contingent policy paths.

¹⁹ This procedure involves two steps. First, the FRB/US model's projections of real activity, inflation, and interest rates are adjusted to replicate the baseline forecast values. Second, a search procedure is used to solve for the path of the federal funds rate that minimizes the value of an assumed loss function, allowing for feedback of changes in the federal funds rate from baseline to real activity and inflation. For the purposes of the exercise, the loss function is equal to the cumulative discounted sum from 2012:Q2 through 2025:Q4 of three factors – the squared deviation of the unemployment rate from 5-1/2 percent, the squared deviation of overall PCE inflation from 2 percent, and the squared quarterly change in the federal funds rate. The third term is added to damp quarter-to-quarter movements in interest rates.

benchmark – unlike the simple policy rules – implicitly takes full account of the additional stimulus to real activity and inflation being provided over time by the Federal Reserve’s other policy tool, the past and projected changes to the size and maturity of its securities holdings.²⁰

Figure 11 shows that, by keeping the federal funds rate at its current level for longer, monetary policy under the balanced-approach rule achieves a more rapid reduction of the unemployment rate than monetary policy under the Taylor (1993) rule does, while nonetheless keeping inflation near 2 percent. But the improvement in labor market conditions is even more notable under the optimal control path, even as inflation remains close to the FOMC’s long-run inflation objective.

As I noted, simple rules have the advantage of delivering good policy outcomes across a broad range of models, and are thereby relatively robust to our limited understanding of the precise working of the economy – in contrast to optimal-control policies, whose prescriptions are sensitive to the specification of the particular model used in the analysis. However, simple rules also have their shortcomings, leading them to significantly understate the case for keeping policy persistently accommodative in current circumstances.

One of these shortcomings is that the rules do not adjust for the constraints that the zero lower bound has placed on conventional monetary policy since late 2008. A second is that they do not fully take account of the protracted nature of the forces that have been restraining aggregate demand in the aftermath of the housing bust. As I’ve emphasized, the pace of the current recovery has turned out to be persistently slower than most observers expected, and forecasters expect it to remain quite moderate by historical standards. The headwinds that explain this disappointing performance represent a substantial departure from normal cyclical dynamics. As a result, the economy’s equilibrium real federal funds rate – that is, the rate that would be consistent with full employment over the medium run – is probably well below its historical average, which the intercept of simple policy rules is supposed to approximate. By failing to fully adjust for this decline, the prescriptions of simple policy rules – which provide a useful benchmark under normal circumstances – could be significantly too restrictive now and could remain so for some time to come. In this regard, I think it is informative that the Blue Chip consensus forecast released in March showed the real three-month Treasury bill rate settling down at only 1-1/4 percent late in the decade, down 120 basis points from the long-run projections made prior to the recession.²¹

Looking ahead

Recent labor market reports and financial developments serve as a reminder that the economy remains vulnerable to setbacks. Indeed, the simulations I described above did not take into account this new information. In our policy deliberations at the upcoming FOMC meeting we will assess the effects of these developments on the economic forecast. If the Committee were to judge that the recovery is unlikely to proceed at a satisfactory pace (for example, that the forecast entails little or no improvement in the labor market over the next few years), or that the downside risks to the outlook had become sufficiently great, or that inflation appeared to be in danger of declining notably below its 2 percent objective, I am convinced that scope remains for the FOMC to provide further policy accommodation either

²⁰ Optimal control takes account of the stimulus provided by the balance sheet operations because it conditions on a baseline forecast of real activity and inflation that (at least implicitly) incorporates the effects of the Federal Reserve’s balance sheet operations on projected financial conditions, real activity, and inflation.

²¹ For a further discussion of this issue, see William C. Dudley (2012), “Conducting Monetary Policy: Rules, Learning and Risk Management”, speech delivered at the C. Peter McColough Series on International Economics, Council on Foreign Relations, New York, May 24.

through its forward guidance or through additional balance-sheet actions. In taking these decisions, however, we would need to balance two considerations.

On the one hand, our unconventional tools have some limitations and costs. For example, the effects of forward guidance are likely to be weaker the longer the horizon of the guidance, implying that it may be difficult to provide much more stimulus through this channel. As for our balance sheet operations, although we have now acquired some experience with this tool, there is still considerable uncertainty about its likely economic effects. Moreover, some have expressed concern that a substantial further expansion of the balance sheet could interfere with the Fed's ability to execute a smooth exit from its accommodative policies at the appropriate time. I disagree with this view: The FOMC has tested a variety of tools to ensure that we will be able to raise short-term interest rates when needed while gradually returning the portfolio to a more normal size and composition. But even if unjustified, such concerns could in theory reduce confidence in the Federal Reserve and so lead to an undesired increase in inflation expectations.

On the other hand, risk management considerations arising from today's unusual circumstances strengthen the case for additional accommodation beyond that called for by simple policy rules and optimal control under the modal outlook. In particular, as I have noted, there are a number of significant downside risks to the economic outlook, and hence it may well be appropriate to insure against adverse shocks that could push the economy into territory where a self-reinforcing downward spiral of economic weakness would be difficult to arrest.

Conclusion

In my remarks this evening I have sought to explain why, in my view, a highly accommodative monetary policy will remain appropriate for some time to come. My views concerning the stance of monetary policy reflect the FOMC's firm commitment to the goals of maximum employment and stable prices, my appraisal of the medium term outlook (which is importantly shaped by the persistent legacy of the housing bust and ensuing financial crisis), and by my assessment of the balance of risks facing the economy. Of course, as I've emphasized, the outlook is uncertain and the Committee will need to adjust policy as appropriate as actual conditions unfold. For this reason, the FOMC's forward guidance is explicitly conditioned on its anticipation of "low rates of resource utilization and a subdued outlook for inflation over the medium run."²² If the recovery were to proceed faster than expected or if inflation pressures were to pick up materially, the FOMC could adjust policy by bringing forward the expected date of tightening. In contrast, if the Committee judges that the recovery is proceeding at an insufficient pace, we could undertake portfolio actions such as additional asset purchases or a further maturity extension program. It is for this reason that the FOMC emphasized, in its statement following the April meeting, that it would "regularly review the size and composition of its securities holdings and is prepared to adjust those holdings as appropriate to promote a stronger economic recovery in a context of price stability."²³

²² See Board of Governors, "FOMC Statement," January 25, in note 9.

²³ See Board of Governors of the Federal Reserve System (2012), "FOMC Statement," press release, April 25.

Economy is expanding at a moderate pace

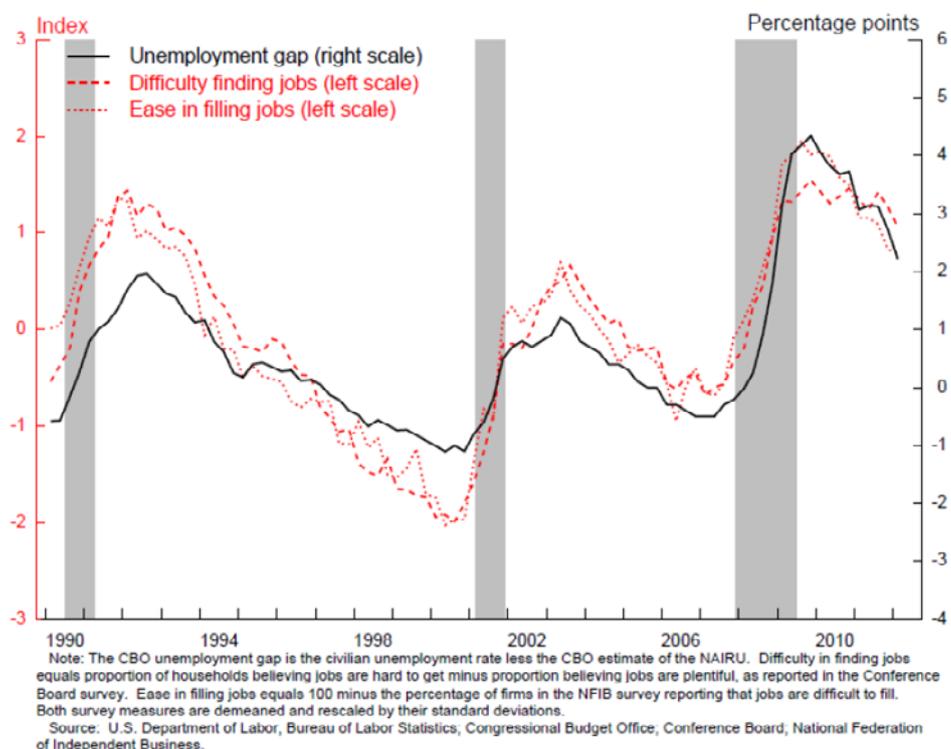
- Unemployment has declined over the past year.
- But we remain far short of full employment.
- Further progress is likely to be gradual due to persistent headwinds.
- I expect inflation at or below 2% for the foreseeable future.
- Risks are tilted toward a weaker economy.

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Figure 1. Measures of Labor Market Slack



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Headwinds to recovery

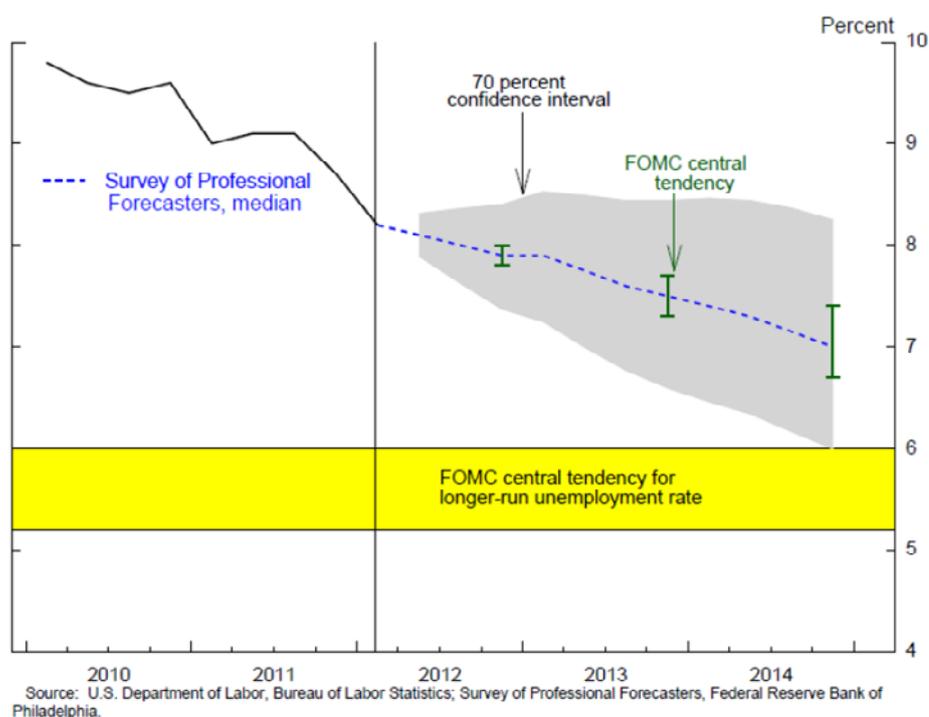
- Housing sector
- Fiscal policy
- Sluggish pace of growth abroad and global financial market strains

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Figure 2. Projections of Unemployment

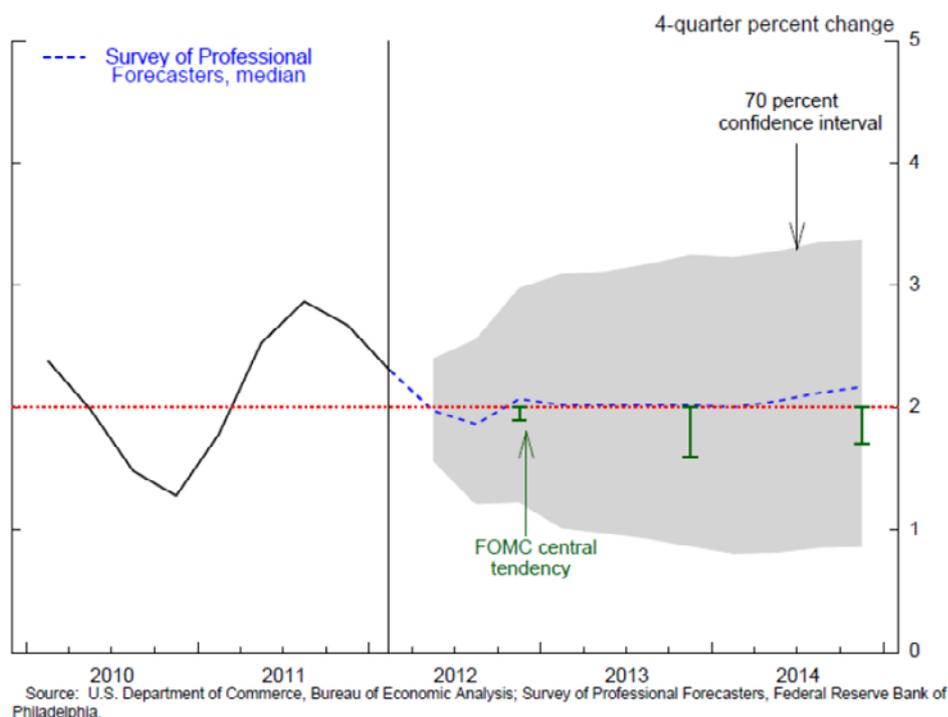


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Figure 3. Projections of PCE Inflation



Behavior of Inflation and Unemployment

- Does the stability of inflation in the face of high unemployment mean that unemployment is structural, not cyclical?
- Simple Phillips curve model predicts downward pressure on inflation from labor market slack.
- But cross country evidence shows that once inflation is low, it is less responsive to slack.
- This nonlinearity may reflect downward nominal wage rigidity.

Figure 4. Distribution of Nominal Wage Changes

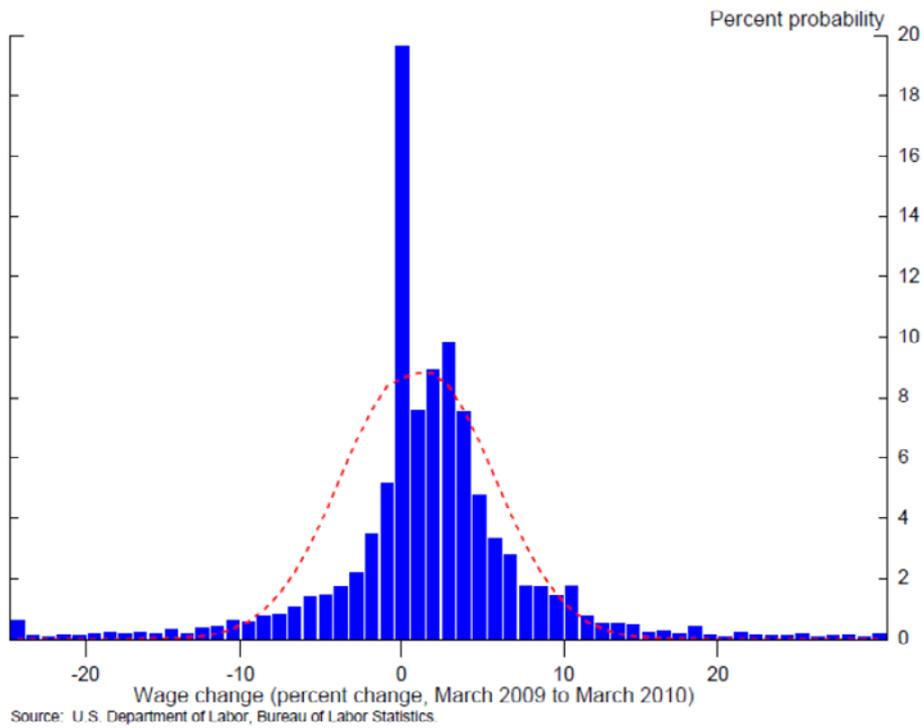
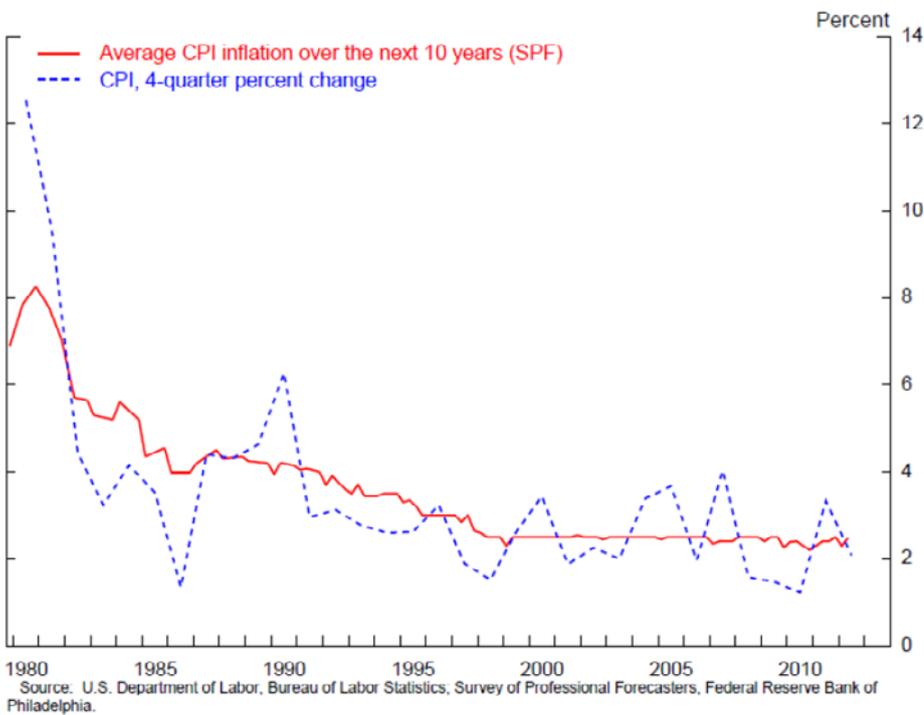


Figure 5. CPI Inflation and Inflation Expectations



Downside risks to the outlook

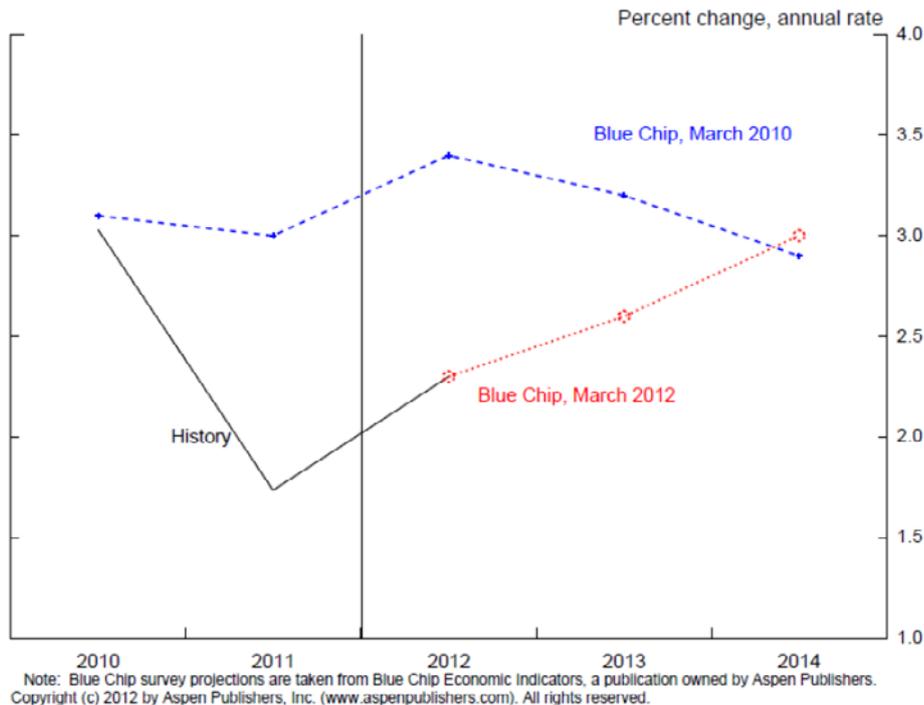
- Impending “fiscal cliff”
- Potential for highly destabilizing developments in Europe and global financial markets.
- Forecasters have repeatedly overestimated the strength of the recovery and may still be too optimistic.
- Potential for cyclical unemployment to become structural if the recovery were to stall.

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Figure 6. Revisions to Professional Forecasts of GDP Growth



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Figure 7. Forecasts for 3-month Treasury Bill Rates

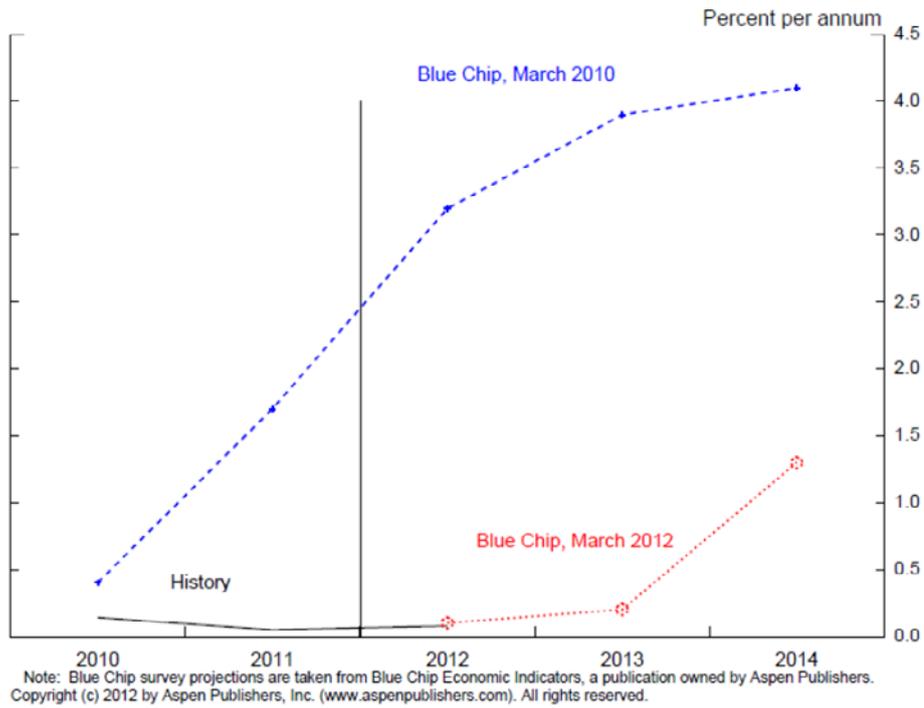
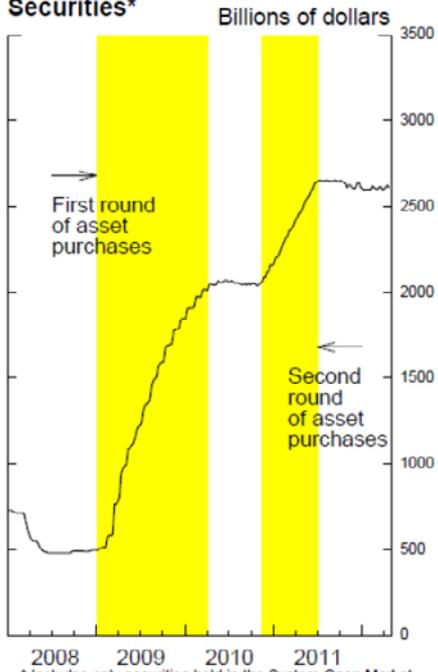


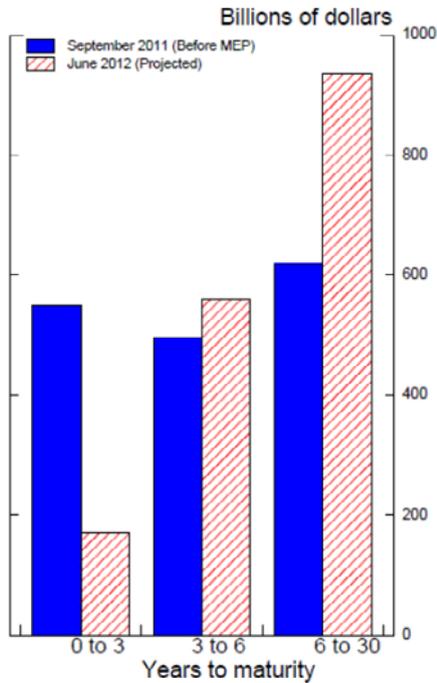
Figure 8. Federal Reserve Balance Sheet Actions

Holdings of Treasury and Agency Securities*



* Includes only securities held in the System Open Market Account.
Source: Board of Governors of the Federal Reserve System.

Treasury Holdings by Maturity



Source: Board of Governors of the Federal Reserve System.

Figure 9. Estimated Effect of Balance Sheet Operations on the 10-year Treasury Term Premium

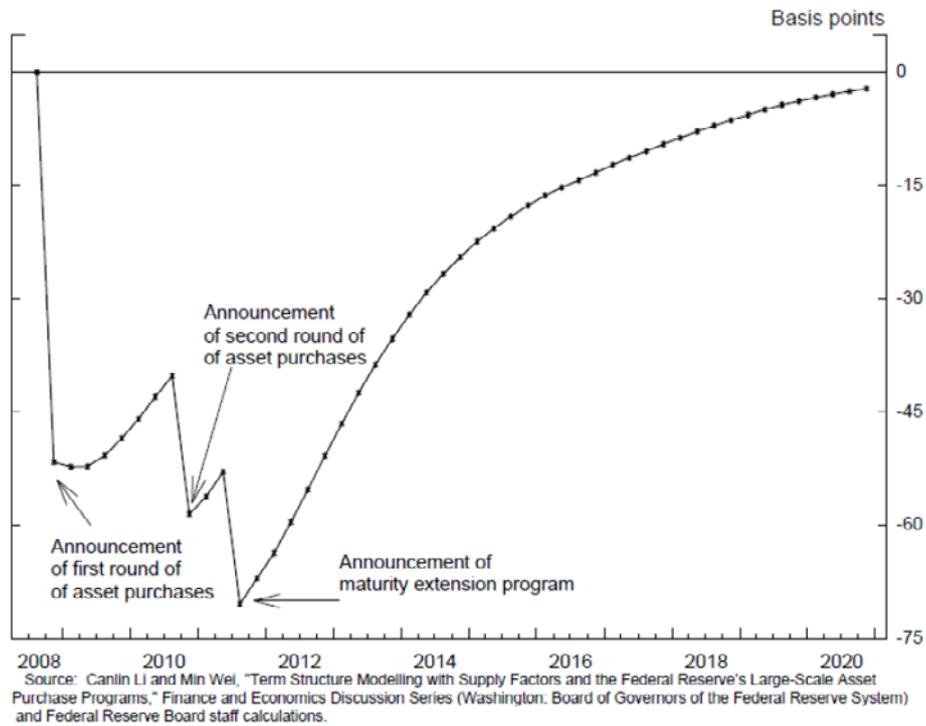


Figure 10. Taylor Rule, Balanced-Approach Rule, and Optimal Control

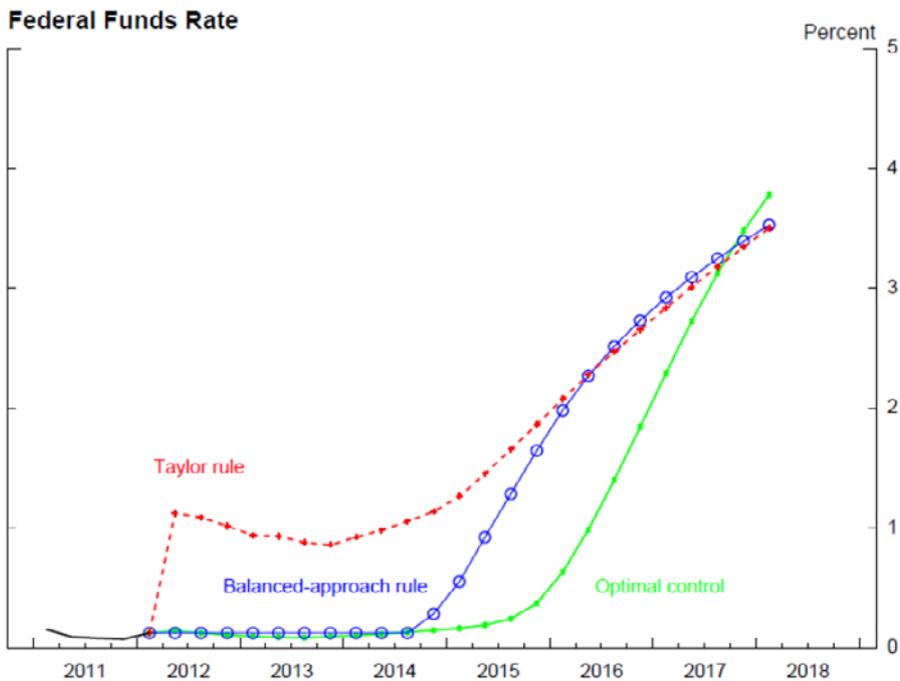
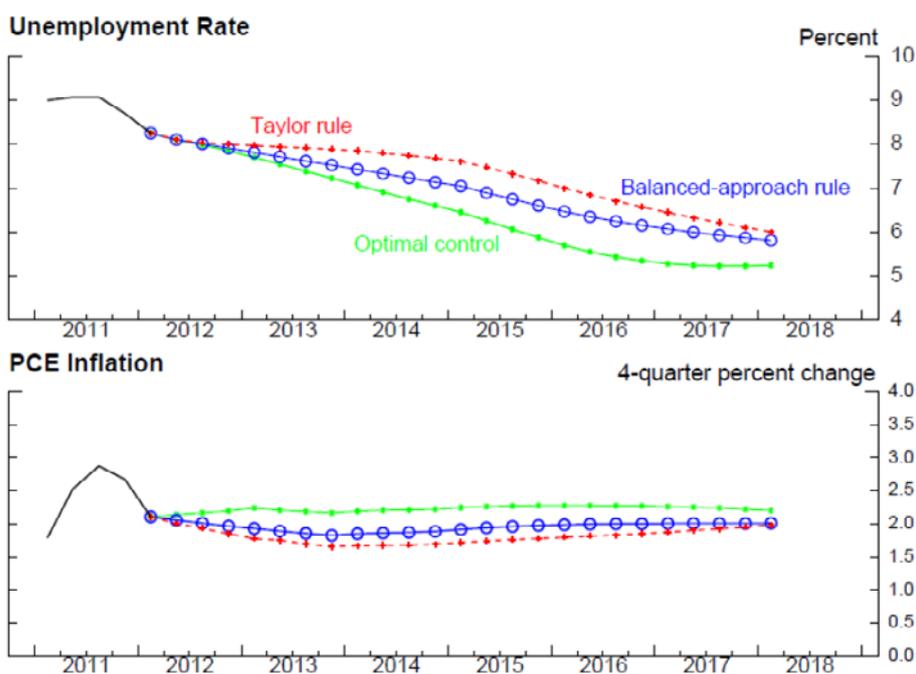


Figure 11. Illustrative Economic Outlook under Alternative Policies



Simple Rules may understate the case for keeping policy accommodative

- Rules don't adjust for a long period of policy restraint due to the zero lower bound.
- Rules ignore the persistent headwinds that have been holding back recovery.
 - These headwinds imply an abnormally low equilibrium real funds rate.

Looking ahead

- Economy remains vulnerable to setbacks.
- Scope remains for the FOMC to provide further policy accommodation.
 - Unconventional tools have some limits and costs.
- If Committee judges that the recovery is proceeding at an insufficient case could:
 - Extend Maturity Extension Program
 - Undertake additional asset purchases