

William C Dudley: Conducting monetary policy – rules, learning and risk management

Remarks by Mr William C Dudley, President and Chief Executive Officer of the Federal Reserve Bank of New York, at the C Peter McColough Series on International Economics, Council on Foreign Relations, New York, 24 May 2012.

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It is a great pleasure to have the opportunity to speak here today. My remarks will focus on how I think about monetary policy in today's challenging economic environment. As part of this, I will discuss how simple policy rules might appropriately be used as a guide to decisionmaking. I do this not because policy rules play a dominant role in my own thinking, but because the use of these tools is widespread, with many framing their arguments this way. To start with the punch line, although I believe simple policy rules can provide useful input into the policymaking process, it would be unwise to rely on them mechanically. As always, what I have to say today reflects my own views and not necessarily those of the Federal Open Market Committee (FOMC) or the Federal Reserve System.

Policy must strive to promote the dual mandate objectives of maximum employment and price stability given to the Federal Reserve by Congress. I believe that this should be done in a transparent and systematic manner because this will help us to achieve our objectives. In particular, a well-articulated framework for policy that explains our goals and how we use our tools to promote these goals helps market participants, businesses, and workers to anticipate how the Federal Reserve will respond under different circumstances and plan accordingly.¹

This helps to anchor private sector expectations in ways that make it easier to achieve the dual mandate objectives. In contrast, if we acted in an unpredictable way, policy would be ineffective at anchoring expectations and this shortcoming would disrupt the transmission of the monetary policy impulse to the real economy.

Over the years, this logic has led the Federal Reserve to become increasingly transparent and systematic in its decisionmaking.² In January, the Federal Open Market Committee took another important step in this direction, endorsing a public statement of longer-run goals and monetary policy strategy. This document articulated a 2 percent inflation objective and committed the FOMC to a "balanced approach" with respect to promoting the dual mandate objectives.

For me, the key issue is how to interpret these principles and put them into practice. I interpret the strategy document as expressing a relatively straightforward proposition: The Fed should seek the policy setting that generates the best achievable path back to full employment and price stability following shocks that push us away from either of our objectives.

I regard the policymaking process as a systematic effort to investigate what policy setting would deliver the best achievable set of economic outcomes,³ taking into consideration all available information, including risks not fully summarized in the base case point forecasts. Our approach is not greatly different from those of central banks that operate inflation

¹ But, of course, predictability is not an end in itself. A policy could be completely predictable, but also incompatible with the central bank's goals.

² The policy response to the extreme shock of the financial crisis was predictably vigorous, even if its detail was hard to specify in advance, and the knowledge that the Federal Reserve would act "as needed" to promote the dual mandate anchored inflation expectations and helped to avoid a deflation outcome.

³ In formal terms, this approach would be described as a target-rule or forecast-targeting rule.

targeting regimes, but in our case we explicitly seek to promote both aspects of our dual mandate.⁴

The basic question is how the FOMC should implement monetary policy to best push the economy back to its dual objectives. Prescriptions from simple policy rules such as Taylor Rules, named after Stanford economist John Taylor, have a legitimate role to play in this evaluation as do more complex simulations such as optimal control rules. In a Taylor Rule, the nominal federal funds rate depends on the equilibrium or neutral real short-term rate of interest, the deviation of the level of economic activity from estimates of the level of activity that would be consistent with long-run price stability, and the deviation of inflation from the central bank's target.⁵

The Taylor Rule formulation has a number of characteristics that make it a useful input into the policy-setting process. First, it very explicitly focuses on the two parameters – the long-term inflation objective and the level of potential output consistent with that objective – that map directly to the Federal Reserve's dual mandate objectives. Second, standard Taylor Rules are self-equilibrating. They respond to economic shocks and forecast errors in a way that pushes the economy back toward the central bank's objectives. Third, academic research shows that Taylor-type rules typically perform quite well across a wide range of economic models. This is important because we want rules that are robust; that is, not overly sensitive to model-specific assumptions about how the economy performs or how households and businesses alter their expectations and behavior in response to changes in monetary policy.

Fourth, with respect to the United States, the most popular versions of the Taylor Rule approximate how policy has evolved since the late 1980s – a period in which the Federal Reserve has been successful in keeping inflation in check (**Figure 1**). This suggests that policymakers, faced with the economic conditions of that period, weighted deviations from their goals in a manner similar to the weights used in these versions of the Taylor Rule.

Despite these attractive features, I do not believe that simple policy rules can take the place of in-depth analysis of economic conditions, evaluation of alternative policy plans, and ultimately policy judgment. While simple policy rules provide useful information to policymakers, their very virtue – simplicity – means they cannot capture all information that is relevant for policymaking. For example, such rules cannot easily incorporate asymmetric risks or financial stability issues.

Moreover, the usefulness of simple policy rules depends critically on the stability of the relationship between monetary policy and economic outcomes. If the relationship between

⁴ In practice, so-called inflation-targeting central banks also tend to take into account employment and other aspects of the real economy; hence, their approach is often referred to as “flexible inflation targeting.”

⁵ More formally, a Taylor Rule can be represented as:

$$\text{FFR} = r^* + \pi + a(\pi - \pi^*) + b[100(Y - Y^*)/Y^*]$$

where:

FFR = federal funds rate

r^* = neutral real federal funds rate

π = rate of inflation

π^* = target inflation rate

Y = output

Y^* = output at full employment

a = weight put on inflation gap

b = weight put on output gap

monetary policy and the real economy were stable over time, following a relatively simple and unchanging policy rule would likely generate acceptable results. However, if the linkage between monetary policy and the real economy is more variable, as I believe it is, then an approach that is more pragmatic and updates the policy setting in a clear and systematic manner based upon what the FOMC learns over time will be more effective.

In particular, a simple policy rule can generate poor macroeconomic outcomes when either the structure of the economy or the transmission mechanism of monetary policy changes in a significant way (whether the change is temporary or permanent). If private sector economic agents – workers, businesses, investors – thought we would implement a particular policy rule regardless of changes of these kinds, policy would not be effective at stabilizing private sector expectations in ways that promote the dual mandate objectives. This is particularly relevant in the unusual environment that we find ourselves in – the aftermath of a housing bust and a financial crisis.

In the current context, there is an additional complication that is extremely important. Simple policy rules implicitly assume that monetary policy is unconstrained and that the Fed can always achieve the federal funds rate policy setting the rule proposes – even if it is negative. By extension, they also assume that it is as easy to ease policy as it is to tighten policy if certain risks materialize. In practice this is not the case. Because our traditional tool, the federal funds rate, is already at its effective zero lower bound, we may want to react differently to a given economic outlook and set of risks than we would if policy were unconstrained. We are certainly not completely constrained: we have additional tools such as the balance sheet and forward policy guidance that we can use to provide additional monetary policy stimulus. But these tools have costs as well as benefits. Moreover, we can only imperfectly translate the impact of these policy instruments into interest rate equivalents for the purposes of evaluation using simple rules.

So for many reasons, I focus my attention primarily on how we are progressing and expect to progress relative to our dual mandate objectives. In this context, simple policy rules are an input, but my judgment also is informed by the economic environment and what we learn about the responsiveness of the economy to monetary policy.

Nevertheless, it is possible to translate my assessments into a language that would be more familiar to those who think in terms of a Taylor-type rule.

Recall that in a Taylor Rule framework, five major parameters can be adjusted:

- The inflation objective and the estimated output gap.
- Different weights can be placed on deviations of output relative to its potential and inflation relative to the Fed's objective.
- The estimate for the neutral real short-term rate of interest.

Thus, while the Taylor Rule generally is viewed as a fixed formula, its underlying framework is sufficiently flexible that such a rule could be modified to reflect certain types of new information.

What values should we use? In the United States, the inflation objective is well specified – a 2 percent annual rate for the personal consumption expenditures deflator.⁶ The FOMC has formally committed itself to this objective.

In contrast, there is disagreement among FOMC participants about how far the U.S. economy is operating from potential. Our staff forecast at the New York Federal Reserve estimates that the long-term unemployment rate is about 5 percent. The central tendency in

⁶ Over the past 25 years, CPI inflation has averaged about 30 basis points to 50 basis points above PCE inflation.

the most recent Summary of Economic Projections is a bit higher at 5.2 percent to 6.0 percent, but the degree of dispersion is not particularly wide.

More difficult is the judgment about what weights to put on deviations of output from potential versus deviations in expected inflation from the Fed's inflation target. This will differ among policymakers based on their views about the costs of deviations from the dual objectives and the structure of the economy. This debate can be summed up by looking at the two most well-known versions of the Taylor Rule – the original version put forward by Mr. Taylor, which is commonly referred to as Taylor 1993, and a later version updated by other economists that Mr. Taylor has discussed but does not endorse, which is referred to as Taylor 1999.⁷ Taylor 1999 puts more weight on deviations of output from potential than Taylor 1993. Thus, Taylor 1999 would lead to a later liftoff of the federal funds rate as the economy returns to full employment.

Which set of weights is better is a matter of judgment. John Taylor prefers Taylor 1993. My own thinking, when translated into Taylor Rule terms, favors the weights in the Taylor 1999 formulation. I believe that Taylor 1999 is likely to perform better in achieving the Federal Reserve's dual mandate objectives. Compared with Taylor 1993 it can achieve significantly greater stability in employment without sacrificing the medium-term inflation objective or significantly increasing the variability of inflation outcomes.

Finally, the remaining parameter in the Taylor Rule is the neutral, real short-term interest rate. This is the interest rate adjusted for inflation that neither stimulates nor slows the economy. It is typically set at 2 percent. Although there is no reason why the neutral real rate cannot change over time, the 2 percent rate is typically plugged in without further attention. Whether this is appropriate is a critical question in today's economic environment that I will return to a bit later.

Let me now discuss the economic outlook, and examine some of the implications for monetary policy. In doing so I will look at results obtained by applying some variants of the Taylor Rule, and explain some of my concerns about using simple policy rules in a mechanical way for setting monetary policy.

As I see it, the U.S. economy is continuing to slowly recover from the after-effects of the housing boom and bust and the financial crisis. But the recovery has been disappointing. Indeed, when we look back at economic forecasts made over the past three or four years it is notable that growth has systematically fallen short of both the Federal Reserve and private-sector forecasts.

Despite what has been an unusually accommodative monetary policy by historical standards, the economy has grown at only a 2.1 percent pace over the last four quarters and the Blue Chip consensus forecast only anticipates a modest acceleration to a 2.4 percent rate over the next four quarters (**Figure 2**).

The headwinds retarding recovery are well known. Consumers have been deleveraging in response to the large losses in wealth generated in large part by the collapse in home prices. Housing activity remains depressed for many reasons. These include the large shadow inventory making its way through the foreclosure pipeline, tight underwriting standards for new mortgage origination, and the sharp slowdown in household formation.

⁷ For Taylor 1993, the output gap and inflation gap parameters are both 0.5. For the Taylor 1999 version, which updates the original formulation to take into account data over a longer period of time, the output gap parameter is 1.0:

$$\text{Taylor 1993 FFR} = 2\% + \pi + 0.5(\pi - 2\%) + 0.5[100(Y - Y^*)/Y^*]$$

$$\text{Taylor 1999 FFR} = 2\% + \pi + 0.5(\pi - 2\%) + 1.0[100(Y - Y^*)/Y^*]$$

Although the corporate sector as a whole is now reasonably healthy, there still is a significant constraint on the availability of credit to small business. Fiscal policy has become restrictive as state and local governments have cut expenditures in response to revenue shortfalls; and the uncertainty about how Congress and the Administration will address the 2013 federal “fiscal cliff” is likely to inhibit hiring and investment by business. Global economic growth has slowed as European activity has stagnated and this is capping the demand for U.S. exports.

On the brighter side, some of these headwinds appear to be subsiding. Employment growth has picked up somewhat (**Figure 3**), which should eventually lead to faster household formation and more demand for housing. U.S. banks are healthier so that credit conditions, while still tight, are gradually easing. And, households appear quite far along in the deleveraging process by a number of important measures. For example, the ratio of household debt service relative to income is back to levels last seen in early 1990s (**Figure 4**).

For these reasons, I expect that growth will gradually strengthen over the next few years. Nevertheless, significant downside risks remain, especially those related to the challenges in Europe and how the potential “fiscal cliff” in the United States will be resolved after the fall elections. Even if these risks do not materialize, I anticipate only slow progress toward full employment.

On the inflation side, in recent years our forecasts have been noticeably more accurate than on the growth side, and we have succeeded in delivering inflation very close to our 2 percent price stability objective. Through March, as measured by the personal consumption expenditures deflator, overall consumer prices have risen 2.1 percent over the past 12 months, and prices excluding food and energy have risen 2.0 percent (**Figure 5**).

But price trends have been a bit stickier than one might have anticipated given the large amount of slack in the economy. To some degree, this likely reflects the anchoring exerted by stable inflation expectations. But some of the price pressures can be attributed to other, more temporary, factors:

- Higher oil and gasoline prices and their pass-through into the costs of other goods and services.
- Upward pressure on imputed homeowners rents due to increased demand for rental housing.
- Higher import prices for goods, such as apparel. This reflects many factors including commodity prices pressures and higher wage inflation in countries such as China.

Some of these upward pressures on inflation appear to be fading. Oil and gasoline prices have fallen in recent months. Apparel price inflation should gradually ease, given the sharp drop seen in cotton prices. Owners’ equivalent rent should also eventually stabilize as multi-family construction picks up and programs that shift real estate owned by banks to investors so they can be rented gear up.

More generally, there are several reasons to think that inflation will remain moderate and close to our objective. First, and most obviously, the economy continues to operate with significant slack. Second, measures of underlying inflation show little upward pressure. In fact, one – the Federal Reserve Bank of New York’s Underlying Inflation Gauge – is turning down. This measure uses a very wide set of variables to forecast the underlying inflation trend (**Figure 6**). Third, it is hard to be very concerned about inflation risks when the growth rate of nominal labor compensation is so low and stable. It is noteworthy to me that the employment cost index has risen only 2.1 percent over the past four quarters and has shown no acceleration (**Figure 7**). Fourth, inflation expectations remain well-anchored (**Figure 8**). This is critically important because inflation expectations are an important driver of actual inflation outcomes. Taking into account the current stance of monetary policy, I anticipate

that inflation will decline to slightly below our 2 percent long-run objective over the next few years.

So what does this all imply for monetary policy? I currently anticipate that the Federal Reserve's federal funds rate target will remain exceptionally low – that is at the current level – at least through late 2014.

This policy setting is more accommodative than the setting prescribed by the Taylor 1999 rule discussed earlier.⁸ Using the Federal Reserve Bank of New York's current staff forecast, the Taylor 1999 rule – unadjusted for the Federal Reserve's balance sheet actions – implies liftoff in 2014.⁹

But this is incomplete because it does not incorporate any adjustment for the Federal Reserve's balance sheet actions. I estimate that the current balance sheet provides the equivalent of roughly 150 to 200 additional basis points of federal funds rate easing.¹⁰ But as time passes, we will come closer to the date when the balance sheet will begin to be normalized. This implies that the amount of stimulus from the balance sheet will gradually lessen over time. Putting these adjustments into the Taylor 1999 formulation would pull the liftoff date to 2013 (**Figure 9**).

So, why do I believe the policy that promotes the best achievable path back to our dual mandate objectives should be more accommodative than that implied by Taylor 1999 – adjusted or unadjusted? Taylor 1999, like other simple rules, does not take into account two key considerations:

- The likelihood that the relationship between monetary policy and the economy has changed significantly following the financial crisis.
- The need to apply a risk-management framework to policymaking at the zero bound.

I don't believe that the standard Taylor 1999 formulation is a good guide for policy right now because the neutral real rate assumption embedded in this rule of 2 percent simply doesn't look plausible. This is important because the degree of stimulus depends not on the current policy setting but on the difference between the current level and the neutral level. For example, a short-term rate that appears highly stimulative under standard assumptions may in fact be much less so under alternative estimates of the neutral real rate. If the neutral real

⁸ In contrast, optimal control simulations using FRBUS put the federal funds rate liftoff in 2015; see Vice Chair Yellen's speech of April 12 (<http://www.federalreserve.gov/newsevents/speech/yellen20120411a.htm>).

⁹ For more details on this forecast, go to: <http://libertystreeteconomics.newyorkfed.org/2012/05/just-released-the-new-york-fed-staff-forecast-may-2012.html>.

¹⁰ This estimate should be considered very imprecise. To generate this estimate we first need to estimate how much long-term rates have been pushed down because of the Federal Reserve balance sheet programs. Although there is considerable uncertainty, New York Fed staff has estimated that the Fed's programs have pushed down the term premium by about 50 basis points.

The question then becomes how much would the federal funds rate have to fall to generate the same result? That depends on how changes in the federal funds rate pass through to longer-term interest rates. If reductions in the federal funds rate were viewed as permanent, then the pass-through would presumably be 1 to 1. However, if the federal funds rate reductions were viewed as fully transitory, then there would be virtually no pass-through. Econometric estimates indicate a value of about 4 to 1, a four basis points reduction in the federal funds rate would lead to a one basis point reduction in long-term rates. However, this degree of pass-through seems too low in the current environment in which the reductions in the federal funds rate have been in place for some time and are expected to continue for several more years. If one assumes a parameter value of 3 to 4 and uses 50 basis points as the estimate of the balance sheet impact on longer-term rates, then this implies that these actions have been equivalent to a 150 to 200 basis point reduction in the federal funds rate currently.

As the onset of balance sheet normalization comes closer over time, the effect of the Federal Reserve's balance sheet actions on the term premium will gradually diminish. This means that the size of the federal funds rate adjustment should also diminish over time.

rate has fallen, as I believe it has, then the entire trajectory of short-term rates implied by Taylor 1999 shifts down and this pushes back the liftoff date implied by Taylor 1999 significantly.

So how strong is the evidence that the neutral real rate has fallen significantly at least in the short term? First, and most importantly, if the neutral real rate were really 2 percent, then the U.S. economy should be growing faster¹¹ as monetary policy would be extraordinarily stimulative right now. But, if that is the case, then why do we see such a lackluster economic performance? Thomas Laubach and John Williams have devised a means of estimating how the equilibrium real interest rate varies over time based on how the economy has actually performed. The estimate generated by their model for the first quarter of 2012 is 0.3 percent.¹²

Second, we can identify good reasons why the neutral real rate is depressed currently. The channels through which monetary policy stimulates the economy are weaker than normal right now.¹³

Monetary policy works through its effect on financial conditions that influence economic activity. Thus, the linkage between the policy setting and the economy can be affected by changes in the relationships between policy and financial conditions or between financial conditions and the economy.

Let's consider the linkage between the policy setting and financial conditions first. In my view, the major components of financial conditions include: 1) the value of the equity market; 2) the level of real interest rates across the yield curve; 3) the level of credit spreads; 4) the availability of credit; and 5) the exchange value of the dollar. There are certainly others, but these are probably the most important ones. If we look at these financial indicators as a set, financial conditions do not appear to be unusually tight or easy in aggregate:

- For the equity market, the evidence is mixed (**Figure 10**).
- On one hand, the equity risk premium actually appears to be quite elevated relative to historical levels and price/earnings ratios based on current year expected earnings are not unusually high. On the other hand, based on valuation measures using trailing 10-year earnings, the U.S. stock market valuation may be more stretched.
- For interest rates, conditions are accommodative. Real rates are unusually low (**Figure 11**).
- For credit spreads, the level is well within normal ranges – neither as narrow as in 2005 or 2006 nor as wide as during 2008 and 2009 (**Figure 12**).
- Although credit availability is improving, the sharp tightening that occurred in 2008 and 2009 has not fully reversed (**Figure 13**).
- Credit availability remains unusually tight for certain sectors such as housing and small business.
- The exchange value of the dollar remains in the middle of a long-run channel showing a gentle decline (**Figure 14**).

¹¹ Or, if we were wrong about spare capacity, inflation should be higher.

¹² See Thomas Laubach and John Williams, "Measuring the Natural Rate of Interest," Review of Economics and Statistics, November 2003, pp.1063-1070. The link to the updated estimates is: http://www.frbsf.org/economics/economists/jwilliams/Laubach_Williams_updated_estimates.xls.

¹³ Impairment to the transmission mechanism implies that the neutral rate that neither stimulates nor slows the economy will be lower than it would otherwise be.

Similarly, there is evidence that the linkage between financial conditions and economic activity is attenuated as well. The most obvious example of this is the housing sector. But the subdued overall rate of credit expansion for both households and the business sector is also noteworthy. This has occurred despite a monetary policy that would be judged on its face as one of the most stimulative in history.

Finally, market expectations suggest that the equilibrium real rate of interest will remain depressed. To me, it is particularly noteworthy that the real forward interest rate expected 5 to 10 years in the future is currently only 0.3 percent. It has been moving lower recently and is far lower than at any time in recent memory (**Figure 15**). While this pattern likely reflects in part a very low term premium, it may also be driven by an assessment that the equilibrium real rate has fallen and will remain unusually low for years.

This evidence implies that current circumstances warrant the use of a significantly lower neutral real short-term rate in the Taylor Rule formulations. As economic conditions normalize, supported by accommodative monetary policy, the neutral interest rate presumably would gradually rise back toward its long run level over time. For example, adjusting Taylor 1999 for a zero percent neutral real rate that gradually normalizes over time would push liftoff beyond 2014 (**Figure 16**).

Risk management considerations also suggest that a more stimulative monetary policy than prescribed by Taylor 1999 is appropriate. In particular, simple policy rules implicitly treat the welfare losses generated by deviations from the central forecast path symmetrically. But I don't believe that the potential losses are currently symmetric. In my view, the distribution of potential outcomes is currently skewed to the downside, reflecting risks posed by developments in Europe and the impending U.S. fiscal cliff.

Moreover, the costs associated with such downside outcomes are likely to be considerably higher than the costs of realizing upside surprises. For example, consider two alternative scenarios: an economy that grows very quickly, but starting with some genuine spare capacity, versus an economy operating way below potential that stagnates, pushing the United States into a liquidity trap.

In the first case, we have good tools with which to respond. As the economy moved closer to full employment, we could raise short-term interest rates and subsequently sell assets from our portfolio. By doing this, we would tighten financial conditions, slow the economy and ensure it remained on a path consistent with our dual mandate objectives. The losses to society from this scenario should not be very large, provided we act in a manner that keeps medium-term inflation expectations in check.

But the losses to society may be very high in the second case. That is because – as Japan has discovered over the past two decades – once in a liquidity trap it is not easy to return to full employment and price stability. Pinned at the lower bound, we don't have as good a set of tools as we would ordinarily have to push the economy back toward our dual mandate objectives. As a result of this asymmetry, we should give somewhat more weight to avoiding the liquidity trap outcome.

Embedded within the traditional Taylor Rule formulations is the implicit return path back to full employment and price stability that the FOMC achieved in the past when faced with shocks that pushed economic activity below its potential level.¹⁴

¹⁴ Obviously, there is a cost to those who are unemployed longer than necessary with no offsetting gain in terms of greater price stability. But there also is another potential long-run cost. Those who have been unemployed for a long period of time may lose their job skills and become less employable in the future. This can push up the non-inflationary rate of unemployment (NAIRU). Not only is this bad for those who are unemployed due to the loss of their job skills, it is bad for the nation as a whole because the rise in the NAIRU lowers the effective productive capacity of the economy and, with it, the capacity of the country to service its debts.

In the current economic cycle, I think it is apparent that the path back to the Fed's dual mandate objectives has been much slower than the one that the FOMC found acceptable in the past. Growth has consistently been disappointing relative to both our own and consensus forecasts. Recent performance and forecasts relative to the dual mandate objectives suggest that standard rules calibrated in earlier times understate the degree of accommodation required to achieve the desired return path to the dual mandate objectives.

We should focus on how fast we are moving toward our employment and inflation objectives, and be wary of the risks that we see around that path. If progress toward the mandate objectives is slower than desired, then this is telling us that monetary policy needs to be kept at a more accommodative setting for a longer time period than a standard rule would suggest. As downside risks continue to be present, the case for accommodation is even stronger.

Given our forecast of stable prices and a still slow path back to full employment, there is an argument for easing further. But, unfortunately, our tools have costs associated with them as well as benefits. Thus, we must weigh these costs against the benefits of further action.

As long as the U.S. economy continues to grow sufficiently fast to cut into the nation's unused economic resources at a meaningful pace, I think the benefits from further action are unlikely to exceed the costs. But if the economy were to slow so that we were no longer making material progress toward full employment, the downside risks to growth were to increase sharply, or if deflation risks were to climb materially, then the benefits of further accommodation would increase in my estimation and this could tilt the balance toward additional easing.

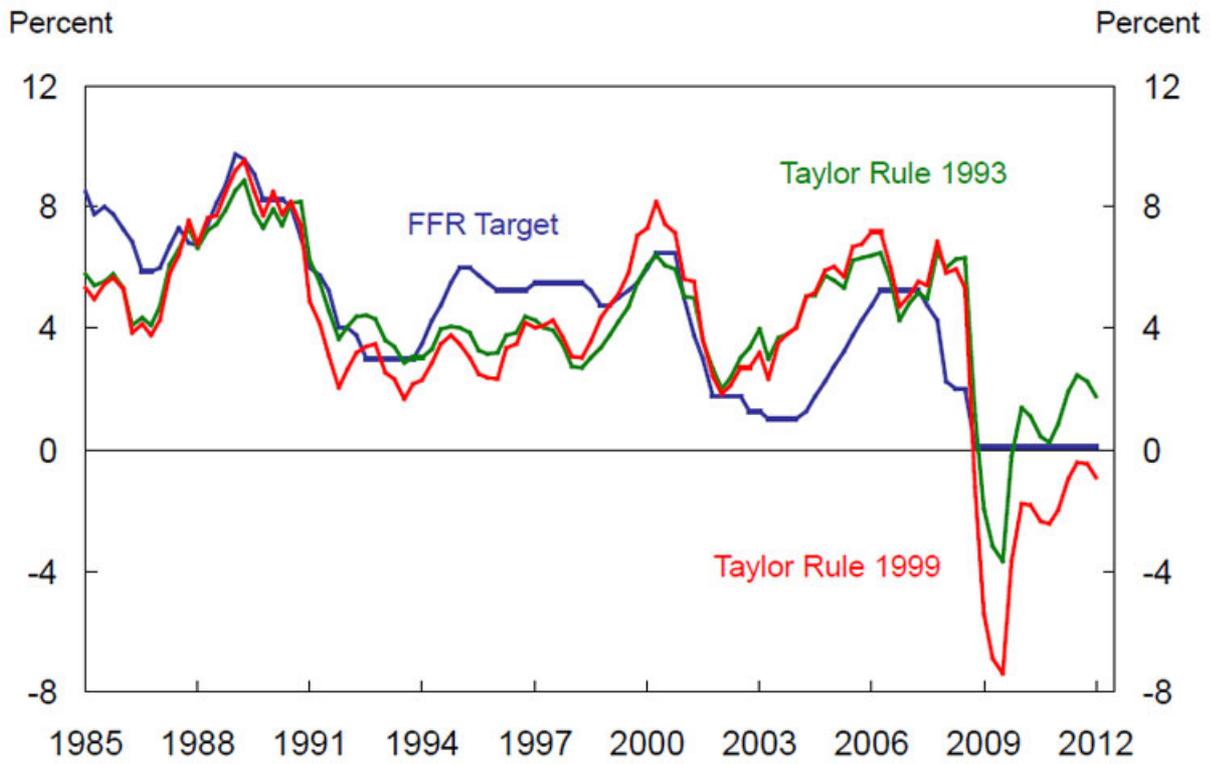
Under such circumstances, further balance sheet action might be called for. We could choose between further extension of the duration of the Federal Reserve's existing Treasury portfolio and another large-scale asset purchase program of Treasuries or agency mortgage-backed securities.

Conversely, I would be willing to consider tightening policy at a somewhat earlier stage if growth strengthened sufficiently to materially improve the medium-term outlook and substantially reduce tail risks, or if there was evidence of a genuine threat to medium-term inflation, including a rise in inflation expectations. In such a case, I would anticipate that the first step would be to bring in the late 2014 date of the policy guidance. This would effectively tighten financial conditions not only by changing the expected path of short-term interest rates, but also by bringing forward the expected start of balance sheet normalization.

To sum up, I see substantial advantages in behaving in as systematic fashion as possible in setting monetary policy. But that should be done in a way that fully accounts for any constraints on policy imposed by the economic environment, the presence of asymmetric risks, and allows us to learn as we go. The fact is that the economy is recovering after an unusually deep recession and a severe financial crisis. We don't have much experience with this type of episode and how the economy is likely to perform. What we need to focus on is not what interest rate a given rule generates, but what policy setting can be expected to deliver the appropriate return path to the dual mandate objectives – the type of return path that standard Taylor Rule formulations achieved in different economic circumstances in the past.

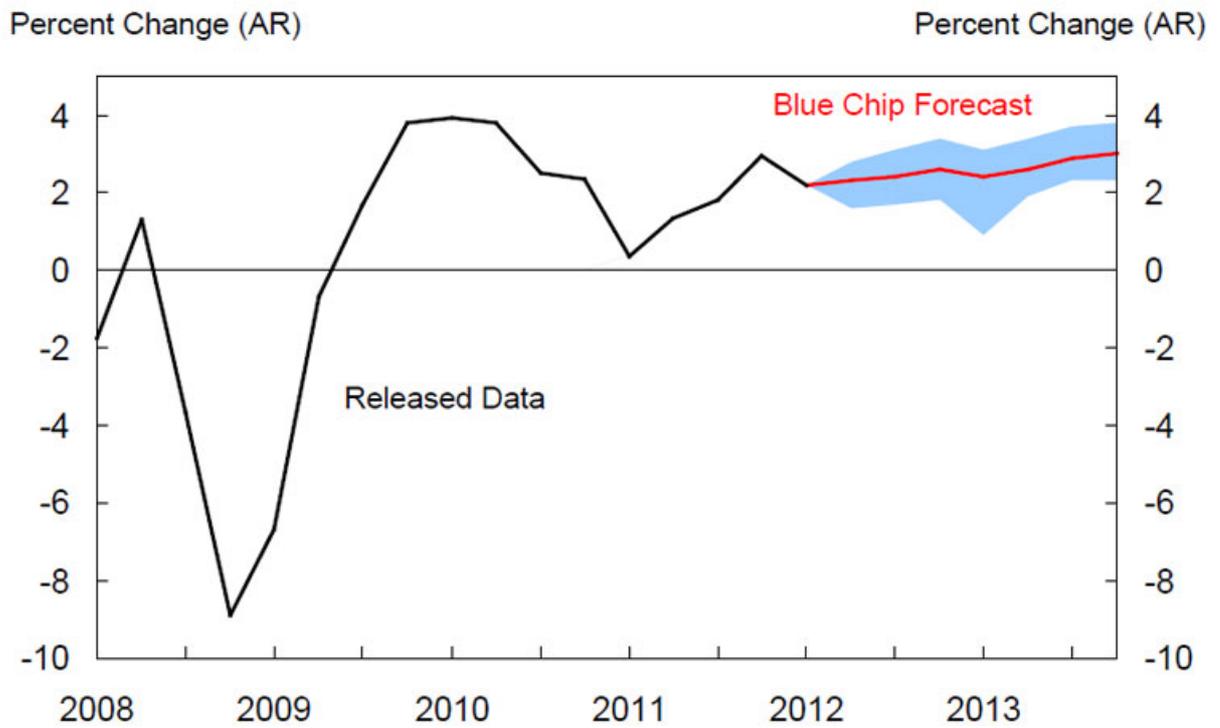
Thank you very much for your kind attention. I would be happy to take a few questions.

Figure 1: Federal Funds Rate Target and Taylor Rules



Source: CBO, BEA, Federal Reserve Board

Figure 2: Real GDP Growth



Note: The blue band represents the top 10 and bottom 10 averages of the May 2012 Blue Chip survey.

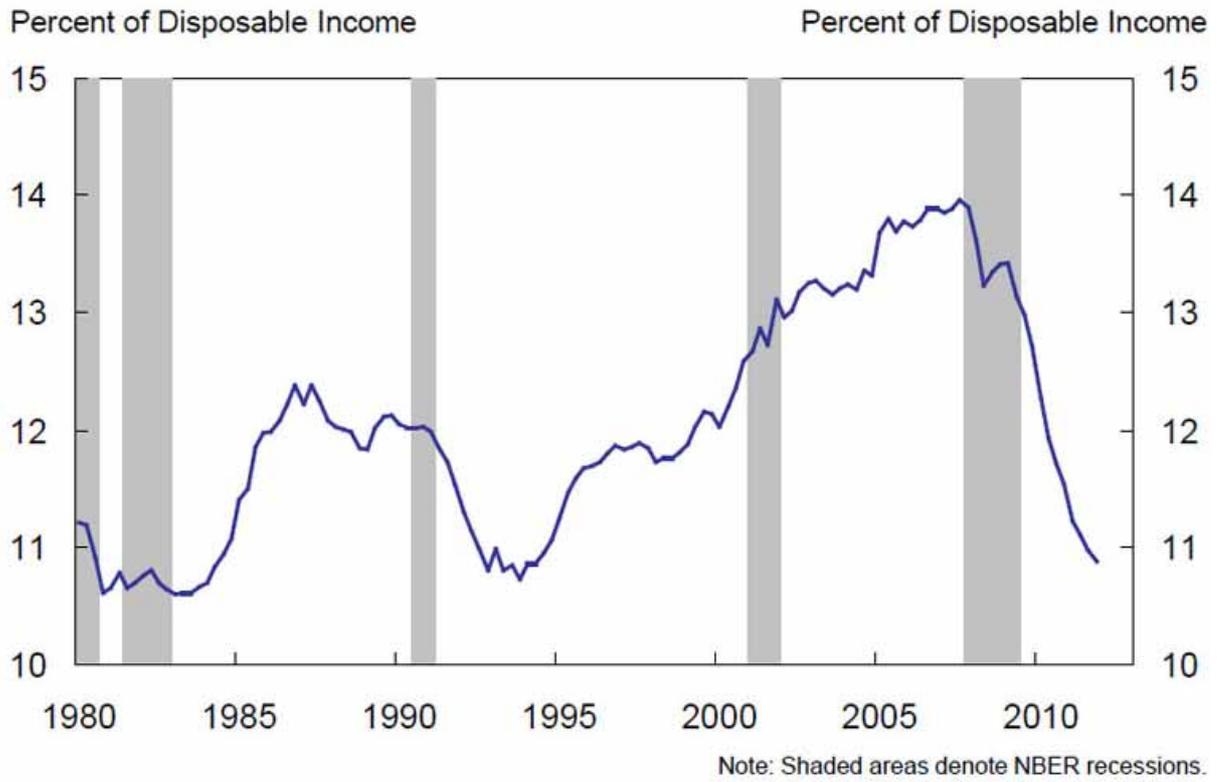
Source: BEA and Blue Chip Economic Indicators

Figure 3: Private Nonfarm Payroll Employment



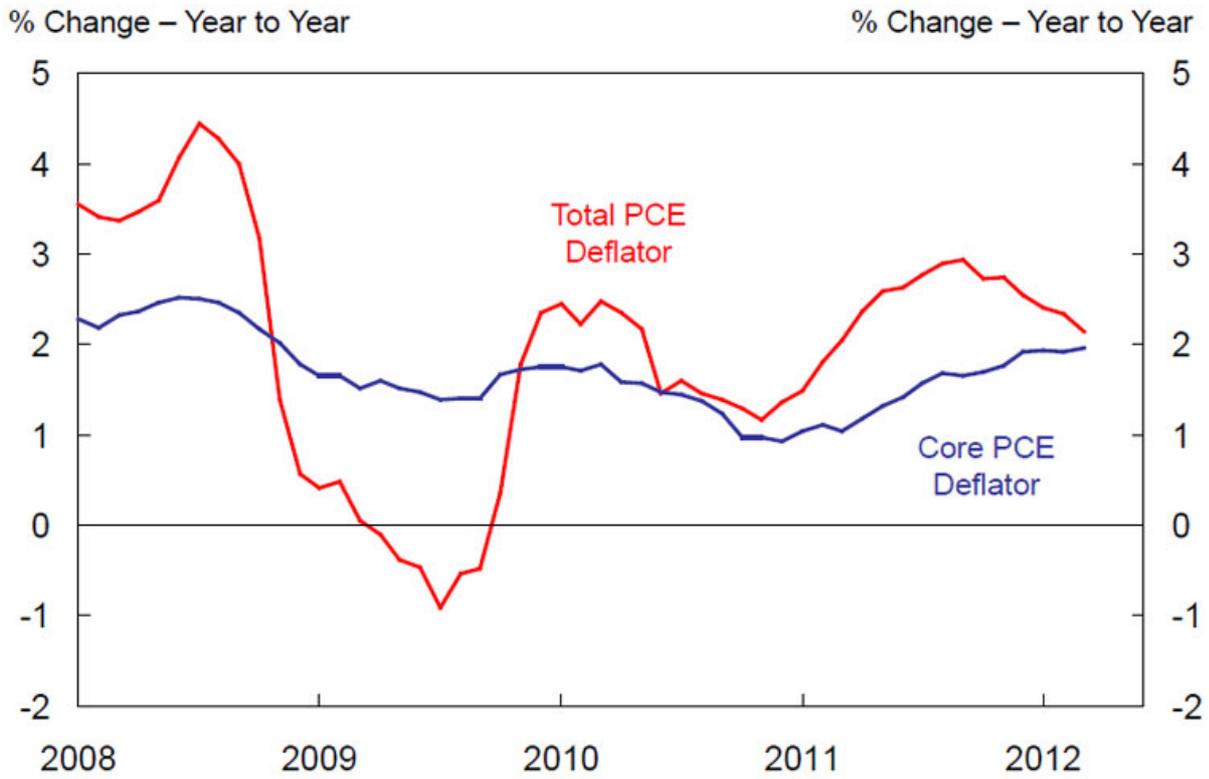
Source: Bureau of Labor Statistics

Figure 4: Household Debt-Service Ratio



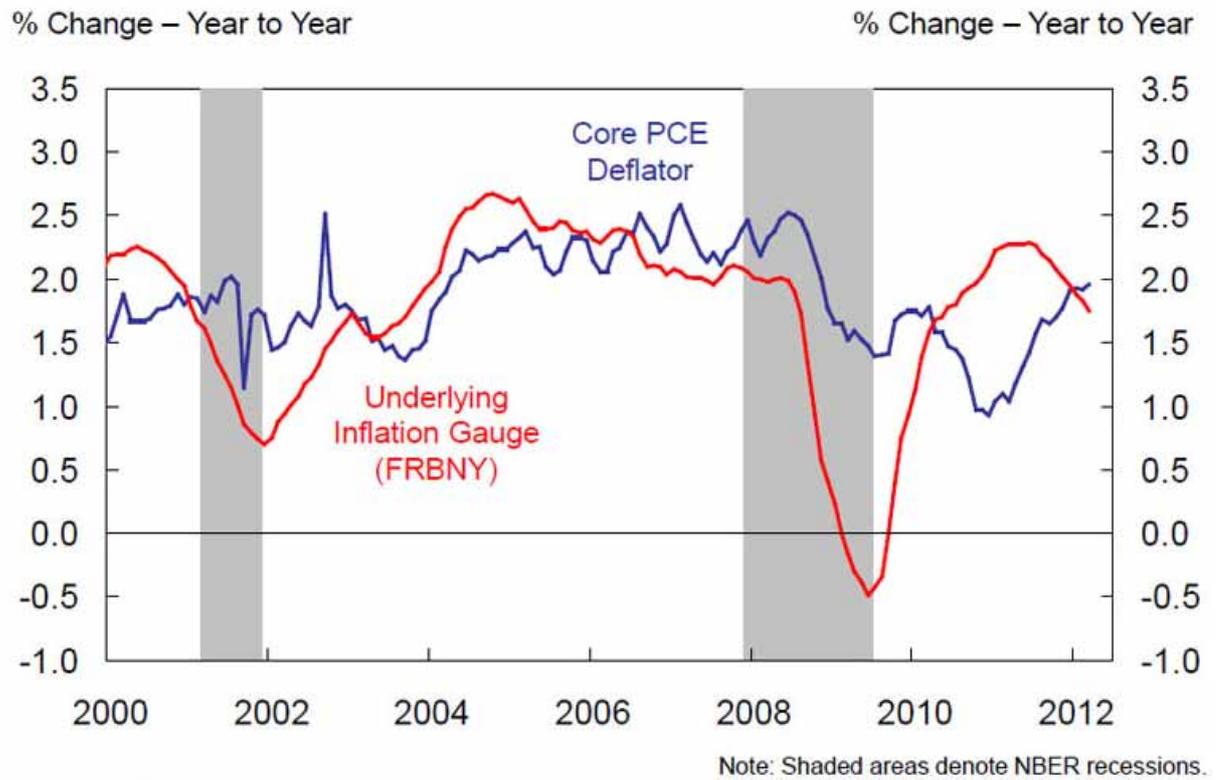
Source: Federal Reserve Board

Figure 5: Total and Core PCE Deflators



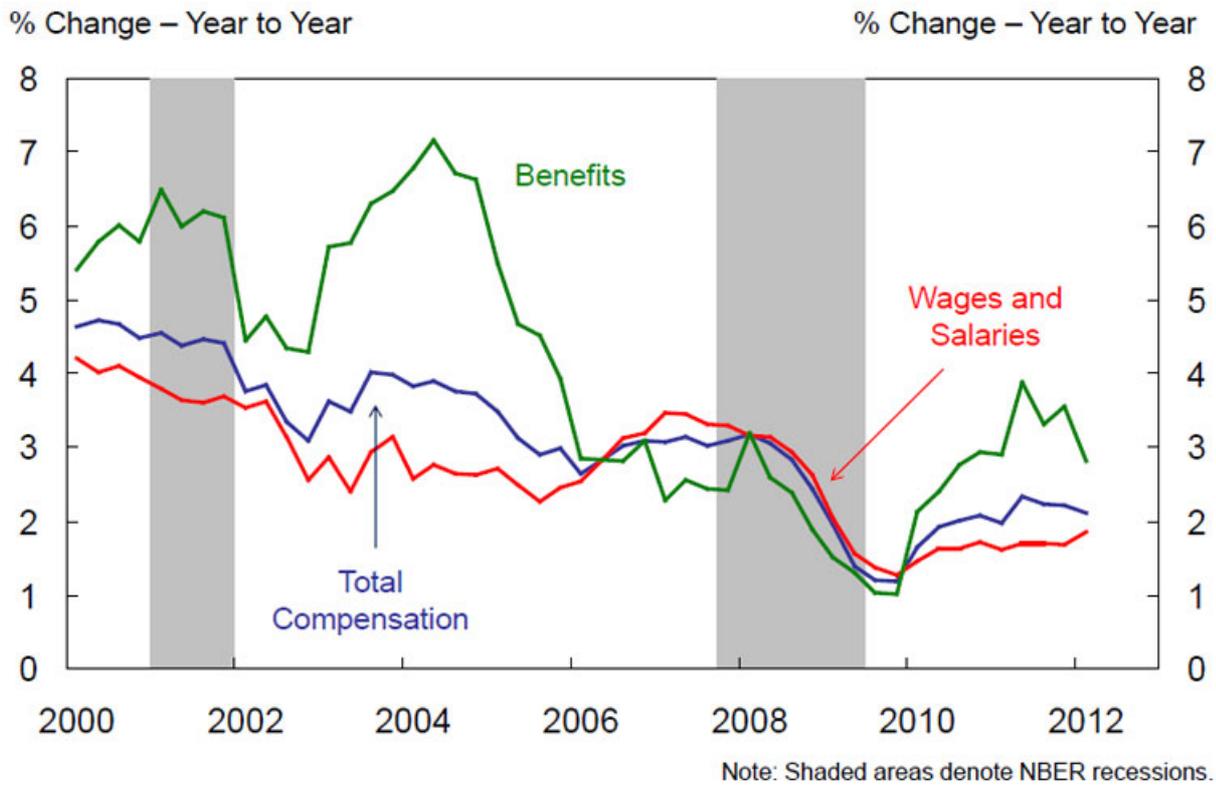
Source: Bureau of Economic Analysis

Figure 6: An Alternative Measure of Underlying Inflation



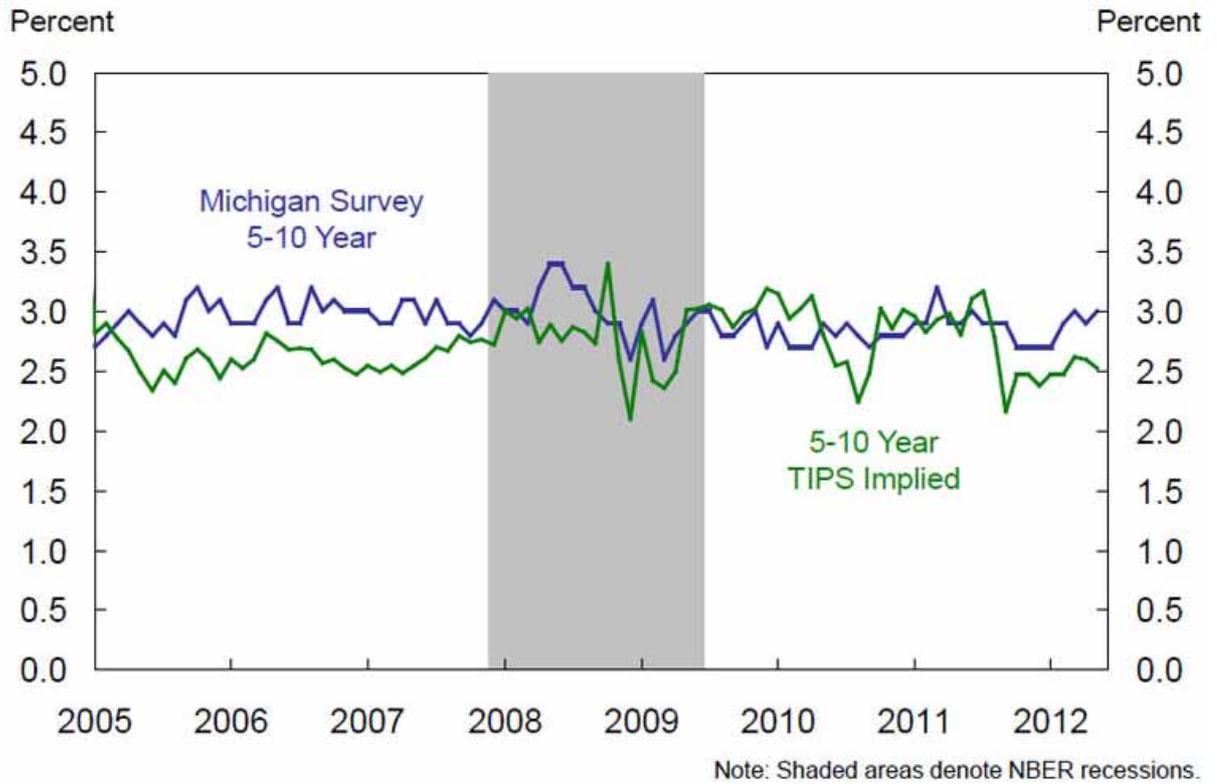
Source: Bureau of Economic Analysis and FRBNY Staff

Figure 7: Employment Cost Index: Private Industry Workers



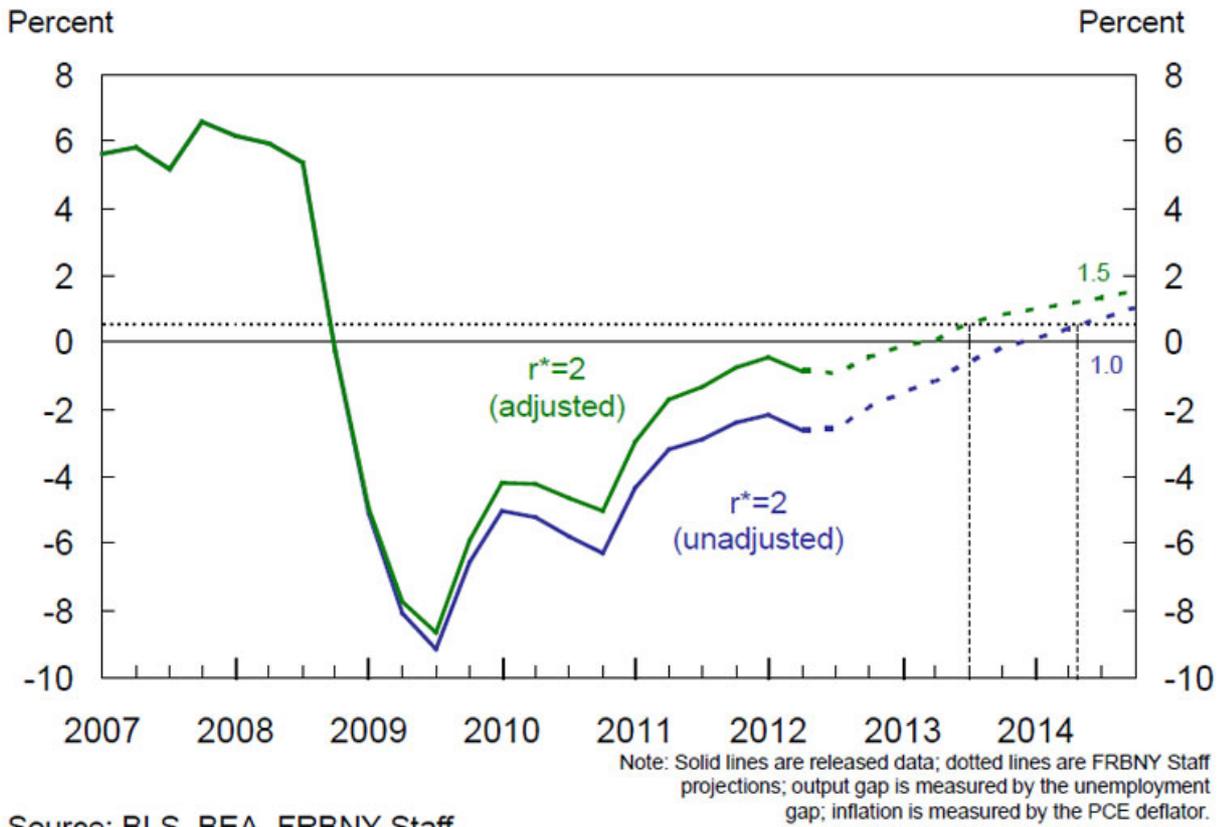
Source: Bureau of Labor Statistics

Figure 8: Long-Term Inflation Expectations



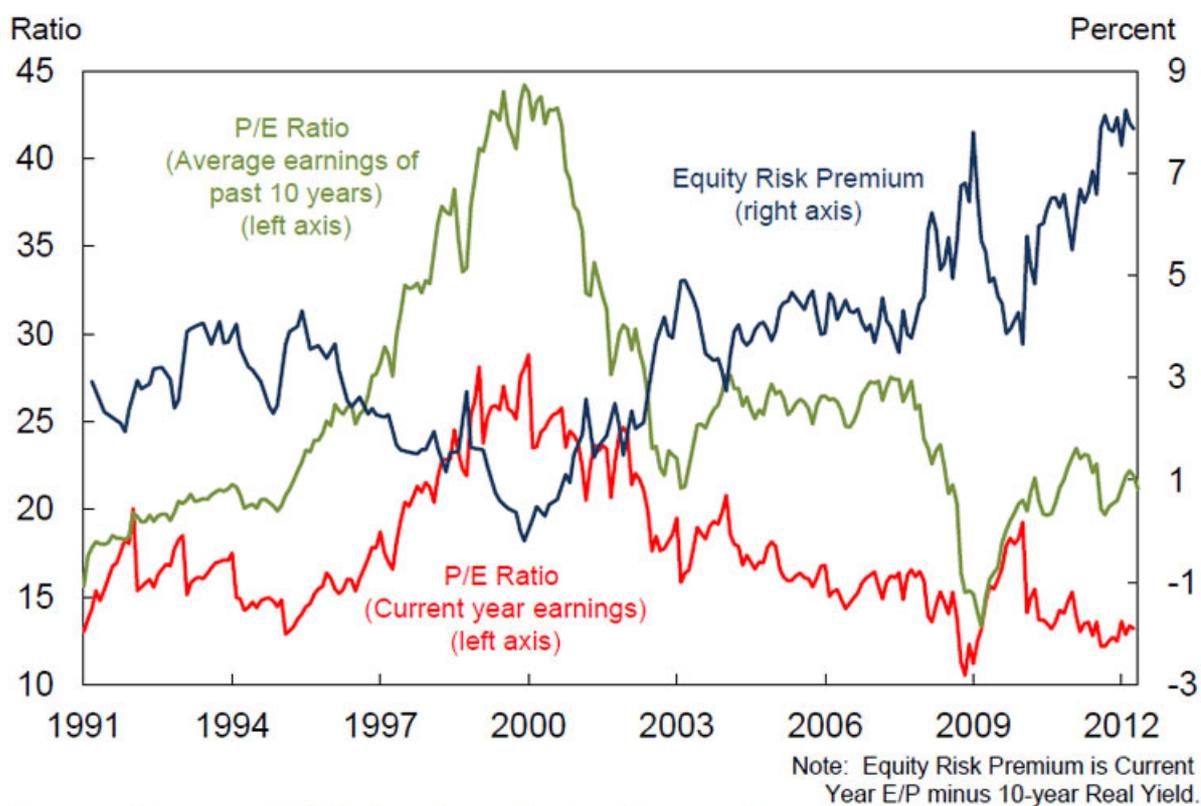
Source: University of Michigan and Federal Reserve Board

Figure 9: Taylor 1999 with and without Balance Sheet Adjustment



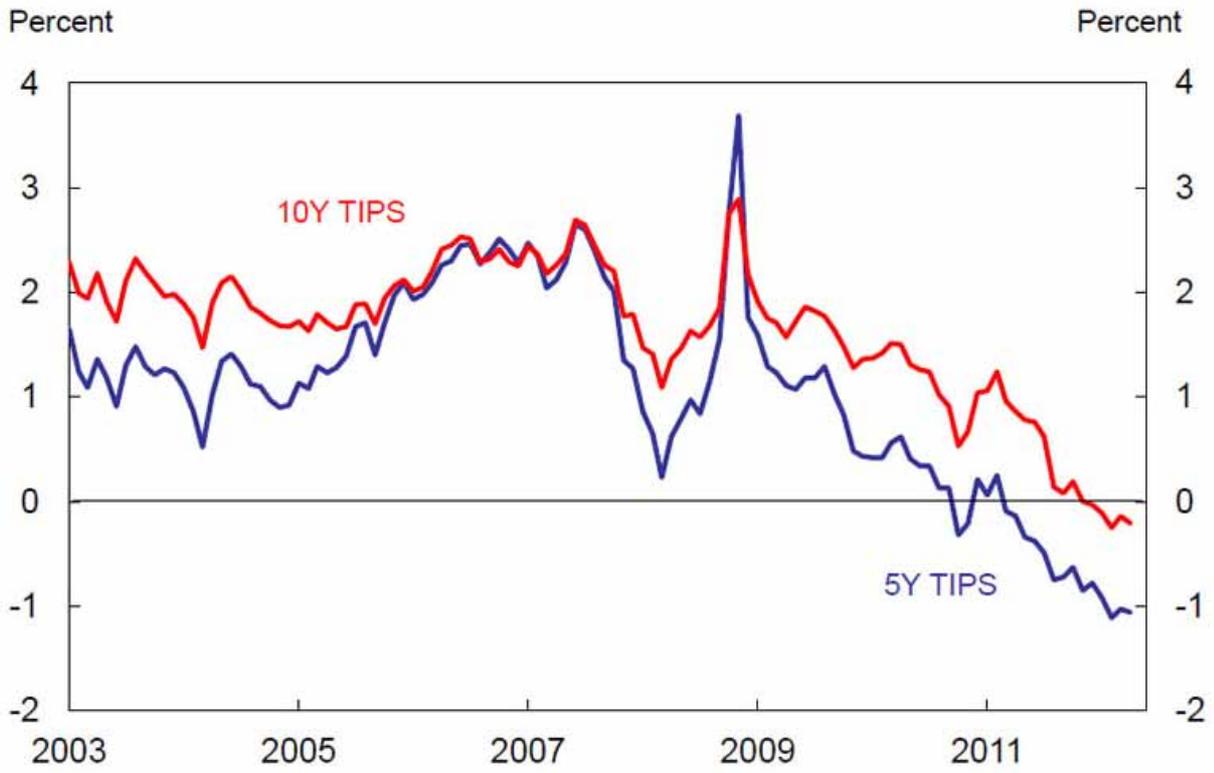
Source: BLS, BEA, FRBNY Staff

Figure 10: Valuation Measures of U.S. Equity Market



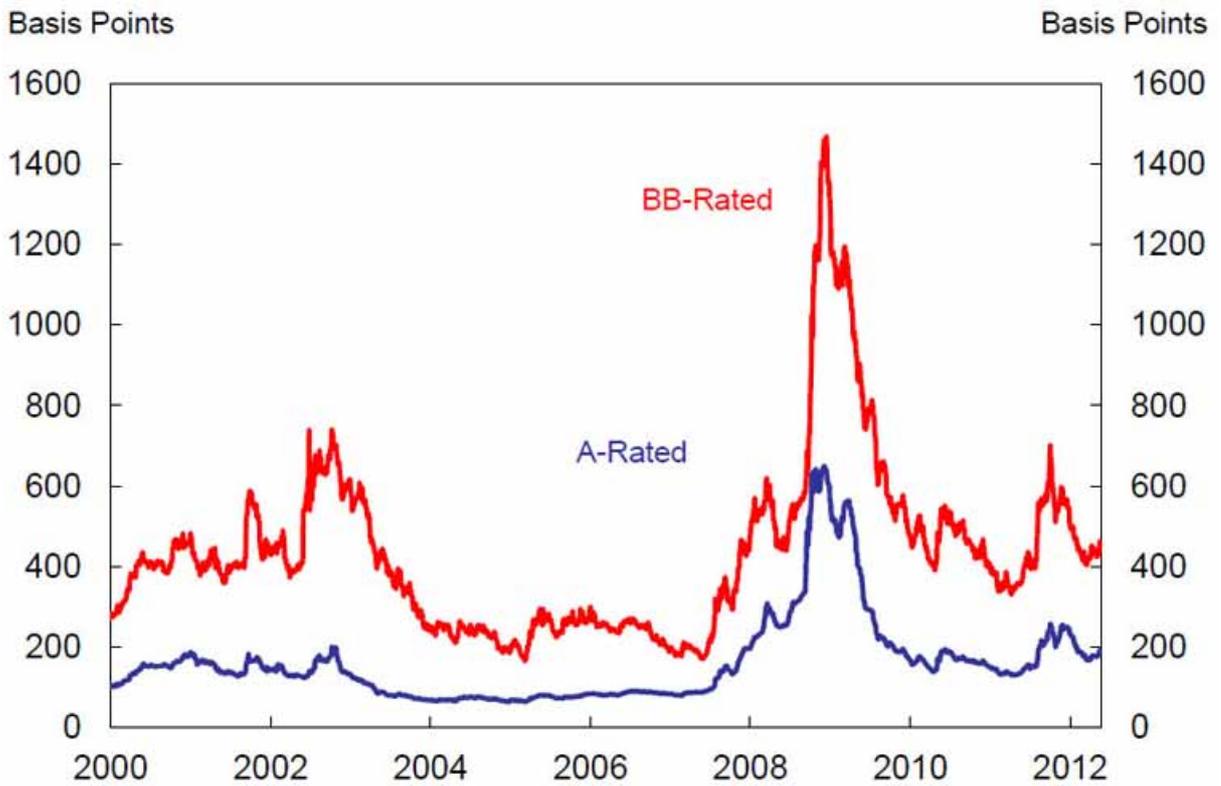
Source: Thomson ONE, Bloomberg, Federal Reserve Board

Figure 11: TIPS Yields



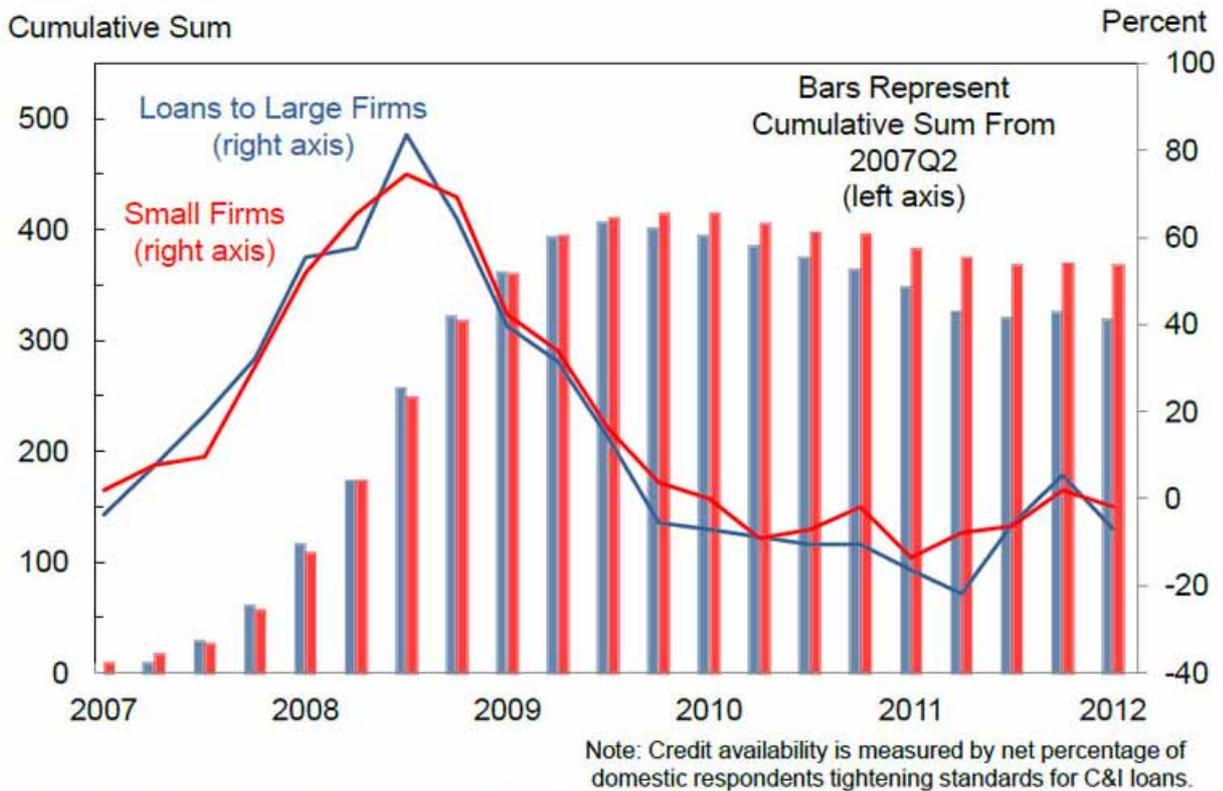
Source: Federal Reserve Board

Figure 12: Corporate Option-Adjusted Spreads



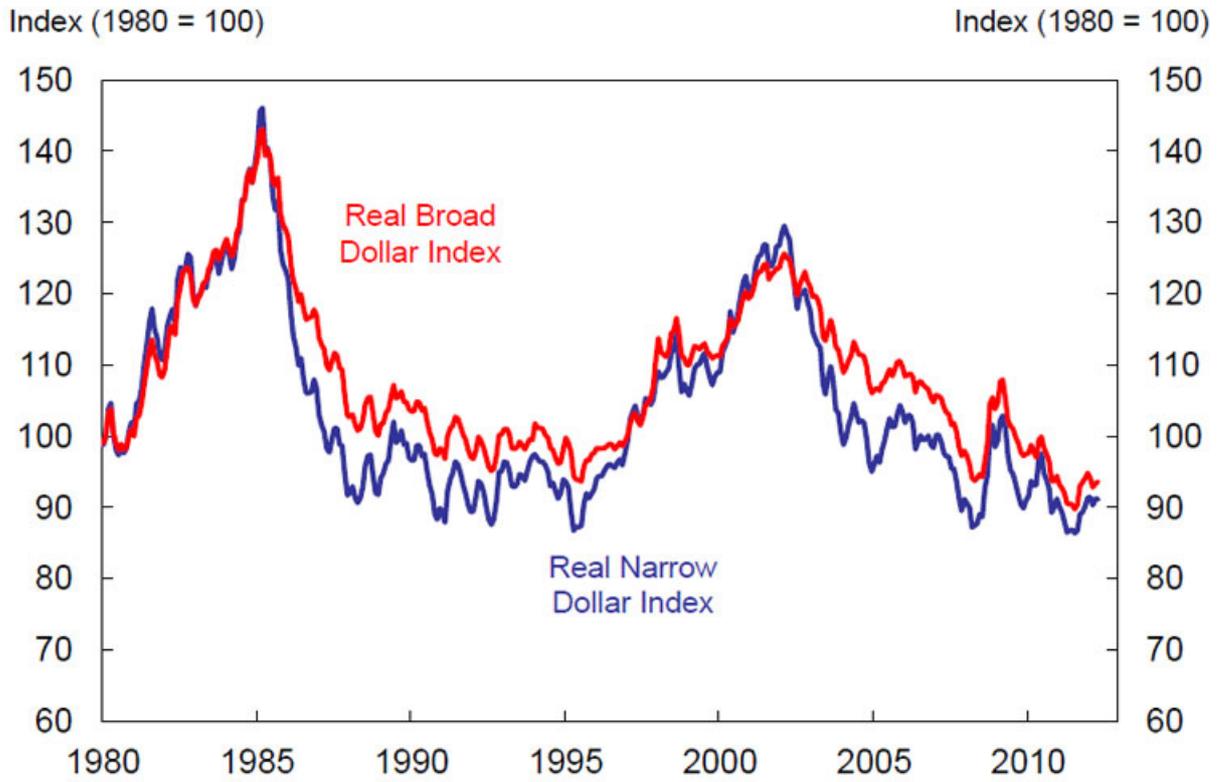
Source: Merrill Lynch

Figure 13: Credit Availability



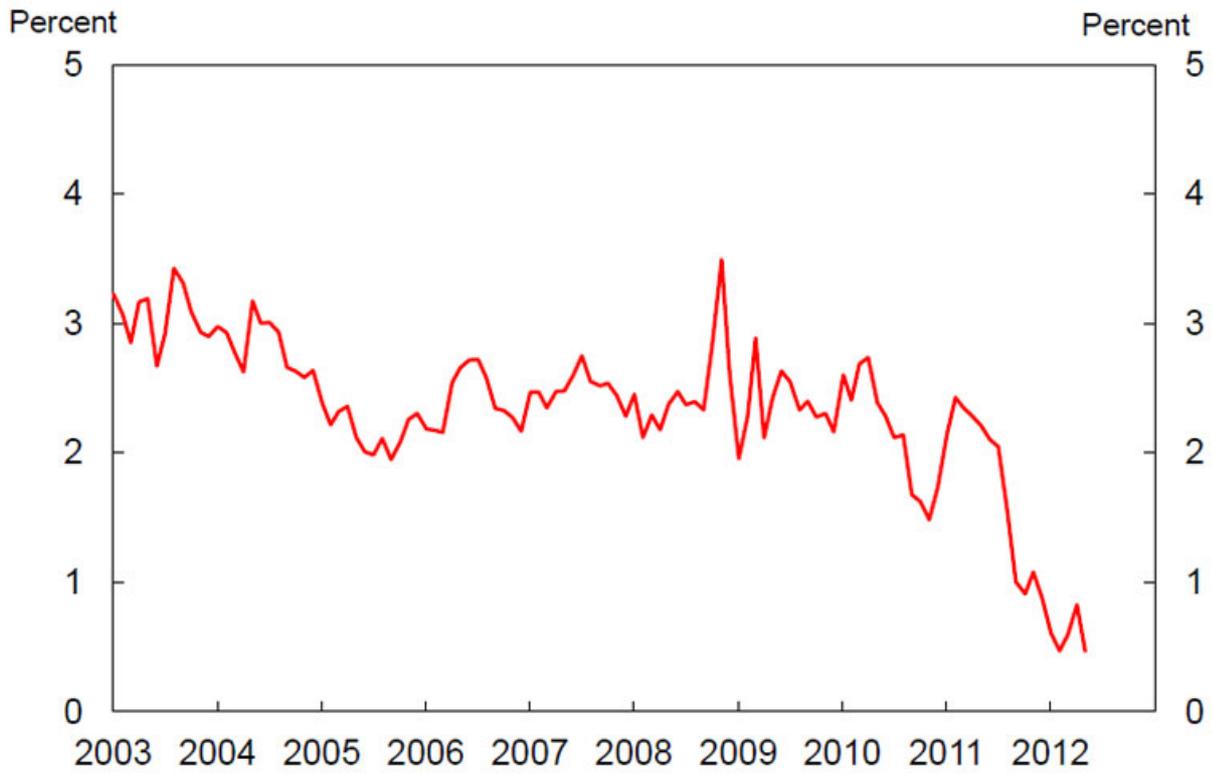
Source: Senior Loan Officer Survey, Federal Reserve Board

Figure 14: Real Trade-Weighted Exchange Rates



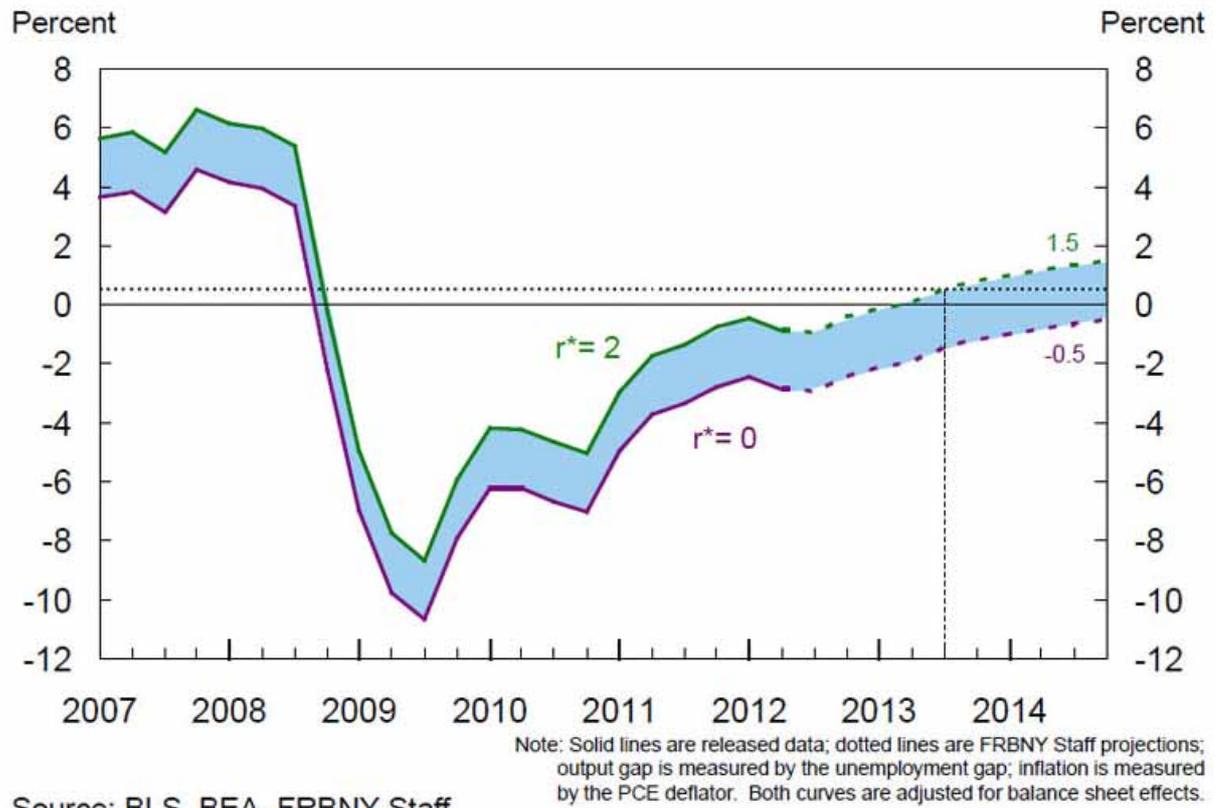
Source: Federal Reserve Board

Figure 15: 5-10 Year Forward Real Rate



Source: Federal Reserve Board

Figure 16: Taylor 1999 with Alternative Real Rate Assumptions



Source: BLS, BEA, FRBNY Staff