

**Meeting of the Federal Open Market Committee on  
October 27–28, 2015**

A joint meeting of the Federal Open Market Committee and the Board of Governors was held in the offices of the Board of Governors of the Federal Reserve System in Washington, D.C., on Tuesday, October 27, 2015, at 10:00 a.m. and continued on Wednesday, October 28, 2015, at 9:00 a.m. Those present were the following:

Janet L. Yellen, Chair  
William C. Dudley, Vice Chairman  
Lael Brainard  
Charles L. Evans  
Stanley Fischer  
Jeffrey M. Lacker  
Dennis P. Lockhart  
Jerome H. Powell  
Daniel K. Tarullo  
John C. Williams

James Bullard, Esther L. George, Loretta J. Mester, Eric Rosengren, and Michael Strine,  
Alternate Members of the Federal Open Market Committee

Patrick Harker, Robert S. Kaplan, and Narayana Kocherlakota, Presidents of the Federal  
Reserve Banks of Philadelphia, Dallas, and Minneapolis, respectively

Brian F. Madigan, Secretary  
Matthew M. Luecke, Deputy Secretary  
David W. Skidmore, Assistant Secretary  
Michelle A. Smith, Assistant Secretary  
Scott G. Alvarez, General Counsel  
Steven B. Kamin, Economist  
Thomas Laubach, Economist  
David W. Wilcox, Economist

David Altig, Thomas A. Connors, Eric M. Engen, Michael P. Leahy, William R. Nelson,  
Glenn D. Rudebusch, Daniel G. Sullivan, and William Wascher, Associate Economists

Simon Potter, Manager, System Open Market Account

Lorie K. Logan, Deputy Manager, System Open Market Account

Robert deV. Frierson,<sup>1</sup> Secretary of the Board, Office of the Secretary, Board of  
Governors

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<sup>1</sup> Attended Tuesday morning's discussion of equilibrium real interest rates and Wednesday's session.

Michael S. Gibson, Director, Division of Banking Supervision and Regulation, Board of Governors

Nellie Liang, Director, Office of Financial Stability Policy and Research, Board of Governors

Margaret Shanks,<sup>2</sup> Deputy Secretary, Office of the Secretary, Board of Governors

James A. Clouse and Stephen A. Meyer, Deputy Directors, Division of Monetary Affairs, Board of Governors

Andreas Lehnert, Deputy Director, Office of Financial Stability Policy and Research, Board of Governors

William B. English, Senior Special Adviser to the Board, Office of Board Members, Board of Governors

Andrew Figura and Stacey Tevlin, Special Advisers to the Board, Office of Board Members, Board of Governors

Trevor A. Reeve, Special Adviser to the Chair, Office of Board Members, Board of Governors

Linda Robertson, Assistant to the Board, Office of Board Members, Board of Governors

David E. Lebow, Senior Associate Director, Division of Research and Statistics, Board of Governors

Jeremy B. Rudd, Senior Adviser, Division of Research and Statistics, Board of Governors; Joyce K. Zickler, Senior Adviser, Division of Monetary Affairs, Board of Governors

Fabio M. Natalucci, Associate Director, Division of Monetary Affairs, Board of Governors

Joseph W. Gruber,<sup>3</sup> Deputy Associate Director, Division of International Finance, Board of Governors; Jane E. Ihrig<sup>4</sup> and David López-Salido,<sup>5</sup> Deputy Associate Directors, Division of Monetary Affairs, Board of Governors

Glenn Follette and John M. Roberts, Assistant Directors, Division of Research and Statistics, Board of Governors; Christopher J. Gust, Assistant Director, Division of Monetary Affairs, Board of Governors

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<sup>2</sup> Attended Tuesday's session following the discussion of equilibrium real interest rates.

<sup>3</sup> Attended Tuesday's session only.

<sup>4</sup> Attended through the discussion of financial developments and open market operations.

<sup>5</sup> Attended through the discussion of equilibrium real interest rates.

Robert J. Tetlow, Adviser, Division of Monetary Affairs, Board of Governors

Penelope A. Beattie,<sup>3</sup> Assistant to the Secretary, Office of the Secretary, Board of Governors

Dana L. Burnett, Section Chief, Division of Monetary Affairs, Board of Governors;  
Andrea Raffo,<sup>5</sup> Section Chief, Division of International Finance, Board of Governors

David H. Small, Project Manager, Division of Monetary Affairs, Board of Governors

Yuriy Kitsul, Senior Economist, Division of Monetary Affairs, Board of Governors

Benjamin K. Johannsen,<sup>5</sup> Economist, Division of Monetary Affairs, Board of Governors

David Sapenaro, First Vice President, Federal Reserve Bank of St. Louis

Jeff Fuhrer, Executive Vice President, Federal Reserve Bank of Boston

Kei-Mu Yi, Special Policy Advisor to the President, Federal Reserve Bank of Minneapolis

Michael Dotsey, Michael Held, Evan F. Koenig, and Christopher J. Waller, Senior Vice Presidents, Federal Reserve Banks of Philadelphia, New York, Dallas, and St. Louis, respectively

Edward S. Knotek II and George A. Kahn, Vice Presidents, Federal Reserve Banks of Cleveland and Kansas City, respectively

Robert Rich and Andrea Tambalotti,<sup>5</sup> Assistant Vice Presidents, Federal Reserve Bank of New York

Andreas L. Hornstein, Senior Advisor, Federal Reserve Bank of Richmond

Jing Zhang,<sup>5</sup> Senior Economist, Federal Reserve Bank of Chicago

**Transcript of the Federal Open Market Committee Meeting on  
October 27–28, 2015**

**October 27 Session**

CHAIR YELLEN. Good morning, everybody. Let's get started. As most of you know, this is the last FOMC meeting for President Kocherlakota. Later today we will have a chance to thank him and to wish him farewell at a luncheon, but in view of Narayana's service on the Federal Open Market Committee, I'd like to take this opportunity to thank him in the setting of an FOMC meeting as well.

Narayana became president of the Federal Reserve Bank of Minneapolis in October 2009. He has participated in 54 regular meetings of the FOMC. Before becoming president, he was a highly successful economic researcher while serving as a university professor and as a research consultant for the Federal Reserve Bank of Minneapolis. The insight and creativity that he demonstrated as a researcher were also hallmarks of his work as a monetary policymaker. Over the past six years, President Kocherlakota has contributed greatly to the Committee's formulation of monetary policies to address the challenging macroeconomic issues facing our nation. So, Narayana, let me say thank you in this venue for your service and say how much we will all miss you. [Applause]

MR. KOCHERLAKOTA. Thank you very much, Madam Chair.

CHAIR YELLEN. Thank you. And, as we did the previous time and probably will from now on, our meetings will be throughout joint meetings of the FOMC and the Board of Governors. I need a motion to close the Board meeting.

MR. FISCHER. So moved.

CHAIR YELLEN. Thank you. Without objection. The first topic on our agenda is "Equilibrium Real Interest Rates,"  $r^*$ . Let me ask Chris Gust to start us off.

MR. GUST.<sup>1</sup> Our briefing will be delivered in four segments by Kei-Mu Yi, Andrea Tambalotti, David López-Salido, and me. We will be referring to the package labeled “Material for Briefing on Equilibrium Real Interest Rates.”

What level of the real policy rate would be consistent with moving the economy to, or keeping it at, full employment? This benchmark rate is often referred to as the “neutral” or “equilibrium” real rate, or  $r^*$ . A policy stance that sets the real policy rate equal to  $r^*$  is, in some models, neither contractionary nor expansionary. This general concept of a neutral real rate has been given several more-specific definitions, which I will summarize. Kei-Mu, Andrea, and David will focus on longer-run trends in  $r^*$ , on shorter-run variations in  $r^*$ , and on the policy implications of having to rely on uncertain estimates of  $r^*$ .

Exhibit 1 identifies different concepts that have been referred to as  $r^*$ —that is, different definitions of a “neutral” real rate. Some have a very specific interpretation that is tightly linked to a model or class of models; others are statistical in nature.

The first three entries in the list are associated with formal economic models. The natural, or Wicksellian, real rate is the real interest rate that would prevail in the absence of nominal rigidities such as sticky prices and wages. Thus, it is the real rate consistent with the level of resource utilization that would prevail if there were no nominal rigidities. The efficient real rate is the real rate that would prevail if there were neither nominal rigidities nor distortions such as imperfect competition or taxes that move allocations away from their efficient levels. The optimal real rate is the rate that would be prescribed by optimal monetary policy based on maximizing some welfare criterion. It may differ from the efficient rate if policy is constrained by the effective lower bound or if there are not enough policy instruments to achieve the most efficient outcomes. The real rate associated with the optimal control simulations presented in Tealbook B is one example of an optimal real rate.

The natural, efficient, and optimal real rates are short-term concepts. Estimates of these rates fluctuate in response to economic shocks and move over the business cycle. In the simplest New Keynesian model, these three  $r^*$  concepts are equivalent, and it is optimal for policymakers to set the short-term real interest rate equal to the natural rate in order to stabilize the price level and keep output at potential. In larger, more realistic New Keynesian models, these three concepts need not coincide; nonetheless, as Andrea will discuss, a monetary policy strategy in which the real policy rate tracks the natural rate generally leads to beneficial economic outcomes.

Continuing down the list, a focus on the long-run average real rate takes  $r^*$  to be the average of some short-term real interest rate measured over a long period of time. This definition is statistical and does not rely on a specific economic model. By contrast, estimating the steady-state real interest rate, which is the short-term real interest rate that would prevail in the long run once all shocks die down, requires a fully specified economic model. These two concepts are often used interchangeably

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<sup>1</sup> The materials used by Messrs. Gust, Yi, Tambalotti, and López-Salido are appended to this transcript (appendix 1).

in simple policy rules that are based on an assumed fixed long-run or steady-state real rate and thus have a constant intercept term. However, as Kei-Mu will explain, treating the long-run real rate as fixed, as is often assumed in the formulation of simple policy rules, does not appear to be realistic.

FRB/US  $r^*$ , which is shown in the Monetary Policy Strategies section of Tealbook B, is a different, though related, concept of  $r^*$ . It provides a medium-run perspective on  $r^*$  and is the level of the federal funds rate that, if maintained for 12 quarters, will close the output gap in three years.

One can employ the “real rate gap,” which is the gap between the actual real interest rate and  $r^*$ , as an indicator of the stance of monetary policy. For example, if the path of the actual real rate lies persistently below the path for a short-run concept of  $r^*$ , output would eventually exceed potential.

I will now turn it over to Kei-Mu, who will discuss long-run trends in the real rate.

MR. YI. Thank you. In this presentation I will summarize aspects of the memo that Jing Zhang and I wrote on the evolution of long-run real interest rates and their fundamental determinants.

The two real interest rates relevant to our memo are defined again in the top panel of exhibit 2. Why should policymakers care about these longer-run interest rates—the term I will use to describe both? There are four related reasons, shown in the middle panel. First, optimal monetary policy requires specifying a path for the real federal funds rate. This, in turn, requires estimates of the future path of short-run  $r^*$ . Longer-run real rates characterize the future path of short-run  $r^*$  once short- and medium-run shocks die down—these rates thus serve as (time-varying) reference points for short-run  $r^*$ . Second, the intercept term in a Taylor-type policy rule typically is set equal to the longer-run real interest rate. Third, estimates of longer-run real interest rates can suggest when it is appropriate to change the long-run assumptions implicit in estimates of short-run  $r^*$ . Finally, estimates of longer-run real interest rates can shed light on the probability of hitting the effective lower bound, or ELB.

The bottom panel provides an outline of our presentation.

In exhibit 3, we present our estimates of long-run real interest rates, which are constructed as 11-year centered moving averages of the policy interest rate less the current annual CPI inflation rate, which we use as a proxy for the expected inflation rate. The upper panel shows long-run real interest rates in each of the G-7 countries. The lower panel shows the median long-run real interest rate across as many as 20 large economies for each year as well as the interquartile range and the U.S. long-run real interest rate. Note that there are three subperiods of trends, with the long-run real interest rate falling from the mid-1960s to the mid-1970s, then rising for 10 years or so, then falling again. In this last trend, covering a quarter-century, the 20-country

median and the U.S. long-run real interest rate have fallen almost 3 percentage points and real rates have become more closely synchronized across countries.

Next, we examine some of the fundamental determinants of the movements in long-run real interest rates. We first present some theoretical background in the upper panels of exhibit 4. The panels use a simple saving-investment framework to illustrate how real interest rates are determined. The interaction of desired saving and desired investment determines the equilibrium real interest rate. Forces that alter desired saving and desired investment shift the corresponding curves, thus leading to a new equilibrium real interest rate.

One example of a force affecting desired saving is the “global saving glut” hypothesis put forth by then Governor Ben Bernanke in 2005. In that story, due to the Asian financial crisis and to increased earnings by oil-producing nations, desired saving by many emerging market countries increased. In the upper-left panel, this shows up as a shift of the saving curve to the right, leading to lower real interest rates, higher equilibrium investment and saving, and, as a byproduct, increased capital inflows into countries like the United States that offer attractive investment opportunities. Similarly, a force that causes global investment demand to fall, such as lower productivity growth, would show up as a leftward shift in the investment demand curve, leading to lower real interest rates and lower investment, as shown in the upper-right panel.

The lower panel of exhibit 4 shows global gross fixed investment as a share of GDP over the past 50-plus years. There is a secular decline since the late 1970s. Coupled with the fact that long-run real interest rates have fallen since the late 1980s, these data suggest that declining global investment demand has been a relatively important force over the past 25 years. We are not saying that the global saving glut has been unimportant. Rather, we are pointing out that a decline in global investment demand had to be at least as important.

Exhibit 5 presents a couple of key determinants of investment demand. A standard result from the theory of investment demand is that the risk-free real interest rate equals the expected marginal product of capital, or MPK, less the risk premium and the economic depreciation rate. Our memo describes how this relation can be explained via a simple cost-of-capital framework. Thus, two key determinants of the real interest rate are the marginal product of capital and the risk premium. We can estimate the marginal product of capital from data on the capital share of income, GDP, and the capital stock. We compute the risk premium as a residual from the equation after subtracting depreciation.

The top panel of exhibit 6 shows the median long-run MPK across countries for each year and the U.S. long-run MPK. For comparison, it also shows the median and U.S. long-run real interest rates from exhibit 3. Median MPK dropped sharply by about 5 percentage points between the mid-1960s and the mid-1980s. Since then, it has been between about 11 and 12 percent. This decline, as well as the decline in total factor productivity growth that we show in our memo, is consistent with the

textbook growth model in which diminishing returns to capital accumulation eventually set in. This story fits the experience of a number of countries, especially those that went through a period of rapid economic growth—because of recovery from World War II, integration into the global economy, or both—in the 1950s through 1980s. The decline in MPK, however, does not closely track the trends in the long-run real interest rate, especially after the mid-1970s. For example, in the United States, long-run MPK declined slightly through the 1970s, then rose slightly until the mid-1990s, and has been flat since then. The flatness over the past quarter-century, juxtaposed against the declining trend of real interest rates, suggests that MPK has not been an important driver of long-run real interest rates during this period.

The bottom panel of exhibit 6 shows the median long-run risk premium across countries for each year and the U.S. long-run risk premium. Again, for comparison, we have also included the median and U.S. long-run real interest rates. The median and U.S. risk premium fell from the mid-1970s through the late 1980s, but they have both risen about 3 percentage points since then. The fall in the long-run real interest rate during a period in which MPK was essentially constant can be reconciled by the rise in the risk premium.

What could account for this rise in the risk premium over the past quarter-century? One possibility is that with increased integration of global goods and asset markets, the risk of capital projects has increased—with global competition, the probability of success is lower, but, conditional on success, the rewards are greater. A second possibility is that the demand for safe assets has persistently increased over the past quarter-century.

Exhibit 7 presents projections of two determinants of the marginal product of capital and long-run real interest rates: growth of total factor productivity (TFP) and of the working-age population. The TFP projections are for the United States and come from recent research by John Fernald of the Federal Reserve Bank of San Francisco. He estimates that future TFP growth will be about 0.3 percentage point per year lower than during the Great Moderation period. In his framework, this translates into lower long-run real interest rates of at least 0.3 percentage point. The working-age population projections in the middle panel are for the 20 countries we studied earlier. Annual population growth is projected to fall about 1 percentage point between now and mid-century. All else being equal, this will also lead to lower real interest rates.

Finally, we summarize key takeaways and policy implications in the bottom panel. Long-run real interest rates have declined over the past quarter-century and are currently low in all of the world's major economies. Coupled with the estimates of U.S. steady-state  $r^*$  discussed in our memo, the data suggest that short-run real interest rates in the United States and other countries will fluctuate around a lower anchor compared with before. In addition, the projections of slower U.S. TFP and global working-age population growth suggest that further reductions in the long-run or steady-state real interest rate may occur. If so, the United States and other



economies will be more likely to hit the ELB in the foreseeable future than prior to the crisis. Thank you.

MR. TAMBALOTTI. Thank you. I will be continuing with the same set of exhibits, starting with exhibit 8.

My presentation focuses on the so-called natural rate of interest, or NRI for short. As noted in panel 1, this concept has been developed within the New Keynesian modeling framework, in which it is defined as the real interest rate that would prevail in the absence of nominal rigidities such as sluggish adjustment in nominal prices and wages.

The appeal of the natural rate of interest is that it is optimal in very simple New Keynesian models in which keeping the real value of the policy rate equal to the NRI delivers *both* price stability *and* full employment. In more realistic dynamic stochastic general equilibrium models, of the kind used for this presentation, this divine coincidence between the natural rate of interest, stable prices, and maximum employment no longer holds. Nonetheless, even in these more complex models, the natural rate of interest is a useful reference point for monetary policy, as a monetary strategy in which the real policy rate targets the natural rate generally promotes stable inflation and economic activity.

The DSGE approach to  $r^*$  has three main strengths, which are listed in panel 2. First, DSGE models provide a coherent framework for estimating the natural rate of interest by positing a theoretical connection between the natural rate, which is unobservable, and observed macroeconomic variables. Second, these models trace the movements of the natural rate back to the underlying sources of business cycle fluctuations. Third, DSGE models allow us to study the effects of alternative policies through the use of counterfactual simulations.

The main drawback of the DSGE approach to  $r^*$  is that estimates of the natural rate are tightly linked to the features of specific models. As a partial antidote to this model dependence, we estimate the natural rate in the five different models listed in panel 3. Three of these models—EDO, FR, and GIH—have been developed here at the Board of Governors. The fourth is the Federal Reserve Bank of New York DSGE model, and the fifth is an empirical model of  $r^*$  developed at the Federal Reserve Bank of Dallas.

These models represent a diverse set of approaches to the measurement of the natural rate in terms of model structure, data used in estimation, and econometric techniques employed. This diversity of approaches is a strength of our work, as it provides a range of estimates for the natural rate of interest that takes into account uncertainty about the “true” model of the economy.

This range of estimates is represented in blue in panel 4, together with the average real NRI across our five models, the black line. Several features are worth highlighting. First, the natural rate fluctuates significantly over the business cycle,

rising during expansions and declining sharply in recessions. Second, the different models provide a consistent view of the broad movements in the natural rate, even if the range of estimates can be quite large at any given time. For example, the models disagree on how far the natural rate fell during the Great Recession, as shown by the wide range of estimates in 2009, but they all see it plunge to its historical low around that time. Finally, the natural rate has recovered gradually since the end of the recession and currently is about zero.

Exhibit 9 provides some insight into the sources of fluctuations in the natural rate. As explained in panel 1, DSGE models trace fluctuations in the NRI back to a handful of fundamental business cycle shocks. Reflecting the diversity of approaches that they represent, our models collectively include many such shocks. However, it is possible to group these shocks based on the economic decisions that they affect most directly. So, for instance, financial/saving shocks shift households' desire to save and to hold safe assets, influencing their current demand for consumption. Financial/investment shocks affect firms' willingness or ability to invest—for instance, by changing the premium on external finance and, hence, firms' cost of capital. Productivity shocks affect the overall efficiency of production. All of these shocks, when negative, depress the natural rate because they boost desired saving, reduce desired investment, or both.

Panel 2 illustrates the independent contributions of the three groups of shocks to the estimated movements in the natural rate in the EDO model, on the left, and the FRBNY-DSGE model, on the right. The results in the other two DSGE models are similar. In these figures, the contributions of financial/saving shocks are represented by blue bars; those of financial/investment shocks are in red, while those of productivity shocks are in green. The contributions of all other shocks are in light gray. The colored bars sum to the black line, which represents the deviations of the estimated NRI from its steady state.

All the models attribute the sharp decline in the natural rate during the Great Recession to a combination of severe negative shocks. Financial/saving shocks are by far the most prominent in EDO, as shown on the left, as well as in FR and GIH, as discussed in the memo. Investment shocks are also important in both EDO and FRBNY-DSGE, and the latter model attributes a significant role to productivity shocks as well.

The models also indicate that financial shocks have generated persistent headwinds well into the recovery, keeping the natural rate well below its steady state. These headwinds appear to have abated somewhat over the past few quarters. Both models project a gradual return of the natural rate toward its steady state. In the FRBNY-DSGE model, this normalization is slower than in the EDO model, with the NRI still about 1 percentage point below steady state at the end of 2018.

Factors similar to those at work in the United States appear to have lowered the natural rate of interest in the major advanced foreign economies as well. Panel 3.1 compares estimates of the NRI based on the FR model for the United States, the black

line, and the advanced foreign economies, whose trade-weighted aggregate natural rate is represented in brown. According to these estimates, the NRI in the advanced foreign economies reached historic lows during the Great Recession, remained depressed during the recovery, and is projected to normalize gradually, as in the United States. As indicated by the blue bars in panel 3.2, on the right, adverse financial/saving shocks account for most of these developments.

The extent to which our estimates of the natural rate of interest may represent a useful reference for the federal funds rate is the subject of exhibit 10. As described in panel 1, we consider a counterfactual policy simulation, which we call NRI targeting, in which the central bank sets the real policy rate equal to the natural rate in every period rather than following the estimated interest rate rule that describes its historical behavior in each model. Compared with the estimated policy rule, NRI targeting significantly reduces the volatility of both inflation and the output gap in two of our models. As shown in panel 2, the standard deviation of both variables in EDO falls about 70 percent when replacing the estimated interest rate rule with NRI targeting. In FRBNY-DSGE, the standard deviation of inflation is 39 percent lower, and that of the output gap is 86 percent lower under NRI targeting than under the estimated policy rule. In the GIH model, in contrast, NRI targeting reduces the volatility of inflation but at the cost of a less-stable real economy. This tradeoff between inflation stabilization and output gap stabilization highlights the fact that, in general, NRI targeting is not optimal in empirical DSGE models.

Panel 3 compares the recent evolution of the federal funds rate with that of the estimated nominal natural rate, which is computed by adding expected inflation to the real natural rate in each DSGE model. In panel 3, the federal funds rate is in red, including the October Tealbook assumption over the forecast horizon. The black line is the average nominal natural rate across models, with the blue shaded area representing the range of estimates. The average nominal NRI is very close to the federal funds rate until the end of 2008, when the federal funds rate reaches the effective lower bound. The natural rate continues to fall thereafter, opening a gap between the two of about 5 percentage points. This gap persists through 2010 according to all the models and until 2013 according to the average. As of the second quarter of 2015, all of the models estimate a positive nominal natural rate in a narrow range roughly between 1 and 2 percent. The models project a gradual normalization of the NRI, at a similar pace to that assumed for the federal funds rate in the October Tealbook.

Our conclusions are, first, that a diverse set of empirical macroeconomic models provides a consistent account of the evolution of the natural rate of interest over the business cycle. Second, according to our estimates, financial disturbances were mostly responsible for pushing the NRI to its historical lows during the Great Recession, generating persistent headwinds that have kept it depressed through most of the recovery. Third, these headwinds appear to have partly abated more recently. Currently, the nominal natural rate is estimated to be back into positive territory after several years in which the effective lower bound on nominal interest rates was

severely binding. For the period ahead, this normalization is projected to continue gradually.

With that, I turn it over to David.

MR. LÓPEZ-SALIDO. Thank you. I will summarize the key results presented in the memo titled “Monetary Policy at the Lower Bound with Imperfect Information about  $r^*$ ” that I prepared with my colleagues Chris Gust, Ben Johannsen, and Bob Tetlow. I will focus on the implications of uncertainty about  $r^*$  for its use in conducting monetary policy.

The top panel of exhibit 11 outlines the key elements of our modeling approach. We use a simple New Keynesian model that has two key equations: an intertemporal “IS equation” that relates output to the real interest rate and expected future output, and a “Phillips curve” that relates current inflation to the output gap and expected future inflation. In models of this class, demand and supply shocks are reflected in the natural rate, which is the real rate necessary to achieve full employment, and the stance of monetary policy can be defined in terms of the deviations of the actual real rate from this natural rate. The model is completed with a description of how monetary policy is determined. In this description, we first assume that policymakers choose the optimal monetary policy under discretion, meaning that they set the policy rate optimally in response to incoming data on a period-by-period basis, but cannot make future policymakers follow a policy plan adopted today. Next, we analyze the implications of uncertainty about  $r^*$  for simple policy rules. Whether policy is discretionary or follows a rule, the policy rate can be constrained by the effective lower bound on short-term nominal interest rates, which introduces an important nonlinearity in the model economy. Finally, policymakers observe only an imperfect estimate of the natural rate.

The middle and lower panels of the exhibit compare optimal policy under these assumptions with optimal policy in the complete information case, in which policymakers know the true value of  $r^*$ . The policymaker optimally sets the nominal policy rate (on the vertical axes) in response to an indication that the natural rate has increased (the horizontal axes show the magnitude of the estimated increase, measured in percentage points). In the middle panel, the economy is assumed to be in “normal times,” meaning that the nominal policy rate is initially well away from the ELB. As shown by the dashed blue line in the middle panel, if policymakers have timely and accurate information about the value of  $r^*$ , it is optimal for them to adjust the policy rate one for one in response to changes in  $r^*$ . In contrast, if policymakers have incomplete and potentially erroneous information about the value of  $r^*$ , it is optimal for them to attenuate their policy responses, as shown by the flatter, red dot-dashed line.

The bottom panel repeats this exercise for an economy in which the ELB is initially just binding. For small revisions to estimated  $r^*$ , the policy rate remains at the ELB regardless of whether information is complete or incomplete. But if the estimate of  $r^*$  is known to be imprecise, a larger estimated increase in  $r^*$  is required to

lead the policymaker to move away from the ELB (that is, to lift off), and policy responses are even more attenuated than they are in normal times, as can be seen from the flat slope of the red dot-dashed line in the bottom panel of the exhibit. The reason is somewhat straightforward: When the policy rate is at or near the ELB, the optimal policy is to err on the side of keeping the real policy rate below the  $r^*$  estimate so as to reduce the likelihood that an adverse shock will weaken the economy enough to require a return to the ELB. In essence, policymakers “take out insurance” against situations in which the information about  $r^*$  might lead them to mistakenly raise the policy rate and in which the ELB would prevent them from offsetting the error in subsequent periods.

Our memo noted that pursuing optimal policy under discretion in the neighborhood of the ELB requires a complex nonlinear reaction function for the policy rate and that, as a practical matter, such a reaction function may be difficult to communicate and implement. An alternative approach might be to commit to a simple monetary policy rule whose intercept term varies in response to information indicating that the natural rate of interest has changed. The next exhibit illustrates the implications of committing to a particular rule-based approach in setting monetary policy in our model economy with imperfect information. In exhibit 12, we examine two versions of the Taylor (1999) rule. As shown in the top panel, the difference between the two specifications is the assumption regarding how policymakers use information about  $r^*$ . In one case, policymakers set the intercept of the rule equal to the long-run average real rate and do not change it (the case in which  $\alpha = 1$ ). In the other case, the central bank adjusts the intercept term in the Taylor rule as the natural rate fluctuates (the case in which  $\alpha = 0$ ), but, as in the previous exhibit, policymakers only have a noisy estimate of  $r^*$ .

The bottom panel of exhibit 12 compares the standard Taylor (1999) rule with a constant  $r^*$ , the black solid line, to the optimal discretionary policy, or ODP (the red dot-dashed line), when the policy rate is in the vicinity of the effective lower bound. As before, the panel displays the policymaker’s reaction function to estimated changes in  $r_t^*$ . Even though  $r_t^*$  does not appear directly in the specification of the rule—because the intercept, in this instance, corresponds to the longer-run average real rate of around 2 percent—the policymaker recognizes that the estimates of  $r^*$  contain valuable information about underlying shocks that also affect inflation and the output gap. The Taylor (1999) rule with a fixed intercept counsels notably higher nominal interest rates than the ODP even when the estimate of  $r^*$  is imprecise; indeed, because the rule has an unadjusted constant intercept, the policy rate departs from the ELB for any change in the estimate of  $r_t^*$  shown. In contrast, the blue dashed line shows the outcomes when the intercept of the rule is allowed to change, one for one, with perceived movements in the natural rate (labeled “TR with Time-Varying  $r^*$ ”). In this case, policymakers’ reactions to estimates of  $r^*$  are very similar to those under the optimal discretionary policy (the red dot-dashed line).

The memo also analyzes a Taylor rule and a first-difference rule using parameter values optimized to account for uncertainty about  $r^*$  and for being in the vicinity of the ELB. They deliver reaction functions that are quite similar to those shown in

exhibit 12. As comforting as these results might appear, they are subject to the criticism that, because  $r^*$  is unobservable and difficult to measure, the public could see monetary policy as being discretionary even if policymakers are following an optimized rule.

In exhibit 13 we show a summary of our principal findings. First, although  $r^*$  can be useful as a benchmark for measuring the stance of monetary policy, the unobservable nature of  $r^*$  and uncertainty about its value provide an argument for attenuating the response of policy to information about  $r^*$ , relative to the full-information case, but do not argue for ignoring such information. Second, this attenuation is increased when the policy rate is near the effective lower bound, reflecting a policy approach that “takes out insurance” against possible adverse outcomes, with more insurance being optimal the more tangible the threat of the ELB. Finally, in terms of simple rules, a strategy that allows for time variation in the intercept term of the rule could approximate reasonably well the performance of the optimal discretionary policy.

Our results, of course, come with caveats. The results may be model-specific. In addition, following any of the strategies we analyze would certainly introduce communication challenges because policymakers would need to explain their actions by referring to information that cannot easily be verified by private agents.

Your final exhibit repeats the questions about your thinking on  $r^*$  that were posed in the cover note that accompanied the four memos. Thank you. Chris, Kei-Mu, Andrea, and I would be happy to answer any questions you may have.

CHAIR YELLEN. Okay. Let’s start with questions for the various presenters. President Lacker.

MR. LACKER. Thank you very much. First, I want to thank staff of the Board and Reserve Banks for an exceptionally thorough and thoughtful range of materials. This is greatly appreciated. Really nicely done.

A natural question occurs regarding this material, and I’m genuinely interested in the staff’s views about this. A basic message I take away from the staff memos is that current estimates of  $r^*$  are well above the actual real federal funds rate. Suppose we were to project ahead under the usual assumption that no further economic shocks hit the economy, and suppose we make the usual assumption that, in the long run, monetary policy can’t influence real variables. I take it that the underlying premise of these frameworks is that the real rate gap will

close as we project ahead. So, if you think of the current  $r^*$  as the long-run value of  $r^*$ , the real rate is ultimately going to have to rise to meet  $r^*$  as we project out. There's the simple Fisher equation that has to hold. In that projection, we'd see either a combination of a rise in the nominal interest rate or a fall in the expected inflation rate, and, presumably, if the latter took place, it would pull down the actual inflation rate.

I'm interested in the staff's views on the following question. If, under those assumptions, we held the nominal interest rate near zero long enough, would that cause inflation to fall? The second related question is, how long is "long enough"? And then a third related question is, what are the odds that such a mechanism might be depressing inflation now?

CHAIR YELLEN. Does anyone want to take that?

MR. TAMBALOTTI. I can take a stab at it. I can tell you what happens in the FRBNY-DSGE model. That model has an interest rate rule that governs monetary policy as we lift off. The gap between the prescription of that rule and the natural rate is not very different over time from what you see in panel 3 in exhibit 10. Everything is quite well behaved in that context. And inflation, actually, as well as the output gap, quite slowly converges back to the steady state. That's the context in which the existence of this gap doesn't create any particular problem for the economy, and, in particular, you would then observe this effect that you are suggesting, in which inflation would be driven down along that.

MR. LACKER. I think you may have misunderstood. One premise was that we hold the nominal interest rate fixed at zero for a long time, and that would violate the assumption you just described of following the rule you've implemented in your model. I'm asking about a different simulation than you just described, in essence.

MR. TAMBALOTTI. We would be happy to run that simulation and provide you with an answer. We haven't done that.

CHAIR YELLEN. President Evans.

MR. EVANS. I'm not really very familiar with this line of theory. Actually, President Bullard has referred to these before. Isn't this sort of the new monetary—it's a different equilibrium, sort of a "multiple equilibriums" kind of story. I didn't know that it had very desirable features empirically.

CHAIR YELLEN. President Bullard.

MR. BULLARD. I think one thing you could say is that the whole analysis is based on a unique steady-state equilibrium. It's a linear model approximated around that steady state. Even when you're at the zero policy rate, there's no other steady state that you can converge to or anything like that. The paper by Benhabib, Schmitt-Grohé, and Uribe says there is another steady state. It is associated with zero policy rates, and that, they say, would exist in your model, but the way you analyzed it, either you're assuming there's no convergence to that steady state or you're just ignoring the steady state altogether.

CHAIR YELLEN. Maybe what I'm going to say is consistent with what President Bullard just said. Isn't there an argument that if you were to hold the nominal rate at zero, in spite of the fact that the equilibrium nominal rate would be higher, you would end up generating not lower but higher inflation. And, the higher inflation went, if you kept the nominal interest rate at zero, the lower the actual real rate would move over time, the gap would increase, and you would get accelerating inflation. But that's equivalent to saying, instead of going to a steady state with lower inflation, you'd actually be on the dynamic path that would be unstable.



MR. LACKER. Those are the standard dynamics in a model in which expected inflation is anchored and we're following a policy rule when you've got some nonneutralities that generate those dynamics. So, the thought experiment I was asking about invites us to, first, back away from stable inflation expectations. I'm not sure whether this is true, but President Kocherlakota and others have said we should question whether they're well anchored or not. And it backs away from adherence to a policy rule. It asks us to think about, what if we depart from a rule for some time, and what if inflation expectations, over time, become unanchored? That's the question. Could we, by holding nominal rates low, drive inflation down? That was the question I wanted their thoughts on.

CHAIR YELLEN. President Kocherlakota.

MR. KOCHERLAKOTA. Yes, I don't know if I'll add much, but I'll talk anyway. [Laughter] I think President Lacker's comments really get at the heart of the matter, which is what would happen to inflation expectations if the FOMC were to keep the federal funds rate low over a long period of time. And there are models in which the public thinks through, "Well, the reason they're keeping the federal funds rate low is actually because their target for inflation has fallen, and so, because they're keeping the federal funds rate low, I must lower my inflation expectations," and that becomes consistent in equilibrium. I really think that the question is less a theoretical one than an empirical one about whether that is the way the public forms inflation expectations.

MR. LACKER. Right. That's what I wanted the staff's thoughts about.

MR. KOCHERLAKOTA. That empirical question?

MR. LACKER. Yes.

CHAIR YELLEN. Vice Chairman Dudley.

VICE CHAIRMAN DUDLEY. I don't quite understand the intuition behind the attenuation. I understand the attenuation when you're close to the effective lower bound, but when you're not at the effective lower bound, what's the reason why you would be lagging behind what you thought was the unbiased estimate of the  $r^*$ ? I mean, it would seem to me that if you were lagging behind with your unbiased estimate of the  $r^*$ , you'd be risking falling behind in inflation expectations and allowing them to get unanchored. What's in the model that pushes against that? I don't really understand the intuition behind the attenuation. I get it at the zero lower bound, because you don't want to make a policy mistake and get pushed back to the zero lower bound, but when you're away from the zero lower bound, what's the intuition behind the attenuation? Are there features of the model that would generate that result? It just doesn't seem that logical to me.

MR. LÓPEZ-SALIDO. If I may say something, you're right that the attenuation is smaller when you are far away from the effective lower bound, but, again, the attenuation is coming from the filtering problem that the policymaker needs to do. In any case, he has incomplete information about the true value of  $r^*$ , which means, following the usual William Brainard principle, responding less aggressively to any uncertainty. The effect is a lot less important than when you are on the effective lower bound, precisely, as you mentioned, because of the nonlinearity. But, in normal times, you also would tend to respond by less, precisely because you are still uncertain.

VICE CHAIRMAN DUDLEY. But you're assuming that nothing bad happens when you're lagging behind. In other words, inflation expectations don't respond to that because otherwise it could be explosive. Let's imagine that  $r^*$  increased and then you lag behind because of the Brainard principle. What happens then? Don't inflation expectations start to get

unmoored because you're lagging behind what the correct policy should be? I just don't understand this notion that you always want to do less. I understand it at the effective lower bound, but I don't understand the attenuation otherwise.

MR. LÓPEZ-SALIDO. That's right. So, what we said is that, in normal times, the attenuation depends on the size of the signal regarding the natural rate. You converge to the case in which you start to get a bigger signal.

VICE CHAIRMAN DUDLEY. You catch up.

MR. LÓPEZ-SALIDO. You catch up.

VICE CHAIRMAN DUDLEY. But the model sets things up so there's no cost to being late because, presumably, inflation expectations stay well anchored through this whole time period. The model is sort of begging the result in some sense.

MR. LÓPEZ-SALIDO. There are two assumptions used in the simulation. One is, of course, that inflation will go down further, and the policy that we show is the policy under discretion. So the policymaker is just optimizing period by period, taking expectations as given.

VICE CHAIRMAN DUDLEY. I guess what I'm trying to really drive home is that the expectation in these models that inflation expectations always stay anchored is a pretty strong assumption, and that ends up potentially driving some of these results. I think that what's driving that attenuation outcome needs to be brought out a little bit more.

MR. LAUBACH. If I may, this is very much related to President Williams's past line of work. I feel a little reluctant to opine about that here [laughter].

MR. WILLIAMS. Go for it.

MR. TARULLO. Who's the coauthor of that work?

MR. LAUBACH. He is a former Board staffer by the name of Athanasios Orphanides.

One key point is that it's the imprecision about the  $r^*$  estimate that is really making you cautious. I think one of the key lines that came out of the Orphanides-Williams line of work was that, in the presence of uncertainty regarding these estimates, you try to pursue strategies that rely much more on observed data rather than on these imprecise estimates. And so, the key lesson arising from that, for example, was that you want to particularly weigh in on observations on inflation, because if your estimate of the natural rate turns out to be wrong, this is where the information should show up. And so that's why you give relatively little weight to the  $r^*$  estimate. I hope I'm presenting that fairly.

CHAIR YELLEN. President Lockhart.

MR. LOCKHART. Thank you, Madam Chair. Two questions for Kei-Mu, I presume. On the global dynamics, exhibit 3, can you explain the convergence since, say, 2000 or so? You said in your remarks that rates seem more synchronized. Is there a hypothesis of why that has happened?

MR. YI. There are hypotheses. I think the most natural one is that countries have become more financially integrated over time, globally. So, barriers to capital flows have come down, and when that happens, various wedges that make interest rates differ across countries tend to become smaller, and then the rates become more similar. I think the financial-integration story is the most natural story for the past quarter-century.

MR. LOCKHART. My second question is probably an economics or monetary policy 101 question, but I won't be embarrassed asking it. There was so much talk a few years ago about the global savings glut. As a practical matter, where does it show up, and through what channels does it have the most effect on our rate structure? Is it from foreign exchange reserves to Treasury securities? Is that the channel that most influences real activity in the

United States, or are there other channels by which that global savings glut has an influence on our economy?

MR. YI. I'm going to think in terms of former Chairman Bernanke's view of it, and I think his story had both a private-sector and a public-sector element to it. I think the public-sector element was that a number of governments—for example, those coming out of the Asian financial crisis—decided that, as a precautionary mechanism, it would be useful to build up a lot of foreign exchange reserves. And the way they built up those reserves was, they bought a lot of U.S. Treasury securities. So that was a force to drive down real interest rates. I think you can make a similar argument for some of the oil-producing countries, too.

At the same time, there are stories of emerging markets—for example, China, India—joining the global economic scene. These are countries that are growing rapidly, but they also are financially underdeveloped. In that type of world, if it were not for the financial underdevelopment, you would think that these countries would have high interest rates because their productivity prospects and growth prospects are very high. But because they are financially underdeveloped, their interest rates at home are actually quite low, and they are looking to save abroad. And so, once these economies start opening up, then these private-sector resources go abroad. Maybe not so much in China, because there are still capital controls there, but from other emerging market countries. And that is another force to drive down U.S. and other advanced foreign economy interest rates.

MR. LOCKHART. Thank you.

CHAIR YELLEN. President Kocherlakota.

MR. KOCHERLAKOTA. Thank you. I had a question for Andrea, though it also relates to Kei-Mu Yi's memo. On exhibit 10, you have a natural rate of interest and a federal funds rate.

That picture must depend on the assumption about the long-run or steady-state neutral rate. How does your estimate for that dovetail with what is in Kei-Mu's memo?

MR. TAMBALOTTI. Thank you. That's a very good question. The models are built around a constant steady state. So, in the long run, all the models are going to go back to the steady state. Let's say that the natural rate at that point is something around 2 percent; that is generally across the models. In that respect, there is no long-run variation in the long-run  $r^*$  in these models. So that's part of the reason why we call these "short-run estimates of  $r^*$ ." So, if I wanted to integrate this perspective with some of the work that President Williams, for example, has done together with Thomas, I don't want to say that you would want to sum the two sources of variation, as that would probably involve misstating the way in which the two components covary. But, roughly speaking, that's the type of exercise that you want to do.

There is really no variation in the very long run in these models. So you would want to take that into consideration as well if you wanted to have a complete picture of the short-run and long-run variation in the natural rate that comes from this exercise.

MR. KOCHERLAKOTA. So, to push you a little harder, if you were to try to integrate some of the thinking that was in Kei-Mu's memo with what you had done, would that tend to push the blue line downward or upward?

MR. TAMBALOTTI. It would definitely push down. Again, I wouldn't want to say that you want to have a one-to-one addition there. Another consideration is that there are very persistent shocks in our models that do keep the natural rate depressed below the steady state, potentially for very long. That's the reason why you wouldn't want to add up whatever effects might come from Laubach-Williams-type estimates. But, certainly, the bias could be toward

making the black line somewhat lower, and we would have to do more work to tell you exactly how much lower.

MR. KOCHERLAKOTA. Thank you.

CHAIR YELLEN. President Mester.

MS. MESTER. I want to thank the staff for the memos. I found them very useful, good conceptually and also in terms of the policy. I have three questions about the policy prescriptions. I guess I wasn't that surprised about the attenuation result within the context of the models you were looking at, but I was wondering whether you have investigated models that actually think about the cost of financial stability of keeping interest rates low. In particular, ones that have true microfoundations of that.

Giovanni Dell'Aricca, Luc Laeven, and Robert Marquez have a *Journal of Economic Theory* paper that actually provides some microfoundations regarding some of the costs of financial stability. In their model, they have a banking sector in which, if the interest rate is very low for a long time, banks take on more risk, they become more leveraged, and they no longer monitor their borrowers as much as they did. So you get this aggregate increase in risk to the financial system. The DSGE models don't have that; the DSGE model is just going to have the macroeconomic risk. Have you thought about what the policy prescription would be in a model that has this kind of financial-stability cost of low interest rates? That's one question.

The second question has to do with the type of uncertainty. You only look at uncertainty or measurement error associated with  $r^*$ . But you can also think about uncertainty associated with other artifacts in the Taylor rule—in particular, the output gap. We know that's measured with imprecision; there's a lot of uncertainty about it. And if there is uncertainty, for example, in some of the parameters in the model—for example, the degree of relative risk aversion—you can

think about whether there would be a negative correlation between the  $r^*$  and the output gap. Some of the Federal Reserve Bank of Cleveland staff analysis indicated that that attenuation result would then go away, because the measurement errors would offset one another. You'd have to think about how that would interact when you consider a policy prescription. I was wondering if you have any thoughts on that.

With regard to my third question, in the Tealbook we sometimes use the inertial Taylor rule in which you are keeping interest rates low and then not reacting totally to it. My third question is that I'm wondering whether you are going to propagate the measurement error in  $r^*$  over time, and how that would interact with your attenuation result, if you think about a different kind of rule.

MR. LÓPEZ-SALIDO. Thank you, President Mester. Those are very good questions. I'll try to answer in the context of what we did, so I'm going to go in reverse order.

You are absolutely right. Thinking about the inertial aspect of the rule, we experimented in the memo with the first-difference rule, and you have a problem of “nowcasting” actual variables like the output gap or even inflation. Then you actually translate persistent mistakes into the level if you respond wrongly to the variables. So, that is obviously going to have an effect that is probably going to make the attenuation less important, and we discussed that in the memo. So you are absolutely right.

The idea that we have in the memo, though, was trying to get a way of introducing this smoothing parameter that is kind of a reduced-form in character, in order to capture many things and to try to illustrate a potential way of thinking about a smooth response, or a gradual response, of the nominal interest rate by thinking about uncertainty about  $r^*$ . That's the way we thought about that issue.



MS. MESTER. Let me just rephrase that. So what you're saying is this is an alternative to looking at an inertial Taylor rule, because part of the reason you want an inertial rule is not because we don't like fluctuations in the interest rate.

MR. LÓPEZ-SALIDO. That's an alternative view. In your first question, you probably have in mind, too, because of this financial-stability consideration, that this idea of smoothing the interest rate is another way of thinking about how, without having that in the rule as, it can arise because policymakers have a problem with incomplete information. That's absolutely right.

Your second question is about the uncertainty of  $r^*$  and another form of uncertainty. What gave us some perspective on that is that we use a little model; it's very much a "toy" model. In it, the  $r^*$  is moving because we can control the nature of the fluctuations underlying the economy. The  $r^*$  is moving because there are different shocks, whether a discount factor shock or technology shocks, and there are potentially shocks that matter for the Phillips curve too. Those are what we call macro shocks. We actually know exactly what variation was behind what we call uncertainty about  $r^*$ . Of course, we can introduce other forms of uncertainty into the model. You mentioned uncertainty coming from a parameter; that is going to enter your model in a nonlinear way, so, in terms of the model, it is going to lead you exactly in the direction that William Brainard was emphasizing, to some attenuation.

Of course, that's going to depend on what parameter. You mentioned one, risk aversion, which pretty much is saying something about the relation between the real interest rate and aggregate demand. Of course, if you change that, because that's related to risk aversion in this kind of model, that's going to lead to some counteraction to what we call attenuation here. You're absolutely right. We didn't consider those kinds of uncertainties. But in the case of all

the uncertainties that we did consider, the ones that we discussed always led in the same direction, in terms of  $r^*$ , that we just put here in the memo.

MS. MESTER. But even if you didn't want to pin it to one parameter. With the parameter I chose, of course, you get the negative correlation.

MR. LÓPEZ-SALIDO. Yes.

MS. MESTER. You can imagine a world in which the measurement error associated with  $r^*$  and the measurement error associated with the output gap would be negatively correlated.

MR. LÓPEZ-SALIDO. You can think of situations like that. We have these kinds of situations in the model, in order to think about markup shocks or technology shocks, and create—sometimes it depends on the persistence—this kind of negative correlation. And you're right. On the one hand, you want to attenuate your response; on the other hand, you don't want to do that. So, you can have situations like that in which they can cancel each other. We see that in our model, too. But for the kind of shocks that we consider, either technology or the one that changes the preference in terms of savings, they both lead to the conclusions that we have.

And then, the last question was about how to introduce financial-stability considerations into these models. That's a really interesting question. The only thing that I can say there is that we have a paper in which, instead of going through theory of how you might introduce searching for yields into the model, we follow a very simple practical and empirical approach. That is, we made a probability of a crisis endogenous with regard to a policy decision. We incorporate that into a New Keynesian model, and we try to understand how this kind of framework matters when you take into account that your policy decisions matter for future inflation and output through changing the probability of a crisis in the future because of searching for yields or other

mechanisms. We leave that completely outside the model. We introduced such kinds of nonlinearities into the model, too. And that's, of course, going in the direction that you mentioned. That's leading to less attenuation when policymakers endogenize or internalize that there is a potential cost, and that is then to move the rates in the direction of increasing as opposed to attenuating. However, when we calibrate the model, the effects tend to be small. So, it's really difficult, taking as given the correlation that we see in the data between the nominal interest rate and the probability of a crisis. You need to have a really large effect on changes in the policy rate on credit to that probability to get some results along the lines that you suggested.

MS. MESTER. Of course, it depends on, if you're a minimax person, right, the fact that you may end up with this crisis—

MR. LÓPEZ-SALIDO. Well, if you think in terms of robust control, too, yes.

MS. MESTER. Yes. Exactly.

MR. LÓPEZ-SALIDO. Whether the last person—yes, you definitely need to take into account worst-case scenarios to think about policy.

MS. MESTER. Right.

MR. LÓPEZ-SALIDO. You're absolutely right.

MS. MESTER. All right. Thank you.

CHAIR YELLEN. President Evans, did you have a question?

MR. EVANS. I do. Is it my turn?

CHAIR YELLEN. Let's say it is.

MR. EVANS. Thank you. First, on page 10, when you describe the experiment in which the volatility in inflation and the output gap are reduced when you follow the natural rate, what is

the volatility of the policy rate process in that case? Presumably, it's a lot higher, because it doesn't have inertia.

MR. TAMBALOTTI. That is correct. We only focused on the volatility of inflation and the output gap without taking a stance on what would that imply for the policy instruments. It is quite volatile. If you look at the estimates of the natural rate, you will see how volatile they are.

MR. EVANS. Right. So if anybody wanted to try to pocket those types of improvements, we'd be apt to move policy around quite a lot.

MR. TAMBALOTTI. Yes, absolutely.

MR. EVANS. President Mester's question was fascinating and related to something I had been thinking about, too. If you think about the financial-stability issues and try to build them into these models—obviously not having seen that model—it's going to imply some type of real cost to the economy when you've got these types of shocks and structures in place. So, you're going to lose your “divine coincidence” result really quickly and in a big way. One of the nice things about these types of analyses is, if you think about  $r^*$  movements as indicative of what almost-optimal policy or optimal policy is, it kind of tells us how to close inflation gaps and output gaps. Now, if we're going to build in another mandate, financial stability, I'm presuming that we're not going to be getting closure of inflation gaps and output gaps if you've only got one instrument to achieve those three things.

MR. LÓPEZ-SALIDO. That's absolutely correct.

MR. EVANS. Any ideas on how far away the wedges might be or how you go about thinking about that?

MR. LÓPEZ-SALIDO. No. [Laughter]

MR. EVANS. Fair enough, fair enough. It's an imponderable.

MR. LAUBACH. Very quickly, President Evans, just for clarification: In the analysis that David just was referring to, the goals actually remain the traditional dual-mandate objectives. There is no third objective of financial stability per se. It is simply that you take into account that your policies may have implications for your dual-mandate objectives through a channel that wasn't previously present, which is that it might contribute to the probability of a financial crisis in the future.

MR. LÓPEZ-SALIDO. That's right. You can think about how any financial friction you can bring into the model may involve an additional gap from whatever the optimal credit-to-GDP ratio is in the absence of any friction. In that sort of model, we don't have a loss function that incorporates into the policymaker's decision the deviation of any financial variable from that target. We only look at the usual deviations of output from potential output and inflation from target. If you accommodate that, it's going to bring another tradeoff, as you mentioned. I wasn't sure whether that's what you meant when you referred to the gap.

MR. EVANS. Well, it's kind of open-ended, really.

MR. LÓPEZ-SALIDO. You definitely need to think about all of the instruments.

MR. EVANS. Let me see if I'm following this. If you consider models that are more complicated and they introduce these financial-instability risks with those structures, now you go to compute your definition of  $r^*$ . It's going to be the Wicksellian version in which you close out the nominal rigidities, not the efficient real rate?

MR. LÓPEZ-SALIDO. With the natural rate, yes.

MR. EVANS. Okay, the natural rate. So in the analyses without that friction, you could take some comfort in saying, "Gosh, if I know what that  $r^*$  is, I can kind of judge policy and move it in that direction and feel like I'm on track to achieve our dual mandate." Now, in the

more complicated model in which we compute that, there's going to be these additional wedges preventing that closure. So it's not going to be enough to be following that  $r^*$ , but we're going to need additional strategies in order to close the gaps.

MR. LÓPEZ-SALIDO. Exactly, exactly. The optimal policy will never be to close the gap between the real rate and  $r^*$ , whatever its definition. For example, that's precisely what happened in this simple model when you acknowledge the effective lower bound, because once you are at the effective lower bound, you recognize reaching the effective lower bound as a credible threat and the possibility you will come back to it. It's like a shifter that creates another wedge. You will never be able to close inflation deviations and the output gap. So tracking the natural rate is not going to be the optimal policy in that case.

MR. EVANS. Thank you.

CHAIR YELLEN. Okay. Then why don't we start our go-round. This is not a full go-round, but a number of people have indicated a desire to speak on this topic. Let's start with President Williams.

MR. WILLIAMS. Thank you, Madam Chair. I think this is a timely topic for two reasons. One is, I think it is useful input into our own policy decisions and deliberations in the situation we find ourselves in today. But I also think it is important for thinking about our longer-term policy strategy, and I'll come to that in a few minutes.

I found the memos and the briefings very useful and the discussion we've had already this morning very good, but my remarks will focus on the research on  $r^*$  that Thomas Laubach and I have been working on for the past 15 years and that was summarized in the paper that we distributed to the Committee last week. And, by the way, after the paper was distributed, I received a nice e-mail from President Kocherlakota saying, and I quote, "As you think about

your policy intervention for the upcoming meeting, I highly recommend this thoughtful paper.” Now, I found it very gratifying that he found our work useful input for the Committee’s thinking. But upon closer inspection, I noticed that the e-mail was not addressed to the FOMC but only to me. [Laughter]

MR. EVANS. It’s still relevant.

MR. WILLIAMS. In my reading of the literature and my own work with Thomas on this, I think a robust finding across pretty much all the studies is that  $r^*$  has declined considerably over the past decade and, although point estimates differ, nearly all the current readings on  $r^*$  are near historic lows. What remains unanswered is, what are the forces that have driven the natural rate of interest down? Numerous explanations have been put forward, including slower economic growth, global factors, and so on, but it’s not possible to draw definitive conclusions based on the available evidence. This inability to identify clearly the sources of a decline in  $r^*$  makes it hard to know how much of the shift will be temporary and how much will be long lasting.

Although much is made, in debate among researchers, of this distinction, for policy purposes we don’t need to wait for a definitive answer. Even if the natural rate eventually returns to its higher level, it’s likely to remain low for the next few years. This is seen in the analysis from the DSGE models and, quite honestly, from all the other models in which the natural rate is assumed to be only temporarily depressed. The conclusion I draw is that a relatively low natural rate of interest is likely to be with us for some time, and we need to take that into account in our forecasts, our analysis, and our policy deliberations. Particularly, it argues for a shallow path of rate increases and an endpoint for interest rates that are below historical norms. I should note that the Tealbook forecast implicitly incorporates a very low

effective short-run  $r^*$  and a long-run  $r^*$  of only  $1\frac{1}{4}$  percent. So these considerations are already built into the baseline projection to a large extent.

Looking further ahead, if the natural rate of interest stays persistently low, this does have direct implications for the frequency and severity of zero-lower-bound episodes and for financial stability. As prudent planning for such a possibility, we should have renewed discussions here in the Committee of the optimal size of our balance sheet, the expected use of LSAPs in the future, negative interest rates, and even the optimal inflation target and other approaches to cope with an environment of very low rates. Even if you're not convinced today that the natural rate of interest is permanently lower, I do think that it makes sense for us to focus on these issues over the next year or so. Thank you.

CHAIR YELLEN. Thank you. President Rosengren.

MR. ROSENGREN. Thank you, Madam Chair. The estimate for the equilibrium federal funds rate that I submitted to the September SEP was 350 basis points. However, I must admit that I have very little confidence in my ability to estimate the real equilibrium federal funds rate in the long run or in the short run. If the next recession were to begin with the federal funds rate at 350 basis points or lower, I am worried that we would once again return to the zero lower bound. Because we have lowered the federal funds rate more than 500 basis points in the wake of each of the past three recessions, the potential to hit the zero lower bound seems uncomfortably high.

As the paper circulated by President Williams discusses, lower real equilibrium interest rates limit the options available to monetary policymakers to counter contractionary shocks to the economy. However, further exploring the tolerance of the Committee for expanding the balance sheet to offset average-sized recessions, assessing the effect of balance sheet actions on



term premiums, and discussing the cost and benefits of a higher inflation target seem to be the most fruitful areas of discussion at this time.

A lower equilibrium real interest rate implies that both the frequency and duration of zero-lower-bound episodes have risen, although it is difficult to know by how much. The past 15 years have already shown us that the frequency and duration were too high. The other implication of a lower real rate will be that we may need to respond to slowdowns with more-aggressive monetary policy actions. This may imply reducing the federal funds rate more quickly and aggressively than we have done in previous economic slowdowns, and we should prepare the public and the Congress over time for the potential that unconventional monetary policies may not be idiosyncratic, associated only with severe financial crises in the future, but may become tools more commonly deployed in economic slowdowns. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Evans.

MR. EVANS. Thank you, Madam Chair. And thanks to everyone who worked on this  $r^*$  project. The memos provide an excellent summary of the state of knowledge about this important topic. In fact, this topic is central to our policy deliberations.

The fundamental question before the Committee this year and next is whether policy is sufficiently accommodative to support currently low inflation rising to our 2 percent objective over the medium term. These memos get to the heart of this issue. Does our current zero interest rate policy represent emergency levels of monetary policy accommodation, or is it just slightly accommodative, or is it not really accommodative at all? Understanding movements in  $r^*$  is a way to bring all of these issues together in one place.

There's too much good material in these memos to cover all the interesting observations. Here's a few messages that I took away. First,  $r^*$  has been falling over time. I think President Williams was on target there. These reductions are quite persistent. Some analyses, like the DSGE models, assume stationary deviations, and they turn out to be potentially very persistent, depending on the driving process that got us there. Other analyses, like Laubach-Williams, assume  $I(1)$  permanent changes that persist indefinitely. I agree with President Kocherlakota's e-mail to you quite a lot. [Laughter]

The most recent Laubach-Williams  $r^*$  estimates are close to zero and permanent. A very low  $r^*$  combined with our 2 percent inflation objective implies that dealing with the zero lower bound will continue to be a big risk even once we get inflation back to target. So it's important that we know how to deal with future situations when our policy rate may be forced to zero. I agree with all of the suggestions that we should continue to study our tools that we could bring to bear on that situation when we find ourselves at the effective lower bound again.

Second, even though it is not totally clear why real rates have been falling, it seems to be a worldwide phenomenon that has been going on for two or three decades. I agree with Kei-Mu and Jing that most of the developments that we can foresee suggest  $r^*$  is going to stay low or maybe fall even lower, leaving us in a world in which the effective lower bound may be frequently binding.

Third, with  $r^*$  currently close to zero, we cannot just assume that today's zero funds rate is providing large amounts of policy accommodation. It appears that we are only below the equilibrium nominal rate by something on the order of 150 basis points. Some have characterized our current policy rates as being at an emergency setting, a comment that's clearly meant to imply that emergency rates are no longer appropriate for current economic conditions.

My view from these memos is that having the real funds rate about 150 basis points below  $r^*$  is not really an emergency setting. Maintaining a zero funds rate is just prudent policy following a long period when we would have liked to have put rates much, much lower but couldn't because of the effective lower bound. These low  $r^*$  estimates also mean that two or three quarter-point increases in the funds rate could eliminate a good portion of the accommodation that we are finally now able to provide.

Fourth, uncertainty about  $r^*$  most likely implies that “lower for longer” is a prudent risk-management policy. It's not enough to simply point to wide uncertainty bands surrounding  $r^*$  estimates. We need to assess the variety of policy losses under different realizations of  $r^*$ . Our policy losses are asymmetric at the zero lower bound, and, hence, in David, Chris, Ben, and Bob's memo, optimal policy delays liftoff and prescribes lower rates until uncertainty about  $r^*$  and the odds of hitting the effective lower bound are substantially reduced. My Brookings paper with Fisher, Gourio, and Krane reached a similar conclusion on the basis of a different information structure.

Finally, President Lacker brought up an interesting point and criticism of our monetary policies related to—I can't really penetrate these models very well—the New Monetarist models with alternative equilibrium calculations. I think that if you go out in public, you can hear people make comments like this to us. I think it might be worth our time to figure out what is there and what is not. Every time I hear the Fisher equation mentioned as an important point in this regard, I've come away with the impression that it's the slavish appeal to an interest rate rule that interacts with the Fisher equation to validate this equilibrium, and it's really quite fragile. If you were to break from that interest rate rule, and maybe you've got a threshold that tells you, “When I get way off target, I break from it,” that's going to break that equilibrium. These are

kind of transversality-type conditions. President Bullard, some years ago, when he was talking about this issue, similarly argued that maybe we should start doing more asset purchases, work the money angle on this. That's another attempt to break the slavish commitment to that interest rate rule, and that knocks that equilibrium out. It's outside the model, but in talking about these things, as President Lacker mentioned, if the public starts thinking we're going after lower inflation, it begins to ratify this. That's why I think it's so important for us to recommit ourselves firmly to our inflation objective of 2 percent in an aggressive symmetric approach to that so that people won't be left with that wrong impression and perhaps validate that type of outcome. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Vice Chairman.

VICE CHAIRMAN DUDLEY. Thank you, Madam Chair. And thanks to the staff for these memos. They are very thoughtful and stimulating.

When I think about  $r^*$ , I have two concepts in mind, one short run and one long run. The short-run  $r^*$  is consistent with what I think is a neutral monetary policy today, and the long-run  $r^*$  is what I think will be consistent with neutrality in the long run. I don't have a precise estimate of what either of those are, but I certainly agree that both are likely to be well below what we have seen historically.

With respect to the short-run  $r^*$ , I would put some weight on the model results, but I also would look elsewhere—simply, how fast has the economy been growing? If  $r^*$  were really close to 2 percent, I doubt we'd be growing at only a slightly above-trend pace right now.

I think we also have to be a bit careful and not overemphasize the DSGE model results too much because these models typically have very underdeveloped financial sectors, if they have one at all. This relevant in the current environment, because I think developments in the

financial system have been important in depressing the real equilibrium rate. It's not just about longer-term fundamentals such as productivity growth and demographic trends. For myself, I think that short-run  $r^*$  has been held down by strict lending standards for mortgages, especially for households with low FICO scores. Also, to the extent we have had higher capital requirements and other regulations, they have weighed on the intermediation margin. I would expect those would push down  $r^*$  slightly, both now and in the longer run. I think memories of the crisis may also be important through their effects on precautionary saving, less borrowing. Presumably, that influence will diminish over time, assuming we don't have any new crises.

As I have noted in speeches for some time, I also think the appropriate stance of policy does depend on how financial conditions evolve because monetary policy is not transmitted directly to the real economy but, instead, through its effect on financial conditions. I think this is particularly important because the linkage between short-term rates and broader financial conditions is not stable through time. The events of the fall of 2008 are the most noteworthy example of that. Financial conditions tightened abruptly, and this called for a much lower short-term interest rate and response. That implies that the level of short-run  $r^*$  is affected by financial conditions and how they respond to cyclical, secular, and even political developments.

My expectation about the short-run  $r^*$  is that it will gradually rise over time as some of the financial headwinds generated by the financial crisis fade. I would expect that household credit histories and FICO scores will gradually improve as we get further away from the Great Recession. Also, as home prices recover, the number of mortgages that are underwater should decline. This may also lead to a greater access to credit for affected households. At the same time, I don't expect  $r^*$  to get all the way back to 2 percent in the long run. So I'm with President Rosengren, 3½ percent on the long-run nominal federal funds rate without a lot of conviction.

But it strikes me that an aging population, slower labor force growth, and somewhat slower productivity growth should all be factors that suggest that  $r^*$  will stay below 2 percent for the foreseeable future.

Finally, I think it's important that we don't overfixate on  $r^*$  compared with other issues. For example, this issue of how far we want the policy rate to deviate from our short-term  $r^*$  estimate is also important. Presumably, there is a path back to full employment and price stability that is superior to others in terms of its welfare-maximizing attributes. We need to be open-minded about the size of the differential that we should be seeking and not just accept the prescriptions as simple policy rules because those policy rules seem to be doing a good job of describing monetary policy in the past. The impetus to economic growth from a given gap between the policy rate and  $r^*$  might be different now than in the past. And, if that was the case, then that should affect our choice of the policy rate and the size of the gap. Also, I would argue that, currently, risk-management concerns may imply a wider differential than maybe we have had in the past. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Harker.

MR. HARKER. Thank you, Madam Chair. In reflecting on the memo and the presentation, I just have two brief comments related not to the theory but to our current policy decision, what faces us right now. First, I'm on board with the general thrust of the memos that the neutral rate is zero to slightly positive. This implies to me that the policy is currently too accommodative. And I believe this view is broadly consistent with the unemployment rate being close to its natural rate. Second, I think that the steady-state  $r^*$  is probably around 1.75 percent. The U.S. economy is fundamentally sound, and productivity should pick up in the future.

Because of the after-effects of the financial crisis, neutral  $r^*$  is below its steady-state value. But it will rise over time, and monetary policy should keep pace with that rise.

Additionally, and I think this is important, we need to learn, and we will be learning, about  $r^*$  as normalization proceeds on a shallow path. And we need to see how the economy evolves as interest rates rise. There is an experiment that we will be conducting, and it's an important experiment, to watch how  $r^*$  evolves as we move along this shallow path. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Kocherlakota.

MR. KOCHERLAKOTA. Thank you, Madam Chair. I want to thank all of the presenters and the authors for a great set of memos. I find the analysis to be highly informative, as I believe I will illustrate through my comments. And, as others have noted, I think this is a very timely topic, in terms not only of the current policy considerations facing the Committee but also in terms of the policy considerations that may be facing the Committee for years to come.

I have three high-level takeaways from the memo. Short-run  $r^*$  has risen from recessionary lows, and there are good reasons to expect short-run  $r^*$  to continue to rise. However, there have been significant downward trends in long-run and steady-state  $r^*$ . If those trends were to persist, we should expect short-run  $r^*$  to remain below its 2007 level for years to come. This is broadly consistent with the pattern that we see in longer-term TIPS yields. There are some issues there about sorting out term premiums from the behavior of expectations of short-run real interest rates, but it is broadly consistent with what we see in longer-term TIPS yields. There are many uncertainties associated with the preceding two statements. In general, because of the presence of the effective lower bound, those uncertainties argue for more-accommodative policy. My summary of these takeaways is that it would be appropriate for the

FOMC to use a reaction function, both now and in the future, that has a lower intercept, potentially much lower, than the familiar Taylor rules.

I want to make two additional comments. The first concerns a potentially important takeaway from the memos about the nature of the slope coefficients in the FOMC policy reaction function. We focused a lot of the discussion on the intercepts through our conversation about  $r^*$ . The second comment I want to make builds on President Mester's questions about low  $r^*$  and measures of financial stability.

My first comment is about the nature of the slope coefficients in the FOMC policy reaction function. The questions at the end of the memo, which I'll note that most of my colleagues have neatly sidestepped, are about our assessments of  $r^*$ , with the idea that we could plug those different assessments into a policy rule. As I have heard from the comments made by others around the table—President Williams, Vice Chairman Dudley—it is pretty hard to know what is driving  $r^*$ . And so I think it is going to be pretty hard to formulate and communicate measures of  $r^*$  on an ongoing basis.

Now, I think the memo by López-Salido and others was potentially helpful along these lines. It points out that if we use a Taylor rule with a high coefficient on inflation deviations—and Thomas pointed out that this is a lesson from President Williams's former work as well—we can substitute for this kind of uncertainty while essentially using a policy rule that tracks variations in  $r^*$  around its long-run value, without having to measure those variations. And the intuition behind this finding, I think, is simple to understand when the only shocks present are to the natural real rate of interest. So there are no shocks to the Phillips curve. In that case, it is optimal to use a rule that tracks the natural real rate of interest, this so-called “divine



coincidence” case. If you don’t have shocks to the Phillips curve, you’re going to get divine coincidence.

Another way to say that, though, is that it’s always optimal to tighten further if inflation is too high and to ease further if inflation is too low. That suggests we can get good outcomes by using a rule that has a high coefficient on inflation gaps. In a recent working paper, Chris House of the University of Michigan and a student coauthor show that we can get arbitrarily close to desirable outcomes in this no-shocks-to-the-Phillips-curve case by using a rule that has arbitrarily large coefficients on inflation. So you don’t have to measure the variations in  $r^*$  around its long-term value, you just have to track inflation and respond to inflation very aggressively.

I think this is potentially an important lesson. As we all talked about already, measuring  $r^*$  and communicating about it could be very hard. Responding a lot more aggressively to inflation is not. I think it’s easy to communicate to the public why you might want to do that. It’s true that inflation isn’t perfectly measured, and this is an important consideration that drives us, for example, to talk about core inflation in a lot of our communications. But we could filter it by using forecast inflation instead. This was, indeed, a favorite prescription of Chairman Bernanke, and it is also very similar to the goal-oriented approach that President Evans and I have advocated for some time—that you put a lot of weight on your goals, and that drives what your setting of the policy rate would be.

So that’s my first comment. Results in the memo suggest we can track variations in  $r^*$  around its long-run value, if you were to use a rule that was more aggressive, potentially a lot more aggressive—the memo by López-Salido and others settles on a coefficient of 20—about responding to actual or forecast inflation gaps.

My second comment follows up on what President Mester was saying about financial stability. I did a search of the papers for the words “financial stability,” and it came up blank. I didn’t find a single reference to financial stability. I think this is an important omission that I hope future work will fill. About two and a half years ago, I gave a speech about low  $r^*$  and financial stability, and I pointed out that if  $r^*$  is to be low permanently or even high persistently, we are only going to be able to achieve our dual-mandate objectives in the presence of signs of financial stability. President Williams, at our previous meeting, expressed concern that housing markets, at least in California, or potentially in the nation as a whole, were unduly frothy because rent-to-price ratios had fallen back to 2003 levels. But if  $r^*$  is going to be low by previous historical standards for years to come, then we are only going to achieve our dual-mandate objectives if things like the rent-to-price ratio are indeed low by previous historical standards.

My own thinking is that Kei-Mu and Jing are right, that there are good reasons to believe that  $r^*$  is likely to be low for years to come. If so, it will be even more important for central banks to integrate financial-stability considerations into their policy assessments. The QS analysis is a valuable first step along those lines for this Committee, and I will talk about some ways that I hope we can build on it. Maybe you can build on that analysis in the next go-round.

I thought there already were some very thoughtful comments—I will just echo that I agree with them very strongly—that President Williams and President Rosengren made. If  $r^*$  is going to be low for quite some time to come, that really suggests the need to reevaluate the whole framework of the Committee. Are things like LSAPs an emergency tool, a break-the-glass kind of tool, or something that really should be part of the toolkit if  $r^*$  is going to remain low? Contemplating negative interest rates has certainly proven to be useful in Europe as well as potentially contemplating a change in the inflation target itself. All of these, I think, are things

for the Committee to think about if, in fact,  $r^*$  is going to prove to be low for a long time to come. But you'll get some information about that, as President Harker pointed out. Thanks a lot.

CHAIR YELLEN. Thank you. Governor Powell.

MR. POWELL. Thank you, Madam Chair. I have just a couple of brief comments. According to this excellent staff work, as well as many other estimates and under a variety of definitions,  $r^*$  has declined over two or three decades to a very low level, now about zero, with no signs yet of recovery. And the markets and a variety of factors suggest that a low  $r^*$  is likely to be with us for a while.

What are the implications of this? In the short term, while  $r^*$  may be low, short-term rates are now substantially negative. So real short-term rates are providing a good deal of stimulus. For me, that's appropriate for three reasons: We have inflation below mandate; we have economic growth that is barely above trend; and we have, as page 10 of the handout shows, five years to make up for when the Committee was unable, probably despite significant unconventional monetary policy, to provide adequate support for the economy.

For me, the implications of the precise timing of liftoff are more ambiguous. I agree that uncertainty regarding  $r^*$  argues for some inertia when policymakers are at the zero lower bound. Indeed, there are many arguments that support the idea of having inertia at the zero lower bound. But what is the right amount of inertia or patience? Is it more or less than the Committee has already employed? This work, to me, doesn't speak directly to that question. There is also the argument that uncertainty about the level of  $r^*$  as well as about the level of the natural rate of unemployment should lead us to de-emphasize those factors in setting policy, which tends to lead, then, to something that focuses on the inflation gap, which we are better at observing, and

also the change in the output gap, or a first-difference rule. And I would say that the first-difference rule is also consistent with liftoff in the current time frame. So I don't take any obvious signal about the precise timing of liftoff from this work.

I would say that the medium- and longer-term implications of a sustained low  $r^*$  are clearer and more troubling. If economic growth is going to continue along just a bit above its lackluster trend rate, it would not surprise me if every single rate decision will be very challenging in the coming years. On that growth path, it is going to be extraordinarily difficult—indeed, it would be inappropriate—to raise rates at anything other than a very gradual pace. And, over time, as others have stressed, that very low path implies more frequent and longer episodes at the effective lower bound.

On that last point, I read one of Andy Haldane's clever speeches over the summer titled "Stuck," which caused me to get into a series of discussions with Bill English and many others. And Bill ran some numbers, which I'll share. Based on historical data, experience suggests that the chance of a recession over the next four years from today is about 40 or 50 percent. The Committee has typically cut rates about 400 basis points, give or take 100 basis points, in a recession. So, if you take the market's projected path for rates, or even the latest primary dealer survey, you will see that almost any recession for the next several years will return us to zero interest rates. So I would echo what others have said around the table. There really is a need to evaluate all of our tools, including forward guidance, the balance sheet, and negative rates, because much as one might hate to admit it, we may very well need them. In fact, we are likely to need some or all of those tools.

The other thing is that a gradual increase in  $r^*$  to more normal levels is a fundamental assumption underlying the Tealbook forecast for interest rates. And, if this work calls that

assumption into question, it really does suggest that the set of issues regarding this question will be the major challenge facing monetary policy in the coming years. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Bullard.

MR. BULLARD. Thank you, Madam Chair. I have many comments on the  $r^*$  memos. Congratulations to the staff on putting together an excellent analysis of this important issue. I'll give you a summary, and then I'll provide more detail.

The summary is this. My first comment is that there is a lot of uncertainty about concepts and estimates, and that suggests caution. I'll talk about that a little bit. My second comment is that marginal product of capital is higher and smoother since 1985 than the declining returns on government paper. I would take that marginal product of capital to be the more relevant rate, so I'll talk about that a little bit. I'll talk about the simple New Keynesian model, which was used a lot here in the memo. That model has no capital. It also predicts mean reversion, as we have been talking about already this morning, so I think there are two strikes against that particular model and the policy implications coming out of that. I'll talk a little bit about the Laubach-Williams model-based  $r^*$  estimate. I'd prefer an independent measurement of real returns.

On policy, I have several comments. For  $r^*$  itself, I am going to suggest sticking with constants or modifying the constants only slightly. These are, after all, 25-year trends that we are talking about in a lot of this work. I'm also going to say that adopting radical values for  $r^*$  would require a rhetorical shift on the Committee that I'm not sure we're really prepared for. We can talk about that a little bit. The real returns to government paper have clearly declined, suggesting a safe asset shortage. I think the policy implications of that are unclear. And, finally, the permanence of the Laubach-Williams estimate suggests possible convergence to a low

nominal interest rate–low inflation steady state delineated by Benhabib, Schmitt-Grohé, and Uribe, which has also already been discussed this morning.

I have a lot of comments. I apologize for that. But I just wanted to get my thoughts on the table here. Let's take these one by one.

First, regarding uncertainty about the concepts and estimates, the memos clearly indicated that there are a lot of ideas about theoretical concepts relevant to  $r^*$  and that these concepts are used in different ways by different authors. Empirical estimates also vary widely and use different versions of the underlying theoretical constructs. The initial table explaining the issue has a myriad of different definitions. This, of course, leads to considerable uncertainty in interpreting empirical results and the associated policy advice. So the first comment is just that we should be quite careful about relying too heavily on new interpretations of  $r^*$  as a driver of U.S. monetary policy.

The second comment concerns marginal product of capital versus the returns to government debt. A lot of the empirical results contained in these memos are essentially stating that the real rate of return on government paper today is very low by historical standards. The real rate of return to capital, as calculated by Gomme, Ravikumar, and Rupert, and by others, tends to be higher and shows little or no downward trend since 1985. The marginal product of capital may be the more relevant concept for real macroeconomic performance, and it is not indicating substantially different behavior from postwar history. The high price and corresponding low real returns of government paper suggest that the idea that there is “a shortage of safe assets” globally may have considerable merit. This idea has been analyzed by authors like Caballero and Farhi as well as Andolfatto and Williamson. In these papers, government

debt has liquidity value, collateral value, or both. But the policy implications are far from fully settled, and we would need quite a bit more work to put a lot of weight on that.

The third set of comments concerns the simple New Keynesian models. The results on the marginal product of capital versus returns to government debt call into question the policy advice in the memo stemming from the use of the simple New Keynesian model alone. As useful as that model is, there is no capital in the model. If there was capital, its return might be expected to be falling in tandem with the returns on government paper over the past 25 years, which is arguably not happening in the data. In addition, the simple New Keynesian model has a unique steady-state equilibrium, so the model predicts mean reversion of  $r^*$  to its long-run value.

As Laubach and Williams point out, comically but also tragically, in their figure 10, repeated predictions of an imminent rise in  $r^*$  have turned out to be incorrect during the past six years. The time scale over which the Laubach-Williams estimate of a low  $r^*$  value is beyond ordinary business-cycle frequencies, possibly indicating, instead, convergence to a low nominal interest rate–low inflation steady state.

In the fourth set of comments, Laubach and Williams take a longer-run view in their paper and use multivariate estimation with a common filter to interpret recent U.S. inflation behavior as suggesting that potential output must be on a lower path than previously believed and, therefore, that  $r^*$  must be lower. The nature of this analysis is summarized in the outstanding quote from the 1931 *QJE* article by John H. Williams, affectionately known as “H” among the Williams economists. [Laughter] In a nutshell,  $r^*$  is calculated under the null hypothesis that the model is true. Although I think this is an interesting exercise, I would prefer to see independent estimates concerning the relevant rates of return, such as marginal product of capital.

For comments on policy, the first comment concerns constants in the intercept term. The original Taylor rule-type analyses have constants for  $r^*$ . Much of the usefulness and intuition behind the success of the Taylor rule is based on this type of formulation. It is far from clear that the use of a time-varying version would have worked better over the postwar era. The spirit of the original analysis was that the real returns most relevant to economic growth and development, like the marginal product of capital, are relatively smooth and well approximated by a constant. Ideas about real rates based on consumption growth or TFP plus population growth also provide relatively smooth measures, which might be viewed as consistent with the original Taylor rule analysis. My advice on this dimension is that we stick with constants or modify them only slightly.

A second comment on policy: Taking on a more radical interpretation of  $r^*$ , an estimate like the one reported by Vasco Cúrdia, who is at the Federal Reserve Bank of San Francisco, which is minus 2 percent, would imply that U.S. monetary policy is currently not accommodative. At least that would be one interpretation. This would require, in my opinion, a dramatic shift in Committee rhetoric, which has repeatedly emphasized “highly accommodative” policy over the past five years. This is probably far too dramatic a shift in rhetoric to be credible.

I think if we wanted to go in that direction, we could do it, but we have told people that we are aiding the recovery, that we have done all we can, we have supplemented zero rates with many other actions, promises to stay at zero longer, and quantitative easing. So we have said that we have a highly accommodative policy. I think it would be a little bit jarring to say, “Well, you know, it’s not that accommodative after all.” We could make that argument, but it would certainly be a shock, maybe to ourselves and to how people outside this Committee have been thinking about monetary policy over the past five or six years.



The third comment on policy is that, while the marginal product of capital has arguably held relatively steady, real returns to government debt have declined for many years. This suggests that the “shortage of safe assets” story is a promising direction for future thinking on monetary policy. Policy implications are unsettled.

The last comment on policy is that the permanence of the decline in real returns to government debt and related assets suggests the possibility of convergence to a new steady state, as analyzed by Benhabib and others. If that is the case, then promising an even longer time at the zero bound, directly or through quantitative easing, is not doing anything except reinforcing the BSU steady state. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. A two-hander from President Kocherlakota.

MR. KOCHERLAKOTA. I wanted to comment on President Bullard’s point about the rhetoric from the Committee about accommodation. I think, certainly, the Committee has pointed out that we have used a lot of historically unprecedented forms of accommodation given the fact that we are at the zero lower bound. That’s what I always took the rhetoric about high levels of accommodation to mean—that our tools, because of the evolution of the economy, had to be historically unprecedented. I do not think that the American public believes that the economy has evolved according to what would be deemed as being appropriate over the past five or six years. I don’t think it will come as a shock for them to find out that inflation has been below target for seven years, or that output has been growing so slowly. I don’t think it would take a major change in communications, simply more focusing on the outcomes of our policy on inflation and output. That’s what gives rise to calculations like Cúrdia’s.

CHAIR YELLEN. Governor Brainard.

MS. BRAINARD. I will follow up on this conversation about communications. I think the very helpful work that the staff presented to us is quite illuminating for how we think about as well as how we talk about what we mean by “normalization.” I went to our website, and it equates normalization with steps to raise the federal funds rate and other short-term interest rates to more normal levels. But it begs the question, what are more normal levels? It clearly implies that the target range for the federal funds rate is currently below normal. We haven’t, I don’t think, explicitly defined what we mean by “normal,” but the central tendency, or the median, of the path in the SEP might reasonably be considered a rough guide. And by that proxy, the definition of normal has moved down noticeably at all horizons over the course of the Committee’s discussion of what normal is. I think today’s discussion, and the work that we do based on it, does provide a common analytical framework that should help us get to a more common definition of what we have in mind with “normal.” It also perhaps can help educate the public, which I think is very important.

I think what stands out from the work that was presented here, from the empirical estimates of the shorter-run natural rate of interest from the DSGE models and the other important work that has been done in this area, is that a wide variety of models suggest that  $r^*$  has been negative in recent years and is only now approaching or is close to zero six years into the recovery. With these estimates far below the average level in previous decades, it implies that the accommodation associated with any given level of the federal funds rate has fallen short of what one might have been thinking about in historical terms. And those shorter-run estimates imply that the current level of the federal funds rate is likely to be mildly accommodative, something that might help explain the very gradual pace of expansion in activity and, in

particular, despite being low by historical standards, a very long period of low rates has coincided with only modest growth in investment throughout the recovery.

There are, I think, a host of observable reasons that the natural rate might be low currently. And, of course, earlier in the recovery, the dominant explanations focused on domestic factors and headwinds from the crisis. More recently, I think it's likely that the foreign outlook has become increasingly important as a source of downward pressure on short-run  $r^*$ . Weak economic growth trajectories are now the norm in much of the world. And, as we know, in the other G-7 economies we have seen a very large shift down in 10-year sovereign bond yields, a shift that has been persistent over the past year or so. But also, interestingly, if we look at emerging markets, we have seen a broad-based reduction in interest rates with average real Treasury bill rates falling from about 5 percent earlier to around zero in recent times.

The way this would spill over into our rates would be through adjustments in the exchange rate. I think the staff provided a useful simulation to get a sense of how big an adjustment in the federal funds rate might be necessary to restore monetary policy to "normal" in the sense of insulating domestic employment from an appreciation in the dollar. So let's just take a 10 percent appreciation of the dollar, which is the experiment that they ran, which is about two-thirds of the movement that we have seen in the past year alone. It suggests that in the context of a Taylor (1999) rule with a fixed intercept, normalization of monetary policy in the sense of insulating us from this exchange rate shock would call for lowering the intercept about 60 basis points. And because we're in the neighborhood of the effective lower bound, that means that you push off liftoff as well as pull the path down.

Another benchmark we use for determining what constitutes normal is the medium-term FRB/US  $r^*$ . And there we have seen that, by that metric, the current stance of policy is quite

accommodative relative to what would be prescribed by that, which is the level of the funds rate that, if maintained, would close the output gap in 12 quarters. What is important, I think, is that that benchmark actually takes no account of inflation. If you look at that benchmark, it gets us to 1 percent above where we should be on the output gap, and we are still shy of our 2 percent inflation target at the end of the 12 quarters, suggesting that if we cared a lot about inflation, we would actually want a more accommodative stance. Or, similarly, we are pretty far along in the recovery, and if we instead wanted to think about policy normalization as closing the output gap in, say, 4 quarters instead of 12 quarters, again, that benchmark regarding what constitutes normal would suggest a lower federal funds rate would be appropriate right now.

I think the discussion around the table has also been good at focusing on several factors that suggest that the medium-run or even long-run natural rate of interest has also shifted down. And for reasons that many people around the table have talked about, and that resonate a great deal with me, if we believe there has been such a shift down, we would want to think very seriously about what that implies for the likelihood that we see the policy rate returning to the effective lower bound with more frequency and with longer duration than has been the case historically. And, in that context, risk-management considerations and the asymmetry of them, I think, would lead one to counsel a cautious stance even today.

Finally, I think the likely low level of the natural rate of interest in today's conditions, and the implications for what can be considered normal monetary policy, do suggest we should be thinking very much about our communications and devoting some care and attention to how we talk about what "normal" means and is likely to mean as we go forward. I think it is very striking that there is a draft bill in the Congress that would codify a 2 percent intercept in a Taylor equation as the benchmark by which monetary policy would be evaluated at a time when

most researchers believe the empirical regularities that underpinned that relationship are unlikely to hold. I think several around the table have also suggested that it may lead us to want to reevaluate unconventional tools and consider whether they will need to be used more frequently. If that is the case, we should really start communicating that now, because I believe there are much higher bars for returning to a realm of unconventional tools than there are for simple adjustments of the interest rate up and down. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Governor Fischer.

MR. FISCHER. Thank you, Madam Chair. Like everyone else, I would like to thank the authors for their very good work, and I would add to their four papers, the paper sent to the FOMC by John Williams, one of those he wrote with Thomas Laubach, “Measuring the Natural Rate of Interest Redux.”

I was all ready to summarize everything, and then I looked at exhibit 13 and realized that they had copied what I was going to say and put it into their presentation. It’s on page 13 of the handout, “Equilibrium Real Interest Rates.” I think that it is a good a statement of what the overall findings are in the very interesting work that we have been presented.

Obviously, the finding that everyone knows is that the natural rate of interest has fallen sharply and shows few signs of recovering. That’s happened since the start of the Great Recession, and it is a common finding among all of the papers. There is, I think, another key point, and here I’m going to diverge a little from what everyone has been talking about. The point is that  $r^*$  also depends on a set of other variables, some of which are policy-related—for example, fiscal policy; productivity growth, I don’t know to what extent it is policy-related; the real exchange rate, which is monetary policy-related; the relative price of energy; and demographics. All of these are factors affecting  $r^*$ , and I think we need to start talking about

what it is that moved  $r^*$  more than using  $r^*$  as a shorthand way of saying, “We’ve got to keep the interest rate very low.”

I say that for two reasons. I think we need to speak up much more about the policy responsibilities of other agencies in this town, including the fiscal authorities, which I know we are not allowed to do, but I am never quite sure why. All other central banks do it. And I suspect that productivity growth will have far more influence on future  $r^*$  than what it is that we do with the interest rate. The interest rate works through investment. Since Solow’s initial paper, there hasn’t been another paper that says technical change is not the main driver of economic growth. And I suspect we will end up there one day.

I have been trying to figure out what is the use of  $r^*$ . You read Wicksell, and it is either brilliantly simple or it’s too simple. It says there is a marginal rate of return on capital. And when the interest rate is below that, then there is going to be a high level of investment and more inflation. And when the marginal product of capital is below the interest rate, then we are going to get deflation. And so there is a rate which will keep the price level constant.

Well, that’s what we calculate in our models, and we get a measure of  $r^*$  that takes us back to a steady state of some sort over 12 quarters, and that’s what we use. But why don’t we just use the models? What is the extra that we get out of the  $r^*$  as opposed to what we get out of the different models we consult when we are looking at different policies, which would take us to where we want to go?

It was very interesting that one of the findings was that, using  $r^*$  instead of a calculated optimal policy, you could actually do fairly well. Well, that’s an interesting reason to want to know  $r^*$ . But how do you think—I’m asking the authors. How do you think about  $r^*$  and what its uses are? It’s obviously a shorthand for us. But as we talk about it, I have a sense very much

that it gets more weight in our minds than it should, and that we should also be focusing on other variables.

Well, to end, I was naive and I tried to answer the three questions. I guess next time, if the other students would only tell me which questions you have to answer, I'd do much better.

MR. EVANS. I've spoken on that before. It's a rookie mistake. [Laughter]

MR. FISCHER. Anyway, what does your estimate of current  $r^*$  imply for the degree of accommodation provided by current monetary policy? I think almost everybody said it— $r^*$  is somewhere around zero. The real rate is somewhere around minus 1 percent, minus 1½ percent. So we have, I think, adequate accommodation, which will be higher when the inflation rate rises, I assume, or when productivity growth rises. And, yesterday, in another meeting, some of us here saw a staff model forecast that I'm not sure has been generally accepted by the staff, which showed productivity growth returning to 1½ percent from next year. I don't know if there is anything other than convenience in that chart.

What did the exchange rate do to  $r^*$ ? The appreciation probably temporarily reduced  $r^*$ .

And then the third one was, how do I expect  $r^*$  to evolve, and what are the implications for the appropriate future path of the policy rate? Well, there is great uncertainty about future  $r^*$ . That is what is clear from the various factors that have been mentioned as determining it in the various papers that we have. If productivity goes up at a reasonable rate, if animal spirits return, I assume that  $r^*$  will rise. If we stay stuck in roughly the equilibrium we are in now, I think that people will begin to be very worried that there is not much in the future and it could potentially fall.

My bottom line is that  $r^*$  is useful. Which is what I think is said at the first line of exhibit 13: " $r^*$  is a relevant, albeit complex, benchmark to guide the stance of monetary policy."

Well, it's not a definitive benchmark. It's not the pole star of whether monetary policy is right, but it is something useful that we need to consult. But I think that if we want to get full analyses of the policies we are undertaking, we still need to use models. Thank you.

CHAIR YELLEN. Thank you. President Kaplan.

MR. KAPLAN. Thank you, Madam Chair, and thank you to the staff for these papers. I tried to think over the past several days about my answer to number 3, how is  $r^*$  likely to evolve, and what are observable factors that, at least, I will be watching to try to figure that out. And I probably didn't like the answer to my own question, in that, number one, the decline in the working-age population in the United States, that demographic, is a major factor. Two, another factor is globalization, and related to globalization, the demographic challenges not only in Japan but in China, which has a severe demographic problem and one that will evolve and grow over the coming years. I also believe we are on the flip side of the—for lack of a better term—debt supercycle. We spent the past number of decades leveraging up. We are now more recently, since the crisis, on the flip side of that debt supercycle, and we are having to deal with deleveraging, which I assume has to bring down  $r^*$ . And then, finally, more regulation in general, across industries in our economy—much of it in financial services was desperately needed—has contributed to the fall in  $r^*$ . When I look at all of these factors, which are transitory or cyclical and which are secular, almost all of them, unfortunately, appear to me to be secular—that is, they are going to be with us for an extended period of time. So, these are the fundamental issues that I will be looking at, in the years to come, that I would think will result in downward pressure on  $r^*$  in general, all things being equal.

CHAIR YELLEN. Thank you. President Lockhart.



MR. LOCKHART. Thank you, Madam Chair. I, too, would like to thank the staff for a very thorough discussion. For someone like me, who is not deeply experienced in the literature, this is very helpful.

I would like to just make a few comments on short-term practical considerations in answer to the questions. First, on the question of the current degree of accommodation, the message I take from the second and third memos is that an operating assumption of  $r^*$  being around zero would not be unreasonable. This is in the ballpark of my working assumption. If I connect that thought with my sense of the degree of remaining slack in the economy and the shortfall of inflation from our objective, I would conclude that the degree of monetary accommodation is not too far from where it should be, though a modest increase in the funds rate target is supportable.

On the question of how recent financial conditions and developments affect my notion of  $r^*$ , I tend to view those developments as risk factors with respect to the outlook more than factors that drive an estimate of  $r^*$ , which I'd view as a benchmark in any event. So recent financial conditions and the exchange value of the dollar were definitely factors leading to my support for a delay of liftoff at the September meeting, but I am just treating them as emergent risk factors.

On the third question about how  $r^*$  might evolve and what the implications would be, I expect that the underlying value of  $r^*$  will evolve slowly enough to justify low funds rate targets by historical norms for the foreseeable future. I did think the risk-management exercise in the fourth memo was interesting. My own sense is that the economy is firming up enough that the insurance policy aspect of maintaining the funds rate at its effective lower bound is passing or has passed.

Those are my comments. Thank you, Madam Chair.

CHAIR YELLEN. Well, thank you to everyone for a very interesting and productive discussion, and especially to the staff for an excellent set of memos and presentations. Let me just say that  $r^*$  has always played a key role in my own thinking about the appropriate stance of policy, and, at various times, a related notion we have called the neutral funds rate has played a central role in FOMC communications about monetary policy strategy. Frankly, I think it could potentially assume a more important role as we go forward.

I will come back to  $r^*$  in my economic and policy remarks later on. But, for now, if you would permit me, I would like to add a couple of comments of my own on the three questions posed by the staff.

The first question pertains to my assessment of current  $r^*$  and the applied degree of monetary policy accommodation. I read the staff memos and the Laubach-Williams paper as confirming that short-run  $r^*$  is currently quite low, near zero, or, according to some of the DSGE model estimates, below zero. That is higher than the real funds rate at present, but not by all that much. I think that's consistent with the fact that economic growth at present appears to be running near or only slightly above trend. And it means that the stance of monetary policy is only modestly accommodative at the current time. It is certainly not imprudently expansionary, especially taking the current low rate of inflation into account.

The second question pertains to the effect of the dollar on  $r^*$ . I think that is an important question. It is difficult to pin down because the stance of U.S. monetary policy is a key influence on the exchange rate. When we are perceived to be pursuing a tighter policy than previously anticipated, the dollar will rise endogenously. That said, I think it's reasonable to argue that the marked appreciation of the dollar over the past year mostly reflected policy and economic

developments abroad that were independent of our own policy actions and statements. And, if that's the case, the dollar appreciation would certainly have worked to hold down the short-run natural rate of interest, particularly as movements in the dollar tend to be highly persistent.

The analysis by Board staff using the FRB/US model that was distributed last night suggests that a 10 percent depreciation of the broad real exchange rate—it's about what we have seen over the previous year—would lower the equilibrium real interest rate about 60 basis points. That assumes the initial appreciation fades away substantially over the following six years. That is a large effect. But if the upward shift in the real exchange rate, in contrast, is expected to be more persistent, the FRB/US model calculations suggest that the implied decline in the equilibrium rate would be on the order of 1 full percentage point. And I will say that I view the appreciation of the dollar over the past year, and the resulting downward movement in  $r^*$ , as a key reason why, in my view, we have not yet lifted off, and for me, it certainly is a reason why my own SEP funds rate path has moved down and flattened.

The final question pertains to the likely path of  $r^*$  over time. I interpreted the results reported by the staff as generally consistent with my own view that  $r^*$  is likely to rise gradually over the next few years but only to a level that is rather low by historical standards. I do suspect that the DSGE model simulation results may overstate the level to which the funds rate will eventually need to climb because the steady states of the DSGE models don't take fully into account the staff's separate analysis of longer-run trends in the real interest rate and the factors driving those trends.

I think the longer-run estimates reported by staff are pretty much in line with my own expectation that the federal funds rate is likely to settle down only at around 3¼ percent or so over the next decade. That said, whether the underlying strength of the economy will actually

improve this much over the next few years is highly uncertain, and the evidence in statistical models, like Laubach-Williams, that the natural rate of interest has shown no signs to date of recovering, suggest to me that the very gradually sloping market-implied path for short-term rates may well end up being a better forecast of future short rates than the more steeply sloped median funds rate projection in our SEP.

Let me stop there. I think at this point we should take a break for lunch, and we will be celebrating, wishing our colleague farewell in a more formal way.

[Lunch recess]

CHAIR YELLEN. Okay. Why don't we get started again. Our next topic is "Financial Developments and Open Market Operations." Let me call on Lorie Logan to start us off.

MS. LOGAN.<sup>2</sup> Thank you, Madam Chair. When we met in September, Simon discussed the financial market turbulence that followed the renminbi devaluation in early August. That volatility abated in recent weeks, and financial conditions retraced some of their earlier tightening, in part because of a perception that the risks of a severe downturn in China and other emerging markets had declined somewhat. Expectations that advanced-economy central banks would provide a more accommodative path of monetary policy also played an important role. Despite the stabilization, some financial markets appear to signal a subdued outlook for the global economy. In this regard, two areas of continued focus among market participants are the low levels of inflation compensation and the continued widening in some credit spreads.

The decline in market turbulence over the period can be seen in the top-left panel of your first exhibit, which shows that option-implied volatility fell across several asset classes. The drop in equity-implied volatility, in dark blue, was particularly striking, and currency-implied volatility, in light blue, fell back to levels seen before the renminbi devaluation. Implied volatility of longer-term interest rates, shown in red, was steadier. Market participants have suggested that the relative stability of longer-term rates may reflect the tendency since the renminbi devaluation for the effects of so-called flights to quality, or their reversal, to be offset by fluctuations in reserve manager selling of U.S. dollar assets to fund foreign exchange intervention.

Alongside the fall in market volatility, emerging market asset prices reversed a portion of the sharp declines seen over the summer, and outflows from emerging market bond and equity funds appear to have decelerated, as shown in the top-right

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<sup>2</sup> The materials used by Ms. Logan are appended to this transcript (appendix 2).

panel. Despite the recent retracement, emerging market asset prices remain well below levels from earlier in the year. Market participants remain concerned about potential spillovers occurring from a slowdown in China and about possible terms-of-trade shocks that will result in economic and financial challenges for countries closely tied to the export of commodities.

In China, authorities took a number of actions over the intermeeting period to address risks related to capital outflows and weakening economic growth. In particular, PBOC intervention stabilized the renminbi and supported a convergence between the spot onshore and offshore renminbi–U.S. dollar exchange rates, as shown in the middle-left panel. The willingness and ability of the PBOC to stabilize the renminbi and converge the onshore and offshore rates increased market confidence in its ability to contain renminbi depreciation. This may have helped to produce a partial repair of confidence in Chinese policymakers' broad ability to address the weakening economic outlook in China; that confidence had been fragile following some policy actions in recent months. Additionally, some estimates suggest that Chinese FX intervention has slowed recently as pressure from capital outflows became less acute, although it is difficult to judge this with any confidence given the limitations of available data.

Chinese authorities pursued a number of other policy initiatives over the period to support growth, including cuts to interest rates, reserve requirements, and liberalizing bank deposit rates. Further, the PBOC made final preparations for the introduction of a global payment system later this year and announced that some international institutions, including foreign central banks and sovereign wealth funds, will now have direct access to the onshore interbank foreign exchange market. These later steps appear to be aimed at further liberalizing the international use of the renminbi and increasing the odds of its inclusion in the IMF's SDR basket. It is not clear how much direct effect these later policy announcements had on market participants' outlook for the Chinese economy, but they may have helped to bolster sentiment toward Chinese policymaking in the near term.

Also underpinning the stabilization in markets were increased expectations regarding monetary policy accommodation in the major advanced foreign economies. These expectations were driven in part by tepid incoming data on output and inflation and continued declines in and low levels of global measures of inflation compensation, shown in the middle-right panel. Communications stemming from the ECB's meeting on October 22 bolstered expectations that it would continue its asset purchase program well beyond September 2016. In addition, comments by President Draghi during his press conference led market participants to believe that the ECB's effective lower bound on euro-area policy rates is lower than previously indicated and, therefore, to expect a modest further reduction in the ECB's policy rates later this year. The bottom-left panel shows the EONIA forward curve after the September, in dark blue, and October, in light blue, ECB meetings. Assuming the spread between the EONIA and deposit rates remains around its current level, the forward curve reflects greater-than-even odds on a 10 basis point cut to the deposit

rate by the January ECB meeting. This would bring the deposit rate to negative 30 basis points.

Expectations regarding monetary policy in Japan and the United Kingdom also shifted. As shown in the bottom-right panel, U.K. sterling futures, in dark blue, declined moderately; these rates now price in an increase in the Bank Rate in the fourth quarter of 2016, a shift out of two quarters over the period. While short-rate futures in Japan, in red, were relatively little changed, the Japanese yield curve flattened a bit, as expectations built that the BOJ would step up the pace of its JGB and ETF purchase programs later this week.

The moves in financial markets over the period were also underpinned by a shift in expectations toward a later liftoff by the Federal Reserve as well as by a slower expected pace of tightening thereafter. In addition to the Committee's decision not to tighten policy at the September meeting and its communications associated with that decision, the shift in expectations was driven by weaker-than-expected domestic data—particularly the September Employment Situation report—and ongoing concerns about global economic growth.

The market-implied probability of liftoff before year-end is now about one chance in three, as shown in the top-left panel of your next exhibit, and the market-implied probability of liftoff occurring at this meeting is near zero. The average probabilities derived from the Desk's primary dealer and buy-side surveys are in line with these market-based measures.

In addition, the path of the policy rate implied by market prices, shown in the top-right panel, flattened substantially and now rises to only a bit above 1 percent by the end of 2017. Consistent with the flattening in the market-implied path, survey respondents revised lower their expectations for the pace of tightening. As shown in the middle-left panel, the average expected pace of tightening in the first and second years after liftoff, conditional on not returning to the zero lower bound, fell to their lowest levels since we introduced this question on the surveys last year.

The middle-right panel presents information about inflation and energy prices. As can be seen, five-year, five-year-forward inflation, the dark blue line, stabilized somewhat over the period, edging down only slightly after having declined sharply since mid-2014. This stabilization coincided with a similar bottoming-out in spot oil prices, the light blue line. Far-forward inflation compensation remains close to its lowest levels since March 2009. In contrast, expected inflation over the same horizon in the Desk's surveys has been relatively steady at around 2.15 percent.

The Desk's most recent surveys asked respondents to rate the importance of various factors in explaining the difference between the survey-based measures of longer-term inflation expectations and the market-based measures. The responses, which are not shown, suggested that survey respondents put significant weight on three explanations: "inertia" in survey expectations, differences in inflation

expectations embedded in survey- and market-based measures, and risk or liquidity premiums in market measures.

More generally, we continue to hear a range of explanations for the low levels of far-forward inflation compensation. Many market participants cite liquidity premiums or “technical factors” unrelated to fundamental macroeconomic expectations. However, we have not found much direct evidence of increased liquidity strains in the TIPS market, and some market participants have noted that the decline in far-forward inflation compensation seems quite large and persistent for an effect driven by these types of nonfundamental factors alone. Other market participants focus more on how measures of inflation compensation may reflect concerns about low inflation over the next decade and note that negative inflation risk premiums may also be cause for concern.

High-yield corporate credit spreads, shown in the bottom-left panel, continued to widen over the period. The widening was fairly broad based and not confined to extractive industries affected by recent declines in commodity prices, although spreads on debt of firms exposed to those factors have risen sharply. Moreover, the widening in spreads was also seen in related markets, such as that for commercial mortgage-backed securities. Contacts attribute the widening in corporate credit to a range of factors, including concerns about global growth, a rise in corporate leverage, and a variety of idiosyncratic issues related to individual firms or industries.

To summarize, domestic financial conditions generally eased over the period, as shown in the bottom-right panel. Equity prices increased amid a decline in volatility and real interest rates fell as expectations for monetary policy accommodation increased. The dollar, for its part, was little changed on net, as expectations for policy rates declined across advanced economies. As the table shows, standard indicators of financial conditions have now retraced much of the tightening that took place following the August devaluation of the renminbi, the notable exception being credit. Importantly, though, the broader retracement occurred alongside a buildup in expectations for substantially more accommodative monetary policy.

I will now turn to money markets and operational matters. Testing of the Federal Reserve’s RRP operations proceeded smoothly. Outside the quarter-end date, most money market rates were a few basis points below the somewhat elevated levels of the last period amid a reduction in Treasury bill supply, though they largely remained above the ON RRP offering rate. Consistent with lower money market rates, take-up at the Desk’s RRP operations was higher this period, as shown in the top-left panel of exhibit 3, with overnight operations outside quarter-end averaging \$118 billion compared with \$82 billion during the preceding period. Federal Reserve repurchase agreements with foreign official accounts—the foreign RP pool—also increased, averaging \$171 billion.

Total ON and term RRP take-up over the quarter-end date was also elevated, as expected, reaching a record level of \$450 billion. This larger take-up than in recent quarter-ends was primarily attributed to a larger-than-usual contraction in IOER

arbitrage activity by foreign banking organizations as they sought to temporarily shrink their balance sheets for reporting purposes. The reduction in Eurodollar activity, shown in the top-right panel, resulted in more cash being reallocated to RRP operations from prime money market funds.

Similar to previous quarter-ends, usage of the foreign RP pool was elevated and touched a record high of \$191 billion. There was also some incremental usage of Federal Reserve dollar swap lines by the Bank of Japan, as the rate became relatively more attractive to their counterparties due to temporarily elevated pressures in the yen–dollar swap markets.

Over the intermeeting period, there continued to be sizable paydowns in Treasury bills related to the debt ceiling, which garnered increased focus on the part of market participants. Since the September FOMC meeting, and consistent with Treasury Secretary Lew’s projections to the Congress, staff expectations for when the Treasury will exhaust its borrowing authority moved up to November 3. The staff estimates that the Treasury would have less than \$30 billion in cash on that date and will have depleted this cash by mid-November. As shown in the middle-left panel, the scheduled debt payments after November 3 include weekly maturities of Treasury bills beginning on November 5 as well as midmonth and end-month principal and interest payments on coupon securities.

In the past 24 hours, the White House and congressional leaders appear to have reached an agreement to extend the Treasury’s borrowing authority to March 2017, though any deal would still need to be passed by both chambers of the Congress. Market participants generally believe that missing a payment on Treasury securities would have extremely negative consequences for financial markets, and we saw some signs of concern in the Treasury bill market over the intermeeting period. Much as in past episodes, the bill market began to price some risk of delayed payments into securities maturing after the November 3 deadline, as seen in the middle-right panel, though since news of the agreement emerged yesterday, this has entirely retraced. With the exception of early-to-mid-November bills, we saw little signs of stress. Jane will discuss the treatment of delayed securities in Federal Reserve operations and issues around communication in her briefing.

Looking ahead, we intend to release a Desk statement about year-end RRP operations shortly after the October minutes are published, provided that the Committee does not increase the target range at this meeting. As summarized in the bottom-left panel, we would announce a plan to offer \$300 billion in term RRP operations across three operations in addition to the \$300 billion in ON RRP capacity on December 31. These aggregate amounts are identical to those offered in the 2014 year-end operations and consistent with the authorization from the Committee in March. Further, the statement would note that the Desk will release the remaining details of the term RRP operations after the December FOMC meeting. At that meeting, the Desk would propose two configurations for the year-end operations, one for use if the Committee decides to tighten policy at that time and the other if not.



The staff also recommends conducting one TDF test operation during the first week of December to continue our periodic testing of the facility and maintain operational readiness.

Turning to the bottom-right panel, I would like to provide a short update on the recent changes that were made to improve the FR 2420 data collection. You may recall that, in an effort to improve the quality of the data in advance of the production of the new median-based effective federal funds rate and overnight bank funding rate, we published a *Federal Register* notice in July to expand the Eurodollar collection and the panel of domestic banks required to report federal funds transactions. The new reporting requirements went into effect on October 20, and the data received since have been in line with our expectations. We believe that we are on track to start publishing the revised effective federal funds rate and the new overnight bank funding rate in early 2016, and we plan to provide more information to you on the proposed implementation at the next meeting.

To conclude with an update on reinvestments, the Desk continues to reinvest principal payments on holdings of agency debt and MBS in agency MBS through secondary-market purchases. Looking ahead to the end of the year, trading volumes in the MBS market typically decline in December and early January. In line with last year's practice, the Desk is planning to adjust its purchase calendar so that MBS purchases do not occur during days with the lowest trading volumes. We do not expect this to have much market effect, as the practice is in line with the scheduling in recent years.

With respect to Treasury reinvestments, the SOMA portfolio will receive \$326 million in Treasury principal payments on November 15. Although this falls after the November 3 debt ceiling deadline and the timing of the payment could therefore be at risk if there is no resolution, we expect to be able to roll over the maturing proceeds at auction, in line with the current reinvestment policy. This would be the last Treasury rollover operation in 2015 before the maturities of Treasury securities increase materially in February of next year, as shown in the top-left panel of your final exhibit.

As we have reported previously, market participants' expectations regarding when the Committee would cease some or all reinvestments of principal payments have been gradually pushed out over time, a result of both the shift later in expectations for liftoff and the view that there will be a longer interval between liftoff and any change in reinvestment policy. As shown in the top-right panel, the median respondent to the Desk's surveys currently expects that the FOMC will cease some or all reinvestments of Treasury securities and agency MBS approximately nine months following liftoff, roughly three months later than was expected one year ago following the release of the Committee's Policy Normalization Principles and Plans. Respondents' expectations regarding the timing of a change to reinvestment policy remain dispersed, however, with estimates ranging from roughly concurrent with liftoff to more than several years following. Thank you, that concludes my prepared remarks.

CHAIR YELLEN. Questions for Lorie? Governor Tarullo.

MR. TARULLO. Thank you, Madam Chair. Lorie, you mentioned, in connection with the ON RRP, that some of the foreign banks have pulled back, presumably to try to put their balance sheets in a better light for capital purposes. Given that the ECB, the Bank of England, and the Swiss banking regulator have all recently indicated increased expectations regarding capital among their big internationally active banks, do you think we can expect take-up to be moving up on a durable, rather than transitory, basis because foreign banks will be a little less willing to intermediate?

MS. LOGAN. We've seen a decline in repo trading activity, particularly from the European banks, and I think that has marginally affected the level of overnight RRP. But over the past year, the RRP level has been fairly steady. Looking ahead, I think market participants are still very attuned to whether that repo activity does continue to decline. But they're more focused on the money fund reform and the expectations that government funds are going to have larger amounts of assets under management, and that's going to be more likely to affect the overnight RRP.

MR. TARULLO. Of the three jurisdictions, only the United Kingdom is increasing the leverage ratio. The other two are just risk based, which presumably won't have as much of an effect.

MS. LOGAN. We've seen a lot of the largest declines already in the European banks, and they've suggested in commentary that they're largely done with that reduction. But it's hard to really know, as the firms get better about doing this full assessment across the firm, how different departments are then going to adjust.

MR. TARULLO. Okay.

MR. POTTER. And in the unsecured markets, Canadian, Swedish, and Australian banks are doing a lot of the trades.

MR. TARULLO. Thank you.

CHAIR YELLEN. Other questions for Lorie? Okay. Seeing none, let me turn to Jane Ihrig, who is going to talk about issues associated with the debt limit.

MS. IHRIG.<sup>3</sup> Thank you, Chair Yellen. I would like to take a few minutes to review issues related to the debt ceiling. As Lorie reported, the Congress seems to be close to an agreement to suspend the debt limit until March 2017. Proposed legislative text was released last night, and procedural steps are being taken to allow for expedited consideration of an agreement. This proposed agreement also would lock in spending caps for the next two years, making a government shutdown unlikely before the end of fiscal year 2017.

No votes have been scheduled as of yet, and the contents of a proposed deal could change at any point before legislation is formally brought to the floor. Rank-and-file members of the House and Senate learned of the proposed deal only yesterday afternoon and were first briefed on the contents of the proposed agreement last night, so there is no guarantee as of yet that a deal would have the votes necessary to pass in both the House and the Senate.

The uncertainty surrounding a resolution in the past couple of weeks was starting to show signs of strains in financial markets; Lorie noted bill yields on securities that are at risk of delayed payment had moved up. These strains led to some inquiries regarding the Federal Reserve's operational plans, and the Chair's letter last week outlined an approach for FOMC participants and Federal Reserve staff to deal with questions. The hope is to minimize public communications on issues associated with this topic to the extent possible. However, in response to inquiries, the minutes of the October 16, 2013, videoconference meeting are available on the Board's public website to reference.

My exhibit provides text in those minutes that might be seen as talking points on debt ceiling matters now and in the future. With regard to operations involving delayed payments on Treasury securities, policymakers saw "no legal or operational need to make changes to the conduct or procedures employed in open market operations, securities lending, or to the operation of the discount window," and would "continue to employ prevailing market values of securities in all its transactions and operations, under the usual terms." Regarding supervisory policy, policymakers noted that they would "take into account and make appropriate allowance for unusual market conditions."

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<sup>3</sup> The materials used by Ms. Ihrig are appended to this transcript (appendix 3).

If asked about steps the Federal Reserve might take to address market issues resulting from a delay in payments of any obligation of the U.S. government, it may be useful to note that “appropriate responses would depend importantly on the actual conditions observed in financial markets,” and “while the Federal Reserve should take whatever steps it could to address disruptions in market function and liquidity, the risks posed to the financial system and to the broader economy by a delay in payments on Treasury securities would be potentially catastrophic, and thus such a situation should be avoided at all costs.”

In terms of tools that the Federal Reserve has to address financial market pressures, the staff memo sent to the Committee on Thursday reviewed Desk and Reserve Bank operations that may moderate pressures. These operations include daily, routine operations such as overnight reverse repurchase tests and securities lending, and also repurchase agreement operations and the use of the discount window. No change would be made to current temporary open market operations without the consultation of the Committee.

The staff will continue to monitor markets for signs of financial strains that pose risks to market functioning and liquidity in case a deal does not go through and could, at a later date, come back to the Committee with options for potential actions as appropriate. Thank you. I would be happy to take questions.

CHAIR YELLEN. Are there questions for Jane? Seeing none, let me ask around the table. As Jane noted—and I sent a note to the Committee last week on this—the proposal would be that, in answering questions that may arise on this, we continue to act in line with the decisions that were made in 2013. President Lacker.

MR. LACKER. Yes. We discussed this in the Committee on Credit and Risk Management and reviewed what happened last time and what tiny, narrow, little potential credit issue there is. It seems quite manageable by manual workaround means, so we support this as a communications strategy and a recommendation to our colleagues on the conference as to how they should proceed in response to inquiries.

CHAIR YELLEN. Okay. And to the extent we have open market operations, we would continue to treat securities at risk in the normal ways. Any concern around the table? We don't need a vote, but I want to make sure there's broad agreement on the strategy. [No response] Okay. We also need a vote to ratify domestic open market operations.

MR. FISCHER. So moved.

CHAIR YELLEN. Second? Without objection. Okay. Thank you. Now we will go on to the “Economic and Financial Situation.” Let me call on David Lebow to start us off.

MR. LEBOW.<sup>4</sup> Thank you, Madam Chair. I will be referring to the handout titled “Material for the U.S. Outlook.”

In putting together our economic projection for this FOMC meeting, the primary issue we faced was deciding how to interpret the mixed economic data that we have received since the time of the September Tealbook.

As you know, the September labor market report was somewhat disappointing. Although the unemployment rate came in as expected, holding at 5.1 percent, the participation rate surprised us to the downside, and we did not get the upward revision to August payroll employment that we had anticipated. As a result, payroll employment growth is now reported to have averaged just under 170,000 jobs per month last quarter, down from the first half’s average monthly pace of 215,000. Of course, this is just one report, and we do still see some possibility of an upward revision to the August or September payroll figures. Accordingly, we took only modest signal from the labor news. We now expect monthly payroll job gains to average 180,000 in the fourth quarter—25,000 lower than we had previously assumed, but still higher than August and September’s reported average pace of 140,000 jobs per month.

The news from the industrial sector has also been disappointing, with industrial production weakening and the manufacturing surveys generally downbeat. Of course, two of the most identifiable sources of restraint on the economy, the strong dollar and the effects of low oil prices on energy producers, both have effects that are concentrated in the industrial sector, so this relative weakness may not be surprising.

Some positive news has come on the spending side, an area in which we have had upward surprises to indicators of both household consumption and business fixed investment, although this morning’s advance durables release for September was weaker than we had projected and makes the investment news a little less positive. In all, private domestic final purchases—which we think tend to carry some momentum—seem to be showing solid growth. However, net exports continue to decline, importantly reflecting the appreciation of the dollar since the middle of last year. And the available data on inventory investment now point to a fairly sharp slowing in the pace of stockbuilding last quarter. Given this mixed array of indicators, as you can see from the first panel of your forecast summary exhibit, our projection regarding real GDP growth in the second half remains modest, with an average pace that is a little lower than in our September forecast. I should note that, with today’s durable goods data, along with other bits of data received since the

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<sup>4</sup> The materials used by Mr. Lebow are appended to this transcript (appendix 4).

Tealbook closed, our estimate of GDP growth in the third quarter is now at 1¼ percent, rather than the 1½ percent in the Tealbook, and that is shown in your exhibit.

Over the remainder of the medium term, our outlook for real GDP growth is essentially unchanged from the September Tealbook. In addition to the fact that we took little signal from the mixed incoming data, we made only minor revisions this round to our key conditioning factors. For fiscal policy, we assumed that the Congress and the Administration would find their way to avoid a government shutdown and raise the debt ceiling without causing material disruption to the economy, and, fortunately, that does seem to be playing out. For monetary policy, we now assume that the federal funds rate will lift off from its effective lower bound after the December meeting; in our previous projection, we had assumed a September liftoff date. As we noted in the Tealbook, our models suggest that the economic consequences of altering the liftoff assumption by one or two meetings would be quite small, both because the difference in the funds rate path would not be very large and because the models embed the implicit assumption that the public does not take a signal from different liftoff dates for either the monetary policymakers' reaction function or for the outlook for economic activity or inflation.

With little change to our projection of real output growth, our outlook for the unemployment rate—panel 2—is also little revised since September. At the end of the medium term, we continue to expect that the unemployment rate will be 4.7 percent, 0.4 percentage point below our estimate of its natural rate.

Panel 2 also indicates that the unemployment rate in the third quarter was equal to our estimate of its natural rate, implying that the unemployment gap has now closed. As you know, however, for some time we have thought that the unemployment gap understates the margin of slack in the economy, and we view our estimate of the output gap as providing a more comprehensive measure of resource utilization. In panel 3, the dotted blue line plots the judgmental estimate of the output gap that is reflected in the Tealbook baseline; as you can see, this gap estimate was still negative in the third quarter, though small.

The panel also shows two other gap measures obtained from staff models. The red line gives the production-function variant of the output gap generated by EDO, one of our DSGE models, while the black line—labeled “FRB/US”—plots an estimate of slack from a state-space model that pools the information from a number of indicators. Both of these alternative gap estimates also suggest that resource utilization has nearly returned to its sustainable position, though the wide confidence interval surrounding the FRB/US value should give you an idea of some of the uncertainty that surrounds these sorts of estimates.

Panels 4 and 5 summarize the inflation outlook. As you can see from panel 4, we are no longer projecting an outright decline in total PCE prices in the fourth quarter, mainly because it now looks like the pass-through of this past summer's oil price declines to consumer energy prices will be a little more spread out over time. We

have also nudged up our near-term projection of core PCE inflation—panel 5—in response to the September CPI report, which came in a little higher than expected. Over the medium term, our projections of both total and core inflation rates are unrevised from the September Tealbook, and they show inflation gradually approaching 2 percent.

As you know, the primary aggregate measures of labor compensation have shown little sign of accelerating over the past few years, despite a substantial improvement in labor market conditions. This round, Deb Lindner, John Roberts, and Bill Wascher sent a memo to the FOMC that analyzed the recent behavior of compensation and, in particular, asked how much of a signal it provides regarding the amount of slack remaining in the labor market. They concluded that the recent evolution of compensation can be reasonably well explained by the recent behavior of structural productivity, trend price inflation, and the staff's estimate of the unemployment gap. In panel 6, I have reproduced one of the figures that appeared in their memo. It uses one of the staff's empirical compensation models to decompose recent changes in the employment cost index, or ECI, into the contributions of these various underlying factors. As you can see from the red portion of the bars, which give the estimated contribution of the unemployment gap, the effect of labor market slack in holding down compensation growth is estimated to have been steadily diminishing during the economic recovery. However, this factor has been largely offset by a slower pace of trend real wage growth—the blue portion of the bars—that in turn reflects a slowdown in structural productivity growth.

These results suggest that it is not necessary to appeal to a wildly different estimate of slack than the staff has assumed to explain recent compensation developments; that said, the memo also finds that point estimates of the natural rate obtained from empirical wage equations are quite imprecisely estimated, and they are sensitive to the specific values of structural productivity growth and trend inflation that are assumed. Thus, the behavior of wages, taken alone, does not appear to provide much useful guidance about the level of the natural rate.

Finally, the next page updates an exhibit that we have recently been showing you that attempts to provide a high-level summary of some of the key pieces of information that will be available at the next few FOMC meetings. The data that have become available for today's meeting are shaded in blue, the data that will first be available at the December meeting are in gold, and the additional observations that will become available in time for the January meeting are in red.

As I mentioned, we expect to see total PCE price inflation that is modestly higher than our September projection, mostly reflecting a somewhat slower anticipated pace of consumer energy price declines. Nevertheless, even by the time of the January meeting, the 12-month change in total PCE prices is only expected to be about  $\frac{1}{2}$  percent, and the 12-month change in core prices will be about  $1\frac{1}{2}$  percent. For real activity, we still think you will be seeing fairly solid payroll job gains and a 5 percent unemployment rate at the time of both the December and January meetings; however, the most recent read on real GDP growth that we will have received—for the third

quarter—we think will be lackluster. Steve Kamin will now continue our presentation.

MR. KAMIN.<sup>5</sup> I will be referring to the exhibit labeled “The International Outlook.” Panel 1 presents our outlook for economic growth abroad. As you can see from the solid black line, we estimate that aggregate foreign GDP growth more than doubled from a severely anemic 1 percent pace in the second quarter to a still-subdued 2¼ percent pace in the third. For the period ahead, we continue to expect that economic growth abroad will pick up to its trend rate of nearly 3 percent by next year, little changed from the September Tealbook. Altogether, our outlook may appear fairly benign, but, like the smile painted on the face of Bozo the Clown, it masks some pretty deep uncertainties and anxieties. [Laughter]

To be clear, the advanced foreign economies, or AFEs, are not the source of our sleepless nights. As shown by the solid green line, we estimate that GDP growth for the AFEs jumped to nearly 2 percent in the third quarter. Most of that upswing comes from Canada, which has a very large trade-weight in our foreign aggregate. The Canadian economy had contracted in the first half of this year, depressed both by low oil prices and by transitory outages in the energy sector, but it has since rebounded as energy production came back online and manufacturing activity picked up. The Japanese economy also looks a bit better after a second-quarter slump, while the U.K. and euro-area economies continued to expand at a moderate pace. The AFEs should continue growing about 2 percent over the forecast period, interrupted in early 2017 by Japan’s second consumption tax hike. We now anticipate more monetary policy accommodation on the part of the Bank of Japan, Bank of England, and European Central Bank than in the previous forecast. The additional stimulus should be motivated mainly by shortfalls in headline inflation, but concerns about the global outlook will likely also be a factor.

Indeed, while our projection for the EMEs, shown in blue in panel 1, looks reasonably optimistic, with economic growth reaching 4 percent later in the forecast period, the risks around this outlook are quite prominent. To be sure, a number of the concerns that roiled global markets in August and September have subsided for the time being, as indicated by the decline in CDS spreads shown in panel 2. China’s authorities kept the renminbi roughly stable over the past couple of months, easing worries that substantial further devaluation would destabilize world markets. And, as indicated in panel 3, Chinese GDP growth for the third quarter came in unexpectedly strong, at nearly 7 percent on a four-quarter basis, thereby reducing investor fears that a hard landing was in train. Finally, market expectations for a later Fed liftoff likely played some role.

While some of the risks and uncertainties surrounding the EME outlook have subsided, however, they have hardly gone away. To begin with, the recent strength of Chinese GDP appeared to reflect an acceleration in services activity (the blue line in panel 3) even as industrial production (the red line) continued to slow. On the face of

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<sup>5</sup> The materials used by Mr. Kamin are appended to this transcript (appendix 5).



it, this development is encouraging evidence of the rebalancing of China's economy. But it is difficult to tell how much of the strength in services reflects a transitory surge rather than a more lasting trend. Certainly, at least part of the recent upswing reflects heightened activity in financial services that should recede as the stock market calms down. But to the extent that a shift to a services-led growth model is genuinely under way, it will require new models to map incoming data into future growth, making it yet more difficult to project China's economy. In the event, we marked up our outlook for China a touch for the next couple of quarters while leaving the rest of our projection unchanged, but we remain quite uncertain about this forecast.

The shift from manufacturing to services may have implications for China's trading partners as well. In principle, the rebalancing of the Chinese economy should entail weaker exports, stronger consumption and imports, and thus greater contributions to global demand. But the consumption and production of services is likely to require fewer imports of commodities, intermediate materials, and even finished goods than manufacturing for export. As a consequence, although China's rebalancing should be a positive for the global economy in the long run, in the shorter term it could prove disruptive for EMEs that depend on China's manufacturing sector for their export sales.

Indeed, declines in China's imports over the past year, along with declines in commodity prices also associated with China's slowing, have already been depressing economic growth in other EMEs, as shown in panel 4. But other factors besides China have also been at work: Increases in global commodity production have weighed on prices, the recovery of the advanced economies has provided less support for EME exports than we would have expected, and some emerging economies are running into structural bottlenecks that are limiting their growth. Brazil has been the poster child for such problems, as its government struggles to revive its economy while simultaneously attempting to tamp down rising inflation, achieve fiscal discipline, and restore confidence in its credit. But economic growth in many other EMEs has also slowed, and the recovery in the second half of this year has thus far been tepid.

These considerations pose two related risks to the outlook. First, the momentum of EME growth in the period ahead may prove still weaker than we anticipate, leading to further downward revisions to our forecast. Second, EME corporations have accumulated considerable debt in recent years, and a further slowing of economic growth would make it more difficult to service that debt, boosting the likelihood of default and, at an extreme, possibly leading to financial crisis in one or more emerging market economies. We do not believe that a widespread EME crisis is likely, but such concerns explain why fears of a hard landing in China proved so disruptive to markets a couple of months ago.

Higher global interest rates would also make debt service more difficult and put pressure on financial conditions in emerging markets. Returning to panel 2, concerns about the future normalization of U.S. monetary policy are probably adding to

emerging market jitters, but they do not seem to have been directly responsible for the upsurge in volatility during the summer, as U.S. yields—the black line—were actually declining during this period. We doubt that the gradual tightening of FOMC policy envisaged in the staff forecast would be sufficient to trigger much distress in emerging markets. However, if markets overreact to liftoff and push up yields to a much greater extent than we currently anticipate, more-adverse outcomes are certainly possible.

By the same token, our forecast for the dollar, shown in panel 5, is predicated on our view that Fed liftoff, assumed to take place in December, will not be a great surprise to market participants. We have built some further dollar appreciation into our forecast even after that event, as some market participants take time to adjust their positions, the subsequent pace of FOMC tightening exceeds market expectations, and investors react to further easing by foreign central banks. This uplift is offset in our forecast by some depreciation of the dollar against the Chinese renminbi as it resumes its appreciation starting in the middle of next year, and so the broad real dollar remains about flat over the forecast period. However, forecasting exchange rates is not quite an exact science, and there is certainly a good chance that the dollar could rise further than we are projecting. Even if it does not, the 14 percent rise in the dollar that has already taken place since the middle of 2014 leads U.S. net exports, shown in panel 6, to continue to be a negative contributor to real GDP growth for the next couple of years. This result reflects the very long lags we have estimated for the response of trade to exchange rates. Andreas will now continue our presentation.

MR. LEHNERT.<sup>6</sup> Thank you. Since our last assessment of financial stability in July, amid concerns about slowing Chinese economic growth and the prospects for emerging market economies more generally, financial markets experienced a bout of turbulence, which they appear to have absorbed without causing broader strains in the system.

I will start with a discussion of asset valuations. As shown in panel 1, despite the events of the summer, forward P/E ratios remain relatively high, at about their 75th percentile, and valuations for small cap stocks, not shown, are still at the upper end of their historical range as stock prices largely retraced their losses.

The imprint of the summer's events on bond spreads, panel 2, has been more durable, with spreads on speculative-grade bonds in particular now well above their recent lows. This widening represents some mixture of darker expectations about default rates and decreased risk appetite. Evidence from the term structure of corporate spreads and other sources also suggest that investor risk aversion has increased, pointing to some continued easing of valuation pressures in the corporate debt markets since late last year.

When bond yields rise, of course, prices fall and investors take capital losses. As shown in panel 3, the late-summer losses were accompanied by moderate flows out of

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<sup>6</sup> The materials used by Mr. Lehnert are appended to this transcript (appendix 6).

mutual funds that hold loans and high-yield corporate bonds. In the event, flows were not particularly large, and certainly well below the flows seen late in 2014 when energy-related concerns prompted a pullback from the sector. (Although it is hard to see on the chart, data so far in October suggest such funds have seen net inflows.)

Outflows from mutual funds that hold relatively illiquid assets such as high-yield bonds or loans are a potential concern due to their structural liquidity mismatch, under which investors can redeem their shares at the end of each day, but the underlying assets can take much longer to sell. Further, redemption costs are borne by the remaining shareholders in the fund, creating a mild first-mover advantage.

On September 22, the SEC put out proposed rules on mutual fund liquidity risk management that went some way to address these concerns. The proposal would require funds to adopt a liquidity risk management policy, to report their own assessment of their liquidity positions, and to set a benchmark for the minimum amount of assets sufficiently liquid that they could be sold in three days. In addition, mutual funds would be able to adopt so-called swing pricing, a scheme used in Europe in which investors pay some of the redemption costs as they exit, decreasing the first-mover advantage. While we are continuing to study the proposal, in principle the changes would represent significant progress in remedying a structural risk in open-end mutual funds.

Leverage in the financial sector plays an important role in our assessment of vulnerabilities. While we do not have a comprehensive measure of leverage from derivatives or at dealers, we can measure leverage at institutions central to intermediation: insurance companies and banks. As shown in panel 5, debt-to-equity levels at insurance companies are below their pre-crisis levels, suggesting insurance companies are in relatively good positions. Panel 6 gives a historical perspective on bank capital ratios. The chart shows the ratio of tangible common equity to total tangible assets at commercial banks. Although there is not a specific regulatory expectation regarding this measure, it has the virtue of being roughly comparable over long periods of time despite changing risk-weighting regimes and accounting standards.

You can see two distinct episodes when bank capital ratios increased: after the original Basel capital accords in the early 1990s and again following the Dodd-Frank Act and the implementation of Basel III. Whether this is enough capital for financial stability depends on the size of the shock; however, we can say that this is substantially more capital than the industry has seen in several decades. Moreover, results from the Federal Reserve's stress tests suggest that participating institutions have sufficient capital to weather a severe recession.

On exhibit 2, I turn to the issue of vulnerabilities stemming from developments in commercial real estate before turning to broader nonfinancial leverage measures. As shown in panel 7, prices for commercial properties have been rising rapidly in recent years, with the increase in prices of apartment buildings particularly notable. Fundamentals in this sector have been improving, with rents increasing amid

declining vacancy rates. However, ratios of rents to prices—capitalization rates—are at all-time low levels, although cap rates relative to Treasury yields are not unusually low.

As further evidence of valuation pressures in CRE, the rise in prices has been accompanied by weakening underwriting standards in securitization markets. Panel 8 shows that issuance of commercial mortgage-backed securities has picked up in recent years, though it is still well below its pre-crisis levels. Rating agencies and market participants have complained that issuers are shopping their securities in order to get better ratings; in addition, they report that recent deals feature loans with higher LTV ratios, a greater portion of interest-only loans, and more loans secured by properties outside the central business districts of major cities.

At banks, underwriting standards appear more moderate. Panel 9 shows responses from the July Senior Loan Officer Opinion Survey on Bank Lending Practices to questions about the level of standards on commercial real estate loans at banks. As you can see from the yellow and orange areas, the bulk of respondents reported that standards were at their midpoint or somewhat easier than the standards since 2005. It is worth noting that standards on construction and land development loans, the rightmost bars, are more in line with their midpoint. These loans carry higher risk of default and generally larger losses conditional on a default. Moreover, results from the October survey show a slight tightening of standards, suggesting that the long period of easing that followed the crisis has slowed or perhaps even come to an end. In addition to underwriting standards that largely meet supervisory expectations, the exposure of large banks to these loans appears pretty limited.

While prices and underwriting standards show evidence of valuation pressures, it does not look like commercial real estate debt is, as yet, growing in line with these pressures. Panel 10 puts CRE debt into perspective. Loans backed by commercial properties, including apartment buildings—the blue region—have grown to about \$3.5 trillion, just exceeding their pre-crisis peak. Total business debt—the blue and green regions together—including bonds, unsecured loans, and so forth, has been growing faster and now stands at about \$12.5 trillion.

We have flagged the balance sheets of businesses as a potential building vulnerability in our assessments for several rounds.

Although total business credit, the top line in panel 10, has not been growing particularly rapidly lately, the riskiest forms of business credit—that is, leveraged loans and high yield bonds—have been a particular focus, in part because of weakening underwriting standards on leveraged loans combined with the sustained period of double-digit growth in these forms of debt, shown in panel 11. As you can see, debt growth has decelerated in recent quarters as financing conditions began to tighten in 2014, even ahead of the late summer volatility.

A number of papers, including those by Schularick and Taylor, Reinhart and Rogoff, and the IMF, argue that there is an empirical link historically between rapid

growth of some forms of credit and subsequent financial instability. In this spirit, panel 12 shows the credit-to-GDP ratio decomposed into debt owed by businesses, the orange region, and that owed by households, the red region. As you can see, the overall debt-to-GDP ratio has been flat for several years now, with the business debt growth I flagged offset by the continued decline in borrowing by families, especially for mortgages. Thus, on balance, we judge the vulnerability associated with nonfinancial debt to be moderate.

Your last exhibit shows our heat map summarizing our current view of financial vulnerabilities (in the rightmost column) compared with our views a year ago (the middle column) and, somewhat speculatively, what we think we would have said in mid-2004 (the leftmost column). Reviewing our current assessment, starting at the top, we judge valuation pressures to remain notable despite the rise in risk aversion in some fixed-income markets, vulnerabilities from private nonfinancial leverage to be moderate, vulnerabilities from financial-sector leverage to be low, and vulnerabilities from maturity and liquidity transformation to be moderate.

Our overall assessment, which is based on the levels and interactions of the individual categories, is that the vulnerability of the financial system is currently moderate. Thank you.

CHAIR YELLEN. Are there questions for any of the presenters? President Kocherlakota.

MR. KOCHERLAKOTA. Thank you, Madam Chair. I had a question about the inflation outlook. On page 2 of 2 in the handout labeled “U.S. Outlook,” if I look at the 12-month change in core PCE, going from July up through December—obviously, December is a forecast—we see an increase of 0.3 percentage point in a five-month period. At that point, the staff is expecting core PCE inflation to either flatten out or even decline slightly over the course of 2016 before beginning its gradual rise back up to target over the remainder of the decade. What’s the story for 2016? Many observers, if your forecast comes to pass in 2015, are going to be saying, “Look, we’re going up 0.3 percentage point in five months. It looks like the Fed is back on track.” But that isn’t your outlook, so I was wondering what the story is behind that.

MR. LEBOW. Most of these movements in the 12-month change in total PCE inflation that you're referring to have to do with the timing of when the energy price movements are happening.

MR. KOCHERLAKOTA. Sorry. I meant to talk about core. The 12-month change in core PCE in July was 1.2 percent, and you expect it to move up to 1.5 in December. If you go to Tealbook A, the outlook for 2016 is actually, I think, 1.4 percent. So I was just wondering, what's the story for the contours of that forecast?

MR. LEBOW. That's right. For 2015 as a whole, the four-quarter change is 1.4 percent, and so it's not surprising that the 12-month numbers you're seeing in the fourth quarter are at that same level. One of the factors built into our projection is a little bit of residual seasonality, as we've talked about before. That is not as visible because the September CPI that we just got was higher than expected. We do have some low-ish numbers built into our monthlies for the next couple of months, and that affects the three-month change pattern that you're seeing, in which it falls back from 1.5 in November to 1.2 in December.

Broadly speaking, in 2016, we are expecting that some of the effects of the import prices holding down core inflation are going to be waning, according to our projection of what import prices will do. That in itself would lead you to expect a little higher inflation in 2016. In fact, that's worth maybe a couple of tenths. In 2015, that 1.4 is actually a little higher than we would've predicted on the basis of the fundamentals, including the movements of the dollar and import prices. So that slight positive surprise in 2015 goes away and offsets the dollar effects coming out in 2016. That's why we've got the same 1.4 in 2015 and 2016 in our projection of core inflation. Then we have core inflation edging up from there as the import and energy price effects on core dwindle further.

MR. KOCHERLAKOTA. Okay. Thank you.

CHAIR YELLEN. Governor Fischer.

MR. FISCHER. Andreas, we talked a fair amount about leveraged loans last year, and it seems that the talking worked. Was it the talking, or was it something else that was happening at the same time?

MR. LEHNERT. Yes. Certainly, the evidence from the examinations that our supervisory colleagues have conducted is that the number of so-called nonpass loans—that is, loans violating the guidance—really declined over the past year. At the same time, there was a pretty substantial increase in risk aversion. We had the oil price declines in late 2014 and the associated concerns about the outlook for that sector in which there's a volume of leveraged loans. So between supervisory pressure, guidance, et cetera, and the increase in risk aversion, it's hard to judge. I guess I'd say that the spread widening probably can't be explained by guidance per se, and that it seems to reflect more risk aversion or risk appetite or the outlook for that sector.

MR. FISCHER. Okay. Thank you.

CHAIR YELLEN. President Evans.

MR. EVANS. Thank you, Madam Chair. I'd like to ask a question about the Tealbook A box on page 54, "The Recent Decline in Longer-Horizon Inflation Compensation." For a little context, we just had the discussion about  $r^*$ , and one of the things that comes out of that is, it depends a little on your modeling strategy—whether your shocks are basically stationary and you're not going to have your estimates move around for any great length of time or whether you allow them to be permanent. Our FOMC statement, for quite some time, has pointed to market measures of inflation compensation moving down but survey measures being

fixed. What's our ability to detect longer-horizon movements in those? Are they baked in the cake, are they never going to move, or do they actually have the opportunity?

Now, taking it to the yield curve data—the topic of the box—most of our term structure models have baked into them  $I(0)$  stationary assumptions about inflation and the yields and things like that, so they can't move very far from endpoint inflation expectations. But in the box you allude to a new model that has  $I(1)$  properties, so it has the possibility of seeing them move. This came up with President Lacker's comment about different equilibrium and whether inflation expectations can move down. If I understand it right, its estimate is potentially 50 basis points lower inflation expectations. That's viewed as an upper bound. I'm not quite sure how to put all of those things together. If I remember right, the inflation attractor that the Tealbook uses is around 1.8 percent, and then there's the assumption that it's going to move up, and we don't really know. Could you discuss some of that?

MR. LAUBACH. Perhaps I can pick up on the upper-bound notion. That really has to do with the possible persistence of shocks to inflation. In that sense, rightly, this model takes the view that these shocks might leave a permanent imprint. You might view that as one polar assumption. You're right in pointing out that it matters a whole lot for the implications for longer-horizon inflation expectations whether, technically speaking, you have a unit root, or the root is 0.99. It makes a huge difference as you forecast further and further out. Of course, I'd add that, sadly, for that reason, the data also don't speak very loudly on the matter, so we're presenting this estimate as an interesting case to consider. But if you asked us about our confidence as to whether it's this assumption or what's built into the standard model, it would be very difficult for us to confidently say anything about which of the two it is. As you know, even in our standard model, there's some persistence—at the 5-to-10-year horizon, you can generate



some decline in inflation expectations, and so it doesn't revert back very quickly. Nonetheless, it matters a great deal whether you move to the possibility that you literally have permanent imprints on inflation expectations. I wish we had greater ability to discriminate confidently in the data between these two.

MR. EVANS. Thank you. I'm sympathetic to all of those issues.

MR. LEBOW. Regarding the inflation projection itself, just to be clear, our projection is predicated on the idea that longer-run expectations are stable and will remain stable for some time more. In other words, we're not taking signal for our baseline inflation projection from this news in the TIPS spreads moving lower. Our assumption is of stable expectations that are consistent with PCE inflation settling out a bit below 2 percent—1.8 percent, as you said. We do eventually assume that those expectations will drift slightly higher to be consistent with 2 percent inflation in the longer run, but there would be no support for that assumption in the TIPS data—quite the opposite.

MR. EVANS. Okay. Thank you.

CHAIR YELLEN. President Williams.

MR. WILLIAMS. Yes. I have a couple of questions around financial stability, but these charts also appear in the Tealbook, so it can be a free-for-all.

In the QS report, chart 1-11 shows cap rates in commercial real estate, which you mentioned are at very, very low levels—in fact, I would say the lowest we've seen since 2006 and 2007. Also the price-to-rent ratios in residential real estate are in chart 1-14. I don't just want to think about financial stability, I want to think about risk to the macroeconomic outlook, because when I talk about financial stability, we immediately go into leverage of banks and this and that. I'm actually also focused on risk to economic growth. Which should I think of as the

better metric, or measure, of risk to the economy? Is it the price-to-rent ratio relative to a historical norm, a cap rate relative to a historical norm, or a cap rate that's adjusted for where interest rates and other right-hand-side variables may be?

It could be, as we saw in the mid-2000s, that basically all assets were overvalued, and so when you compare commercial real estate cap rates with Treasury securities, everything looks great because everything is in a frothy state while, in fact, there are problems all over the place. Also, in the house-price-to-rent ratio, you have this long-run trend that, as I understand from the footnote, reflects not only some trend in the house-price-to-rent ratio but also carrying costs, which I take to mean interest rates and things like that. The way I read the house-price-to-rent ratio is that the house prices are about 35 percent above their historical norms, but once you put in this trend and the carrying costs and other things, it actually looks pretty good.

Going back to my question, when we think about macroeconomic risks, should I be thinking about the 35 percent, should I be looking at cap rates being really low, or should I be saying, "Maybe I can justify all of this because of very low interest rates?" If that wasn't a leading question, it was supposed to be.

MR. DUDLEY. I have a question for President Williams. Let's say the risk was all Treasury yields. Then don't you have the risk of Treasury yields going up a lot?

MR. WILLIAMS. Yes. That's one way to put it.

VICE CHAIRMAN DUDLEY. It seems to me that it doesn't matter that much if the cap rates are out of line or the Treasury yields are out of line. Something is out of line; you still have the same risks.

MR. WILLIAMS. Right. That's actually how I was thinking about it.

VICE CHAIRMAN DUDLEY. Okay.

MR. WILLIAMS. But then that would argue, “Don’t tell me cap rates are low because Treasury yields are low, so that’s okay.” But I also don’t quite understand where this long-run trend that’s in both the Tealbook and the QS report really comes from. To what extent is that some view about trend price-to-rent ratios—which I don’t have a good understanding of—or to what extent is it really reflecting just interest rates? At the last FOMC meeting, I said house prices were roughly 30 percent overvalued based on a chart like this, and of course the Tealbook says that’s not correct, they’re actually overvalued by 6 percent. I want to know the right way to think about the risk to the outlook. Maybe they’re both good ways to think about it, but it’s a question. It’s a leading question.

MR. LEHNERT. I know you don’t want to hear about leverage and so forth, but I’m duty bound. [Laughter] As someone who labors in the macroprudential-industrial complex, I feel required to mention this. The question from a stability perspective is, what happens if prices decline a lot? What I tried to lay out for you was an argument that in the CRE space at least, there wouldn’t be any amplification; there wouldn’t be any second-round effect. There are no externalities or spillovers from leveraged intermediaries suffering capital losses and so forth. That is doubly true in the residential space in which all the credit risk is held, for better or for worse, on the public-sector balance sheet.

I heard some questions about the price-to-rent ratio. I have to talk about that, too. [Laughter] I think I might be the original progenitor of the price-to-rent ratio. As I recall, Josh Gallin and I worked on it 15 years ago. The problem in residential is that there’s no equivalent of cap rate. There’s no way that you really observe a house being both available for rent and available for sale. One way to approach that problem is to compare indexes with indexes—the index of prices with the index of rents. There are many measurement problems, but the most

obvious one is that the stock of rental housing and the stock of owner-occupied housing are divergent in terms of their hedonic qualities over time—the willingness of people to pay for them. So that's the main underlying source for the price-to-rent ratio trend.

Then the question of the sensitivity of the overvaluation estimate to the trend is a fair one. Back when I was doing this, I tried a bunch of different ways to correct for this, including looking at the Census data directly and actually doing a regression of hedonic characteristics and trying to construct an equivalent rental house and an equivalent occupied house. A much simpler way to do it is to forget about rent. Let's just assume that there's some kind of trend in real house prices for whatever reason—population growth, what have you. And let's say that the bubble period began in 2000 or 2001, and let's estimate the trend through there and then jump it off. All of these kinds of approaches—the paper that I wrote with our former colleague Morris Davis and the simple-minded jump off from the trend—all give you answers that housing is no longer cheap, but it's not, I would say, excessively rich. I don't know if that helps you.

MR. WILLIAMS. The issue there is always extrapolating. You're extrapolating now 15 years out on the trend, and your out-of-sample period is getting closer to the size of your actual sample. But that answered my questions on how to think about it.

I actually said I wasn't going to ask about leverage, but you wouldn't let me do that. My own view of leverage was that one of the things that we should have better understood was the distribution of leverage and not just the aggregate. When you look at a picture like yours, it's really high, it's lower than it was before, it's flat, but there's not a lot of information in here about how many people in California today are buying houses with 95 or 100 percent LTVs, because this is an aggregate statistic. To the extent that these summary statistics are mushing

together my parents, who have no leverage; me, who has a little bit; and then all of my neighbors, who are completely leveraged out—[Laughter]

MR. LEHNERT. Okay. I'm really glad you asked that question, although you may live to regret it. That is an absolute void in our understanding that we identified back when this was first a concern. The staff here has done an extraordinary amount of work to try to understand precisely the issues that you're describing. I don't know if this is available to you, but there's a big book of QS assessments, which is a mere 216 pages this round.

MR. WILLIAMS. We're limited at our Federal Reserve Banks in how much we can spend on printers. [Laughter]

MR. LEHNERT. I understand.

MR. TARULLO. It's a high one. [Laughter]

MR. WILLIAMS. But there's a limit.

MR. LEHNERT. I would say that we do look at the cross-sectional distribution of a variety of different measures. Maybe one to highlight is county-level breakdowns. If you see house prices move a lot, how much do you see debt in that county grow? There's a pretty solid relationship between those two variables in history. Since 2009, that relationship has really broken down. I don't know your neighbors, and I don't know where you live, but my sense is that people are using cash to buy or pay. You may argue that they're paying too much, but the point is that they're not really borrowing money to do it.

MR. WILLIAMS. Okay. It would be great to have updates in which we see that kind of information because we are definitely hearing a lot more stories from our banking advisory council, CDIAC, and from our board about very high LTVs in our District—over 90 percent.

CHAIR YELLEN. Governor Tarullo.

MR. TARULLO. Thank you, Madam Chair. I want to build on President Williams's question, because I think Andreas actually has more to say about it than he has to this point. President Williams was, I think, implicitly drawing an important distinction between, on the one hand, financial stability considerations, in which leverage is implicated—meaning that there's some significant risk to the intermediation function—and, on the other hand, the potential effect of leverage as a macroeconomic matter.

Nellie and Andreas, I thought we had a pretty good case study of at least thinking that through in the leveraged-lending context that Governor Fischer was mentioning a moment ago. In that case we were pretty confident that financial-stability risks, as conventionally understood, were not all that implicated by this big growth of leveraged-lending originations because so much of that was getting passed on to ultimate holders who were not themselves intermediators, or at least not highly leveraged intermediators. But then there was a complementary analysis, which I think came from your office, saying that you would still be concerned because this is upping the risk of quite a few bankruptcies—more bankruptcies with a minor dip than would otherwise take place—and, thus, although we may not have supervisory or regulatory tools to deal with it, it still ought to be relevant. That was what I understood John to be getting at, which then does argue for more granular data on, as he would put it, how to “disaggregate” that curve. I think I'm characterizing fairly what you said 6 or 8 or 10 months ago.

MR. LEHNERT. That's right. In mid- or late 2014, as I recall, we asked what the strongest case was to be concerned about the growth of the leveraged finance sector. The channel that we identified was one in which the business sector gets leveraged and then you have a more fragile industry from now on that's more likely to face higher credit losses and financing constraints.

MR. TARULLO. One could say that about people who own commercial real estate and people who own houses, too, even though they're not intermediators, right?

MR. LEHNERT. Yes. I see your point. There's still the legacy of the old mortgages that are hanging around, but in terms of debt service burdens and so forth, those have come down remarkably in the past few years.

MR. WILLIAMS. I invite you to come to my beautiful District. [Laughter]

MR. LEHNERT. Thank you.

CHAIR YELLEN. Governor Fischer.

MR. FISCHER. Thank you. To follow up on Governor Tarullo's question, there are two issues. One, what happens if the interest rate goes up and they're at 5 percent down on the mortgage? And the other is, what happens if business conditions deteriorate? Now, both of those could create the bankruptcies about which you talked. What are you focusing on, or doesn't it matter?

MR. LEHNERT. In the exercise that we did in 2014, we focused more on just the susceptibility of the business sector to shocks—typical, if you will, accelerator-type dynamics. On the interest rate picture, we often do think about the sensitivity of the system to rates and so forth, but that seems to be a slightly different question.

MR. FISCHER. Okay. Thanks.

CHAIR YELLEN. Vice Chairman.

VICE CHAIRMAN DUDLEY. Doesn't it depend a bit on the rollover risk? I could have a leveraged position, when interest rates go up, but as long as I'm term funded, nothing really is going to happen to me for a while, right?

MR. LEHNERT. Yes. I think it's more of an issue in the leveraged finance sector, in which people expect to refinance their big loans even though, as you say, a bond is going to have a term exposure. The loans themselves are floating rate, so that's an area in which an increase in rates would pass through, in terms of payment burdens, to the borrower.

VICE CHAIRMAN DUDLEY. But in housing, presumably, people have mostly fixed-rate mortgages.

MR. LEHNERT. Yes. Exactly. Housing, autos, and cards are mostly amortization. There's not really an issue there.

CHAIR YELLEN. President Kocherlakota.

MR. KOCHERLAKOTA. Thank you, Madam Chair. I thought President Williams's intervention was really food for a lot of thought. I wanted to follow up on one of his comments about thinking about the decomposition of price-to-rent ratios into a risk premium factor, a path-of-short-rates factor, and a term premium factor. Some of these questions about how secure we should feel about the current level of price-to-rent ratios really come down to what you think of the time-series properties of these various factors. One way to respond to his question would be to provide some information to the Committee about the particular time-series properties of these various factors. Obviously not definitive, but, certainly, it would be a starting point.

CHAIR YELLEN. Okay. Now, we have an opportunity to make comments on financial stability, and a few people have indicated their desire to do so. Let me start with the Vice Chairman.

VICE CHAIRMAN DUDLEY. Yes. I'd like to talk about something that we haven't talked about yet, which is Puerto Rico. Time is running out there, and nothing that will facilitate an orderly restructuring has yet emerged. On the positive side, you've probably seen that the



U.S. Treasury has taken the initiative in proposing that the Congress pass legislation that would enable the territory—not just the public corporations, but the territory itself—to have the option of filing for bankruptcy. If they got that authority, that would be important, because that would put pressure on creditors to agree to a voluntary restructuring or, failing that, to have a more organized process for restructuring under bankruptcy protection. Also, the Treasury has advocated increasing the earned income tax credit for Puerto Rican residents, improving Medicaid access, and having an oversight board to monitor the restructuring and its aftermath.

On the negative side, I would say that the congressional response to the U.S. Treasury's proposal has been lukewarm at best, and it's unclear whether the Treasury proposals go far enough, frankly, in putting Puerto Rico on a sustainable course. There are many other structural impediments that could be addressed that the Treasury is silent on, including exempting Puerto Rico from the Jones Act, allowing a lower minimum wage for Puerto Rico, or taking steps to broaden the tax base, because Puerto Rico has a very large informal economy.

At this juncture, a hard landing for Puerto Rico seems like a real risk within a few months, and much needs to be done quickly if we're going to avert that outcome. If it does transpire, it's going to be absolutely horrible for Puerto Rico and its residents, but as I said in the past, the systemic effect on the broader U.S. economy and the financial system is still likely to be very modest. Puerto Rican debt already trades, for example, at a steep discount from par, and municipal bond insurers that are exposed to Puerto Rico play a much smaller role in the municipal bond market now than they did before the financial crisis.

CHAIR YELLEN. Thank you. President Rosengren.

MR. ROSENGREN. Thank you, Madam Chair. This follows up on one of Andreas's charts. Recently, a number of economic research papers have focused on assessing the

information content in credit spreads. Not so long ago, we were concerned that credit spreads were unusually low, suggesting an underpricing of risk. It is noteworthy that spreads have moved from their unusually low levels. Particularly at a time when we are actively considering tightening monetary policy, it is somewhat incongruous that we are seeing credit spreads reaching multiyear highs last seen several years ago when concerns over European problems were particularly acute.

It should be noted, however, that at these levels, the spreads on high-yield bonds relative to Treasury bonds are significantly below the peaks seen during the financial crisis. If one looks at the Bank of America Merrill Lynch high-yield corporate bond index, high-yield spreads have risen 267 basis points since June 2014. Although this increase has certainly been aggravated by the oil and commodity downturn that has significantly affected firms in those industries, the rise in high-yield bond spreads is not coming from that sector alone. For example, when the energy sector is excluded from the Bank of America Merrill Lynch high-yield index, high-yield spreads ex energy have widened 210 basis points.

One explanation for the higher yield is concerns about the future growth of the economy. However, if so, concerns being expressed in bond spreads are at variance with our discussion on policy and the need to tighten rates. An alternative is that high-yield securities are now viewed as being more risky because of loosening underwriting standards and the previous willingness of investors to hold riskier assets. If so, we should be considering the implications for how these changes in high-yield bond characteristics may affect the performance of these bonds in a future downturn, as well as how such a downturn might cause investors to rapidly reduce their willingness to hold risky assets, further adding to any instability in bond markets. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Kaplan.

MR. KAPLAN. Thank you, Madam Chair. I'm going to comment on these charts from a slightly different perspective as we sit here in approximately year six since the post-2009 low. I agree with your conclusions. I actually see a number of markets that seem to me to be quite overvalued. The U.S. stock market leads the list for me when you consider that corporate earnings for 2015 are estimated to be down year-over-year and the market is still trading at about 19 times 2015 earnings. It's one thing for the market to be trading at 17 or 18 times earnings when earnings are rising, but these earnings are actually declining. This multiple really strikes me as full. Having said that, unlike a so-called bubble in which you have severe overvaluation that could lead to a boom and a bust, what I see that worries me maybe as much is a significant and prolonged trend in behavior affecting asset allocation, involving pools of capital, the choice between bonds and more risky assets, and carry trade taking place in various forms.

Let me explain one particular aspect of this that probably bothers me the most, and that is the change in the behavior of people running companies and what it means today to run a nonfinancial business. By the way, I would say that in the sixth year of an expansion, you would normally see more excess than we are seeing, but, not to be gratuitous, I think financial regulation has helped tamp it down, except in the area of people running companies.

Increasingly, CEOs have had to become not so much operators as financial engineers. This is widespread. It is now unusual for me to talk to a CEO who is not dealing with an activist, or the fear of an activist, in their stock and who is not actively being pressured to use financial engineering, often to buy back their stock in size. If you ask them what they would be doing if they were a private company or without the activists, a fraction of them would actually be using their resources to do things that would yield more revenue growth. But their time frames are

much, much shorter. This is because—even though there have always been activists—in the past several years, the recent emergence of very, very large pools of activist capital means that the pools of capital are dramatically bigger now, as people are willing to allocate to riskier assets.

It's not surprising because not only time frames are shorter, but also the tenure of CEOs in this country is much shorter. It's not a coincidence. These pools of capital have an extremely short time horizon, to the point at which I would call them renters of the stock, not owners of the stock. They're not going to be around a year from now, they may not even be around six months from now, but they will stay around long enough to get a CEO—or groups of them will get a CEO—to take an action. These pools of capital can't afford to be patient because the people who bought the pool themselves have made allocations away from bonds to riskier assets. And they're probably overallocated to riskier assets, so they don't have a lot of patience either.

So what's the point of all of this? A lot of this is a byproduct—not fatal yet, maybe, but I think it's getting to be dangerous. Considering our dual mandate, particularly real GDP and unemployment, I think this type of behavior continuing at this scale probably cannot be helpful to our desire to foster GDP growth and lower unemployment. I don't think it helps foster a flow of capital into more productive resource allocation that might actually grow revenue, create jobs, and increase productivity. This is something I haven't seen before. I've seen a lot of waves of takeover artists and others that were driving mergers, and, in a way, I like that trend better. These activists are not owners, they are short-term traders, and I am concerned that behavior is starting to be affected in a widespread way. I think that, at some point, it is likely to undermine our ability to achieve our own mandate. That's the comment I'd make on financial stability.

CHAIR YELLEN. Thank you. Governor Fischer.

MR. FISCHER. Thank you, Madam Chair. I want to say a few words about the QS and the work that's being done in the Office of Financial Stability. The QS report we received on October 20, 2015, is really extremely useful, and it's well summarized in two charts. The first one is on page 3, which we've talked about already. It's the overall evaluation of what's going on, with the overall assessment being that risks and vulnerabilities are moderate. The other one is on page 32—the radar chart that is sometimes known as “the spider's web.” If we look at the one on page 32, it tells a very interesting story. On the side that says “Financial Sector Vulnerability,” relative to what there was before the crisis, there's almost nothing that looks dangerous until we get around to consumer credit. And then commercial real estate sticks out as the one area in which we're now in worse shape, according to this, than we were in 2006. This is a very useful chart for concentrating the mind and telling the story in a very vivid way. By the way, on page 32, there are a few things for which we don't yet have the data—as far as I can see, we don't yet have the data for nonfinancial business—so there may be something more that is problematic.

Now, the question is, “what are we supposed to do with this if we detect a problem area?” We're likely to say, “Use macroprudential policy,” but we don't have a whole lot of macroprudential tools. We have the countercyclical capital buffer, which is gradually making its way into regular examination by the Board. We have margin requirements, which we haven't used for a long time. We have supervisory capacities, which, at least to those lenders we supervise, we can use to try to control risks. And we've got OMP, which is “open mouth policy,” which may do well in some circumstances. We don't know how well this all works, and it's something we'll have to feel our way into.

The other half of this—the stuff that Governor Tarullo and his colleagues in the FSOC are doing—is structural reforms, and that becomes the far more important part of what we have to do to reduce the potential costs of future crises or what might have been future crises. There's a lot going on there. There are the very large increases in capital. We hope there will be improved resolution procedures soon. So we can feel a bit better about all of that, and we can feel that the effort that Nellie and her colleagues are putting into the surveillance is very, very useful.

But we also have to remind ourselves that surveys like this and the work that goes on in the FSOC, which is monitoring, is essentially an intelligence exercise—it's the exercise of an intelligence agency, which is inherently difficult. History tells you that however good the intelligence agencies are, they make mistakes and they miss things, which means, once again, that this is very, very important. Getting the structure right, getting the ability to absorb losses is probably more important, without detracting in any way from what is being done by the people doing financial stability analysis.

The only other thing I think we have to warn ourselves about is this great concern that every time you get into a crisis, the more you look, the more you find that there are problems that you missed, and so not to believe that small sectors don't lead occasionally to big problems, and to keep that up.

This is very important work that's being done. It needs to be accompanied by other very important work on strengthening the financial sector's ability to deal with shocks and problems.

Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Kocherlakota.

MR. KOCHERLAKOTA. Thank you, Madam Chair. I often say in public remarks that the Federal Reserve has a much better understanding of financial system vulnerabilities and risks than it did a decade ago. I feel safe in saying that because of the work of the QS group, and I want to thank Nellie, Andreas, and the other QS contributors from all around the System for their thorough and thoughtful measurements and analysis.

As I suggested earlier today, I believe that  $r^*$  will be low for many years to come. If so, the FOMC will achieve its dual-mandate objectives only in the presence of signs of financial instability, like high and possibly volatile asset prices. This observation suggests to me that financial-stability considerations are likely to be a central consideration at FOMC discussions for years to come. The Committee will need to become even more systematic in its approach to these issues.

There are two key points as you think about how to become more systematic. First, as already noted, our statutory mandate is to promote price stability and to promote maximum employment. I see financial stability mattering for this Committee only insofar as it affects the risks to the outlooks for inflation and unemployment. The stance of monetary policy should not be influenced by a risk that some bondholders or collection of bondholders will lose money because of a rapid rise in term premiums. A relevant question for monetary policy is whether such a sudden revaluation of bonds lead to a decline in employment and prices that is not readily addressable using ex post monetary policy tools. We need to have a way to trace the manifestations of financial instability into price and employment outcomes.

The second issue is, we need to know how changes in monetary policy would mitigate financial-stability concerns, mitigate the risks that I mentioned earlier. Right now, I'm not sure that I even know the signs involved, let alone the magnitudes. For example, if we're concerned

about undue increases in house prices that could eventually lead to a housing bust, should we address the stability concerns by removing monetary accommodation to slow the rise in house prices or by adding monetary accommodation to cushion an eventual fall? Presumably, it depends on the position you are in the cycle, but, as we know, that timing is hard to judge.

As I said at the beginning, I feel the current financial stability briefing process has served the FOMC well, but I see it only as a first step. The current approach implicitly treats financial stability as an add-on concern for the Committee's consideration. The Committee and its staff should aim for the financial-stability briefing to be more seamlessly integrated into Tealbook A. Let me be somewhat more specific about what I have in mind. Tealbook A currently focuses on how monetary policy influences the modal outlook, which is grounded in the certainty equivalence principle that emerges from quadratic objectives. As I've discussed both here and in various conference settings, we can incorporate financial-stability considerations by seeing them as a way in which monetary policy influences the risks to the outlook beyond just the modal outlook itself. I would say the ultimate goal should be a Tealbook A that allows the Committee to gauge, in a systematic and quantitative way, how its monetary policy decisions will influence both the modal outlook and the risks associated with that outlook. I'm optimistic that through the collective effort of QS and monetary economists around the System, this goal could well be achievable in a couple of years.

I was at the conference that the Federal Reserve Bank of Boston hosted on macroprudential tools—a great conference—and Lars Svensson presented some interesting work that started to push in this direction, and he threw down a gauntlet. As those of you who have heard Lars before know, he's done that before. He challenged people to find big effects of monetary policy on employment and price risks through financial stability. He was not able to



find very much along those lines in his own calculations. While it's not the way the System should think about financial stability, I think it would be great for this Committee to have a more integrated approach. Thank you.

CHAIR YELLEN. Thank you.

MR. TARULLO. Can I just ask President Kocherlakota—this is your last meeting, so I'm not going to have this opportunity again—on that point you just made, I recall the fact that risk-management systems, particularly quantitative risk-management systems, of banks broke down because they were so bad at dealing with tail events. I'm wondering whether there's a similar problem here. The risk to financial stability—at least in the Williams–Tarullo understanding of it—is about intermediation. When those risks mature, it is a very big deal indeed, as we saw a few years ago, but because they tend not to go incrementally, it's a tail-risk issue. And I'm wondering how the Tealbook kind of approach could be modified to incorporate tail risks in a sensible fashion like that.

MR. KOCHERLAKOTA. I think it would be useful to actually draw upon thinking beyond the people in this room to try to address this. Jeremy Stein, I think, when he was still Governor, made reference to the idea of having an objective that would be nonquadratic in nature. So that starts to get at moments of the distribution beyond mean and variance. It starts to force you to think about tail events. Tail events are hard because they don't occur very often, but I think the way you start to force yourself to think about them is to think about not just the mean, not just the variances, as I've emphasized in some of my talks or that Svensson has, but also these higher moments.

I'll give you my biases upfront. Because of the uncertainties of how monetary policy actually influences all of these financial-stability considerations, I think it's going to be hard to

build a case in which you're going to actually tighten to trade off the deterioration of the modal outlook you might get in order to achieve the lower probability of the tail events. But that's the way you would start to build it—to have an objective function that was starting to bring in aspects of the probability distribution other than just the mean and the variance.

CHAIR YELLEN. Okay. President Rosengren.

MR. ROSENGREN. Just one follow-up to that comment. The Survey of Professional Forecasters does try to provide a distribution. I'd say it doesn't do very well at capturing the distribution, particularly in the tail. So it probably means thinking a bit more in terms of simulation exercises rather than trying to do what the Survey of Professional Forecasters does because my past experience with that is, it almost never captures tail events, and very rarely did the tails seem to widen prior to actual problems occurring.

MR. KOCHERLAKOTA. I agree with what President Rosengren is saying. My own guess about what the Survey of Professional Forecasters does is that they have normal Gaussian errors, they generate a bunch of simulations based on that, and they look at tails based on that Gaussian distribution. It's almost like you want to use scenario analysis to try to inform yourself and then think about how monetary policy might be influencing the probability of those scenarios. I think it's a very rich and, I hope, rewarding journey.

CHAIR YELLEN. Okay. I suggest we take a break at this point for about 15 minutes, and that takes us to about 3:50 p.m. Then we'll return to begin the economic go-round.

[Coffee break]

CHAIR YELLEN. I think we're ready to begin the economic go-round. Let me just mention before we do this that some of you may note a slight change from past practice. It has been traditional, both in the economic go-round and in the policy go-round, for the Governors to

speak at the end, after all of the presidents. But—in a radical break with tradition—we’re going to shake this up a little bit and, from now on, just as you were polled on when you would like to speak, the same will be true for the Governors.

MR. TARULLO. We are told when to speak. [Laughter]

CHAIR YELLEN. So you may see a violation of the traditional order. Let’s start the economic go-round with President Rosengren.

MR. ROSENGREN. Thank you, Madam Chair. The most serious concerns about the outlook that were raised at the September meeting seem now to have diminished. Neither the slower economic growth in many parts of the world nor the financial market turbulence at the end of August have spilled over noticeably into the domestic economy. Private domestic final purchases grew at a robust 3.9 percent rate in the second quarter, and the Tealbook forecasts similar growth for the third quarter at a 3.8 percent rate. The Federal Reserve Bank of Boston forecast is consistent with that outlook, with consumption expected to grow more than 3 percent in the second half of this year and residential investment continuing as a source of strength for the economy.

While the data for private domestic final purchases suggest little spillover from foreign developments to the domestic economy, strong domestic final demand has been needed to offset the greater-than-expected weakness in exports and inventories. The effects of the appreciating dollar and continued disappointing economic growth among trading partners are largely responsible for our bank’s forecast of growth over the next six quarters only a bit faster than 2 percent. With relatively sluggish productivity growth holding potential down, this pace of growth should gradually diminish the remaining labor market slack. And relatively slow

economic growth should also give us the flexibility to raise rates very gradually—possibly closer to current market expectations than to our last median SEP.

Financial markets have recovered some of their lost ground, helped by policy easing abroad. Boston staff analysis of stock market movements since the middle of August finds little effect on the stock prices of firms with large foreign exposure. Firms with a larger share of shipments abroad generally—or, more specifically, with significant trade with China—registered cumulative stock price changes that were virtually unchanged from the middle of August to the end of September. And since that time, stock markets have improved somewhat more. With the recovery in stock markets since the August tumult and no notable effect on firms with the largest exposure to foreign trade, it is not surprising that the U.S. economy has not suffered the potential collateral damage that encouraged us to defer the onset of tightening at our September meeting.

With my forecast projecting the unemployment rate to decline to 5 percent by the end of the year and continuing to decline in 2016, I am now reasonably confident that inflation will gradually move to 2 percent. While core PCE inflation is still well below our target, recent price data do seem consistent with some firming since earlier this year. And while we have consistently overestimated how quickly inflation will return to 2 percent, we have also consistently underestimated how quickly the unemployment rate would decline.

While U-3 is nearly at its full employment level, the broader U-6 measure is not yet back to normal. And although U-6 has declined to 10 percent, it still needs to decline further. Work by my staff looking at U-6 and U-3 reveals that both remain elevated in some states relative to the period before the recession, consistent with our position that some slack remains in labor markets. It is noteworthy that, in states in which U-3 has normalized, U-6 is still running above

its pre-recession levels. This may suggest that at least some of the elevated spread between U-6 and U-3 will be more persistent.

In summary, while I believe we are still somewhat above the natural rate of unemployment and I am comfortable probing a bit lower for it, especially given the low readings on inflation, I also recognize that we are already at or below the natural-rate estimates of many Committee members. Given the amount of monetary stimulus from low interest rates and our hefty balance sheet, I do not want unemployment to undershoot significantly our estimate of the natural rate of unemployment. Because we have significantly underestimated the speed at which the unemployment rate has declined over the past four to five years, we need to be cognizant of the risk that labor markets could tighten more quickly as well as more slowly than we are currently anticipating. Tomorrow, I will discuss the implications of that heightened risk. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Lacker.

MR. LACKER. Thank you, Madam Chair. The Fifth District economy continued to expand at a moderate pace, with activity in the service sector generally more robust. Manufacturing activity was flat, according to our survey numbers, but our directors and contacts provided mostly positive reports on the sector. Falling energy prices reduced the cost of inputs for some manufacturers, but some of our contacts in the rail and trucking sectors noted a slowdown in manufacturing shipments in September that they attributed in part to an unfavorable exchange rate. The service sector, on the other hand, continued to shine in October, according to our strong survey numbers and reports from contacts. The frequency of reports of difficulties finding qualified workers has continued to trend upward. We again heard reports of wage

pressures in particular industries and skill groups, and the wage index numbers in our surveys remain elevated.

Residential real estate markets continued to improve across many areas in the Fifth District, including notably the Hampton Roads area in southeastern Virginia, where defense cutbacks have been damping activity of late. One exception to the positive residential news is Baltimore, where traffic is down notably over last year. The outlook for commercial real estate continued to improve, although rising labor costs are said to be constraining construction activity. In general, contacts reported strong demand, strong sales, rising rents, increased construction, and “lots of cranes in the air.” One exception to the positive commercial news is D.C., where consolidation by defense contractors and others has thrown a lot of excess office space on the market.

At our last meeting, I argued that the national economic conditions were such that it would be prudent to start raising rates. We had seen strong, sustained consumption growth and enough improvement in labor market conditions that slack seemed all but gone. Firm monthly inflation numbers for the first half of the year made me reasonably confident that inflation would return to target over the medium run.

What’s changed since September? The inflation reports have not altered the picture much. Gasoline prices have dragged down top-line inflation as expected, but the core CPI was largely firm through September. Based on the experience from January to June, I think we should continue to be confident that overall inflation will return to target if oil prices stabilize or increase at moderate rates, as predicted by the Tealbook. The retail sales report might have been a shade lower than expected, but the ex gasoline numbers strongly suggest that consumer

spending continues to be strong. Indeed, the Tealbook is forecasting consumption growth at an annual rate of 3 percent for the second half.

As I discussed at the previous meeting, I think strong consumption growth argues for higher rates, even if we acknowledge evidence that the natural real rate might be low by historical standards. As we discussed earlier today, estimates of the natural real rate based on semistructural approaches, such as the Laubach-Williams model and its variants, or less restrictive VAR approaches, such as those estimated by some economists in Richmond, are low but they are not negative. In fact, the range of estimates is clustered at or just above zero.

On the other hand, the actual real rate is currently negative. The Tealbook estimate is negative 1¼ percent using four-quarter lagged core PCE inflation, which is currently 1.3 percent, as a proxy for expected inflation, and that strikes me as at the low end of plausible estimates of expected inflation when you think about measures based on inflation compensation or surveys. You get about negative 2 percent for the real rate if you proxy expected inflation with our inflation target, for example. So even though the uncertainty surrounding estimates of  $r^*$  is wide, the current real rate appears to be substantially below the natural rate, which suggests that we should expect the real rate to rise.

The September employment report seemed to disappoint market participants, but payroll employment growth was still substantially above the rate consistent with a stable employment-to-population ratio. So if any slack remains in the labor market, it continues to decline. Some of the slowdown in payroll employment certainly may represent a softening in demand, particularly in manufacturing. However, I think we need to take seriously the notion that some of the slowdown may represent increasingly binding supply constraints. This would be consistent with widespread anecdotal reports of increasing difficulty in finding workers and

the fact that job openings, despite ticking down a bit, are still quite elevated compared with a year ago, and they're still quite elevated relative to hiring rates, which have flattened out this year. Indeed, slowing employment growth is just what one would expect if slack were disappearing.

One often hears the argument that if there is no longer any slack in labor markets, then we should see increasing nominal wage growth. The presumption of a relationship between nominal wage growth and the elimination of slack makes intuitive sense, but the staff memo on compensation points out that slack is just not a major driver of nominal wage growth. This analysis is consistent with a long line of empirical research on the cyclicity of real wages, most of which finds, at best, only weakly pro-cyclical aggregate real wages. Furthermore, what evidence there is for procyclical wages seems predominantly attributable to observations associated with large increases in the unemployment rate. During periods of declining unemployment or low unemployment, you don't see much relationship at all between wages and the unemployment rate. So in current circumstances, we shouldn't count on wages as our canary in the coal mine.

Our September decision to wait and see was motivated to some degree by a desire for more information about the implications of global economic and financial developments for U.S. economic growth. On this front, the intermeeting news has made little difference for the modal outlook, it seems. The Tealbook notes that somewhat disappointing news from emerging markets and Japan has been offset by stronger-than-expected economic growth in China and Canada. Dollar appreciation has reversed course, U.S. equity prices have largely erased their decline, and volatility indexes have fallen. I think it is fair to say that, if anything, the downside



concerns about the U.S. outlook associated with global developments have subsided since September.

To summarize, consumer spending is still going strong, slack is still gone, inflation is still likely to rise, and global concerns have been allayed. So I think the case to raise rates is still strong.

CHAIR YELLEN. Thank you. President Bullard.

MR. BULLARD. Thank you, Madam Chair. The Eighth District economy continues to grow modestly other than in industries closely related to natural resources, energy, and perhaps agriculture. The District unemployment rate, which is measured across metropolitan statistical areas, is 4.9 percent. That's a little bit below the national level. The Eighth District has not been below the national level in the last several years.

St. Louis board members did talk about wage prospects for 2016 and uniformly were talking about a total wage bill increase of 3 percent across the organization, for both skilled and unskilled employees. So I do think we'll see higher wages in the future. They also said, which they have been saying for a long time, that there are pockets of areas like IT in which they've had to really work hard to meet the market. But I was surprised by this 3 percent number across the board in both unskilled and skilled industries. Tyson, for instance, which is in the Eighth District, increased its starting wage by 10 to 15 percent. Generally speaking, I'd say that large multinationals report weakness, but domestically oriented companies are doing much better or very well.

Nationally, tracking estimates for Q3 real GDP growth are low. We think, as the Tealbook does, that this is mostly an outsized effect of inventory adjustment. We have real GDP growth at negative 1¼ percent based on that. Final sales in the second half, as President Lacker

was just noting, look pretty strong. We'll see how the third quarter actually comes out. One of the tracking forecasters that tends to be an outlier on the high side, the St. Louis news index model, currently projects 2¾ percent growth for the third quarter. That index actually predicted the second quarter pretty closely, so we'll see how that works out.

As other people have said earlier today, we interpret financial stress as having receded since our last meeting. The St. Louis Fed Financial Stress Index is down. Equity prices are up over the intermeeting period. The VIX is down, trading below its longer-run average. All of those things will tend to move the Financial Stress Index down.

For labor markets in the United States, I continue to see improvement, though we do have issues with some labor market indicators other than unemployment or nonfarm payroll employment. There I would see a contest between things like claims, which are wildly low—the lowest they've been in many, many years—or job openings, which are very strong, and part-time for economic reasons or labor force participation, which tend to be weaker. If you look at the Board's labor market conditions index, the level is way above its long-run average value since 1976. I would take that as an indicator that, all things considered, we have a pretty good labor market, and it is continuing to get stronger.

I do take seriously the idea that job growth is going to slow from here on, and I think this is a major challenge for the Committee. It will probably drop below 200,000 jobs per month, down to 150,000 or below, and as that slowing is occurring, we will be trying to enter into a normalization cycle. I think that's going to be a very difficult thing for us and something that we're going to have to face.

District and national contacts suggest that preparations are being made for a strong holiday season. I think that's consistent with the pretty good consumption growth that we've

seen. Regarding the risks associated with the debt ceiling, I agree with others here in expecting to see a deal soon, based on developments in the last 24 to 48 hours. Chinese economic growth came in stronger than expected during the intermeeting period. I notice that the IMF did not downgrade China's economic outlook very meaningfully in its most recent report. I interpret these things as indications that the risk of a hard landing in China is at least diminished for now.

Regarding policy, I think the risk of the Fed not moving off the zero lower bound is up dramatically since our September decision. Why do I think this? In broad-brush terms, the staff forecast is for very slow growth, steady unemployment, and inflation low and continuing below target. So I think that the convergence to the steady state described by Benhabib and his co-authors that we were talking about earlier today is now more likely than not for the United States, and I'm going to talk about that for just a little bit. My main concern is that the Committee has not really thought about this as a possible outcome despite my haranguing you about it for a couple of years, and now I think we might have to take it a lot more seriously.

Another thing that's worrying me is the global convergence that's going on. It used to be just Japan, but now you've got Japan plus the euro zone. The euro zone is going to be at zero policy rates for quite a long time, and that seems like a clear reality. This is not a good outcome, in my view. It's a second-best outcome. It would be much better to go back to the equilibrium that we know and love from the 1980s and 1990s. Most of our intuition about monetary policy comes from that equilibrium, but now I think that we've got a better than 50–50 chance of not being able to get back to that equilibrium. So my main message here is that the Committee needs to face up to this likely outcome.

I thought I'd just list seven of the consequences of convergence to the unintended low nominal interest rate, low inflation steady state from the Benhabib et al. analysis. First,

monetary policy becomes passive at this steady state. What does this mean? It means that shocks hit the economy, and monetary policy doesn't really react. You're at the mercy of shocks that hit the economy. You might think of Japan as being in this situation over the past 10 years. They've had several recessions during that period.

Second, promising to remain at the zero lower bound simply reinforces the equilibrium, and it is no longer counted as accommodative policy because everyone already expects that you're going to stay at the zero lower bound. So that's where the steady state is. And whether you want to promise directly that you'll stay at the zero bound longer or you want to go through a QE route, in which the QE is interpreted as promising to stay at the zero bound longer, either way you wouldn't have any effect if you've already converged to this equilibrium outcome.

Third, inflation would remain below target, and you would not be able to get inflation to the target. And just so that you're not completely giving up hope with me, I do buy into the idea that the energy price shock is going to wear off and inflation is going to come back to target. I'm not completely buying into the Benhabib et al. steady state here. But if we did get stuck in that steady state, inflation would just stay below target.

Fourth, medium-term economic growth would still be driven by human capital and technological improvement, as it is in most of our analysis, but you wouldn't have the accompanying stabilization policy that you would normally have. So you'd be at the mercy of shocks that hit the economy, though long-run growth would still be driven by the same things that it's always driven by.

Fifth, the risk of an asset price bubble would be high. Real interest rates would be low. As we were talking about earlier today, the nominal interest rate would be zero. This would presumably put you at risk of volatile asset price movements. One thing I sometimes emphasize

here is that the policy of  $r$  equals zero, or just any policy of an interest rate peg under which the interest rate doesn't react to shocks that come into the economy, is actually the worst policy in the New Keynesian model because it allows many volatile equilibriums to occur. So if you think that those are realistic possibilities, you could think of that as one reason why making the policy rate equal zero forever would lead to the possibility of excessive asset price movements.

Sixth, there would be no prospect of simple normalization. Talk of normalization would just dwindle to nothing.

And, seven, there would be much more contemplation of extraordinary monetary policy, such as a Shinzo Abe-type effort to get away from the zero lower bound, and all the difficulties associated with that.

So I am worried about this possibility. I think we've gotten much closer to it this fall, and I'll comment more on this possibility tomorrow. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Lockhart.

MR. LOCKHART. Thank you, Madam Chair. I continue to believe the economy is on a solid growth track, growing at a moderate pace. I believe much of the recent softness in some data can be explained by short-term factors that do not amount to a serious headwind that would require altering my outlook. My base-case outlook sees economic growth above trend, higher than the staff forecast, with continuing progress, broadly defined, in labor market indicators. I also continue to believe inflation will begin converging to target in 2016, once transitory factors work through.

My team conducted more than 80 interviews over the six weeks since our previous meeting. We also had meetings of all of our advisory committees. Anecdotal feedback was largely consistent with my interpretation of the data and the outlook I just characterized. There

are pockets of weakness, but it is not broad based. Contacts whose activities are substantially domestic remain generally positive about business prospects. However, those connected to the external sector and energy sector are experiencing the weakness that the data portray.

Here is some color commentary from the Sixth District. Activity in ports, particularly outbound cargo to Asia, has declined sharply. Energy-related firms are feeling stress. Layoffs in the oil and gas sector have increased, and more adjustments are projected for 2016 if oil prices don't recover. Domestic shipping has softened across all major modes of transport. A significant share of that slowing appears to be tied to reduced export activity and a dropoff in commodity hauls, especially coal. Excess capacity in long-haul trucking was reported, which is a notable change from a year ago.

We probed on the question of inventory conditions. Our contacts with visibility in inventory trends—logistics firms, for example—did not treat the inventory picture as cause for concern. Several sources advised that a wide range of imports, from finished autos to raw commodities, are being stockpiled in the United States simply because sales opportunities are likely to be better here than elsewhere. Some contacts opined that it is conceivable that global influences could be felt in the near term in markets that are usually insulated from foreign competitors.

The auto sector continues to produce and sell at a strong pace by historic standards. Our director, who heads the country's largest auto retailer, believes the sales pace is likely to be sustained even if interest rates rise. Residential real estate in my District remains healthy in terms of both new construction and sales. Finally, some retailers noted a slowdown in sales in the third quarter, but most remain optimistic, expecting that sales this quarter will pick up and be equivalent to or better than the fourth quarter a year ago, which they considered very good. You

will recall that PCE last year rose at an annual rate of 4.3 percent in the fourth quarter, and it was broad based.

To find the signal in the recent mixed data and anecdotal input, my staff and I are putting emphasis on real final sales. According to our most recent GDP tracking estimate for the third quarter, final sales to domestic purchasers appear to show growth at an annual rate of around 3½ percent, which is essentially unchanged from the robust second quarter. That said, we see the bottom line for third-quarter real GDP growth as weak compared with the second quarter, reflecting inventory swings and the suppressing effect of net exports. Our numbers indicated that net exports could take 0.7 percentage point off the real final sales top line, so to speak, and inventory rebalancing could reduce growth another 2 percentage points. Nonetheless, I am prepared to look through these effects, and I think the continuing strength of real final sales is the story. I am also sticking to my belief that recent subtarget inflation readings are mostly due to a stronger dollar and falling global commodity prices, and that stronger inflation readings are likely as the global situation stabilizes.

I have taken notice of the reduced speed of job growth in August and September. But, as we know, a complete picture of the labor market is hard to see from a single indicator over just a few months. The level of unemployment continues to fall. Jobless claims are still pushing lower. The share of workers working part time for economic reasons and the associated broad measure of joblessness, U-6, both fell sharply in September. Layoff and discharge rates remain low and steady, and job openings are elevated. The entirety of the labor market data, at this date, at least, has me leaving my unemployment rate projection unchanged and essentially the same as the Tealbook.

To summarize, I acknowledge there are risks to my rather positive spin on the outlook. The risks may be reflected in some recent data. Recent developments such as the drag due to weakness in net exports could be both underestimated and more persistent. That said, I think the prospects that data will confirm my assessment of the economy by the time we meet in December are reasonably good. And I would prefer that the policy statement reflect that possibility—even, I would argue, likelihood—in language that achieves a soft lean toward liftoff. I will comment further on that in tomorrow’s policy go-round. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Governor Tarullo.

MR. TARULLO. Thank you, Madam Chair. I’m going to offer a bit of a brief against data dependence and do that as cover for explaining why my outlook hasn’t changed very much since September. And when I say “a brief against data dependence,” I don’t think there is anything terribly original in what I’m about to say. I think the problems with data dependence don’t manifest themselves very much in this room, because I think people tend to give their actual outlooks. But I think these problems have been manifesting themselves in our public communications, in which a focus on one or a few pieces of data somehow implies that whether there are, for example, three good and two bad data points over the course of the next month or two is going to make a difference to policy.

As we all know, what’s going on in the economy generally doesn’t change fundamentally from month to month. We all have, either implicitly or explicitly, our own narrative as to what is basically going on in the economy. This narrative should be, and I think is for most of us, resistant to a few, or maybe even more than a few, incongruous data points. To change it takes something that suggests that you have to rethink the story you’re telling yourself about the economy. Those subtleties often don’t come through in public communication, though,



particularly when coupled with the identification of a particular time when we think the data may be right for liftoff. I think it can leave people with a misimpression about how the actual decisionmaking is taking place here, and, indeed, how everybody individually is assessing the economy.

I want to now explain why my basic outlook, my own narrative, hasn't changed that much since September and explain why that outlook leaves me in the position that I've been in for a while now of having been externally characterized as being in the "show me" group of members of the FOMC. In September, I think the basic components of my outlook were the following: We had modestly above-trend economic growth, though likely with some slowing, particularly in the labor market. There was no evidence of a pickup in inflation or, to the degree it's relevant, nominal wage growth in the context of a globally disinflationary environment. There were continued puzzles in various economic developments—again, particularly in the labor market—reflecting the continued difficulty of determining the degree to which we are just in an elongated reversion to pre-crisis conditions and correlations, or the degree to which secular changes may be under way that mean that those conditions and correlations may not reappear. And, finally, there was a very high degree of uncertainty about the global economy, with potentially dramatic downside risks following the August market movements in China, and there was resulting increased upward pressure on the dollar.

So what have we seen since September? First, there has been some softening of incoming data, particularly in industrial production, employment, and recently even in housing, which had looked to be gaining strength. But, as several of you have commented, consumer spending has stood up fairly well during this period. Second, I think it is probably too early to know exactly how much the labor market has slowed down or whether it has slowed down as

much as the current September numbers suggest. People have already noted that August and September job numbers are more susceptible to revision than your average monthly job numbers, so we may see some change there. As to the external environment, possible downside risks certainly seem less dramatic than at the September meeting. But as reflected in the actual and anticipated actions of the People's Bank of China, the European Central Bank, and the Bank of Japan, economic prospects in those major economies are still quite uncertain, with significant remaining downside risks.

The trend of the dollar in the coming quarters really does matter—I think significantly. It's had a major effect on economic performance this year, and it certainly could be a disappointing source of downside risk over the next year as well. It's hard to say at the moment whether the upward pressure on the dollar created by the various anticipated central bank moves in the rest of the world will be offset by significantly enhanced economic growth abroad or more than transitory effects on asset prices in the United States or both. However, in light of the relatively sober expectations regarding earnings reports, to which President Kaplan referred this morning, we can't be sure that this will be the case.

What are the implications of these changes for my outlook and, thus, for policy? As I said, I don't think it changes them much. Looking at our dual criteria of continued improvement in labor markets and reasonable assurance that inflation will return to target, I don't see these data as having provided a reason to change that outlook very much. With respect to labor markets, we are likely to be seeing some slowing. Thus, while I'm still inclined to believe we can have some further improvement in labor markets without negative inflationary consequences, it seems to me, at least, even more likely that any pickup in inflation won't get away from us. And I think the case for a lower short-term natural rate of unemployment

continues to be fairly strong. I am not going to repeat what I said last meeting—or, for that matter, in numerous earlier meetings—on the level of uncertainty that attends efforts to pin down, with any degree of precision, the natural rate or relationship of unemployment to price inflation. I will just note that the staff memo on labor compensation and the Tealbook box on Okun's law are two further reminders of how sensitive the inferred relationships are to assumptions about unobservables.

Several of you have mentioned job openings. The run-up to a historically high level of job openings over the past year has been hard to understand when quits and hires have not moved much in tandem, or even with a lag, in relation to openings. Decomposition of the data showing that, for example, professional services openings have increased by 50 percent over the past year suggest the measure may be a bit misleading, a conclusion that is reinforced by the fact that using the Conference Board's numbers for openings would leave the recent plotted points on the Beveridge curve pretty consistent with its pre-crisis shape. But there is probably some information value in the fact that both the Labor Department's and Conference Board's total job openings numbers have been trending down a little bit of late, though I'm not sure how much information value there is there.

With respect to inflation, the arguments here are pretty familiar. We have already heard a couple, and I'll bet you that over the rest of this go-round the familiar arguments on both sides will likely be repeated. I don't want to take direct issue with the argument that most of the current downward pressure on inflation can be attributed to declines in energy prices and increases in the dollar, but I do want to observe, again, that we are in a generally disinflationary environment. It is also worth noting that the pattern of the past several years has been that most observers keep expecting a bigger increase in inflation than turns out to be the case.

I am going to take a random example: us, meaning both the staff and FOMC participants. If you look at the evolution of the staff forecast in each of the past three years, the forecast for inflation toward the end of the year preceding the year forecasted was consistently 0.2 to 0.4 percentage point above where it ended up. I'm including 2015 here, assuming that the current projection in the Tealbook for 2015 ends up more or less to be the case. Similarly, the SEP shows repeated overestimation of what core PCE inflation will be in the succeeding year. In September 2012, the central-tendency projection of core inflation in 2013 was 1.7 to 2 percent; actual inflation in 2013 was 1.5 percent. In September 2013, the central-tendency projection for 2014 was 1.5 to 1.7 percent; the actual was 1.4 percent. In September 2014, the central-tendency projection for 2015 was 1.6 to 1.9 percent, and as we sit here at the end of October, we are now expecting somewhere around 1.4 percent. In fact, if you look at those three SEPs in September preceding the beginning of the year for which the projection was made, it appears that there was only one projection of inflation among all of us during that period that turned out to get the number right, and no projections that anticipated inflation would be lower than it actually turned out to be.

As a group, we have also been wrong on real GDP growth pretty consistently in the same direction. As President Rosengren pointed out, we have been wrong on employment pretty consistently as well. There is quite likely some correlation in GDP and inflation, but something else is going on with respect to unemployment. That pattern suggests that there may be some underlying fundamentals affecting inflation, and possibly economic growth, in a more persistent way, and that we mistake the transitory nature of specific depressing factors for below-target inflation itself being transitory.

Now, just because that has been the case for the past three years doesn't mean it's going to be the case indefinitely in the future. But when I put the difficulties of using past correlations together with our systematic overestimation of what inflation will be as well as with the number of questions that many of us are asking inside and outside this room about possible secular changes in the economy, it does put me in a position of wanting to rely on data that provide more direct evidence of meeting the inflation target than what I would term "inferential evidence," or evidence from which inferences can be drawn.

So what I will be looking for over the course of the next couple of months and beyond are data points that make an argument for changing that outlook. And I can certainly imagine what they may be. I can imagine them in the next couple of months, and I can imagine them taking a little bit longer. I'll end by saying that while I do think we should resist the tendency to be data dependent in a talismanic fashion, we certainly don't want to be data insensitive either. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Harker.

MR. HARKER. Thank you, Madam Chair. Our District, like the nation, has seen a step down in economic growth. Job growth has pretty much stalled, and manufacturing has declined. However, retail sales, especially those at auto dealers, remain strong. There is a high degree of confidence among both consumers and firms, and unemployment insurance claims are down. Overall, I would still categorize economic growth in the Third District as modest.

Employment growth slowed in both August and September, and unemployment has remained flat. Participation rates have remained flat over the past year as well. Indicators of Third District manufacturing activity have also indicated weakness. The current activity index in our manufacturing Business Outlook Survey was negative for the second month in a row, and it

displayed substantial weakness in all of the subindustries as well. Although manufacturers remain optimistic, it is safe to say they are currently hurting a bit. Meanwhile, the service sector is performing much more strongly than manufacturing. In our nonmanufacturing Business Outlook Survey, employment bounced back strongly in October, and the index is solidly in positive territory. The general activity index in the October survey rebounded after a relatively weak summer, and respondents remain optimistic. Sales of light vehicles are at near-record levels, and bank lending has been growing rapidly. Regarding real estate, growth in both residential and nonresidential construction lags that of the nation, and house prices continue to rise more slowly as well. The exception is the Philadelphia area. With respect to price pressures, the prices received index has resurfaced from negative territory, and both future prices paid and received have entered positive territory. So while there is no evidence of rapid price increases, disinflationary pressures appear to be waning.

Turning to the nation as a whole, I believe the real economy remains healthy overall, even though economic growth has slowed somewhat. Although it is not totally unscathed, the economy appears to have weathered the significant late summer decline in stock prices, the temporary increase in financial market volatility, the effects of weakening growth in China, the fall in oil prices, and an appreciation of the dollar. Further, the waning in price pressures appears to be a temporary phenomenon, and I am somewhat more confident that inflation will gradually firm in the coming months. Thus, I agree for the most part with the Board staff's assessment of the economy.

The Committee is placing a lot emphasis on labor market conditions in its assessment of when to begin policy normalization, and I would like to suggest an examination of how the Affordable Care Act may be affecting some of the measures we look at—namely, wage

pressures and the number of involuntary part-time workers. A number of recent papers investigate how that law is affecting these variables, and some of that research is being done in our own research department. While there is certainly no consensus on the magnitude or the nature of the increase in part-time work that is ensuing as a result of the ACA, the legislation represents a significant change in the labor market landscape. I'm thinking here of research by Aizawa and Fang, Nakajima and Tüzemen, Even and McPherson, and Mulligan. This research points to the possibility that the ACA is increasing the prevalence of part-time work in the economy and may have caused an increase in the incidence of U-6 unemployment. I believe we should keep this growing body of research on the ACA in mind when assessing labor market conditions.

The labor market of the future may not, and probably will not, look exactly like the labor market of the past. Thus, the wage growth we are experiencing may indicate a healthier labor market than we think, and the somewhat larger than historical difference between U-6 and U-3 may be due in part to a structural transformation in the labor market. Thank you, Madam Chair.

CHAIR YELLEN. Governor Powell.

MR. POWELL. Thank you, Madam Chair. The incoming data suggest that economic activity has slowed a bit since midyear. Payroll job gains have eased from 210,000 per month in the first half to 170,000 per month in the third quarter, with 180,000 expected for the fourth quarter. GDP growth has stepped down just a little bit, from a 2¼ percent rate in the first half to an expectation of a 1¾ percent rate in the second half.

Despite that, I see the underlying economic growth narrative as generally intact. And that narrative is based on continued strong growth of private domestic final purchases in the range of about 3 percent, underpinned by the strong job gains of the past three years, increases in real

income, continued gradual healing in housing markets, and improved household confidence. That rate of growth should also mean continued job creation at a pace that will materially reduce labor market slack. The drag on GDP growth generated by the downshift in inventory investment is likely a one-off event. Activity is likely to pick up in the current quarter. The drag arising from net exports will continue for a while longer but should begin to fade next year if the dollar roughly stabilizes.

I am also a bit more confident in the outlook than I was at the last meeting. The September meeting followed a month of rising uncertainty about prospects in China and the emerging markets and was accompanied by substantial financial turmoil. At that time, I did not see that the modal outlook had changed, but rather that the chances of realizing downside cases had increased. And many emerging markets, of course, remain vulnerable to slower growth in China, lower commodity prices, and substantial leverage. But the risk of an emerging market–driven crisis that would have substantially affected U.S. economic growth seems to me to have receded. Most importantly, the data have reinforced the view that China is not facing a hard landing. Mutual fund outflows from emerging market funds have stopped for now, corporate debt spreads have declined, most EME stock markets are up since the September FOMC, and their currencies have, for now, appreciated against the dollar.

Average hourly earnings, the only piece of wage data that we received during the intermeeting period, rose at a  $2\frac{1}{4}$  percent pace over the 12 months ending in September, the same pace as in the previous 12 months. There has been much discussion about the lack of acceleration in wages and what it might mean, and the memo on wages and slack did an excellent job of reviewing what we can and cannot glean from wage data. The paper's basic finding is that, under current staff assumptions regarding trend inflation, structural productivity



growth, and the natural rate of unemployment, wages are not growing unusually slowly. The underlying narrative is that the effects of declining slack and disappointing productivity are more or less offsetting.

But the model uses averages of productivity growth over fairly long periods of time as its benchmark for the trend. If, by contrast, actual businesses were looking at shorter-term trends, which I suspect might be the case, then one could argue that wage growth is relatively high, as productivity has for a number of years been well below the 1½ percent trend used by the model. That would also imply that the natural rate of unemployment would be higher. To be clear, I'm not arguing that; I'm just suggesting that the risks seem to me to be well balanced on both sides. In addition, as recently shown in a paper by Ekaterina Peneva and Jeremy Rudd, as well as many other papers over the years, wages have not been a reliable predictor of price inflation for a long time. The implication of all that is that the FOMC should not be using nominal or real wages as a litmus test but should instead monitor them, as they may provide some information about the natural rate of unemployment.

Turning to inflation: The picture is slightly improved since our September meeting, with a bit more inflation over the second half of the year. The Tealbook has 1.4 percent core inflation in both Q3 and Q4 despite residual seasonality, so the true underlying number could be a bit higher. If you more or less mechanically add onto that number the effect of import prices and a little bit of leakage through from lower oil prices—a total of 30 basis points or so—one could easily see underlying core inflation as running in the range of 1¾ percent. And from there, it requires no great leap of faith for me to see inflation returning to 2 percent over the medium term once these transitory factors recede provided, critically, that resource utilization continues to tighten.

A key question for me is whether economic growth will continue to be materially above trend for some time. With some slack remaining in the economy and with inflation below target, we need above-trend growth to continue the healing process. And while I expect economic growth to be above trend, the margin is not a large one. This question, which I will return to tomorrow, has important implications for policy, and I hope for some intermeeting clarity from the data—perhaps yet another example of the triumph of hope over experience. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Governor Fischer.

MR. FISCHER. Thank you, Madam Chair. In my remarks on the economic situation in the past few meetings, I have said I believed that we were closing in on full employment, and that I was reasonably confident inflation would rise to 2 percent in the medium term. Well, those statements are still true, but they may not be as firmly held as they were in September in light of the two most recent job market reports. So I'd like to discuss the two main issues I will be watching most in the coming weeks as we decide what we want to do in December.

The first and most important issue is whether the economy is continuing to expand. There would be two reasons for concern if the economy is stalling. First, if it is stalling, we will need to be thinking about instituting some expansionary monetary policy, and that wouldn't be consistent with raising the interest rate. Second, if the economy is stalling, I would be becoming less confident that we will reach our 2 percent inflation goal as soon as I would like. So that is the critical concern.

Although the macro data have been indicating further expansion almost all year, the most recent two labor reports were not encouraging. And in the next couple of months, I'd like to see payrolls rise by at least enough to keep the unemployment rate steady and perhaps falling

slightly. I would also like to be sure before the end of tomorrow that we have a good idea of what the figure for maintaining the unemployment rate steady will be, and I think we should all hear from the staff on what those numbers would be. Ideally, we might also get some upward revisions to weak August and September readings. This seems possible because domestic demand, particularly consumption and business investment spending, appears to be holding up quite well. So that's the main issue that we should be looking at.

Thinking about all that, one of the things I like about these meetings is listening to the presidents tell us what is going on in their Districts. And I am impressed that an increasing number of presidents think that whatever is going on in their Districts suggests that we should raise the discount rate. Of course, not every president who has spoken so far today has reported improvements in economic developments in their District. I thought President Harker was, at best, balanced and possibly reported a slight negative trend. But for those who remember that Texas is key to economic growth in the United States—something we all learned previously—economic activity is growing again in the—what is that, the Eighth District? [Laughter]

MR. KAPLAN. I think it is still the 11th District.

MR. FISCHER. Still the 11th. Of course. I didn't know you were so far away.

CHAIR YELLEN. The Twelfth is very large.

MR. FISCHER. Do you think they did that to make the Texans mad, that they're not the biggest District?

CHAIR YELLEN. There wasn't that much out there 100 years ago. [Laughter]

MR. FISCHER. Anyway, I'm glad that Texas is growing again, so that the world is coming back to normal in that respect.

The second issue relates to wage growth. When talking about prices, I keep being bothered about the emphasis that is placed on wage growth and why it hasn't risen. I read with interest the memo that was sent to us by Deb Lindner, John Roberts, and Bill Wascher on compensation and labor market slack. I thought the memo was remarkably clear, and I was particularly struck by their specification of the wage equation, which showed wage growth depending, *inter alia*, on a weighted moving average of structural productivity growth. With structural productivity growth having been so weak in recent years, it is probably not surprising that we are seeing disappointing real wage growth. That is, on the demand side, it's hard to see why, when productivity is barely rising, real wages would be expected to be rising at any significant rate.

Having said that, there may nonetheless be more wage gains occurring in the economy than we are seeing in our favorite wage measures. The Lindner, Roberts, and Wascher memo showed in its figure 6 that some measures of wage pressures have been rising more robustly than the employment cost index and average hourly earnings. And in March, we had an alternative-view Tealbook box in which Jeremy Nalewaik showed that these alternative measures do a pretty good job of predicting current-year growth of the wages and salaries component of compensation per hour. We are also aware that the actual data on compensation per hour are often subject to large revisions of their initial estimates.

We have also seen the forecast, which I have mentioned several times today—and I apologize if I keep coming back to it—that the staff is predicting labor productivity growth, which includes the effect of capital deepening, will return to 1½ percent per annum next year. And that would indicate some moving up of wages and perhaps some pressure on prices. So I continue to expect that we will see inflation moving toward our target before too long.

I still believe we are meeting the criteria that the labor market continues to strengthen. Subject to discussions on how much it takes to keep it at the same level of strength as it is now, we will be able to see that in the data early next month and then early in December. I do believe that we are going to see inflation rising toward 2 percent in the medium run, but we will come back to several of these issues tomorrow. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Mester.

MS. MESTER. Thank you, Madam Chair. Economic conditions in the Fourth District are little changed since our last meeting. Business contacts expect economic growth to continue in a moderate pace in coming months. The auto sector and nonresidential and multifamily construction continue to show strong levels of activity. There was a notable increase in activity in the retail sector, and residential construction remains steady. That said, manufacturing and energy-related sectors continue to be soft spots, showing reduced activity over the past six weeks.

Our diffusion index of business contacts reporting better versus worse conditions fell from plus 9 in September to minus 5 in October, a level consistent with stable economic conditions. The decline was driven by a sharp fall in a subindex for manufacturing, which was only partially offset by an increase in the subindex for the retail sector. Our manufacturing contacts cited the strong dollar, the slowdown in energy exploration, and weaker economic growth in emerging markets as factors leading to reduced activity. Retailers cited increased consumer confidence and reduced gasoline prices as contributing to stronger sales. Reports of stronger retail sales are consistent with the pickup in sales tax receipts in the state of Ohio.

Conditions in District labor markets remain positive. Year-over-year payroll growth softened to 1 percent in September from 1.3 percent in August, but the pace of growth is higher

than it was over the previous expansion. The District unemployment rate continued to decline in September to 4.7 percent, which is below the national rate of 5.1. Ohio's unemployment rate ticked down to 4.5 percent. This is below the Cleveland Federal Reserve staff's 4.8 percent estimate of the state's longer-run normal unemployment rate, which is based on a model of labor market flows. Reports of upward wage pressure were largely concentrated in specialized occupations like construction and IT. Construction contacts reported that the primary downside risk they face is a shortage of labor, not higher interest rates. Prices of finished goods and inputs were generally steady except for lower prices for products related to oil, such as steel and plastic.

Turning to the national economy, last December the Committee shifted its forward guidance to emphasize the data dependence of its policy decisions. Forward guidance has gone through several formulations as the economy has emerged from the crisis and recession and as we're moving toward more normal conditions. With the end of the asset purchase program, data dependence signaled we were getting back to a more normal policy setting as well. In my view, one of the unintended consequences of data dependence is that it has contributed to the natural inclination of market participants and others to focus on short-run developments in the economy rather than on the medium-run outlook, which is the more appropriate time horizon for monetary policy decisions. Similarly, I have some concerns that the public's expectations about what constitutes a healthy economy are not necessarily in sync with reality. I think our communications should play a role in helping the public interpret the monthly data releases. We can put them into context and create a narrative that provides a proper gauge with which to evaluate economic developments.

The incoming data since our last meeting have been mixed. Economic growth slowed in the third quarter, which is perhaps not unexpected after the second quarter's strong 3.9 percent

pace. The question is whether this slowdown is pointing to a loss of momentum that would change the medium-run outlook. My current read on that question is similar to the Tealbook's. I haven't changed my medium-run outlook. After a temporary slowdown, I expect economic growth to pick back up to an above-trend pace in 2016.

The consumer sector remains strong. Investment has strengthened, and labor markets continue to improve. The stronger dollar and slower economic growth abroad have restrained growth in manufacturing, and the decline in oil prices continues to weaken investment in the energy sector. However, we've recently seen some stability in both the dollar and oil prices. The volatility seen in financial markets at the time of our last meeting, which largely reflected a reassessment of growth abroad, has largely died down. These are welcome developments, but it's important to acknowledge that slowing in the global economy does remain a downside risk to the forecast.

The increase in nonfarm payrolls in September was 142,000, and the August increase was revised down to 136,000, which is slower than the average pace seen earlier this year. The unemployment rate held steady at 5.1 percent. As we often say, it's important not to read too much into one month's employment report, in view of the month-to-month variation in these readings. But even if these numbers do not get revised up, as they have in recent years, we need to put them in their context. With the economy at or nearly at full employment, we should expect the pace of job growth and declines in the unemployment rate to slow. How we characterize developments is going to be very important for setting reasonable expectations regarding progress in the labor market, which is an important part of the criteria we've set for liftoff.

In my view, labor markets continued to improve over the intermeeting period. First, the pace of job growth we've seen over the past two months, though slower than what we saw earlier this year, is consistent with continued declines in unemployment. Across different models and assumptions about labor force participation, estimates suggest that monthly payroll growth in the 75,000 to 120,000 range is sufficient to put downward pressure on the unemployment rate. So the September increase in payrolls is well above the range of steady-state growth. Last month we also saw declines in many of the broader estimates of underemployment, such as the long-term unemployment rate and the U-6 measure. Taken together, I think September's employment report is consistent with further improvement in the labor market. I say this even though the Board staff's labor market condition index, which summarizes developments across a wide range of labor market statistics, was unchanged in September.

We're lucky enough to have Bruce Fallick on the staff at the Federal Reserve Bank of Cleveland. Bruce is one of the authors of the research behind the LMCI. One of the things he pointed out is that the index makes use of estimated statistical trends for each included data series. Since the Great Recession, the trends underlying the LMCI have been excessively cyclical, which means that the gaps have been insufficiently cyclical. The implied trend of private payroll growth used in constructing the LMCI has moved higher, and it's now considerably higher than the private payroll growth that would be consistent with the 75,000 to 120,000 range for trend total payroll growth I just mentioned. So the LMCI interpreted September's private payroll gain of 118,000 as being well below trend, and this pulled down the index substantially. The LMCI is likely then underestimating the improvement in labor markets during the expansion, while it understated the deterioration of labor markets during the recession. What this means is that if the LMCI is overestimating trend private payroll growth by even a



small amount, which seems likely, then the index reading would have been above zero in September, consistent with the improvement we saw in a number of labor market indicators, including the Federal Reserve Bank of Kansas City's labor market momentum index.

Turning to inflation, incoming data are consistent with the inflation dynamics that the Committee has been expecting. As oil prices and the value of the dollar have begun to stabilize, the downward pressure on inflation from earlier changes has started to abate. Headline inflation remains well below our 2 percent target, but recent readings on underlying inflation, including the core, trimmed mean, and median CPI measures, have moved up. Inflation, as measured by the year-over-year change in the Federal Reserve Bank of Cleveland's median CPI measure, rose to 2½ percent in September. There's considerable uncertainty around any inflation forecast, but analysis by Cleveland Reserve Bank staff and others suggests that core measures of inflation can improve forecasts of headline inflation, at least over some time horizons. In some cases, the improvement is statistically significant. Thus, I find firming in the core measures to be a factor supporting the modal forecast that inflation will gradually move toward 2 percent over the medium run.

The other important factor supporting the forecast is stable longer-term inflation expectations. The Tealbook's analysis suggests we should be cautious in inferring much signal from inflation expectations from the recent downward movement in market-based measures of inflation compensation. The survey-based measures have been broadly stable. The Federal Reserve Bank of Cleveland's measure of 10-year inflation expectations is higher than it was at the beginning of the year. It did move down slightly in October, but that reflected a change in near-term inflation. The five-year, five-year-forward measure was essentially unchanged in October at a bit less than 2 percent.

With inflation expectations anchored, the effects on inflation of past declines in energy prices and dollar appreciation beginning to dissipate, and the economy expected to resume growing at an above-trend pace after a weak third quarter, I think we can be reasonably confident that inflation will move gradually back to our target over the next few years. I do not want to imply that there are no risks associated with the forecast, or that there are no developments that would shake confidence in the outlook. For example, a significant slowdown in consumer spending or in payroll growth would necessitate a reassessment. But if economic developments continue along the lines we've seen in recent months, I would view them as indicating that the conditions we've set for liftoff have been met, and I think a prudent course of action would be to follow through in December.

Thereafter, should either downside risks or upside risks actually manifest themselves, the Committee will be in a position to adjust the pace of further policy actions around a path that is already anticipated to be a gradual one. I view this course as balancing the various risks, while maintaining the credibility of our earlier communications. Of course, we need to ensure that the communications coming out of this meeting give us the opportunity to implement this course, and we'll talk about that tomorrow. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Kaplan.

MR. KAPLAN. Thank you, Madam Chair. I'm going to start, as I did in the September meeting, with the outlook for the energy sector. You may remember that we said in the last FOMC meeting that the daily global supply of oil exceeded demand by approximately 2 million barrels a day. That has improved slightly since then; our best estimate is that it is now about 1.8 million barrels a day—mainly because of a reduction in drilling in the United States, which I'll talk more about, and a slight firming of demand estimates for China. In addition to this

supply and demand, though, we estimate that the current OECD inventory of oil stands at about 3 billion barrels. In our view, that is an excess inventory of approximately 300 million barrels. For the oil market to get into some degree of overall balance, daily supply and demand first needs to get to some level of balance, and we still have a ways to go. Then there needs to be sufficient excess demand to begin to work off this high level of inventory. In our view, we're not likely to get to the first part of this process, the balance of daily supply and demand, until late 2016 or early 2017. This helps explain why there has been so much volatility—which I'll comment on in a moment—in the price of oil.

There are several factors we're going to be closely watching. One is, obviously, ongoing reductions in capital expenditures. Rig counts just since the September FOMC meeting have decreased 9 percent. We will continue to closely watch expected demand from U.S. consumers as well as expected demand from emerging market countries, particularly China. We will be watching political and military events in the Middle East, which threaten disruption. This is why Russia's intervention in Syria several weeks ago appeared to have such an effect on oil prices, because it raised fears of disruption. Ironically, these temporary upward spikes in oil prices may, in fact, ultimately slow the process of getting into supply–demand balance because it might cause producers to pause or sell into the futures market instead of further reducing their capital expenditures. We continue to believe that Iran and Libya will come back online, which we now believe will add approximately 3¾ million barrels per day to world oil production. With all this said, this is still a process in which several possible endings could unfold, and we should expect that there will be significant swings up and down in the price of oil because participants are struggling to get a grip on the speed of this balancing process.

In the meantime, in the United States, at least, we expect to see more bankruptcies, restructurings, and mergers because, as we've said before, the pain of these reductions in supply is going to be felt at its worst in the United States because the United States, particularly in Texas and, to some extent, North Dakota—and, to some extent, in Canada as well—has the highest concentration of marginal production—that is, shale.

With all of that background, I'll turn back to the 11th District. This oil situation has continued to create negative spillovers, as we reported last time, in our District. For starters, the new orders component of our manufacturing survey was negative 4.6 percent in September and negative 7.6 percent in October versus an August reading of negative 12.5 percent. Meanwhile, the service sector in Texas continues to grow and add jobs, with the health-care, leisure, and hospitality sectors driving much of the increase. Overall employment in the District has, to us, been surprisingly resilient given the diversified nature of the Texas economy to date. In addition, we've had a significant expansion of the petrochemical industry in the Gulf Coast because of the low price of natural gas, which is a key input into petrochemicals. So we've got a boom in that industry going on in Texas at the same time the oil industry itself is contracting.

We had, through July, an annualized rate of job growth in Texas of 1.4 percent. That dropped to still-positive job growth in August and September of 0.7 percent. We are expecting 0.8 percent growth for the remainder of the year. And when all is said and done, our judgment is that job growth for 2015 in Texas will still be a positive 1.2 percent, compared with 3.6 percent growth in 2014. Despite weakened job growth this year, the unemployment rate in Texas has held basically steady around 4.1 or 4.2 percent for the past eight months. This low rate of unemployment, by the way, is even lower in cities like Dallas, Austin, and San Antonio—that is,

in cities not predominantly reliant on oil. And this statewide rate matches the pre-recession cyclical low of 4.2 percent in 2007.

We continue to see labor shortages in construction trades, machinery, food manufacturing, nursing, truck driving, retail, and restaurants. In terms of wage pressure, both the manufacturing and service-sector surveys suggest upward wage pressures since June, and the outlook for wage growth among respondents continues to be strongly positive for the next six months. In terms of commercial real estate, we see, not surprisingly, higher vacancy rates in cities like Houston, but we continue to see strong commercial real estate in other cities, like Dallas–Fort Worth and San Antonio. Statewide, Texas home prices in the month of August rose 7.3 percent year over year. And home inventories across the state remain tight, with two to four months of inventory in each of our major markets. So this is still a challenge. In terms of prices, though, the majority of our respondents in manufacturing reported price declines for the ninth consecutive month. But in the service sector, our selling price index still went up 3 percent in September and 3½ percent in October. So we have a number of crosscurrents in the District.

On the national economy, our views are not materially different than they were in September. We still expect to see the unemployment rate reach its longer-run sustainable rate of 5 percent by the end of this year and to fall below that level thereafter. The August reading for the Federal Reserve Bank of Dallas trimmed mean PCE inflation rate was 1.67 percent year over year. If you take six months over six months, the rate was 1.97 percent, or almost 2 percent for the past six months. Our 2016 forecast for inflation is 1.8 percent, and we continue to expect inflation to reach our 2 percent objective by the end of 2017.

Lastly, as we said before, we continue to believe economic events in non-U.S. countries, particularly Japan, China, Turkey, and Brazil, have the potential to negatively affect the United

States for an extended period of time. In particular, we believe issues such as the level of debt to GDP in these countries; the need, particularly in China, to restructure state-owned enterprises; efforts, particularly in China, to shift from an economy driven by investments and net exports to one that is consumer oriented; severe demographic challenges in several countries, particularly China; and other secular challenges will create headwinds for U.S. real GDP growth as well as inflation for an extended period of time. The one thing that makes us feel somewhat better, though, is that, as Governor Powell mentioned, stock markets outside the United States, particularly in China, look, at least to us, like they have adjusted to a great degree to this new reality. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President George.

MS. GEORGE. Thank you, Madam Chair. With the exception of the state of Colorado, the pace of economic activity in the 10th District has slowed compared with the nation. While unemployment rates remain low in most District states, employment growth is flat or down over the past six months due to weakness in energy and agriculture, which appears to now be spilling over into other sectors. In the energy sector, our District energy survey paints a picture of continued headwinds. With the breakeven price of oil at around \$60, District firms are not expecting a return to profitability for some time. As a result, capital spending plans are being downgraded and firms continue to shed workers, though anecdotal evidence suggests that some displaced workers are finding jobs in sectors such as aerospace. Some District energy companies have faced credit downgrades, and one company recently filed for bankruptcy in an attempt to shed around \$3 billion in debt from its balance sheet.

Conditions in the District's agriculture sector also remain soft. Cattle prices, which had been holding up, have declined, and prices for commodities such as wheat and corn remain low.

Overall, weakening farm income has led to increased borrowing by farmers and less capital spending. Finally, weak demand for exports has weighed on manufacturing activity, which, according to our District manufacturing survey, has declined for eight straight months. These business contacts point to international conditions as a primary factor weighing on demand for their products.

For the national economy, I expect economic growth to average around 2 percent in the second half of 2015 before moving up to around 2¾ percent next year. The drag due to the behavior of net exports is likely to continue to weigh on headline growth. Otherwise, growth in private domestic demand has been running at more than 3½ percent for more than a year, a pace that looks to have continued and possibly strengthened in the third quarter. Given demographic and productivity trends, I view this pace of domestic growth as quite robust.

Consumer spending, of course, has been a driving factor. Notwithstanding the sluggishness of core retail sales in recent months, they increased at a solid pace in the third quarter. Vehicle sales and consumer confidence remain at high levels. The momentum in consumer spending appears broad based, and growth in real PCE has steadily picked up over the past few years. For example, the year-over-year growth in consumer spending was about 1.3 percent at the end of 2012. Now it's running at 3.3 percent.

In contrast, net exports have weighed on the outlook, and I see them subtracting about ¾ percentage point from GDP growth this year, reflecting the stronger dollar and soft foreign economic growth. Because this forecast has taken developments in recent months in financial and international markets on board, I view the risk from abroad as currently balanced. Along these lines, domestic and foreign financial markets have largely stabilized since our previous meeting.

The recent deceleration of payroll employment growth bears watching in coming months, but we have seen such bumps before, most recently this March. So it's hard to judge whether this deceleration stems from the start of a more general slump in economic activity or slowing momentum in the pace of employment gains. Given the momentum we've experienced over the past two years, I do expect some moderation in the monthly pace of payroll growth over the next year to below 200,000 because of demographic factors and the fact that the economy is likely close to full employment. Even if the slower pace of the past two months continues in the next two employment reports, such a pace would continue to comfortably exceed the minimum growth necessary to continue reducing labor market slack.

Of course, the slowing in employment growth would be more concerning if measures of unemployment were rising. That said, initial claims are currently very low, at levels last reached in 1973, and the U-6 broad unemployment rate continues to make steady downward progress. While most measures of labor market slack have shown significant improvement over the past two years and suggest that only a modest amount remains, some have pointed to lingering concerns that persistently low levels of nominal wage growth are indicative of higher levels of slack. Recent research by my staff aligns with the findings in the Board staff memo showing that current measures of wage growth are in line with readings from our main labor market indicators. Using the Federal Reserve Bank of Kansas City's labor market index as a broad measure of labor market conditions, the analysis found that a model of real wage growth based on this index and labor productivity predicts real wage growth consistent with actual real nominal wage growth. This leads me to believe that the current low level of real wage growth is related more to weak productivity growth and not necessarily to hidden slack.



Finally, turning to inflation, the foreign exchange value of the dollar and energy price movements have been primary factors affecting my outlook. While core inflation remains somewhat low, it has been stable in 2015. The 12-month change in the core PCE index has stayed at 1.3 percent since January, even amid further appreciation of the dollar and additional declines in energy prices. This may suggest that diminishing slack has been compensating for downward pressure arising from these temporary factors. If so, as the effects of these temporary factors fade, it would seem reasonable to expect that both headline and core inflation will begin to move toward our 2 percent goal. Thank you.

CHAIR YELLEN. Thank you. President Evans.

MR. EVANS. Thank you, Madam Chair. The positive reports I received this round were outnumbered by the more pessimistic comments. On the plus side, automakers continue to be quite optimistic about their ability to sustain high sales rates into 2016. Of course, low auto loan rates have helped sustain the 17.2 million unit sales pace we've seen so far this year. In addition, reports on bank lending in the Seventh District were quite strong.

That said, many of my contacts were somewhat more pessimistic than they were in September. The gloom was most pronounced among manufacturers who have a large international business exposure. They've been downbeat for a while, but things took a turn for the worse this round. Steelmakers were particularly dour, as they are looking at global excess capacity and prices that are down 30 percent or so from a year ago. They see no market-based relief in sight and have filed legal challenges to help counter alleged dumping. Heavy-equipment manufacturers were nearly as pessimistic as steelmakers, as they continue to report weak demand and additional layoffs.

However, not all of the new concerns came from the international front. Our Beige Book survey showed sharp cutbacks in hiring and capital spending plans not just among manufacturers, but also by firms in the service sectors. Low crop prices are weighing on rural economies, and, notably, we heard a good deal of talk from our contacts in capital markets regarding tighter credit conditions in the United States. These reports go beyond financing for the energy sector or commodity-dependent businesses. We also heard of wider bond spreads for domestic health-care and technology firms, and even Ford noted that spreads had increased on their commercial paper.

In culling through these reports, it seems difficult to separate the contributions from the strong dollar, weak foreign growth emanating from China and other emerging market economies, and tighter domestic financial conditions. But on top of these, there also seems to have been a noticeable pullback in risk appetite across a range of industries. I suppose an executive summary of this was my conversation with a Fortune 100 CEO who asked me if I was hearing anything positive, because virtually none of his business roundtable counterparts was optimistic. The front page story in the *Wall Street Journal* on Monday captured this sentiment very well, too. For today, I'm filing all of these concerns as important risks to monitor, but not yet as factors that we ought to build into a weaker baseline outlook. So like the Tealbook, our forecast for economic activity hasn't changed much from September. For now, we too continue to see economic growth running moderately above trend over the next couple of years.

The incoming data have not raised my confidence that inflation is poised to return to target over the medium term. Our full suite of models still forecasts 2018 inflation in the 1¼ to 1¾ percent range. The Tealbook box that I referred to on I(1) inflation in term structure models got me thinking: One way or another, I suppose, all of our FOMC forecasts have inflation

getting back to our 2 percent objective at some point in time. The question is, how fast will we get there? More specifically, do we have models that forecast quick convergence to 2 percent yet still match the degree of persistence observed in the actual inflation data? I'm skeptical that we do.

At the Federal Reserve Bank of Chicago, we have two structural models that are capable of generating persistence in the data if the data call for it, and these both see slow convergence of inflation back to our 2 percent objective. One is our term structure model, which will forecast persistently low inflation whenever the stationary but highly persistent level factor from the yield curve data is low. That is an important reason why today this model is predicting that inflation in 2018 will only be back up to about 1½ percent. The other is the Federal Reserve Bank of Chicago DSGE model. It can generate slow convergence back to target because real rigidities mean certain shocks will have persistent disinflationary effects. The model identifies that such shocks have been important in explaining the low economic growth and low inflation of the past several years. As a result, our DSGE model is also projecting inflation at just 1½ percent in 2018.

I recognize that there are many different models of inflation, that prescient inflation forecasting is difficult to come by, and that our uncertainty measures are pretty large in this arena. Many statistical models have stationarity and rapid mean reversion to 2 percent inflation essentially baked in the cake, but these models also fail to match the persistence actually observed in the inflation data. In contrast, models with unit-root  $I(1)$  inflation processes or stochastic volatility or both can generate much more persistent deviations from 2 percent, as can models with strong real rigidities and persistent stationary factors, such as our Chicago Fed

DSGE and term structure models. I put more weight on these latter models. So my bottom line is that I have difficulty feeling confident that inflation is headed back to 2 percent any time soon.

Also, I have to believe an important ingredient in the President Lacker/President Bullard/Benhabib/Schmitt-Grohe/Uribe low inflation equilibrium is that the public is expecting inflation to be below our 2 percent objective. So, again, I think that committing in public that we are focused on getting inflation symmetrically up to 2 percent is an important feature of knocking out that low equilibrium.

One other thing that occurred to me in looking around the table as President Bullard was making his comments is that I'm not sure how many people understand that model analysis. Frankly, when I hear comments in my Bank that I don't understand and that I think might be bad, I try to make sure everybody tries to figure it out or I get some advice. I think that it is probably incumbent on us to have somebody, perhaps from the Federal Reserve Banks of Richmond and St. Louis, put together a briefing memo so we all understand this important feature, if it is important. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Williams.

MR. WILLIAMS. Thank you, Madam Chair. I suggest that President Evans come to Tomorrowland in the 12th District and meet with my directors, because you mostly were seeing the people who were pessimistic, and as one of my advisory council members said, "In La-La Land, no one is pessimistic." [Laughter]

At the previous meeting, I argued that the economy was finally in good enough shape to begin monetary policy normalization, and since then the data received have only reinforced that view. Importantly, the key global economic and financial concerns that stayed our hand in September have receded. Financial market volatility has moderated as data from China and

other emerging markets have come in at or above expectations, and fears of a hard landing have diminished. As noted in the QS report, the U.S. financial system weathered this global turbulence without any systemic strains, and, furthermore, U.S. equity markets have retraced more than half of their late summer selloff. Altogether, these intermeeting improvements resulted in more favorable readings in a variety of broad indexes of financial conditions.

On balance, U.S. macroeconomic data since our previous meeting have also been in line with my expectations. The monthly data on the crucial drivers of final demand, such as consumer spending and business investment, have continued to show solid gains. Despite these gains, third-quarter real GDP growth will likely be held down by the inventory correction. Still, real GDP remains on track to grow at 2 percent this year, and that's the same average pace of growth we've seen over the past five years, which was fast enough to bring the unemployment rate down from 10 percent to close to 5 percent.

I view the risks to the solid economic growth forecast as well balanced. As I've already mentioned, the downside tail risks from abroad have diminished in two ways. First, the probability of an adverse fallout and contagion among emerging markets has come down. Second, some systemic resilience to such shocks has been demonstrated for the next episode of volatility. On the upside, domestic growth could certainly surpass my expectations. For example, residential construction continues to perk up. Both homebuilder sentiment and household formation have jumped to new highs for this expansion, and that should support increased building.

Turning to the labor data, the recent jobs report did not change my view that the unemployment rate will fall to 4.7 percent by the middle of next year. Under current labor force and population dynamics, any monthly job growth above 100,000 will tend to reduce labor

market slack. Indeed, employment grew by less than 140,000 jobs per month on average in August and September, and that pace was enough to lower U-3, U-4, and U-5 by 0.2 percentage point each and U-6 by 0.4 percentage point, continuing their ongoing downward trends. Given the strength of the economy and the lagged effects of any near-term policy tightening, I'm confident that the economy will overshoot full employment next year.

Unfortunately, I have become much more pessimistic that such overshooting will boost labor force participation. My staff has reexamined the prospects for a cyclical resurgence in participation, and the data are not showing the rebound that was hoped for. In particular, it is disappointing how few have entered the labor force during this recovery despite the substantial increase in employment. For example, consider the “marginally attached.” These are nonparticipants who report that they're willing and available to work, who have searched for work within the past year, but who aren't currently looking for a job. This marginally attached group contains the candidates most likely to reenter the labor market. However, as the unemployment rate dropped over the past five years, the reentry rates for the marginally attached have actually come down. A similar pattern emerges for other groups of nonparticipants. These results are consistent with evidence recently highlighted by Alan Krueger that labor force entry rates are not cyclical. All in all, this suggests that overshooting full employment by running a high-pressure economy will not bring a large number of those out of the labor force back into it at a faster pace. It also suggests that nonparticipants are not really an indicator of a significant degree of more slack.

I would like to make one point on that. I find the Board staff's calculation of the potential worker rate to be very useful. It appears, I think, in the Monday morning Board briefing. Basically, it's the unemployed plus the nonparticipants who say they want a job, which

is a pretty broad definition of unemployed. It's broader than U-5, so you could think of it as "U-5 extended," or "U-5 plus." That rate has come down significantly—more than 1 percentage point in the past 12 months. And if you look at its current level of about 8.5 percent, that kind of number has historically been associated with an unemployment rate of 5.3 or 5.4 percent. That is higher than the current 5.1 percent, but it suggests that, at least on this broadest definition of underemployment, the unemployment rate is only understating the degree of slack by about 0.3 percentage point. If you narrow it down to U-5, the difference is only about 0.1 percentage point. So at least based on measures of people who actually say they want a job, there really isn't a lot more slack out there. There's somewhat more slack, but not a lot more slack than the U-3 measure.

Turning to price inflation, I expect that overshooting full employment next year will offset some of the transitory disinflationary pressures associated with the pass-through of lower import and energy prices into core prices. This, along with the waning effects of these price shocks, will help speed a return to our 2 percent target. Still, I expect inflation to remain below our target for some time. The natural question is, is the fact that inflation remains low an indication that the economy remains well below capacity—meaning there is actually more slack out there?

Analysis by my staff suggests caution on this front. Core PCE inflation has been pushed down by a decline in health services inflation driven by public payment adjustments, including limits on Medicare payment growth associated with the Affordable Care Act and the "doc fix" bill. These public payment adjustments are especially important because private payments tend to follow Medicare's lead. Of course, the PCE price index that we follow is actually based on these PPI measures of how much the government and other payers pay hospitals, doctors, and

other providers. Because the PCE price index places a relatively large weight on health-care prices, the unusually weak health-care inflation may obscure evidence of a cyclical rebound in underlying inflation. Therefore, the low rate of core PCE inflation cannot be taken fully onboard as an indication that there's still substantial slack in the economy.

All in all, these findings make a good case for looking to other inflation indicators, such as the Dallas Fed trimmed mean. The trimmed mean is currently particularly attractive because it removes some of the legislative and administrative price changes in the health-care sector. All told, while inflation remains low, this is the result of a confluence of transitory and special factors. It's not indicative of the performance of the broad economy, which remains solid. As slack continues to diminish and the influences of the strong dollar, low energy prices, and the effects of these legislative changes to health-care prices fade, I'm confident that inflation will move back to our 2 percent target. Thank you.

CHAIR YELLEN. Thank you. Governor Brainard.

MS. BRAINARD. Thank you, Madam Chair. Economic data since September have been mixed, but on balance they suggest little difference in my assessment from when we last met. Although some of the heightened risk aversion that led to declines in the prices of risky assets over the summer has faded, the key risk associated with the outlook—the potential for weak foreign demand to weigh even more heavily on economic growth and inflation in the United States—is not materially different.

Turning first to the labor market, measures of labor utilization suggest that there has been little change in labor market slack since September. The unemployment rate was unchanged last month while other indicators of slack were mixed: The drop in the participation rate suggested no reduction in slack, and the decline in the share of involuntary part-time workers pointed to



some further lessening. Both of these alternative measures, together with no sign of a pickup in wage growth, continue to suggest there may be labor slack remaining. At the same time, the pace of job gains appears to have slowed somewhat in recent months. Nonfarm payroll employment increased 142,000 in September, little different from the currently published figure for August. As a result, the average monthly change in the third quarter is somewhat below the pace of job gains in the first half of the year.

The slowing in employment growth looks to coincide with a similar slowing in output growth. After rising at a 2½ percent rate over the first half of the year, real GDP growth appears to have downshifted to a pace below 2 percent in the third quarter. However, a decline in inventory investment, a factor that boosted activity in the first half, likely accounts for that reduction in GDP growth. Abstracting from this component of aggregate demand, which is characteristically volatile, final sales increased at close to a 2 percent pace in the first half of the year, and I'd expect a similar increase in the second half.

I'm encouraged that consumer spending appears to have increased at more than a 3 percent pace in the middle two quarters of the year, with auto sales rising strongly. Business fixed investment also looks to have moved higher over this period despite considerable drag generated by sharp declines in energy-related investment. The housing sector also continues to expand, though the pace is very gradual and activity remains well below what population growth would suggest. And recent developments on Capitol Hill hold out hope that the debt limit, a key source of uncertainty, may be addressed in a broader deal that could lead to federal government spending that is slightly higher than what was earlier projected. However, recent trade data, which will get updated tomorrow, suggest that net exports, after subtracting close to 1 percentage point from GDP growth in the first half of the year, held down growth again last quarter.

Turning to inflation, measures of underlying inflation trends remain below our 2 percent target. The 12-month change in core PCE is estimated to have been 1.4 percent in September, while the 3-month change is estimated to have been about 1.5 percent, little different from the average pace of increase over the recovery. On balance, these data suggest an underlying trend in inflation that is between  $1\frac{1}{4}$  and perhaps  $1\frac{3}{4}$  percent.

Progress toward our goals will be heavily affected by the competing influences of relatively robust private demand in the United States, on the one hand, and weak foreign economic growth on the other. Despite extraordinary monetary stimulus in Japan and the euro area, growth remains very weak. Real GDP in Japan appears to be increasing at a rate barely above zero, while growth in the euro area is increasing at a relatively modest rate of between  $1\frac{1}{2}$  and 2 percent. Over much of the recovery, weakness in advanced economies has been offset by strong economic growth in emerging market economies, but this has changed. Trade-weighted real GDP growth in emerging market economies has slipped from an annual average of  $4\frac{1}{2}$  percent from 2009 to 2013 to 1 percent less than that last year and to an annual rate of only 2 percent in the first half of this year. As a result, total foreign economic growth was  $1\frac{1}{2}$  percent in the first half of the year, the lowest two-quarter growth rate since the recession.

Weak foreign demand pushes down the contribution to real GDP growth from net exports both directly and indirectly by putting upward pressure on the dollar. In addition, concerns about the foreign outlook have at times led to a pullback by investors from risky assets and heightened worries of deflationary pressures. A worsening global outlook has likely been responsible for much of the deceleration in employment and overall activity in the United States this year. Whether this downward pressure eases or intensifies is an open question.

The most recent news regarding emerging markets, particularly China, has been mixed. On the one hand, real GDP in China is reported to have risen at an annual rate of more than 7 percent in the third quarter, consistent with an overall slowing trend but a considerably better outcome than some had feared. Moreover, estimates of employment have held up well, and services-sector output looks to have accelerated. On the other hand, growth in industrial production remained depressed in September. If this reflects a structural shift that persists, it suggests that downward pressures on commodity prices and commodity exporters are unlikely to ease measurably going forward. Chinese policymakers are currently pursuing several competing goals—transitioning to a more services- and consumer-oriented economy, pushing through difficult financial and economic reforms, and preventing a significant undershooting of economic growth—making their task tremendously complicated. Those complications are enhanced by the poor quality of their macroeconomic data and challenges in the communication of their policies.

That poses risks both to the upside and the downside. It is possible that Chinese policymakers, in an attempt to minimize economic underperformance and the attendant political risks, will institute a full-scale fiscal stimulus, which would boost economic growth, with positive ramifications globally. Under this scenario, the U.S. economy might move somewhat more rapidly toward our goals than is currently expected. However, the most common method for Chinese policymakers to expand is to channel funds into local governments. These policies have led to large amounts of wasteful investment and huge increases in leverage, and they could work against the longer-term structural reform agenda that the policymakers have laid out. As a result, we may see continued hesitation to reemploy this method of stimulus. In that case, slower economic growth would continue to pose risks to the downside, as financial stress would increase and confidence might erode. It's possible, in that scenario, that slowing in global

growth continues or intensifies and that upward pressures on the dollar increase, weighing further on our economic growth and inflation. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Vice Chairman.

VICE CHAIRMAN DUDLEY. Thank you, Madam Chair. My views on the economy haven't changed much since the September meeting. The good news is that domestic final sales still seem to be rising relatively briskly, and the rise appears to be broad based. Consumption, housing, and business fixed investment all seem to be growing at a respectable pace. The bad news, though, is that the economy may be downshifting to a somewhat slower overall growth pace. As many people have mentioned, inventory drag is going to be a big factor in the weakness we see in the third quarter, and net trade is not only going to be a drag in the third quarter, it's going to be a drag for many quarters to come.

The improvement in labor market conditions, at least measured by the Board's broad-based measures, stalled out in September, but it's unclear to me whether this is a one-time blip or the start of a new phase in which payroll gains slow and the improvement in the labor market grinds to a halt. It seems to me that labor market developments over the next two months are going to be very important in assessing whether the timing is right for liftoff in December. The key question for me is, will the slowdown in economic growth that I think we're seeing lead to lower payroll gains, and will those lower payroll gains, in turn, lead to weaker consumption growth? A number of people have postulated that consumption will stay strong regardless, but if you have a weaker economy leading to lower payroll gains, there'll be less income, and I start to worry about how that dynamic will play out.

I think the downside risks to the outlook arising from overseas developments have subsided. It is noteworthy that we actually do see real GDP growth abroad finally accelerating in

the third quarter, compared with the second quarter. And although the level of market stress increased very sharply late this summer, I think it is quite significant that even though we really ratcheted up the degree of stress, nothing of significance seems to have broken in response to that stress. This is important because the way that a situation like this gets out of hand, as we saw in 2008 and 2009, is that stress causes things to break, which creates more stress, and events start to unfold in a very bad way. I think the fact that equity prices in emerging markets have rebounded quite significantly in recent weeks is also significant. The big question I have with respect to that is, how much of that improvement is due to the fact that nothing is broken, which some people are taking some comfort from, and how much is due to the fact that there's been a shift in expectations about our own policy rate path? And, at this point, I just don't know the answer to that. Nevertheless, it is a positive development.

On the inflation side, I think the news has been relatively constructive in the sense that the core rate of inflation has been broadly stable despite the downward impetus to commodity prices due to the behavior of the U.S. dollar. Although we haven't seen any meaningful uptick in nominal wage growth, I think the anecdotal reports are generally consistent with emerging pressures. For example, you hear the story about the truck drivers almost everywhere at this point. But we need to be careful about the inference that we take away from the fact that nominal wage growth has not picked up. I found the staff memo on compensation and labor market slack very helpful in terms of my own thinking. And I agree that it's certainly possible that the wage gains have been restrained because headline inflation has fallen and productivity growth has faltered, and that those two factors may be offsetting the effect of a labor market that is, in fact, closing in on full employment. What I take away from that is, one, I'm pretty uncertain, and, two, as a consequence I wouldn't be comfortable making a pickup in wages a

necessary condition for liftoff. The pressure may already be there, but we're just not seeing it in the aggregate data because the upward pressure has been offset by these other factors that are restraining nominal wage growth.

The fly in the ointment on the inflation side, which people haven't really commented on very much, is the persistent decline in inflation compensation. I understand why inflation compensation is coming down over the near term because of the weakness in oil prices and other commodity prices, but the persistent declines in the five-year, five-year-forward measures are more difficult to explain and, therefore, more troubling. Although I don't have any reason to dispute the model results—that this is mostly about the liquidity risk premium and what people are willing to pay for inflation protection—I do have some anxiety that we're putting a lot of weight on particular models to disentangle the sources of the decline in inflation compensation. The fact that some of the models are constructed in such a way that they beg the conclusion and push that weight onto liquidity risk and the price of inflation protection makes me a bit more concerned. So I wouldn't want to dismiss the decline in five-year, five-year-forward inflation compensation altogether.

I think what I need to see is economic data that make me comfortable that the economy is likely to continue to grow at an above-trend pace in 2016, that core inflation is flat or rising, and that inflation expectations are well anchored. If I see that, I think we can definitely justify liftoff and probably justify a liftoff at the next meeting.

I do think, though, that we need to talk about alternatives to that scenario, and I'm going to talk tomorrow a little bit about what should happen if the economy should fall meaningfully short of the baseline forecast. I do think we need a Plan B for monetary policy in case the economy disappoints, because if we don't lift off in December, the next question for the Chair is

going to be, what happens if the economy continues to weaken, and what are you actually prepared to do about it? And I really don't think we've had that conversation around the Committee table yet to a sufficient degree. I think this is very important, and I very much welcome your thoughts on that tomorrow. I'm going to go at the very end, as I always do, but if you have anything to say earlier, I'd love to hear what you think we should do if the economy disappoints and we don't lift off in December, because I think we need to have an answer. Narayana, maybe you'll have a few thoughts on that. Thank you, Madam Chair.

CHAIR YELLEN. Let me turn it over to you, President Kocherlakota.

MR. KOCHERLAKOTA. Thank you, Madam Chair. I guess it's a first for me to go last in this round.

MR. TARULLO. It's the first and last for you. [Laughter]

MR. KOCHERLAKOTA. Yes. It gives me the opportunity to comment on other peoples' thinking at this point. But, no, I will stick to my prepared remarks. [Laughter]

Madam Chair, the recent reports from our directors in the Ninth District and other contacts in the intermeeting period were somewhat mixed. I think one of our directors summed it up best by saying that her contacts saw patches of growth coexisting with patches of decline. That's a little bit more nuanced, or at least not as strong as what we had been hearing in the past from our contacts in the Ninth District. Our recent data are pretty much consistent with that. It suggests that even outside the oil patch in North Dakota, the labor market in the Ninth District is showing signs of stagnation, if not actual deterioration. In North Dakota, obviously, the situation is much worse than that, but that's pretty much what you would expect given the challenges facing the oil industry that President Kaplan outlined.

Just to level-set everyone, Minnesota is a very diversified economy that is not reliant on oil, agriculture, or anything like that. The employment-to-population ratio in Minnesota has fallen over the past year. Since April, payroll employment in Minnesota has been essentially flat. Over that time we have seen declines of 1 percent or more in employment in construction, manufacturing, and mining. Mining is not as surprising because of some external demand issues. Manufacturing may also not be a surprise, but it's quite disturbing to me that we have seen a decline of such magnitude in construction. In short, I think that you have to say the Ninth District's economic recovery is flagging, including in sectors that you would generally view as sensitive to policy-related changes in the value of the dollar and the expected real interest rates.

Let me turn now to the national economy. I will speak first about inflation and then turn to employment. And, just to satisfy the Vice Chairman's demand for it, I will talk about inflation compensation. In terms of inflation, the story is a familiar one. Inflation is well below target. Tealbook A projects that inflation will get back to target in 2019, four years from now. One comment I will make is that I think it would be useful to have more conversations about why some principals don't agree with Tealbook A's forecast for inflation. Someone specifically mentioned they expect inflation to get back to target more rapidly. What are the elements of your modeling that lead you to have that confidence?

Frankly, for myself, I think the staff's analysis of inflation is a compelling one. But there is a leap of faith about underlying inflation or inflation expectations: Longer-run inflation expectations, or whatever you want to call them, are at 1.8 percent, then something happens and they get pulled back up to 2 percent. While that's good for us, it's a very optimistic piece of the outlook. But it could make you want to think that inflation might not get back to target in 2019. So following up on some of President Evans's comments about whether you are just assuming it



or whether it is driven by something more fundamental, I think a conversation on this would be interesting and useful.

My outlook under Tealbook A's baseline policy assumption is the same: We will get back to target in 2019. Now, the FOMC could facilitate a faster return of inflation to target by adopting a more accommodative policy stance than in Tealbook A. The question is, what would be the cost of having that more accommodative stance? The main cost identified in the optimal control exercise in Tealbook B is that the unemployment rate would fall below the rate that we currently think is the natural rate. I have two comments about the supposed cost of having supposedly unduly low unemployment. The first is that I take our congressional mandate to promote maximum employment literally. If we can create more jobs without causing excessive inflation, the Congress requires us to do that, and that's what promoting maximum employment means to me. The second comment is on the economics of the situation: I remain considerably more optimistic than most of you about our ability to create jobs without creating inflation. Some of that optimism is due to the inflation picture that I described earlier, but a lot of it is tied to data on household employment. Here I am going to be giving, I suppose, a countervailing story with regard to what President Williams described.

Household employment fell dramatically during the recession. Recovery from that decline, even for prime-age workers, remains highly incomplete. The fraction of those aged 25 to 54 who have a job remains 3 percentage points below its pre-recession peak in early 2007. If we split this group more finely by age, the story remains the same: If you look at those aged 25 to 34, 34 to 45, and 45 to 54, EPOP is down 3 percentage points. If you split it by sex, EPOP for men aged 25 to 54 is down by 3½ percentage points; for women in that age group, it is down by only 2½ percentage points. You can split it by race: Among African Americans aged 25 to

54, EPOP is down by 3 percentage points compared with 2007. The bottom line is, however you want to slice the data, prime-age employment is about 3 percentage points lower than in 2007. Given what we know about labor supply elasticities for prime-age workers, it seems very challenging to rationalize this large decline as being due to structural changes in the labor markets. So we have some room for inflation, and this strong decline in prime-age employment that suggests that we have more room to work on that front as well.

Let me turn, then, to inflation expectations. As I have already noted, inflation has been low for years, is currently low, and is expected to remain low for years to come. Prime-age employment has been low for years, is currently low, and is expected to remain low for years to come. To achieve our goals more rapidly, it would seem like we should be providing more accommodation. But the tilt of policy is very much toward a continuation of the gradual tightening cycle that the Committee began in May 2013, as opposed to providing an increase in accommodation, as seems appropriate given where we are.

So there is a disconnect between our policy direction and our policy goals, and I think this disconnect creates a significant credibility risk. The public and the markets may come to believe that we will not achieve our stated longer-term objectives. And I don't think of this credibility risk as being a theoretical one. As alternative A correctly states, the Federal Reserve's measure of five-year, five-year-forward inflation breakevens is near or at historical lows. Alternative B is more cagey about this point, simply saying that it has slipped a little bit. So I would counsel the Committee to be more transparent about that in the statement. Then if you choose to ignore that information, that's fine. But I think the facts of the matter are that inflation breakevens are near or at historical lows.

Low breakevens are often dismissed as being due to a decline in liquidity premiums, risk premiums, or inflation expectations. In terms of liquidity premiums, we see the same low measures of longer-term inflation expectations in zero-coupon inflation swaps. And this was not always true. If you go back to the end of 2008, zero-coupon inflation swaps did not fall anywhere near as much as inflation breakevens or TIPS did. So I would say that there is little evidence that liquidity premiums are the key driver of the low breakevens in 2015.

In terms of risk premiums, I thought the Tealbook box was very interesting in terms of how you might try to decompose between risk premiums and expectations and how complicated that is. But, as I have argued before, our point of view in Minneapolis is that you should think about risk premiums as being highly informative from an economic point of view. Investors are increasingly betting that inflation will be unduly low at exactly the same time that economic activity is low. Put another way, investors are increasingly betting that the FOMC will be willing to miss both of its mandates at the same time, in the same direction, over the longer term. These bets aren't crazy. They seem entirely reasonable given the persistent disconnect between our actions and our putative objectives. I somewhat share President Bullard's concerns that the markets, at least, are putting more weight on our being in a low-inflation, low-economic-activity outcome. Where I disagree with him is that I don't think it is because we have committed to a low interest rate policy. In fact, the decline in inflation expectations that you see in market-based measures really set in in early 2013. That is associated with the Committee beginning its gradual tightening cycle, not with committing to low interest rates.

Madam Chair, I will summarize briefly. Inflation is low and is expected to remain low for years. Prime-age employment is low and is expected to remain low for years. And yet the tightening cycle and talk about it continues, and that creates a troubling belief in markets that we

may be willing to fail in both our mandates for years to come. I will build on this theme in our discussion of policy tomorrow when, ironically enough, I get to lead off. [Laughter] But thank you for listening.

CHAIR YELLEN. President Williams.

MR. WILLIAMS. This is President Kocherlakota's last meeting, and I know he would be very disappointed if I didn't contradict him contradicting me. [Laughter] I do think we know more about why labor force participation for prime-age men and women is low. If you compare the shift by age of those outside the labor force between 1999 with 2014, and look at the answers to the question of why they are outside the labor force, there has been a significant increase in the number of people who designate themselves as disabled or retired, people who are taking care of family, and people in school. There are a lot of reasons for these "deltas" in relation to 1999. If you look at the groups that want a job but are not in the labor force and ask why they aren't in the labor force, those are higher. But, again, this is the reason the staff looked at this very carefully. It's not a very big group, and it has changed very little. The other group that is not explained is not part of this group at all. In the survey responses, the answer to the question "why are fewer prime-age people in the labor force relative to 1999, which was a very strong economy?" is basically that the number of those disabled and retired has increased. I suppose the question I have is, can monetary policy change that?

MR. KOCHERLAKOTA. Madam Chair, may I answer President Williams's question?

CHAIR YELLEN. Yes.

MR. KOCHERLAKOTA. The answer is "yes," President Williams.

MR. WILLIAMS. Thank you. I feel better. [Laughter]

MR. KOCHERLAKOTA. I'll say a couple of things by way of response. I think this information is very valuable, first of all, and I think it's important to keep in mind. With that said, when you look into the flows, as your staff does so ably, you do see that people who have no interest in getting a job do transit to a job all the time. And I think that's important to keep in mind. The question for us is, how much of an inflation cost do we have to pay to bring these folks back into the labor force? When I look at men aged 25 to 34, maybe you're happy with their being retired from the labor market.

MR. WILLIAMS. They're in school, which you should like. [Laughter]

MR. KOCHERLAKOTA. Men aged 25 to 34, their employment-to-population ratio is down 5 percentage points from 2007. Women's ratios are down considerably less. So I think there are margins on which we can work. I certainly agree that there are limits to what monetary policy can do, but I don't think we have plumbed those limits yet.

CHAIR YELLEN. Okay. Thanks to everyone for an interesting and thoughtful round of comments. I know it's been a long day, but with your permission, I would like to add some comments of my own on the outlook, and in the process anticipate tomorrow's policy discussion.

I want to start by reviewing how, in my view, the economic situation has evolved over the past few months. At the time of our July meeting, my expectation was that if the federal funds rate remained near zero, monthly payroll gains would remain close to 200,000, and the unemployment rate would steadily decline. Delaying liftoff until the transitory effects of low oil prices and dollar appreciation on 12-month inflation had totally dissipated—something that looked quite unlikely before spring of 2016—risked a situation in which the unemployment rate might well hit 4½ percent by the middle of next year, with further declines quite likely. I worried that excessive pressure on resources could well develop under these conditions,

eventually generating an unwelcome rise in inflation or inappropriate risk-taking in financial markets. To avoid ending up in a situation in which we might need to tighten policy abruptly—something that could easily disrupt the economy—I anticipated that it would be appropriate to start tightening at our September meeting.

In September, of course, we decided to keep the funds rate unchanged, in large part because of concerns about global financial and economic conditions and the associated potential for adverse spillovers to the U.S. economy. Although downside risks surely remain, I would say that developments on the global economic front have been largely reassuring. That said, incoming information, primarily pertaining to the labor market, has for me served to cloud the outlook, with the consequence that I am less confident now than in July that resource utilization will in fact continue rising at the solid pace I anticipated then.

Now, it is entirely possible that no change in my midsummer assessment of the modal economic outlook and its policy implications is warranted. If that's true, I would see lifting off at the next meeting as entirely appropriate. But I think it would be wise for us to collect some additional information before making up our minds on December.

With respect to the pace of economic growth, I consider an underlying trend that is expected to be materially in excess of the growth of potential to be a prerequisite for tightening. Third-quarter real GDP growth looks likely to fall short of that trend, but a big swing in the contribution from inventory investment is a significant but temporary restraining factor. And although net exports will likely continue to exert a sizable drag on GDP growth, the pace of final domestic demand seems pretty solid to me based on incoming data. I expect, in line with the Tealbook, that economic growth will run around 2 percent or a bit more in Q4 and beyond. But we will know a good deal more by the time of the December meeting.

What worries me more are the weaker readings we have received on the labor market. Monthly payroll gains were appreciably smaller in the past two labor reports, the unemployment rate stopped falling, and the labor force participation rate declined appreciably. In addition, recent JOLTS data on job openings, quits, and hiring have leveled out or weakened. As President Mester and the Vice Chairman noted, our staff's labor market conditions index was flat in September, suggesting that the labor market just treaded water—although I did take on board President Mester's interesting comments, and I think we should pursue those issues with the staff. I will do that.

It is unclear whether this apparent slowdown is merely transitory or whether it represents something more persistent, such as a pickup in productivity growth or a decline in overall economic growth momentum. Fortunately, with two more labor reports in hand, we should have a better sense of what is going on by December. If payroll growth does pick up to 180,000 per month, as the staff projects, and data on spending suggests growth at least in line with the Tealbook, I would be more confident that my late summer assessment remains broadly correct. Specifically, liftoff would be appropriate in order to slow the pace of expansion to a more prudent rate.

But if payroll gains remain around 140,000, I would see the case for an immediate tightening as at least less compelling. Job growth at this pace would imply a slower take-up of slack in coming months. We have had a good discussion about labor force participation. But if the staff is correct that the participation rate is likely to remain stable through much of next year, and the ratio of household employment to payroll employment is likely to edge down, then payroll gains of this magnitude would also be consistent with little or no change in the unemployment rate in 2016.

An important consideration in deciding when to begin tightening is the amount of slack that remains in the labor market. On this issue, my assessment has changed slightly since late July. As I noted at our previous meeting, the disappointing news on wages was an important factor in leading me to revise down my estimate of the longer-run unemployment rate in my September SEP submission to 4.8 percent. This revision still seems appropriate to me. Not only have the wage data remained disappointing, but the recent memo by the Board staff confirms that wage data are informative about slack. Interestingly, the state-space model used to examine this issue yields an estimate of the current natural rate of unemployment equal to 4½ percent, conditional on assuming, as I do, that longer-run inflation expectations are currently anchored at 2 percent.

If that estimate is accurate, then we are even further away from full employment than I previously thought. Now, I readily admit that all estimates of slack are imprecise, and that confidence intervals are sufficiently wide to include the possibility that we are already effectively back to full employment, on this metric. But because at least one point estimate puts the current unemployment gap at more than ½ percentage point, and because involuntary part-time employment remains elevated while the labor force participation rate remains below the staff's estimated trend, I think we still have a ways to go before we can confidently assert that we have fulfilled our employment mandate. Furthermore, allowing the unemployment rate to move lower for a time may be necessary for us to achieve our inflation mandate within a reasonable period of time.

Looking beyond the near term, one critical factor that will influence the future pace of tightening will be the speed and extent to which the underlying strength of the economy improves over time. As I noted during the  $r^*$  session, I anticipate that the equilibrium real rate



will move up somewhat over the next few years as various forces restraining growth gradually abate. But this is only a forecast, and the outlook is highly uncertain. In the face of such uncertainty, we will need to proceed cautiously in adjusting the stance of policy to verify, as time passes, that higher interest rates are in fact appropriate.

The staff memo on the policy implications of  $r^*$  uncertainty supports this conclusion. The memo demonstrates that when estimates of  $r^*$  are uncertain, optimal monetary policy markedly attenuates the response of the funds rate to signs that the natural rate is rising, as long as the risk is high that adverse shocks could cause the zero lower bound to bind in the near future. And, unfortunately, that is a risk we are likely to face for some time. In addition, the staff finds that  $r^*$  uncertainty increases the weight on inflation and optimized policy rules—a result I interpret, in view of how low inflation is at present, as strengthening the case for gradualist policy.

Finally, on inflation, I don't have much to add to what others and the Tealbook have said. The incoming data have come in more or less as expected. My outlook remains unchanged. On a 12-month basis, I anticipate that PCE inflation should move up markedly over the course of next year, as the transitory effects of low energy prices and dollar appreciation fade. Thereafter, I expect inflation will gradually complete its return to 2 percent in the context of a labor market in which the unemployment rate modestly undershoots its longer-run level for a time. That is, the Phillips curve, in my view, plays a role in helping us achieve our inflation goal.

I think that completes our economic go-round. We have hit 6:00 p.m. Why don't we begin our policy go-round in the morning with Thomas's briefing? We will reconvene at 9:00 a.m., and I think that will give us plenty of time to discuss policy.

[Meeting recessed]



**October 28 Session**

CHAIR YELLEN. Good morning, everybody. We're going to start this morning with an update from Steve Kamin about the trade numbers that came in this morning.

MR. KAMIN. Thank you, Madam Chair. This morning we received the advance trade release for September. This was a release just for the goods part of trade in goods and services. The full report comes a few days later. But in this release, September exports came in strong, and stronger than we were expecting. Imports fell more than we were expecting. All told, that leads to a smaller drag in the third quarter of net exports on GDP growth. So we've revised from a drag in the October Tealbook of minus 0.6 percentage point to a much smaller drag of about 0.1 percentage point in the third quarter. That said, first, these data for trade in goods are going to be subject to some further revision. Second, when we receive trade data and parse them through to look at the effect on GDP, we also take into account any other responses to inventories and things like that. And then, finally, we have yet to receive the data on services. So this is a very preliminary estimate, but right now, we're looking at a smaller drag on net exports in the third quarter. I'll be happy to take any questions.

MR. TARULLO. How many airplanes?

MR. KAMIN. These data are preliminary, and we just received them.

MR. TARULLO. So you don't have the disaggregation of aircraft sales?

MR. KAMIN. We don't have the disaggregated data at that level of granularity. I understand from our very first snapshot that the strength in exports was concentrated in consumer goods, but that's all we know at this point.

MR. LEBOW. Whereas I mentioned in my remarks yesterday that the 1½ percent number we had in the Tealbook for our estimate of GDP growth in the third quarter was now at

1¼ because of incoming data on the advanced durables and a couple of other small pieces, this news would put us back at 1½ percent.

CHAIR YELLEN. Okay. Let's get started on monetary policy, and I'll turn to Thomas for his briefing.

MR. LAUBACH.<sup>7</sup> Thank you, Madam Chair. I will be referring to the handout labeled "Material for Briefing on Monetary Policy Alternatives."

In light of the discussion you had about different measures of the equilibrium real interest rate and their implications for the conduct of monetary policy, I thought it might be useful to return to an analysis that I presented at the March meeting, which considered what your SEP submissions implied for the path, over coming years, of one particular concept of the equilibrium real rate. To set the stage, the upper-left panel shows a noteworthy aspect of the median paths for the unemployment gap, core inflation, and the real federal funds rate in the September SEP: The median of your projections of the real federal funds rate rises by nearly 3 percentage points over the next three years, while the medians of your projections of the unemployment gap and core inflation change very little.

As summarized in the upper-right panel, I use an IS equation that relates the unemployment gap ( $u$  minus  $u^*$ ), as a measure of the cyclical position of the economy, to the real rate gap, defined as the deviation of the real federal funds rate ( $r$ ) from a time-varying equilibrium level ( $r^*$ ). This definition of the equilibrium real rate has the property that, if the actual real rate were kept at its equilibrium level, over time the unemployment gap would close. Thus, in this set-up, the equilibrium real rate is a medium-run concept of what Chris Gust called the neutral policy rate, which varies over time in response to shocks that cause persistent shifts in the position of the IS curve.

The coefficients on the lagged unemployment gap and the lagged real rate gap in this equation are estimated using historical data for the fourth quarter of each year, so as to be consistent with the data that you provide in your SEPs, and using the staff's historical estimates for  $u^*$  and estimates for  $r^*$  taken from the Laubach-Williams model. With the estimated coefficients in hand, I then insert each participant's projected values for the unemployment rate and the real federal funds rate, as well as his or her estimate of the longer-run normal unemployment rate, and solve the equation for the implied values of the time-varying  $r^*$  at the end of each year over the forecast horizon.

The implied values for each participant's projection are shown as the blue dots in the middle-left panel. Reflecting the diversity of your views about the economic outlook and appropriate monetary policy, these  $r^*$  estimates are fairly dispersed. The

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<sup>7</sup> The materials used by Mr. Laubach are appended to this transcript (appendix 7).

median (shown by the red line) is close to zero in both 2015 and 2016, then rises to ½ percent by 2017 and to a little below 1 percent by 2018, gradually approaching the longer-run median estimate of 1½ percent. Your projected paths for the real federal funds rate continue to run well below your longer-run normal values for the next year or two. If  $r^*$  were at its longer-run value, the IS equation would predict substantially more rapid declines in the unemployment rate than those in your projections. To reconcile your unemployment rate projections with your real rate projections, it must be the case that this concept of  $r^*$  remains depressed in 2015 and 2016.

This analysis suggests that the relevant measure of policy accommodation is the real rate *gap*, defined as the difference at each point in time between the real federal funds rate and the time-varying equilibrium real rate. The middle-right panel shows that, for most of you, your projections imply a moderate degree of accommodation at present, but that, by this measure, monetary policy will no longer be accommodative by the end of 2017 despite the fact that most of you project the federal funds rate to remain low by historical standards.

Of course, the expectations of market participants regarding the funds rate path are also an important element of the transmission of your monetary policy decisions to medium- and longer-term interest rates. Your final two panels examine the degree to which the expectations of market participants are aligned with the SEP. The dark-blue dots in the lower-left panel show that the median respondent to the Desk's latest primary dealer survey projected a path for the federal funds rate somewhat below the median SEP path from September, the light-blue dots.

Against this backdrop, it is striking that the expected path for the federal funds rate implied by OIS quotes, the red line, lies substantially below the survey medians; the gap between survey measures and market-based estimates of the federal funds rate path has been persistent and has progressively widened over the course of this year. One potential explanation, noted in the lower-right panel, is that the investors whose views determine these prices have a substantially more pessimistic economic outlook than the economists employed by the primary dealers. We do not have any evidence to assess this possibility. A second explanation could be that investors perceive predominantly downside risks to the outlook: The dealer survey represents expectations of the most likely, or modal, outcomes, whereas the path implied by OIS quotes reflects a mean expectation. For example, the dealers continue to place a 1-in-5 probability on the outcome that the federal funds rate will have to return to the zero lower bound within two years following liftoff. Finally, the gap might reflect sizable negative term premiums: Investors might place substantial probability on adverse economic outcomes materializing over the next few years. If these contracts, and Treasury securities at similar maturities, offer insurance against such outcomes, investors could be willing to accept a low or even negative expected return.

Turning to the draft statements for this meeting: Your second exhibit, alternatives A, B, and C offer different assessments of current conditions, the outlook, and progress toward the Committee's stated criteria for beginning policy normalization.

As indicated in the bullets in the top panel of your second exhibit, paragraph 1 of alternative B would provide an assessment that, despite soft net exports, real GDP has been expanding at a moderate rate, supported recently by “solid” gains in household and business spending and further improvement in the housing sector. The Committee’s overall assessment of labor indicators in paragraph 1 would continue to be that, despite some softer data recently, “on balance, . . . underutilization of labor resources has diminished since early this year.” And its assessment of recent inflation trends would be largely unchanged, although you will need to decide how to adjust the description of the change in measures of inflation compensation over the intermeeting period. As of yesterday’s close, 5-to-10-year inflation compensation from TIPS had declined 10 basis points since the September meeting.

In summarizing the outlook, paragraph 2 would convey that the Committee again expects economic activity to expand at a moderate pace. The Committee’s statement of its expectations that labor market indicators and inflation will move toward mandate-consistent levels over the medium term would be unchanged. With regard to risks to the outlook, paragraph 2 drops the separate sentence on foreign developments that the Committee added in September and instead reports that, while the Committee continues to see the risks to the outlook as “nearly balanced,” it is monitoring “global economic and financial developments.” These changes would signal that the Committee is now less concerned about the implications of developments abroad than was the case in September.

On the Committee’s criteria for increasing the target range for the federal funds rate, alternative B would convey that the Committee still needs to see “some further improvement in the labor market” and is not yet reasonably confident that “inflation will move back to its 2 percent objective over the medium term.” However, in paragraph 3, the Committee would update its communications about the timing of the first increase in the target range for the federal funds rate. Rather than focusing on “how long to maintain” the current target range, the Committee would suggest that such a decision may be close by indicating that “in determining whether it will be appropriate to raise the target range later this year”—or, alternatively, “at its next meeting”—the Committee will, “based on incoming data,” assess realized and expected progress toward its objectives. Although this guidance would leave the Committee wide latitude at the December meeting, it would likely suggest to some market participants a higher likelihood of a December liftoff than they perceived in advance of this meeting.

In contrast, alternative A would cause investors to push out the most probable date of the first increase in the target range and would likely lead them to shift down their expectations of the path thereafter. Alternative A would provide a less sanguine reading of recent data on economic activity, citing the “drag” from inventory investment and net exports, and it would note the leveling out of the unemployment rate. It would also indicate heightened concern about economic and financial developments abroad by stating that they have tilted the risks to the outlook for economic activity and the labor market to the downside. Alternative A would also convey much greater concern about the outlook for inflation by citing “subdued” rates

of inflation, core inflation, and hourly compensation as well as the very low market-based measures of inflation compensation. Accordingly, alternative A would set aside the Committee's current statement of its criteria for liftoff and, instead, state that "if incoming information does not soon indicate that inflation is beginning to move back toward 2 percent, the Committee is prepared to use all tools necessary to return inflation to 2 percent within one to two years."

Alternative C would begin policy normalization by announcing an increase of 25 basis points in the target range for the federal funds rate, reflecting a confident assessment that current and expected economic conditions have met the Committee's criteria for liftoff. Specifically, the Committee would report that recent labor market indicators, including ongoing job gains, show further improvement and confirm an appreciable reduction in underutilization of labor resources since early in the year. It would state that with appropriate adjustments in the stance of monetary policy, labor market indicators are expected not just "to move toward," but also to "reach," mandate-consistent levels. In addition, the Committee would upgrade its assessment of risks to the outlook for economic activity and the labor market to "balanced."

As would the other alternatives, under alternative C the Committee would acknowledge that "inflation is anticipated to remain near its recent low level in the near term" and would note that "market-based measures of inflation compensation remain near the low end of the range seen in recent years." But it would state with greater assurance that the effects of declines in energy prices and in prices of non-energy commodities that are currently holding down inflation "will dissipate." And under alternative C the Committee would say that with continuing improvement in the labor market and stable longer-term inflation expectations, "the Committee is reasonably confident that inflation will rise to 2 percent over the medium term."

The forward guidance about the expected path of the target range of the federal funds rate in today's draft of alternative C is much the same as we presented in September. It states that "the timing and size of future adjustments" will be determined by the Committee's assessment of realized and expected "economic conditions relative to its objectives of maximum employment and 2 percent inflation." Alternative C presents the option to retain, in paragraph 4, the indication that the Committee "will take a balanced approach" to pursuing its objectives.

Thank you, Madam Chair. That completes my prepared remarks. I will be happy to take questions.

CHAIR YELLEN. Thank you. Are there questions for Thomas? President Evans.

MR. EVANS. Thank you, Madam Chair. Thomas, I want to ask a question about exhibit 1. It's always hard to know exactly how much to make of the dots that you show because we don't really identify who the dots are. I do think we have a missed opportunity, in that we

don't share with each other the identities of our explanations. It would be so much more effective if I could associate the good explanations that I read in the SEP with everybody's commentary. But, having said that, on these calculations in the second row, is it the case that the relative ordering of people's funds rate dots is largely preserved? Is there something about your IS calculation that scrambles the identities around very much?

MR. LAUBACH. There can be instances, actually, in which they are being scrambled, because it really depends very much on your projected path for the unemployment gap. You can have someone who has, say, a relatively high federal funds rate but who has a very shallow unemployment rate path. Therefore, actually, that person sees very little accommodation, whereas you could have somebody who still has a relatively low unemployment rate but sees a sharp decline in the unemployment rate and, consequently, must see a whole lot of accommodation. That's basically the approach to backing out the estimates.

MR. EVANS. Is there a lot of that action, then? In principle, I can see that.

MR. LAUBACH. I'd really have to go dot by dot to give you a good answer of how high the correlation is between departures of  $r^*$  estimates from the median and departures of funds rates from the median. I think that's what you would like to know. I'll get back to you on that.

CHAIR YELLEN. President Bullard.

MR. BULLARD. Yes, I have a comment on exhibit 1. This is interpreting people through the lens of this particular model. People could have other materially different models that have very different implications for the real rate of interest.

MR. LAUBACH. Absolutely.

MR. BULLARD. I think it's interesting to look at this, but it's not clear that everyone is using exactly this model.



MR. LAUBACH. I'm fairly confident that this is not the model that everyone used.

[Laughter] If I may say, it is, of course, based on an estimated historical relationship.

MR. BULLARD. There are other models that would have different implications that are also based on estimated historical relationships. So there are a lot of assumptions about how you're going to interpret the data.

CHAIR YELLEN. President Kocherlakota.

MR. KOCHERLAKOTA. Thank you, Madam Chair. I'm going to turn to exhibit 2 and the panel on alternative B. The last bullet says that alternative B leaves the Committee "wide latitude" at the December meeting. When we discussed the changes in language in alternative B, particularly paragraph 3, at the Minneapolis Reserve Bank, we were concerned that those changes did not leave the Committee with a lot of latitude at the December meeting. Let me explain our thinking on that. If the Committee were writing the very first FOMC statement of all time, it would be true that considerable latitude would be left by that language at the December meeting. That is not the case. The Committee is choosing with intention to bring up a specific reference to the next meeting at this time. Our concern was that it would be read by market participants as signaling a relatively strong intention on the Committee's part to initiate liftoff in December. Clearly, the staff here had a different perspective on this. I'd be interested in hearing your thoughts.

MR. LAUBACH. I'll be glad to share my perspective. A literal reading of this red language is, in my view, desirably agnostic because, effectively, all it states is that the Committee is going to wrestle with this question at the December meeting. That, of course, should come as a surprise to no one. There is nothing here that says anything about the likely timing of the liftoff itself. It is only about how, at that meeting, the question will be on the table.

Now, I understand that the literal reading is one thing and what it's taken to signal is a very different one.

MR. KOCHERLAKOTA. Yes, I think I would grant your literal reading, but it's really about the choice to make the change to this particular wording at this time, signaling an intention.

MR. LAUBACH. One question is whether the public will look at this and say, "Well, they could have said it a lot more pointedly, but they chose to say something fairly hands-off." So it at least admits the interpretation that the FOMC is not yet very certain that it will want to lift off at the December meeting." But how this will be interpreted by market participants, for example, is very difficult for me to predict.

MR. POTTER. I would add one thing. I think the market or the public, however you want to say it, knows that we know that they're not expecting large changes to paragraph 3. So the fact that they know that we know suggests that there is some signal in that if people understand it.

VICE CHAIRMAN DUDLEY. Well, the changes are clearly designed to put December on the table to some degree, and the question is, how much signal does the market want to take from that?

MR. POTTER. Yes, that was President Kocherlakota's point, I believe.

VICE CHAIRMAN DUDLEY. There is some uncertainty about how the market will actually take this.

MR. KOCHERLAKOTA. Yes. My staff and I felt that December is already on the table to a certain extent. I think that's consistent with the surveys, et cetera. Then the question is, given that December is already on the table in the minds of those from the survey and the people

who are betting with their money in the markets, what is the intent of the Committee in adding this additional language at this time? How people will interpret our intent is one of the questions.

VICE CHAIRMAN DUDLEY. I think the expectation is that it would push the probability expectation up somewhat, but because it is agnostic in its true language, the expectation is not that much. Simon, what is the probability today—roughly 30 percent for December?

MR. POTTER. Somewhere between 30 and 40.

VICE CHAIRMAN DUDLEY. It's 30 to 40 percent. So maybe it takes it to 40 to 50. But we don't really know, and that's the hard part of the parsing we do. Does the market look at it with a literal interpretation, or does the market say, "Oh, gee, you changed this, and therefore you're trying to provide a signal." I think there's a range of uncertainty about that.

MR. LAUBACH. What might also be helpful is the insertion of "based on incoming data." Again, this should come as news to nobody, but my sense is that this can be read as saying that it really depends on the data that will be received between now and your December meeting.

CHAIR YELLEN. President Lockhart.

MR. LOCKHART. Madam Chair, it's worth mentioning, I think, that you have some opportunities to elaborate further in the next few days.

CHAIR YELLEN. Next week, I will be testifying on supervision before the House Financial Services Committee, but, of course, during the hearing I might be asked questions about monetary policy. Then, in early December—a couple of days before the November employment report comes out—I'm going to give a speech on the outlook and monetary policy,

and the next day, I'm testifying on the economy and monetary policy before the JEC. So I will have some opportunities and, arguably, one in the very near term, at least next week, if there seems to be some misinterpretation of what's happening.

VICE CHAIRMAN DUDLEY. I think the intent here is to make people view this as possible, not probable. If, for some reason, the market reacts that this is probable as opposed to possible, we're going to have to communicate in a way that makes clear that what this language is meant to mean is "possible," not "probable."

CHAIR YELLEN. Governor Brainard.

MS. BRAINARD. On the same point, I also reacted to the "wide latitude" as perhaps a little out of context with what I've been reading in the market newsletters, which have been looking very carefully at this language. If we say "whether it will be appropriate to raise the target range . . . , the Committee will, based on . . . ," I think that will be seen as a lean and as providing wide latitude. When we also add "later this year" or "at its next meeting," that closes the latitude a bit and leans even further. So it's a question at this juncture as to whether that additional precision regarding "at its next meeting" and "later this year" really does not just boost the probabilities—something that I understand is the intent here—but also locks us into something that we then will need to try to figure out how to exit, if the world doesn't turn out the way we expected.

MR. LAUBACH. From my perspective, the hardest piece is to anticipate how the markets will interpret what the incoming data say about the likelihood of liftoff. That is, suppose we get middling employment reports. The world is easy if you get very strong or very weak ones. If you get middling reports, how will they be read? What inference will market participants draw: "Is this good enough, or is it not good enough?" All this language can do is

to point to the fact that your mind is not made up one way or the other. In that regard, the “based on incoming data” is helpful.

CHAIR YELLEN. President Williams.

MR. WILLIAMS. I’m going to pick up on a point, which I completely agree with, that Governor Tarullo made yesterday, and that’s about this issue of “based on incoming data.” I have no problem with the sentence. It is a compromise. It’s an uncomfortable compromise for me but perhaps on the opposite side of some of the concerns that were just raised. But this “based on incoming data” does, I think, feed right into the point Governor Tarullo made yesterday. I’m a big believer in data dependence. I absolutely love the phrase “assess progress—both realized and expected—toward its objectives,” because it is a medium-term outlook and it is about our objectives. When you say “based on incoming data,” we have to accept that we are falling, in my view, into the trap that Governor Tarullo talked about, in which everybody is going to be looking at one employment report and the next employment report, looking for each and every one of us to focus on whichever data release it is. The reality is, we have to say, as I’ve had to do in every interview I’ve done and every speech I’ve done, “I’m not going to say anything about this employment report, these trade data, or whatever piece of news comes out that morning. I’m going to talk about the medium-term outlook in terms of our progress—both realized and expected—toward our goals.”

I do think that when you put in a phrase that says “based on incoming data,” we are just priming everybody to react to these specific short-term noisy data. I’m not saying that we will do that. I hope we will look at it through the lens of, what does it mean for the next year or two? But what this phrase is telling people to do is to look at the couple of data points that are coming

up. Again, it's a compromise. It's an attempt, as I think Thomas nicely explained, to have your cake and eat it, too. But that's just the cost of this.

CHAIR YELLEN. President Rosengren.

MR. ROSENGREN. I have two quick observations. I do think, like Governor Brainard, that if we say “at its next meeting,” that indicates “probable,” not “possible.” If we actually want “possible,” something like “soon” would be a fuzzed-up word. I think we have to distinguish between what we would prefer and what we think we're signaling. I would prefer to say “at its next meeting,” because I'd rather make it probable. But if the goal is to make it possible, I would probably just say “soon.” Everybody can have a different view of the English connected with this, but I do think that, when you add a specificity of “at its next meeting,” it focuses the attention and the rest of the caveats get lost. That's just my own view of the English. After the go-round, we can get a sense of where the Committee is on that.

The question I had was on alternative C. Assuming that the economic conditions come in such that we actually are planning on taking action at the December meeting, I'm wondering whether the language in alternative C gives enough information about the rate path. If part of the goal would be, in effect, a dovish first tightening—which is to say, we are tightening, but the path we're taking is expected to be very gradual—I'm not sure the current version of C conveys that to the extent that I might want. So, as you're thinking about the next meeting, if it does seem to be appropriate, I'd suggest maybe rethinking that paragraph a little bit to more strongly indicate the path.

CHAIR YELLEN. Yes.

MR. ROSENGREN. Right now, I'm not sure I could deduce what the path or the likely path is from the language. If that's the intent—to signal the path—then we might want to craft some language that does that.

CHAIR YELLEN. Are there any further questions? Okay. Let's begin the go-round. President Kocherlakota.

MR. KOCHERLAKOTA. Thank you, Madam Chair. Our first job as a central bank is to maintain the nominal anchor. It is a common belief among citizens in this country that inflation will be at 2 percent over the longer run. I see plenty of evidence to suggest that we're failing in this task. Inflation has been low for years. Core inflation has been below target for most of the past seven years and is expected to remain low for years to come. Wage and compensation growth both remain subdued and, based on information from our labor contacts, are expected to remain so. Global disinflationary trends are strong and expected to remain so.

In my view, financial market data actually provide the most compelling evidence on this point. The low inflation breakevens are sending a clear message. Investors believe that there's a significant risk that the Federal Reserve will be unwilling to do what is necessary to hit either of its mandates over the longer run. To reiterate a point that I made yesterday and have made earlier in these meetings, the low risk premiums that have been deduced out of the low breakevens are signaling that people think low inflation is going to take place at the same time as low economic activity. So they view nominal Treasury securities as being a better protection with regard to those low-economic-activity states. That's what that shrinkage in breakevens is signaling.

What does that mean? It means that investors believe that we're going to have low economic activity for very long periods of time, taking place at the same time as low inflation.

What is that about? We have control over inflation, especially over long periods of time. That's a signal that investors do not believe we're going to do what is necessary to deliver on our inflation goals at the time when there is low economic activity, either because we're going to face constraints in what we're able to do or because we're going to choose not to do it.

Now, Madam Chair, is available evidence definitive that our nominal anchor has slipped from its 2 percent resting place? Thankfully, I would say, "Not yet." But the evidence from around the world and from our own history is clear on this point. If we wait for certainty on this point that inflation expectations have left their mooring, either up or down, we will have waited too long. The Committee needs to respond aggressively now to the risk of credibility loss to avoid facing the certainty of credibility loss. Such a loss of credibility would significantly constrain our ability to support the economy in the face of future adverse shocks, especially in the kind of world we contemplated yesterday, in which  $r^*$  is persistently low.

In view of the risk to our credibility, I would recommend that the FOMC initiate a new round of asset purchases and publicly announce its intention to explore the feasibility of negative interest rates. The Vice Chairman asked for suggestions on what kinds of interventions we might contemplate if needed. I think such interventions are needed at this time, so I'm suggesting some. I'm obviously not wedded to these particular ones. There are a number of ways one could proceed. Simply announcing the intention to never halt reinvestments, by itself, actually has a lot of accommodative power. Announcing your intention to explore the feasibility of negative interest rates—say, by as much as negative 50 basis points or negative 75 basis points—starts, by itself, to provide accommodation in states of the world in which I think investors are concerned that the FOMC will not be able to deliver. So I think there's a lot of scope in terms of what one might do.



The announcements I'm suggesting for this meeting, which would be a new round of asset purchases and an intention to explore the feasibility of negative interest rates, would come as a large surprise to market participants. We need to engender exactly such a surprise. It is clear from the data that market participants put significant weight on outcomes in which the FOMC will not take the actions that are necessary to achieve its objectives over long periods of time. It's time for this Committee to prove market participants wrong on this point.

Madam Chair, this is my last FOMC intervention. So if you'll indulge me, I'd like to offer a final thought on communications for your consideration. Many of us around the table spend a considerable amount of time communicating with the public about our individual views on monetary policy. As someone who did a lot of this activity, I think this kind of communication is entirely appropriate. The public has a right to know the thinking of its representatives about these key policy questions. As well, for those of us who are presidents, this kind of communication helps provide a key link between the decisionmaking in this room and the far-flung residents of our various Districts. However, this kind of communication does have its limitations. Most, if not all, of this communication offers the perspectives of individual participants about policy. There is, I believe, a shortage of Committee communication that would provide the public with a sense of what the Committee has done and is likely to do in response to the evolution of economic conditions.

The Chair is uniquely positioned to communicate to the public on behalf of the Committee. I believe that the public would have a better understanding of the likely evolution and direction of Committee decisions if it got to hear more from the Chair. I note that in 2005, according to FRASER, Chairman Greenspan gave 35 sets of remarks, testimonies, and speeches. The evolution of media technology and media focus suggests to me that the appropriate level of

engagement is at least as high now and possibly much higher. I think, too, that the evolution of the media means that this engagement needs to be more proactive than has been traditional. The communication needs develop, as we were just talking about in terms of miscommunications of the Committee's intentions. The Committee has to fill that need, potentially on relatively short notice.

Madam Chair, I have to say that you are uniquely positioned to communicate to the public on behalf of the Committee. I should say, too, that you are also uniquely qualified to do so. As my staff and I were able to experience during your recent visit to the Minneapolis Bank, you communicate with a rare clarity, a rare candor, and a rare genuine humanity and warmth. You would serve the Federal Reserve well by engaging even more with the public than you currently do.

You may be wondering where to have that communication. I will note that there are convenient nonstop flights from D.C. to Rochester, New York, I believe, almost daily.

[Laughter] That's just a suggestion for your consideration.

CHAIR YELLEN. I appreciate the invitation.

MR. KOCHERLAKOTA. Madam Chair, it has been an enormous honor to serve with my colleagues around this table under your leadership. I wish all of you the best of success in your future decisionmaking.

CHAIR YELLEN. Thank you very much. Governor Fischer.

MR. FISCHER. Thank you, Madam Chair. The outcome of this meeting should surprise no one. We were not expected to start the normalization process at this meeting, and we should not and will not do that. Rather, this is a scene-setting meeting at which we have first to review

where we are and where we might be going and then to communicate our conclusions accurately to the public, the markets, and ourselves.

In September, we took a pause to evaluate recent developments in the global economy, particularly in China. We can now conclude that the global economy is not at the start of a serious crisis; that global financial markets remained robust in the face of the September surprises; and that the external effect on U.S. economic activity and inflation of foreign developments is likely to be substantial but not inconsistent with a continuation of economic growth, the strengthening of the labor markets, and a gradual return to our 2 percent inflation target.

By the time of the critical December decision, we will need to decide whether the employment reports for October and November that are due just over a week from now and early in December, respectively, are consistent with a continuation of economic growth and the strengthening of the labor market. What numbers will we be looking for? Well, staff calculations are that it would take hiring of roughly 50,000 to 75,000 a month to maintain the unemployment rate at 5.1 percent if the participation rate were to drift downward in parallel with its structural trend, and that it would take hiring of roughly 125,000 a month if the participation rate were to hold steady. We might want to build in a cushion for these numbers, but they seem to me the right place to start, and I think we need some more clarity on this issue before the end of the meeting.

As usual, the staff has done an excellent job in producing the Tealbooks. I believe the general feeling that things are not going well economically, as well as more generally, in the United States—which we sometimes hear around this table and elsewhere—is based in part on the expected slowing of economic growth. One of the many interesting features of staff growth

forecasts is the powerful effect of declines in participation on the aggregate growth rate. That is clearly seen in the table “Decomposition of Potential GDP,” on page 26 of Tealbook A, in which the contribution from participation is forecast to decline 0.5 percentage point a year through 2018. It’s also interesting that the contribution of the growth of multifactor productivity to overall growth is expected to rise only slowly from 0.3 percentage point this year to 0.7 percentage point in 2018, while the contribution of capital deepening to growth is expected to be constant at 0.8 percentage point—that is to say, more than double the rate of total factor productivity growth from 2015 through 2017—and then to decline to 0.7 percentage point, the same as the contribution of TFP growth. I take two messages from this. First, economic growth is more in the hands of others than of the FOMC, something we all know but may, from time to time, forget. Second, the effect of investment is potentially more powerful than I, at least, had thought. These are messages we’re entitled to broadcast to a wider public.

On inflation, I have little to add to my previous comments, which were essentially that once the transitory effects of energy price and non-energy and food import price declines pass, we will be close to our target range. Further, if the staff forecasts for the unemployment rate are correct—namely, a decline by 2017 to 4.7 percent unemployment—I believe we’re likely to move all of the way to 2 percent. And we should also remind ourselves that not all shocks to inflation are negative. They used to all be positive, and we will again see positive inflation shocks. We just don’t know when.

I think we should also consider the risks to the forecast, but I’ll leave them aside for now and perhaps return to them during the general discussion of where we’re going.

I’d like to conclude with a few words on our communications coming out of this meeting. I believe we should aim to influence expectations to the point at which the public and market

participants expect us to move in December if our conditions are met, which could be translated into wanting expectations—and now I’m talking about probability—of an increase in the federal funds rate to rise to 50 percent or above after this meeting. But—and now I’m talking not about communications to the public, but about what we need to do—we need also to begin preparing ourselves for the possibility that we will decide not to move in December. And here, in the presence of President Kocherlakota, I think he must feel like Moses looking at the Promised Land with what I’m going to say. [Laughter]

MR. TARULLO. He’s, regrettably, being exiled.

MR. FISCHER. If we say nothing other than what we implied after the June and September meetings—that we will continue along the same path, waiting for the economy to strengthen—we may give the impression that we will not any time soon find conditions that would persuade us to move. The message that three times—in June, September, and December—we’ve decided that the economy is too weak to raise the interest rate sends a disturbing message. If we don’t move in December, we may need to say both to ourselves and to the public that we simply don’t like the path that the economy is on, and that we think we need to see stronger economic growth to be confident that inflation will return to our goal. In short, we should consider moving to an expansionary monetary policy, one that will involve at least some of the measures that might be expansionary: first, forward guidance regarding the path of the federal funds rate, provided that guidance is real or else carefully and expertly qualified; second, extending the maturity of our portfolio by lengthening the maturity of the Treasury obligations we hold, a move that Vice Chairman Dudley has mentioned several times; and, third, reducing the IOER rate and possibly the target range for the federal funds rate, though I doubt the wisdom of moving to a negative interest rate. No doubt there are other measures to consider. But part of

the reason I'm concerned is that there is no other game in town than the Fed when it comes to policy relating to the macroeconomy at the moment. We're it—the only active policy player in town. If we sit on the sidelines after we've reached the conclusion, for the third time, that the economy cannot withstand normalization, that message will be reinforced. Rather, we should help get the economy to a situation from which it can normalize, for we are certainly not in a normal situation at present. Thank you.

CHAIR YELLEN. Thank you. President Williams.

MR. WILLIAMS. Thank you, Madam Chair. I continue to prefer to take the first step in policy normalization at this time as described in alternative C. At our September meeting, I argued that realized and expected progress toward our goals warranted liftoff. Incoming data reinforced that view. Labor markets continued to improve. Even at the slower pace of job growth we saw in the most recent report, we'll overshoot full employment next year in my forecast. Other economic indicators, such as consumption and investment, are in line with my projections from our September meeting. Importantly, downside risks have also abated substantially as concerns about risks to the global economy have ebbed.

Of course, inflation measures do remain low. This is partly attributable to transitory factors, including dollar appreciation and drops in commodity prices, and those should dissipate over the course of this year and next year. The waning of downward pressure from these factors, along with the continued improvement in the labor market, give me confidence inflation will move back to our 2 percent target over the medium term. All in all, given the reduced downside risks from the global economy and my assessment that we'll reach our inflation target and exceed our full employment mandate over the medium term, optimal policy dictates starting to raise rates soon. Indeed, most standard policy rules suggested raising rates some time ago.

While I find a case for liftoff at this meeting at least as compelling as December, I am willing to delay, again, what I would consider to be the appropriate policy action and go with alternative B as written. One of my staff members had suggested to describe my mood as “grumpy.” I was a little fearful that people would find one of the other dwarves to describe my mood or my behavior. [Laughter] Picking up on some of the themes that Governor Fischer mentioned, we cannot continue this waiting strategy indefinitely. We’re keeping financial markets on tenterhooks and, I think, sowing confusion.

I gave a lot of speeches and met with a lot of people, both our boards and members of the public, since our September meeting, and I was struck by how many times I heard, “You know, we thought you guys were raising rates, and we thought it made sense. Now we really don’t understand. Do you know something about the economy that we don’t know?” I said to my own board members, “Well, you know me. We’re not that smart.” But it is striking how difficult it is to convey—especially, I think, in our September statement, which I thought was actually a very good statement—this message that we are just sitting and waiting for something that people really don’t quite understand what we’re waiting for.

Now, as our discussions make abundantly clear, the data and analysis will never be bulletproof. There will always be uncertainties. But, based on what I expect to see in the data in the next six weeks, I’m convinced it’ll be appropriate to lift off in December and—picking up on President Rosengren’s comment, which I agree with 100 percent—to signal when we go to C a “go slow” approach to further tightening over the next year as conditions unfold. I am not only convinced that  $r^*$  for the next couple of years is very low, but I also think there are significant odds that the longer-run  $r^*$  is low. Those are arguments for being clearer about a very gradual or shallow path when we do raise rates. Thank you.

CHAIR YELLEN. Thank you. President Rosengren.

MR. ROSENGREN. Thank you, Madam Chair. I support alternative B. The current language suggests to me, and may signal to financial markets, that unless the incoming data surprise to the downside, the Committee is prepared to raise rates at the December meeting. While this language nudges expectations toward raising rates in December, a nudge that I think is appropriate, it embodies the necessary flexibility to defer actions if incoming data indicate a more pronounced domestic slowdown than we currently expect. I do view the current language as signaling “probable” rather than “possible,” and that’s actually where I am in terms of my views.

Like President Williams, I strongly prefer a gradual increase in removing accommodation. Waiting longer risks the need to remove accommodation more quickly, and, given the uncertainty discussed yesterday about the equilibrium real interest rate, a more rapid increase might run a greater risk of overshooting the equilibrium rate. In fact, I prefer a tightening cycle that is closer to the path currently predicted by the market, which would be a bit slower than the median SEP numbers in September. With inflation persistently lower than our 2 percent target, we have the luxury of removing accommodation more slowly than in previous tightening cycles.

I would make the steepness of the interest rate path conditional on our confidence in reaching the inflation target. Even my currently expected gradual path is contingent on improved confidence in reaching the inflation target. Should our confidence in attaining that goal not improve in coming months or should we be surprised by a more rapid return toward 2 percent, we should be ready to adjust the pace of tightening accordingly.



An additional benefit from moving in December with a plan to move gradually is that we will have time to analyze the effectiveness of our monetary policy tightening tools. If we were to wait longer and need to potentially move rates at each meeting, we might have less flexibility to respond to surprises about the effectiveness of our tools or potential financial surprises from the initial tightening. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Lacker.

MR. LACKER. Thank you, Madam Chair. I'll be brief because I want to make sure to save my voice for the roll call. [Laughter]

At our September meeting, I was convinced that economic conditions warranted an increase in the interest rate target range, based on my sense that labor markets were in line with our past assessment of what constitutes full employment and on my confidence that inflation will move back toward 2 percent once the most recent disinflationary impulse is past. Since then, as I discussed in our earlier go-round, economic reports haven't appreciably altered the assessment for me, and the more worrisome consequences related to global economic developments now seem less likely. So I continue to see a rate increase as warranted, and I support alternative C, although I suspect we will not adopt that alternative today.

If alternative B is adopted, I think the additional language emphasizing December as a live option would be useful. Market expectations regarding liftoff appear to have overreacted since the September meeting, and it would be helpful to push back on that. I had an experience very similar to that of President Williams during the intermeeting period, hearing from many commentators. Maybe these people weren't up to date on the federal funds futures markets, but they seemed to view us as highly likely to change going into September and came away from our decision a bit confused while wondering about our criteria, with many of them taking a negative

signal for the economic outlook from our decision. But it would be useful to add that language only if December is a serious possibility. Listening to your comments at the end of the day yesterday, Madam Chair, I thought it seemed as if you were setting a relatively high bar. That's how it struck me. I'll go back and read the transcript when it comes out. But if December doesn't have a substantial chance or it isn't probable, in the words of President Rosengren, we're risking a big hit to our credibility to go into that meeting with this language coming out of this meeting and not move in some circumstances. In that case, if that's our intention—to set a fairly high bar—we'd probably be better off leaving this language out of the statement. Thank you.

CHAIR YELLEN. President Lockhart.

MR. LOCKHART. Thank you, Madam Chair. I support alternative B at this meeting. I am in favor of the changes in paragraph 3 that include the bracketed language making reference to the December meeting. Like others I've already heard, I think signaling that December is in play for liftoff is particularly important at this meeting. It's entirely plausible that we'll get to the December meeting with employment growth that is at least as strong as in the past quarter, with real-time GDP growth in the 2½-ish range, and with an inflation trend pretty much as it looks today. If these conditions appear to be in place at the time of the December meeting, I believe it will be appropriate to pull the trigger.

Based on my view of the appropriate policy course if economic conditions evolve as I expect, I think an appropriate communication would have public expectations centered on a roughly 50–50 probability of liftoff by the time of the December meeting. To me, roughly even odds after this meeting is what we need to see to support a truly data-dependent decisionmaking process as we approach the next meeting. Market participants are clearly placing current odds of a December move well below 50–50. Coming into this meeting, my view was that we should

craft a statement that would communicate a posture of preserving liftoff in December as a live option but not a certainty. It's my judgment that my preferred outcome, this roughly 50–50 perceived chance of a December liftoff, is most likely with a statement that makes explicit reference to December as a decision point using the language “at its next meeting.” My guess is that the proposed paragraph 3 language without this reference will not send a strong enough signal to move market expectations from where they are today.

Should the Committee go in a different direction and decide on a version of paragraph 3 without any reference to our next meeting, there is a word change that I think is important. Without the bracketed reference to the December meeting, the phrase “In determining whether it will be appropriate to raise the target range” is a construction that may be construed as implying an indefinite delay of liftoff. In the event that the bracketed language of paragraph 3 is omitted, I suggest the statement be adjusted to read “In determining when it will be appropriate to raise the target range.”

As to the specific options in alternative B, I think the “slightly” modifier in paragraph 1, describing the decline in market-based inflation compensation, is accurate. Thank you, Madam Chair.

CHAIR YELLEN. President Lockhart, could I ask you a question? In the brackets in paragraph 3, there are two choices—“later this year” or “at its next meeting.” You indicated a preference for “at its next meeting.”

MR. LOCKHART. “At its next meeting.”

CHAIR YELLEN. Of course, that refers to December, but “later this year” also refers to December.

MR. LOCKHART. Well, I see no difference between the two, so I don't know why we would play around with "later this year." We'd just say "at the December meeting."

CHAIR YELLEN. Because it's a phrase that we've repeatedly used.

MR. LOCKHART. But my point is, if we choose not to put that in, then I take some issue with "whether" and suggest substituting "when."

VICE CHAIRMAN DUDLEY. You're asking a slightly different question, though. Could you live with either of those constructions?

MR. LOCKHART. Yes, I can live with either one.

CHAIR YELLEN. You can. Okay.

MR. LOCKHART. I think they're basically the same.

CHAIR YELLEN. That was really my question.

MR. LOCKHART. I prefer being as explicit as we can, so the word "December" would be in it. But I can live with either one.

CHAIR YELLEN. Okay. Thanks. That's very helpful. Governor Tarullo.

MR. TARULLO. Thank you, Madam Chair. I support alternative B, and, in a moment, I'll refer to the language issues that have been raised. I want to say a couple of things first, though, and they center on this issue of whether we now have to move because people have suggested we're going to move and there was some expectation that we were going to move. I think the optimal approach to policymaking is, before you say something, to be pretty sure that what you say is what you're going to do. But the second-best is not to go ahead and do something that is ill advised because you suggested to people beforehand that you might do it. The second best is to treat your earlier suggestion as essentially some variation on a sunk cost and then go ahead and do what makes sense.

The first point I'd make is that this, to some degree, is a self-inflicted wound. I agree with people who have said that there's a lot of confusion out there, and that there was an expectation as well as a lot of discussion centering on September. How could the markets and the commentators not be focused on September when so many of us were out talking about September? This notion that, "Gee, the markets have focused on September—we'd better do it," is somehow linked to the way in which our public statements have been date and calendar centered rather than talking about the narratives, as I put it yesterday, or the outlook, as many of you refer to it, that would guide our sense of when it's appropriate to move. There is a lot to what President Williams and others have said about there being some sense of, do we know something that the markets don't know? But I think we've created that problem, and we've created it by talking about dates. For so long, President Bullard was trying to get us off dates and onto state contingency. We finally got off of dates, and then we immediately went back to talking about them, which I just don't think has been helpful.

The second point is, I'm still having some trouble with "act sooner so that you don't have to make a big move later." When I say I'm having some trouble, I don't mean I reject it, but I am having some difficulty understanding it for two reasons. One reason is—I assume we all agree with this—the effect of an increase of 25 basis points in the target range will be substantially greater than what the models say an increase of 25 basis points in the federal funds rate will be. The increase is reversing a lot of positions. It's reversing a psychology. It's going to have a big effect. I keep getting told by CEOs to expect a lot of turbulence when it happens. Now, that is not a reason not to do it. I agree with Jeremy Stein's notion that we cannot be driven by what the bond market reaction is going to be. We sometimes just have to fly through that. But I do think there's going to be an effect, and there's going to be a tightening of financial

conditions well beyond what 25 basis points would normally suggest, particularly when, as yesterday's discussion pointed out, 25 basis points is probably a good bit of the way toward what almost everybody would agree a neutral rate is. It's not as though we think, "We've got a long way to go, so this is just a little bit."

Now let me turn to the language itself. I don't have a view on paragraph 1, Madam Chair. Whatever you want to do on that is fine with me.

On paragraph 3, I would have preferred no change to the language at all—that is, keeping what we said in September—but it's obvious that that's not where the center of the Committee is. So I actually thought that the formulation of shifting toward saying the question we're asking is whether—or, in President Lockhart's formulation, when—it's appropriate to raise rates, as opposed to talking about how long to maintain the existing target range, is, as I said, a clever way to signal that the question of an increase is now on the table. I believe that language change cannot help but be noticed by people and will have the desirable signaling effect. Although, again, my preference would be no change in language, understanding where the Committee as a whole is, I think this was a much better way to do it than the formulation that was in the original alternative B that was circulated. However, on the inclusion of "later this year" or "at its next meeting," coming from my policy position, I'm likely to be biased against making it probable as opposed to possible. I think President Rosengren is right. It will make it seem probable, and that's not where I want to be. I'm not sure that's where the Committee is prepared to be right now as to wanting to keep it on the table. By the way, if there's a sentiment favoring removal of the reference to "later this year" or "at its next meeting," I think President Lockhart's suggestion to say "when" rather than "whether" would be fine.

Finally, for the reasons John has already articulated—which will keep my intervention shorter—I don’t think “based on incoming data” is helpful because, to the degree that we want people to think that we’re looking at the data, they already know that, and John said well why. It may give an undue emphasis on a couple of pieces of data. That’s it, Madam Chair. Thank you.

CHAIR YELLEN. Did you have a view, Governor Tarullo, on “later this year” versus “at its next meeting”?

MR. TARULLO. Oh, do you mean if my impassioned plea to omit them is ignored by everybody else?

CHAIR YELLEN. Correct.

MR. TARULLO. Yes, under those circumstances—“Once we’ve decided we’re sending you to Elba, what kind of house would you like to live in?” [Laughter] I think probably “later this year,” and the reason for that is, I believe it maintains a little more optionality for us, because we have to drop “later this year” in December, one way or another. If we drop it but like the formulation, we can substitute “at its next meeting” and the world will think, “Oh, they just couldn’t say it, but it’s the same formulation.” If we decide—as President Lacker was suggesting and as Governor Fischer, in some respects, was suggesting—that you have to reorient if we’re not moving, it gives us the opportunity to do that as well.

CHAIR YELLEN. Thank you. President Harker.

MR. HARKER. Thank you, Madam Chair. Given our economic forecast, my position on policy remains that we should raise rates this quarter and we should better prepare markets for that event. I think the language in alternative B will help accomplish this goal. I believe it will be interpreted as the Committee signaling that a December move is very much on the table. Currently, markets are heavily discounting the probability of any move this year, making it

harder to act. My fear is that we are losing credibility for liftoff, and alternative B will, I hope, get market participants to change their beliefs, at least to some extent.

The continued, consistent underlying economic strength, in spite of recent headwinds, leads me to believe that we will see steady and modest economic growth. With that in mind, and as I stated yesterday, my assessment of  $r^*$  is that it is currently around zero and perhaps a tad positive, which is pretty much in line with much of the evidence presented in the memos. Subsequently, I anticipate that  $r^*$  will gradually increase to around 1.75 percent. That implies that our current policy stance is overly accommodative and will become increasingly so if we do not begin raising the funds rate. However, I also continue to believe that the process of normalization should be gradual, and that starting sooner makes that scenario more likely. Thus, I anticipate that monetary policy will be characterized by some degree of accommodation over the near term, but that the current degree of accommodation is excessive.

Although I can't quantify the effect it will have, I think raising rates this year will send a reassuring message and bolster confidence. It will strongly reflect the view that we have indeed come a long way, that the fundamentals are sound, and that we are approaching a degree of normalcy that has been absent for eight years. Indeed, it increasingly appears to me that the most abnormal aspect of the economy is the current stance of monetary policy. Thus, I support alternative B. In support of President Lockhart's view, I would prefer "at its next meeting," but I could live with either. I also support President Williams's and Governor Tarullo's view concerning dropping the phrase "based on incoming data." Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Governor Powell.

MR. POWELL. Thank you, Madam Chair. I will support alternative B today. On the statement language, I would like, if I could dial this in perfectly, to have the market price in a



50 percent probability of liftoff in December. Then I would like the data to move it up and down from there as we move toward the meeting. For that reason, on the language, I like the red language “whether it will be appropriate to raise the target range,” and I like “later this year.” I could live with “at its next meeting,” but I like “later this year” for the reasons that Governor Tarullo articulated. I am actually attracted to President Williams’s idea of eliminating “based on incoming data,” because, in this context, it puts a bright spotlight on the two I employment reports and I don’t think that’s how we should make policy. So I could lose “based on incoming data.” That’s what I would do there.

Implicit in that is that if the economy continues on the current path, with job growth sufficient to continue to materially reduce labor market slack, I would support liftoff at the December meeting, and I would present such a decision in a context of a very broad agreement among the membership of the Committee that the path of rate increases will be a gradual one. For me, the tightening cycle can be very slow. The market path does not trouble me, although, of course, the data will dictate that.

The question is, why move at all in December? Why not wait another three months or six months—or even a year or two years? And I would offer two considerations. First, I believe that the test that we’ve articulated will be met if we get one more cycle of solid data. I also believe that a well-telegraphed move of 25 basis points, presented in a context of a very broad Committee consensus favoring a shallow path, should not have a sustained material effect on financial conditions.

Second, I would point to the Committee’s own communication, and let me be clear: I’m not arguing here that we should mistakenly do this because we’ve said we would. I’m arguing that, in a close call, I would lean toward going if we get a chance to do that. I don’t think it

would be a mistake. The reason is, we've carefully guided the public to expect liftoff this year. Many on the Committee, including me and many others, have publicly embraced that expectation. The September SEP has 13 of the 17 of us supporting liftoff this year. In the September SEP, we had median expectations regarding second-half real GDP growth of 2 percent and unemployment at 5 percent. Those will be met, hypothetically. I think there will be a cost to appearing to change our minds, and we would simply need to weigh the benefits against that cost. I guess I would really like to move past this essentially tactical decision about the precise date of liftoff and shift the focus toward the very broad agreement about the gradual path.

With that backdrop—and here I echo what others have said—I suspect that a decision not to move in December will not be, and will not be seen by the public as, just another step in a data-driven, meeting-by-meeting evaluation of policy but rather a fundamental change in the Committee's framework as it's been expressed in communications this year. One implication would be a sense that we are seriously troubled by the path of the economy. An additional implication would be a significant further period at the effective lower bound. Any restatement of our objective function risks setting the bar at a level that may not be met for a year or more. In addition to the costs of appearing to change our mind, I am concerned with the buildup of financial and economic imbalances over time if, in fact, we're going to remain at the zero lower bound for an extended period.

The question is how high to set the bar for incoming data between now and the December meeting—particularly on two payroll reports, if I can admit that. I would simply say that I would not be setting it excessively high. I'll end with the thought that I really do believe it's essential that for the period ahead we see economic growth above its trend rate. Otherwise, I'm

not sure why we are raising the federal funds rate. But if we do see that by some reasonable margin, I will be prepared to go forward. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Mester.

MS. MESTER. Thank you, Madam Chair. There's been little change in my medium-run outlook, and I continue to believe there's a good case for moving policy off the zero lower bound. In my view, the criteria we've set out for liftoff have been met. Such a move is consistent with the Tealbook's optimal control simulations, which balance the macroeconomic risks of lifting off too early versus too late, and with various versions of monetary policy rules.

We have already taken out insurance against downside risks by keeping interest rates considerably lower than prescriptions from almost all of the policy rules, even as the Tealbook-consistent estimate of  $r^*$  has been rising. This estimate moved up more than 25 basis points to 74 basis points in this Tealbook. The funds rate remains well below estimates of the longer-run equilibrium rate. In addition, even if they are not imminent, there are likely to be some building risks to financial stability from keeping rates low for a long time. We need to be cognizant of these even if they are not in our models and are difficult to measure. Indeed, we have said in our own *Monetary Policy Reports* that we consider this a potential cost of the necessary extraordinary monetary policy actions we took during the crisis and recession.

Yesterday's discussion of  $r^*$  suggests that there are good reasons to think that the natural rate of interest may be lower than it's been historically and perhaps significantly lower. Given the shocks that inevitably hit the economy, this means the odds of getting pushed to the effective lower bound are higher than they've been historically. To deal with the recent crisis and recession, the Federal Reserve developed a set of monetary policy tools that can be used in such situations. There are many studies showing that these tools were effective in easing monetary

and financial conditions, and I'd like us to be in a position to be able to use these tools again if we ever find ourselves in a situation in which they're needed. However, there continues to be some skepticism about the efficacy of these tools. Ultimately, the verdict will depend on demonstrating that there is a way out. Failure to navigate a good exit has the potential to take these tools off the table. This risk is another factor that persuades me to favor taking an initial action to raise rates rather than waiting too long or too much longer, even in the face of some uncertainty regarding the outlook. I'd rather address those uncertainties by adjusting the slope of the policy rate path after liftoff, if need be, because of shocks as we learn more about the longer-run growth of the economy and  $r^*$ .

Liftoff remains an unlikely outcome at today's meeting. Our next decision point is December. The public is going to be looking at today's statement as providing information about what we need to see between now and December in order to lift off. Have we gotten closer to meeting the criteria for liftoff or not? If I saw data similar to what we saw in this intermeeting period—including payrolls in the 140,000 range or even lower, above the 125,000 that the Tealbook staff has said is necessary to keep the unemployment rate constant—I'd be prepared to raise the federal funds rate in December. However, others may see things differently, and the statement needs to convey a sense of the consensus view.

I admit the communications in this environment are very challenging, but we should always be taking steps to meet those challenges. I believe that the public read a more negative outlook in our September FOMC statement than was intended. The guessing game coming into that meeting reminded me of the old Clairol hair color tag line: "Does she or doesn't she?" That tag line actually won an advertising award. I'm not sure we can say the same about our own communications. [Laughter]

My main concern with the language in alternative B is that the characterization of labor market developments will convey a more negative message than we intend and set up the wrong expectations. The first paragraph drops language stating whether we've seen labor market improvement since September and then cites the slowdown in payroll growth and no change in the unemployment rate. Payrolls continue to grow above trend. Payroll growth of 140,000 per month, if sustained, should put downward pressure on the unemployment rate, and, in this stage of the business cycle, slowing in the pace of job gains is to be expected. It's a feature of many economic forecasts, including the Tealbook and the Federal Reserve Bank of Cleveland staff model. Indeed, I interpreted the adjustment we made in the liftoff criteria in July, changing "further improvement" to "some further improvement," as a recognition that we expected the pace of gains to slow. In addition, other measures of unemployment continued to decline since our September meeting. By omitting these relevant facts, the tone is negative, and the public may infer we have moved further from meeting the labor market condition for liftoff.

I fear we're feeding expectations that monthly job gains close to 200,000 are needed for us to conclude there's been some further improvement in the labor market. If that's true, we should say so. Essentially, what we've done is to add another liftoff criterion by suggesting that the second derivative of employment, and not just the first derivative, matters. If it's not true, then it's a problem allowing that expectation to stand. So let me offer a suggestion—I know I'm tilting at windmills—that we change the characterization of labor markets by saying: "While the pace of job gains slowed last month, the pace is consistent with some further improvement in the labor market. The unemployment rate held steady, while other measures of underemployment declined." I think this characterization is consistent with the facts and conveys the proper sentiment.

Regarding the other changes suggested in alternative B, I support making the change in paragraph 3, and I favor saying “later this year” instead of “at its next meeting.” Out of an abundance of caution, we do take market expectations into account in our decisions to lift off. I understand that. So I think we do need to change expectations in order to keep December alive. I believe that the language does offer us flexibility if the data disappoint and our outlook changes.

I also support the suggested change in paragraph 2. In paragraph 1, I have a small preference for saying “slightly” to characterize the change in market-based measures of inflation compensation to acknowledge that the decline was smaller over this intermeeting period than it was last time—10 basis points versus 20 basis points.

Finally, if the Committee truly believes it’s unlikely that we will have enough information by December to make a judgment about progress toward our goals and therefore to make a liftoff decision, then let’s say so now rather than setting up another round of the guessing game. Thank you.

CHAIR YELLEN. Thank you. President Kaplan.

MR. KAPLAN. Thank you, Madam Chair. I support alternative B. Based on how it’s written now, pointing to the December meeting or later this year for our increase in the policy rate, let me mention three or four data points that I and my staff will be particularly looking at. Number one, on inflation—and forgive me for mentioning Dallas—we will certainly be crunching our numbers for the headline inflation and then crunching our numbers for the Federal Reserve Bank of Dallas trimmed mean inflation. We are looking for that number to stay within a range of 1.6 to 1.7 percent. If it fell below that, that would concern me. With a range of 1.6 to 1.7, which is basically where it is right now, we would continue to feel confident about our

forecast for 2016 of 1.8 percent inflation and continue to be confident that we would reach 2 percent inflation by the end of 2017. So we'll be looking hard at that.

Number two, on the jobs report—and Governor Fischer alluded to this—we'll be looking for job creation in excess of 100,000. I don't think we'll be disappointed if it's only 100,000. Why? Because we'll see that as being sufficient to certainly not increase unemployment, and if job growth is 100,000 or more, it may, based on our numbers, slightly help it improve.

Number three, we'll be looking at the ISM series for not only manufacturing, but also services. We expect manufacturing to be weak. We're expecting that in advance for many reasons, including global overcapacities and the strength of the dollar. What we'll be looking for is that it doesn't get weaker than it is. If it stabilizes, that would be great, but we're not expecting very good manufacturing numbers in this next series of releases. We will, though, be looking hard at services to see that that sector is still healthy and strong and continues to be solid.

Lastly, we'll be looking at the various data series on consumer spending and so on.

If the data come in along the lines I've just described, I'd be inclined in December, then, to say we should, in fact, raise the federal funds rate. I agree with President Rosengren that we should emphasize, though, in that statement that we will remain highly accommodative and make clear that the path of the federal funds rate is going to be very shallow.

I also think it will be very important for all of us in our public comments to emphasize the things we agree on rather than the things we disagree on. To my ear, listening around this table, I think we have a very strong agreement that we should remain highly accommodative for some extended period of time. I know there's disagreement on some of the tactics and the first step, but it would be good publicly to emphasize where there is a consensus around this table rather than to emphasize the differences.

I do agree with the comments that the process—we're talking about liftoff and then pulling back—has probably gotten to the point at which it is no longer serving us well. It was probably necessary to provide us with the optionality, and the world has obviously been very complicated. However, I believe the process of stepping up and then pulling back has created a greater fear of the unknown and magnified the perceived importance of this initial decision, maybe out of proportion to its likely economic significance. I get a number of comments also from people saying, "Gee, I thought liftoff meant 25 basis points. Does it mean something more than that? I guess you see something that we don't see in the economy. What am I missing?" I see these comments as fairly widespread. This thinking has caused businesspeople to doubt what they're seeing in their own businesses and, in some cases, to pause or pull back somewhat from confidently making decisions and to maybe even shorten their time horizons.

I do agree with the comments that were made today that, if we decide in December we are not going to raise the funds rate, it's going to be very critical to look again at the paradigm for our communication. In particular, what I'd like to see us avoid is this thought: "We're about to take action right around the corner—just wait. But it's data dependent." I'd like to see us get out of that cycle depending on what we decide in December. Thank you.

CHAIR YELLEN. Thank you. President Evans.

MR. EVANS. Thank you, Madam Chair. I support alternative B, and I agree with Governor Tarullo's comments that, in paragraph 3, it would be acceptable if you omitted the bracketed language "later this year" or "at its next meeting." On the other hand, if I'm being issued a ticket to the same location as Governor Tarullo, I'll take "later this year" as well.

MR. FISCHER. That might influence Governor Tarullo's decision. [Laughter]



MR. EVANS. Given the location that he described, I don't think it matters. Maybe I'm the only one who heard that.

I'd also find it acceptable to take out the "based on incoming data" language, as President Williams and Governor Tarullo mentioned.

President Williams made a comment about how our communications last time had been misinterpreted by the public. I had a very similar experience. I was speaking at Marquette University in Milwaukee not long ago, and, after giving my speech, I was taking questions. They had microphones out in the audience, and people had to go up to the microphone, so I could see as we moved across the microphones an elderly gentleman moving up into the position for the next question. I cringed and braced myself for the inevitable "saver" question. That wasn't what he asked. Instead, he said, "Gosh, everybody was paying so much close attention to what you were talking about, and, in your speech, you talked about how important communications are. Gosh, you guys just completely blew it. Everybody expected it. You didn't do it. Now we don't know what to make of this. This is just a mess. You guys just need to take an action and be done with it. Now, by the way, I have a second question. The second question is, are you familiar with the fact that a lot of large corporations have a tremendous international exposure and what you guys are doing to the dollar is killing them?" I think that captures the schizophrenia that is in play with so many members of the public. They want us to get off the zero bound, but they don't want the implications of what might transpire afterwards. So we have to be careful about that.

I'm not eager to support a December rate liftoff. I continue to believe current conditions and my outlook indicate that would be premature. I think we need continued very strong accommodation to signal our aggressive commitment to a symmetric 2 percent inflation

objective. Yesterday's interventions by Presidents Lacker and Bullard, as well as the Tealbook box on inflation compensation, suggest there's a costly risk that the public's understanding of our commitment may be less than complete. Unless the intermeeting data take an unlikely turn toward a notably stronger inflation path, I continue to believe that delaying liftoff until mid-2016 is the best way to achieve this inflation goal.

Madam Chair, if I shared your optimism about the possible trajectory of unemployment heading well below 5 percent next year, I would be more enthusiastic toward a December move. Nevertheless, I could be open to such a move in December with the right communications in place. I have heard your commentary, along with those of Governor Fischer and others, that too much weight has been placed on the first move and the path is more important. My own prescription is for three quarter-point increases between now and the end of December 2016. If language regarding a shallow path was crafted to be not too much steeper, I could be open to a December liftoff. And President Rosengren made a comment suggesting that the market expectations path might be one approach that's reasonable.

In meeting with our CDIAC group a few weeks ago, I anticipated that they, being bankers and credit union people, would be anxious to talk about liftoff. So we got that out of the way—yes, they would like liftoff—and then I wanted to talk about the path and how steep it should be. To fix ideas, I said, “Well, I suppose if you look at the dot chart, you might think that, at the end of 2016, a funds rate of about 1½ might not be unreasonable,” and they almost gasped. It was such a large number, basically, was what they were saying. Again, others have said this, too. There's a desire to get off of zero, but how high is really up in the air, and it's not nearly as high as some people probably think.

I'm sorry—did I mention that I have “over 11:15” in the pool for when this ends?

[Laughter] I'll try to cut some things out, I promise.

Now, let me say again why communicating a shallow policy rate path is appropriate. First, the  $r^*$  memos and our discussion yesterday made a strong risk-management case for keeping rates low in order to help avoid bad outcomes associated with the effective lower bound on interest rates. For me, this is a powerful argument, because it captures the asymmetry in the risks we face. That is, currently, I'm not hearing many discussions of similarly bad outcomes on the other side of the ledger. If you are worried about high inflation, even if events changed quickly and underlying inflation was headed to 3 percent or even 4 percent, our interest rate policy tools could be employed effectively to rein it in.

There's a second reason why I support an aggressive commitment to a symmetric 2 percent inflation objective. It's that we are likely in a regime in which even during normal times we could all too often run out of capacity to lower the funds rate to deal with recessionary shocks or below-target inflation. Longer-run measures of  $r^*$  are plausibly in the range of 1 to 1½ percent. So, with our inflation objective of 2 percent over the longer run, the nominal federal funds rate ought to average about 3 to 3½ percent. This means our monetary policy capacity on the accommodative side is only 350 basis points. This is a brave, new, risky world for FOMC recession fighting. In the period that included the 1990–91 recession, the Greenspan FOMC lowered the funds rate from a peak of 9¾ percent to 3 percent. That's 675 basis points. They were a little bit above steady state. In the cycle that included the 2000 recession, the Greenspan FOMC lowered the funds rate from a peak of 6½ percent to 1 percent. That's 550 basis points. In the most recent cycle, the Bernanke FOMC lowered the funds rate more than 500 basis points, and we clearly wanted to do much more. We instead resorted to increasing our balance sheet to

about \$4½ trillion. The point is that having only 300 to 350 basis points of room to lower the funds rate to zero from a neutral level will likely pose a serious challenge for our future recession-fighting and inflation-inducing capabilities. Historically, 350 basis points has not been enough. I agree with the suggestions given by Presidents Williams and Rosengren yesterday that we need to review our tools for more regular use at the effective lower bound.

Well, I've got more comments on symmetry, but I'll skip those.

These issues inform my strong conviction that we need to make sure our policy rate path over the next 12 to 18 months is appropriately accommodative. We need the time to assess domestic and global risks that we might normally discount, but that today impose asymmetric losses due to the constraints of the effective lower bound. And we need the time that a shallow path allows to make sure inflation is heading to our target in a symmetric fashion and not stalling out in a way that would even further impinge on our ability to fight future recessions or disinflations. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Bullard.

MR. BULLARD. Thank you, Madam Chair. My assessment is that the best we can probably do is to raise the rate in December and have it be a dovish increase while getting the policy idea across that we're going to have a gradual pace of increases. That's what I'm hoping for.

I'm willing to recommend alternative B for today. I like the "slightly" language in paragraph 1, and I like the "at its next meeting" language in paragraph 3. I support President Mester's suggestion on the characterization of the labor market in paragraph 1. I thought she made good points on that. I also support President Lockhart's suggestion if we were not going to include the bracketed language in paragraph 3.

I agree with President Williams that there's a good argument for alternative C at this meeting. We cited global financial turmoil in September, which has settled down or reversed. I agree with Governor Fischer that a near-term hard landing in China seems unlikely. I think our arguments are based on cumulative progress toward goals, and that argues that now is a good time to begin normalization. So you could make a case for alternative C today, but, because the preparation for C is not in place, I'd go with alternative B for today.

I want to follow up on some of my comments from yesterday, and, perhaps hazardously, I'm going to comment a little bit on what other people have said this morning. We made a case for normalization beginning in 2011 and later revised that plan. We've had four years of communication of the idea that the Committee intended to normalize. The case for normalization suggests that the policy rate would return to historically normal levels, and that the balance sheet would return to levels more consistent with historical values, once the economy returned to normal.

Today the national unemployment rate is 5.1 percent, very close to historical norms and well below the median unemployment rate over the past 50 years in the United States, which is 5.8 percent. Net of the oil shock, inflation is close to target—1.6 percent or 1.7 percent. On the Dallas Fed trimmed mean, it's 1.7 percent on a year-over-year basis. So, again, net of the oil shock, inflation is actually pretty close to target. Arguably, this is about as good as the Committee has ever done with respect to its goals, yet the Committee has not moved to try to normalize either the balance sheet or the policy rate, even though both dimensions of our goals are arguably relatively close to normal.

The private sector may reasonably conclude, or may be forgiven for concluding, that we intend to keep the zero interest rate policy, or ZIRP, at least through the medium term. Even

with liftoff, as Governor Powell and others emphasized yesterday, the pace of rate increases is likely to be so gradual that a moderately negative shock would easily compel the Committee to return to the zero lower bound. My point is that the probabilities are fairly high at this juncture that we will simply keep ZIRP—or, if not ZIRP, near-ZIRP—in place. I do not think that this is the intention of the Committee. All of us—the Committee and the staff—have in our heads that we’re going to return to the equilibrium of the 1980s and 1990s, which we know and love, and that we’re going to move the funds rate around according to typical policy prescriptions from that era. But I’m not sure I really see that happening, given the way things are evolving and how difficult it’s proving to be to move off the zero lower bound.

I think the Committee should at least begin to prepare some for the possibility that we have either a ZIRP or a near-ZIRP in place for some time. In particular, if this is the way this proceeds, we would have to de-emphasize our rhetoric about normalization and our rhetoric about exit strategy, and I don’t think this would be easy for the Committee to do, because we spent four years talking about it. But then we just de-emphasize all of that and say, “Well, the balance sheet is not going to return to normal very soon—maybe not at all—and the policy rate is also not going to return to normal very soon.” Or, “our concepts of ‘normal’ have changed so dramatically that it’s completely warped to think about the 1980s or 1990s equilibrium as being relevant in today’s policy environment.” We should at least think about this.

Now, a lot of people around the table still think that, if we commit to an even longer period of ZIRP, we’ll produce what the New Keynesian model says it will produce, which is a consumption boom today and higher expected inflation today. After six or seven years of this, you have to start to admit that the model is not generating anything like the kind of prediction that would come out of the basic analysis. So it seems very unlikely that a further commitment

to ZIRP is going to help us, given the current outlook. Keep in mind that the staff's outlook is a very subdued outlook. It's a 2 percent growth rate. It's a flat unemployment rate, more or less. And it's inflation below target for all of the way through the forecast horizon. So almost nothing happens.

It's unlikely that we would get any kind of business cycle dynamics out of further commitment to the low interest rate policy. What's more likely is that we'd get results that look a lot like Japan's. Japan's policy rate has not been above 50 basis points for 20 years. There's no consumption boom there. There's no boom in inflation expectations there, either. We'd get something very similar. I think that the probability that we have converged to something like that is getting much higher than it has been until recently. We still may be able to lift off modestly, and I hope we can, in December. It's definitely possible that the economy will surprise to the upside, allowing normalization to proceed as we have it in our heads. This economy has definitely been resilient in the past, which could happen again. But after seven years of ZIRP, we need to prepare for a more permanent policy of this type.

In response to some of the comments around the table here, I thought it was an excellent set of comments, and I wanted to react to some of them. I have some sympathy with President Kocherlakota's citation of the low TIPS breakevens, which I have cited myself at times in the past and have been very concerned about. He says the evidence is not definitive yet that inflation expectations are falling, but I think we need to worry about this. As those of you who have listened to what I've said about this know, I've noted that the oil price seems to be so highly correlated with the TIPS breakevens that I can't make any sense of it in this current environment, in which the oil price has declined. But now the oil shock is more than a year old, and I'm

starting to wonder if we should start to infer more of a signal from this. So I take President Kocherlakota's admonition on this seriously.

I also agree with President Kocherlakota on Chair communication. I thought he eloquently stated the case, and I was intrigued by the data on Alan Greenspan and his communications strategy for the Committee. President Kocherlakota is not known primarily as a data guy. He's known as a theory guy. But here he came up with some excellent data.

MR. KOCHERLAKOTA. FRASER, man.

MR. BULLARD. I agree with those around the table who said that the goal here is to reel in the market expectations of when the liftoff will occur. The goal is to put some more probability on December. If we could get that above 50 percent, it would be good. If we can't, then we might have to follow up with communications after the meeting. I don't know how that would work. But I think the basic idea is that September was perceived as more dovish than at least my interpretation of where the Committee is, and that the markets have moved way out, some into 2017, on when they think liftoff will occur. This is part of what's making me very concerned that we'll just get stuck with ZIRP long term.

I agree with Governor Fischer on the implications of not moving in December. I think the words he used were, "That would indicate we just don't like the economic outcomes we see," and I believe that's right. The argument about normalization is an argument about cumulative progress. To mix that up with what's going on day to day in the economy is mixing two types of arguments. If we don't like the way the economy is performing, that's fine, but the Committee should just admit this and then chart a new course for policy. Governor Fischer laid out some possibilities in that case. I agree with John Williams and others—we can't continue to wait



indefinitely on this. We're sending a pessimistic signal on the economy that might be unwarranted.

Governor Tarullo has made comments about the “data dependent” sentence, and I actually agree with him on this. In this context, having that data dependence is really going to put a lot of pressure on the various reports that come out. Most likely, they're going to be muddled. We'd do better by saying we're going to focus mostly on cumulative progress. I agree with everyone who says you don't want to make this interest rate move in an environment of a slowing economy. I appreciate that. But as long as we can make the case that we're okay and we can cite cumulative progress, we should be able to get off zero in December. I agree with the Governor even though I have been the big advocate of saying, “We need state-dependent policy, and we've got to depend on the data.” But it does have this feedback to us that every little wiggle in the data is something that's going to change FOMC policy.

I agree with Governor Powell that if we don't move in December, we're going to have to consider a fundamental change in the policy outlook advanced by the Committee—how we're thinking about normalization and how we're thinking about our framework as we go forward. Thank you.

CHAIR YELLEN. Thank you. President George.

MS. GEORGE. Thank you, Madam Chair. I can support alternative B today because it leaves our options open for the December meeting. Based on what we know today, however, I continue to see a strong case for raising the funds rate. Final private domestic demand is growing at a healthy pace; unemployment looks to be at or near its natural rate; and inflation, though below target, in our forecast is expected to rise over the medium term as energy prices and the foreign exchange value of the dollar stabilize.

Moreover, all of our reference rules are telling us that the liftoff is overdue. The memos on  $r^*$  were surprisingly consistent in suggesting that, while various measures of  $r^*$  are currently low by historical standards, they are all generally above the current level of the real federal funds rate. In addition, I was struck by just how far the Tealbook-consistent  $r^*$  is above the current real federal funds rate. The difference in those two rates is now almost 2 percentage points, a gap that has persisted for some time. For example, over the past decade, 12 of the 14 largest gaps between Tealbook-consistent  $r^*$  and the real federal funds rate have occurred since June 2014, a sign that we've kept monetary policy exceptionally accommodative for some time.

Finally, my own policy views aside, I would strongly support those who have urged better communication and clearer direction on the Committee's expectations regarding normalization and the path of rates. I'm happy to see the Chair lead on this front at any of her upcoming opportunities.

CHAIR YELLEN. Thank you. Governor Brainard.

MS. BRAINARD. Thank you, Madam Chair. I see the state of the economy as well as the outlook as very similar to what we faced in September. Improvements in resource utilization look to be gradual, and the recent data on inflation continue to suggest an underlying trend below our 2 percent target. Important downside risks to the outlook for activity and inflation remain, with global economic growth decelerating and key foreign economies continuing to face difficult challenges. It's not yet clear what effect on U.S. activity the recent slowing in global growth will have. As a result and with the deterioration in inflation compensation, I'm not yet reasonably confident that inflation will return to 2 percent over the medium term, and I think it's appropriate to keep the federal funds rate in its current target range while we receive more information on the resilience of the underlying momentum in the economy.

For some time, there's been a conversation concerning the normalization of monetary policy that equates normalization with moving off the zero lower bound and tightening. I think the discussion of the natural rate of interest yesterday grounds that discussion in terms of the distance of the effective federal funds rate relative to a time-varying natural rate of interest. We've discussed a host of reasons why that natural rate of interest might be low at the moment and might remain somewhat low in the medium term, ranging from the empirical estimates that have been circulated to the Committee, to the persistent financial headwinds of the crisis, to the observation that world interest rates appear to have moved quite low and exerted a downward pull on U.S. interest rates by the exchange rate and financial market channels. On balance, the materials developed for the Committee's consideration suggest important reasons why our current monetary policy stance may be closer to neutral than may be implied by conventional monetary policy empirical regularities based on historical relationships.

Importantly, the asymmetry in risk-management considerations also argues for being somewhat cautious. The persistence of the forces holding down  $r^*$  suggests it will remain low relative to historical norms. This, together with downside risks from abroad, points toward an elevated risk of being constrained in the future by a lower bound on policy rates. In those circumstances, prudence dictates ensuring that momentum in real activity and inflation is robust enough to withstand adverse shocks before initiating a tightening cycle.

If risks were skewed in the opposite direction—if there were a sufficiently large chance that policy would have to tighten unusually rapidly in response to an abrupt tightening in resource utilization and a substantial buildup in inflationary pressures—then it would be prudent to begin lifting off to guard against the risks to the stability of the economy. However, given that inflation has run persistently below our target, that inflation breakevens have moved down

substantially and persistently, that wage and other indicators suggest that slack is diminishing but still remains, that estimates of the effect of resource utilization on inflation are relatively modest at present, and that  $r^*$  is estimated to be lower than historical norms, I believe that risk to be somewhat modest. Even rapid tightening in today's circumstances would be well within the norm of historical tightening cycles.

A possible reason for lifting off is a desire to move away from the zero lower bound, perhaps because there is a stigma or a discomfort associated with that policy setting. I think those who are influenced by this view but are also concerned about risk management, given a low medium-term  $r^*$  and substantial downside risks to demand, might recommend lifting off and then moving very slowly. That has some merits, but it also carries substantial risks of resulting in excessive tightening in financial conditions, especially given the possibility of an excessive reaction through foreign exchange values. My own perspective on this, I'd have to say, is colored by the many episodes in other advanced economies of raising, reversal, and regret.

These considerations lead me to want to be somewhat more confident before we initiate a tightening path, which argues for waiting another meeting or two to gauge the underlying momentum of domestic demand. Since March, we've stated that the timing of liftoff is data dependent, and I believe it is advisable to maintain this stance. It's possible that the data we receive between now and the December meeting will justify lifting off or keeping the policy rate at its current level.

With regard to the communications and recognizing there is considerable sentiment in this room in favor of a December liftoff and legitimate concern to ensure that markets are on notice, I agree with the desire to make sure that a liftoff in December is viewed as possible, although not too probable. So maybe I'm in the 55 percent range. As against this, I believe it is

inadvisable to reintroduce calendar-based guidance after working so carefully and deliberately to eliminate it. For those reasons, I'm a bit concerned about introducing language regarding "later this year" or "at its next meeting," which we will then potentially have to remove if it gets stale very quickly and which in turn risks reinforcing perceptions of "lurchiness" in our communications. I actually think the new version of the sentence in paragraph 3 without either version of the bracketed language will clearly put market participants on notice that the Committee is actively debating a rate rise at the next meeting. The suggestions by President Lockhart and by President Rosengren did a nice job of balancing these two considerations, and I would probably put those suggestions above either of the versions currently on the table. With regard to my preference for the wording of those bracketed items on the table, I would probably put "at its next meeting" slightly above "later this year," because of the possibility that we could carry it forward.

The final thing I would say is, I think the perceptions of "lurchiness" in our communications had as much to do with intermeeting communications by participants as they did with the way that we reacted to incoming data. I, for one, would have been very reluctant to utter any calendar-based statement in the days and months leading up to this meeting, and I would be very happy to continue taking a pledge not to utter any calendar-based statements myself if other members of the Committee also wanted to leave to the Chair the sole voice on any calendar-based prognostications between now and December. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Vice Chairman.

VICE CHAIRMAN DUDLEY. Thank you, Madam Chair. I support alternative B. I think the language does a good job of making it clear that a December liftoff remains a possibility, without going so far as to imply that liftoff is highly likely. The statement makes it

clear that we're still data dependent. It gives us a chance to parse that data and decide whether we think the economy has sufficient forward momentum to justify liftoff or not.

If the data are consistent with lifting off, then I would anticipate that expectations about December would shift up as we approach the meeting. But if this doesn't happen sufficiently on its own, then I think we should give the markets a nudge. My own view is that, in December, we want market participants to be expecting liftoff if we are planning to lift off or not expecting liftoff if we're not planning to lift off. This is how we behaved historically, and, given our recent track record on communications, this is very important if we're going to enhance our credibility with the public.

In terms of language, I favor "slightly" in paragraph 1 because, as someone said—I guess it was Loretta—10 basis points is less than 20 basis points.

In terms of "later this year" and "at its next meeting," that's a really tricky one. I like "at its next meeting" better because I think it's more explicit, but, on the other hand, I take Governor Tarullo's point that it's a lot easier to take out "later this year" than it is to take out "at its next meeting," because it has to come out automatically. So I guess if push came to shove, I'd be in favor of "later this year" because of the ease of taking it out of the statement. You don't have to live with "at its next meeting." If we take out "at its next meeting" and we don't move in December, then people are going to find that quite noteworthy.

I do like the "based on incoming data." We've said we're data dependent. It's a little weird now to all of a sudden say, "Well, the data are really noisy, so we're not going to pay attention to them." It's not saying we're going to just take the data literally. It's saying we're going to use the data to assess our progress, both realized and expected. So it's only to the extent that the data inform our views of the progress, both realized and expected, that we're going to

consider those data. Talking about the data is important because we want market participants to react to the incoming data to assess the probability of liftoff. We want them to think right along with us.

Now, we know what we'll do if the economy continues to grow at an above-trend pace and the labor market tightens further. As I said yesterday, I think we also have to come up with some good answers of how we'll respond, if the economy doesn't cooperate, to the potential assertion that we're going to be out of weapons. We need to have a "plan B" just in case, and we need to have more discussion among the Committee participants about what that plan B might consist of, because if we don't move in December, the next question for the Chair is going to be, "Okay, so what are you going to do if the economy continues to disappoint?" The more full and credible answer she can give, the more reassuring it will be to confidence.

There are a number of options worth considering. I'm just going to run through a bunch of options to put them on the table. The first is the very obvious one: We could extend the duration of our balance sheet. The Treasury securities have been aging. We have a lot of Treasury securities maturing next year. So, clearly, extending the duration is a real, live possibility. When we consider extending duration, a lot of times we think, "Well, we'll let the short-dated Treasury securities mature and then invest in longer-term Treasury securities, or we'll sell the short-dated Treasury securities and invest in longer-term Treasury securities." But there's also another MEP program: We could sell short-dated Treasury securities and buy agency mortgage-backed securities. That's another possibility that I think we should at least look into, because it may turn out to have a more powerful effect on economic activity than just buying Treasury securities. I said "look into," President Lacker, not necessarily "do."

[Laughter] You'll have your day in court if we go down this path.

If we were to decide to extend the duration of the portfolio, it's also going to be very important in terms of how we message this. We don't want people to conclude that we're extending our duration because we somehow have this balance sheet constraint. If you're going to talk about extending duration, you also have to say that's the first step in what would be subsequent potential steps to actually expand the balance sheet and do large-scale asset purchases. If we don't talk about that at all, people will reach the conclusion that the reason you're extending the duration is that somehow you have this very solid balance sheet limitation. I think that would not be reassuring to people. That would actually be somewhat alarming to people.

In terms of another large LSAP program, I've never heard anything compelling about why the current balance sheet size is the limit. If someone has a really strong argument for why this is the limit, I'd like to hear it. But it seems to me that \$4½ trillion or \$5½ trillion—it's not obvious that we're out of ammunition here. And, to me, if the option was to be stuck at the zero lower bound indefinitely with inflation far below our objective versus more QE that could maybe avert that outcome, I would favor more QE, thank you.

The IOER rate is more controversial. We could cut the IOER rate. We could probably cut it into negative territory. We decided not to do this earlier because of concerns about the unintended consequences, but maybe the European experience makes us more comfortable that the costs are less than we'd feared. So I would encourage the staff to work on updating our view of the costs and benefits of a reduction in the IOER rate. We could even say in our communications, if the economy were to disappoint, "We're looking at this. This is potentially on the table, and we'll be back to you on that."



The last thing I would point to—and this is going to be a little bit more controversial—is that I think we should consider price-level targeting. I really do. If things get bad and you're worried about inflation expectations getting unanchored to the downside, price-level targeting is a strategy to lean against that and is particularly relevant in the current environment because we've been underperforming on our inflation goals for quite some time. The current policy of bygones—that we just forgive all of the past misses on inflation—does run the risk over time of having inflation expectations become unanchored to the downside. A PLT policy pushes against that. I think we discussed that a few years ago. We decided not to go there because we thought it was hard to explain, but my own personal view is that it's not that hard to explain. If you're really worried about inflation expectations getting unanchored to the downside, it is actually a pretty credible tool to address this.

Finally, in extremis, if all of these tools were insufficient, we probably should call a spade a spade and say to the Congress and the Administration, “Look, monetary policy can only do so much. There is this thing called fiscal policy that could be used to support economic activity.” For example, a pretty strong argument can be made for a large infrastructure investment program if you have a very low level of interest rates. Looking around the Second District, I know we need a second rail tunnel from New Jersey into New York City. Of course, with more federal support, that might occur a little bit more quickly.

MR. TARULLO. A dedicated tunnel.

MR. LACKER. To Montclair?

VICE CHAIRMAN DUDLEY. In conclusion, there are two things I want to stress. We need to be fully ready with a plan should our base-case expectations not materialize. So I think there is some work for the staff to do in terms of developing recommendations. There's some

work for us to do in terms of communicating with one another about what our preferences and orderings would be. We want to give the Chair as much ammunition as possible if she has to go to that press conference after not having lifted off in December.

Finally, as Vice Chairman, I want to say a few words of thanks to Narayana. I thought what was said yesterday was very much on point. You've been an absolutely terrific colleague—very collegial, thoughtful, a great listener, and someone who is attentive to other people's perspectives. You've also been very creative and offered different perspectives that have been very useful for all of us to consider and evaluate. Most noteworthy to me—and this is something the Chair touched on yesterday—is how your thinking has evolved over time. You've responded to new evidence, and you've rethought about how the world works, not just in theory, but also in practice. You have been a great role model for all of us in terms of how to be open minded as we parse this complex work.

Narayana, you're going to be very much missed on this Committee, but we're quite happy to have you in the Second District. [Laughter] And I'm looking forward to paying you a visit at the University of Rochester in the near future.

MR. KOCHERLAKOTA. Thank you, Bill. I look forward to your visit.

CHAIR YELLEN. Okay. Thanks. We've had a very rich and full discussion of the issues. I've heard widespread support for alternative B for today, but we do have a number of wording issues that I'd like to take up individually and resolve.

Let's start with paragraph 1. The first issue is the bracketed "slightly." In light of the fact that inflation compensation has declined 10 basis points, as I think Thomas told us, to me, it seems reasonable to put in "slightly." I heard some support for this, but a number of you didn't

weigh in, so let me ask, is there anyone who would have a problem with “slightly”? [No response] Okay. Then let’s go with unbracketing “slightly,” which we’ll put in.

Second, I did hear a suggestion, and a second of the suggestion, to substantially change the discussion about labor market performance. But it was a very substantial edit that was proposed. I did not hear broad-based support for it around the table, so I want to give people an opportunity to comment. If you think it really is appropriate for us to change the wording about the labor market and what we’ve seen in the intermeeting period, would you let me know?

[Show of hands] Okay. President Bullard and President Lacker.

MR. BULLARD. I did pick up on it because we crossed out the “labor market continued to improve,” and maybe that would be a signal that we thought the labor market was getting worse. I’m not sure that that’s really what we intend to communicate. I agree that it was a more involved edit than we usually do at this stage, but that’s the part that caught my attention.

CHAIR YELLEN. A reason for having it was that there were mixed signals. We do have various labor market conditions indexes. We did have a good discussion. President Mester raised some important points about that index that we need to take up with the staff. Nevertheless, while I would agree—and I think the staff would probably agree—that the pace of job gains for the past couple of months remained above the level that is needed to produce further gains in the labor market, there were other things that moved in the wrong direction. For example, the labor force participation rate fell, hours fell, the quits rate moved sideways, and job openings declined, and these things show up with weight in the labor market conditions index. We do refer to looking at many indicators of the labor market. That was partly the motivation for the wording we have.

MR. EVANS. Could I ask a question about this, Madam Chair?

CHAIR YELLEN. Of course.

MR. EVANS. It sounds relatively benign to point out that we are expecting a step-down in employment growth at some point in a mature recovery, so this is just acknowledging that. We don't report in the SEP what payroll employment numbers we expect to see associated with our outlook. But if, all of a sudden, people think that now it's likely that the number is actually moving down, wouldn't that suggest the unemployment path is not going to be going as low as we previously had it? It doesn't really sound as benign as just the simple observation that, eventually, we'll get there. I don't know if that's a feeling around the table or not. That's why I've been puzzled by the discussion.

CHAIR YELLEN. I would agree with what you just said—that it does have implications for the unemployment gap and for policy. Paragraph 1 is supposed to report the facts. And it did seem to me that the description is not inaccurate. It is a judgment about “the labor market continued to improve.”

VICE CHAIRMAN DUDLEY. Let's put it this way, Madam Chair. It's easier to support the statement “the pace of job gains has slowed and the unemployment rate has leveled out” than it is to support the case that “the labor market continued to improve.” I think that, on balance, it's a lot easier to support the statement we have than to go back to the other statement.

CHAIR YELLEN. I agree. My own preference would be to keep it as it is in alternative B. I see two or three people in favor. Are there others who support changing it? [Show of hands] Okay. Seeing that it is a minority view, I recommend keeping the wording we have.

Let's go to paragraph 3. There are a number of decisions to be made here. I think the first is whether to include one of the bracketed options pointing explicitly to the December

meeting. I did hear some sentiment in favor of getting rid of what's in the brackets. But, on the other hand, I heard quite a bit of support around the table for including one of the bracketed phrases on the grounds that, if we want December to be a live meeting, we probably need, in light of market expectations, to signal it but to do so in a soft way that doesn't indicate we've already made a decision.

VICE CHAIRMAN DUDLEY. Can I suggest that we first decide whether we want one of the two bracketed languages?

CHAIR YELLEN. That's what I'm suggesting. Why don't we first decide whether we want some reference to the next meeting. Do we want one of the bracketed options, or some other option? Governor Powell.

MR. POWELL. Madam Chair, the market newsletters clearly indicate that the market is looking for a clear signal from us that December is on the table. The market loves to discount our words these days. If neither of these is in here and we just changed "whether" to "when," I would predict that the probability of liftoff in December will go down. Now, the risk of putting one of these in is that it goes up more than we want. But I think the data will drive the answer, so I strongly encourage keeping one of the two in.

CHAIR YELLEN. Is there anybody else who wants to comment on this?

MR. FISCHER. Yes. I share those views.

CHAIR YELLEN. Okay. President Kaplan.

MR. KAPLAN. I agree with everything Governor Powell just said. But I also agree with the comment that leaving either one of them in, which I'm fine with, makes this much closer to probable in the mind of the outside world than a lot of people around the table would like. I'm fine with that, and I'm prepared, in terms of what data I'm looking for in the next 45 days, to

have maybe a lower bar than others. But if we leave it in, people need to be prepared that, if there are choppy data, we are saying it's still probable. I'm okay with it. I'm not sure everybody else is, though.

MR. TARULLO. I was going to defer to what you were inclined to do, Madam Chair. But after Jay's and Rob's comments, I feel as though I'm being pushed into opposition, and that we're making the decision now.

CHAIR YELLEN. I would like to say that my own view is what it literally says here—that, at our next meeting, we will make a decision about whether it is appropriate to raise rates, and that that decision has not been made. Now, we'll come to the “based on incoming data,” but I do not regard this decision as having been made at this meeting. But I believe this language is intended to place December squarely on the table as a meeting at which we might make this decision.

Yes, there is a bias here in favor of moving, in the sense that we wouldn't include this language unless we thought there was some reasonable chance we would see data that would make us comfortable. If we thought the odds that we were going to see data that would make us comfortable moving were very low, it would not, to my mind, be advisable to include this. For example, if the staff forecast bears out, then, in my view, it is appropriate to move. And if we take that as a modal forecast of what we're going to see, that's sufficient justification to have it in there. But it isn't decided, and, to my mind, it really does depend on the data. I don't want, at this point, to get into exactly what number of jobs or other things we need to see, but I think it depends on the data.

VICE CHAIRMAN DUDLEY. The argument for having this language in here is the fact that the current probability seems lower than the Committee's own assessment, so we clearly

want to move in the direction of pushing that probability up. The question is, we don't know how far this is going to do it. But I would argue that, if the market were to overreact, it would be pretty easy to underline that this is possible, not probable, in public communications.

CHAIR YELLEN. Yes, especially given that I'm going to testify next week. If we saw an interpretation emerging that this was a done deal and decided, my own inclination would be to push back on that. President Williams.

MR. WILLIAMS. Can this problem be solved through the minutes? Would the minutes summarize the sense of how the voters interpret this? I actually don't like this "possible" versus "probable." I think that is actually separating us. "Probable" sounds like "highly likely," and "possible" sounds like "unlikely," depending on which side you're on.

VICE CHAIRMAN DUDLEY. I think it's almost 50–50. I'm where Governor Powell was.

MR. WILLIAMS. That's what I was about to say. It could be something indicating that we saw that the odds were roughly equal, or some kind of description in the minutes that described it as being the way you said, that we're trying to get the probability up to a value implying there's a good chance of something. Is there a way to do that that lessens some of these concerns?

CHAIR YELLEN. Of course there is. The staff will certainly try to draft something that you'll have a chance to review that accurately portrays where the Committee stands and what the range of views are. Governor Brainard.

MS. BRAINARD. Yes. If the minutes were to state that we saw roughly equal odds, that would be very meaningful. But I'm not sure I was hearing that around the room. But if people

think that's something that could comfortably appear in the minutes, I believe that does do what Jay was suggesting, which seems effective.

CHAIR YELLEN. Okay. With those provisos, my recommendation would be to keep in one of the bracketed options, and then that takes us to which bracketed option to keep in. I heard support for both of the options. I think we're a little bit divided on that. Either way, both of these options point to December. "Later this year," I think, can only be our next meeting. I guess a reason to have that language is, it's language we've used—I've used it repeatedly—so it's playing off that. An advantage, in a way, is that it is a one-shot-only thing. It has to be removed in December. My own view is, if we're not comfortable moving by December and we feel the economy is too weak, then we really have to change our communications substantially. To me, that's an advantage, and I heard some of you echo that thought. "At its next meeting" is also very explicit about December. It is language that we could keep meeting after meeting, but, frankly, even though we could, I think it's unlikely that it would be desirable to do so. If we don't move in December, we really need to rethink our communications and not keep markets on tenterhooks all the time, thinking that we're just on the verge of moving. But I can live with either one of these things. So let me ask, how many people prefer "later this year"? [Show of hands] How many people prefer "at its next meeting"? [Show of hands]

MR. LOCKHART. Madam Chair, you could always say "at its next meeting later this year." [Laughter]

CHAIR YELLEN. I actually see more support for "at its next meeting." Is there anybody who just can't live with "at its next meeting"?

VICE CHAIRMAN DUDLEY. They mean the same thing, substantively.



MR. HARKER. The other question is, who can live with both? Because I would prefer one versus the other, but not strongly.

CHAIR YELLEN. Is there anybody who feels strongly?

MR. EVANS. I could go with whatever your favorite is.

VICE CHAIRMAN DUDLEY. I'm happy to defer to the Chair.

CHAIR YELLEN. "Later this year" are words we've used repeatedly. But, on the other hand, "at its next meeting" is extremely straightforward and clear. If "later this year" is December, why not just say "December" or "at its next meeting"? So I suppose, the more I think about it, "at its next meeting" sounds good. Can people live with "at its next meeting"?

MR. FISCHER. Yes.

CHAIR YELLEN. Okay. Let's go with that. Then the final issue is "based on incoming data," and those are words we could remove. Now, a reason for having them there is, I really think it does hinge on incoming data. This is a decision that could go either way. My own view is that I am going to be looking at incoming data very carefully because my own sense is that we have an economy that seems as though it's growing at a rate pretty close to trend. For me, I need to think the economy is growing above trend, and I'm going to be looking at data on that. I want to make sure the labor market is improving at a sufficient pace. That's crucial to me. But I also agree we've had a lot of problems with data dependence and trying to have the world understand that data have to feed into a view about the medium-term outlook. I realize there is a downside of "based on incoming data." Even if you were to get rid of it, the new language makes clear that December is on the table, but it hasn't been decided. I could certainly be supportive of getting rid of "based on incoming data," but, having heard a number of people say they preferred

to get rid of it, I'd like to go around on that again. Does anybody want to speak on the issue of "based on incoming data"? Vice Chairman.

VICE CHAIRMAN DUDLEY. Well, as I said before, we've been saying that we're data dependent, so I just don't understand why, all of a sudden, we want to drop it. It seems to me that we want the market to adjust their probability of their assessment in December based on information that we receive between now and the meeting, and that's per Governor Powell's point. By having it in the statement, you're basically telling people, "Pay attention to what's happening to the incoming data in terms of how they inform the economic outlook."

CHAIR YELLEN. And it does explicitly say that we're assessing the outlook.

VICE CHAIRMAN DUDLEY. Right. It's not the data just for the data's sake. It's the data in terms of how they affect our view of the progress toward our goals.

CHAIR YELLEN. President Lacker.

MR. LACKER. Yes, I think the principles discussed by Kocherlakota and Laubach are relevant here. Obviously, it's true, but if we leave it out, it's obviously true, too. We're selecting what to emphasize here. To Bullard's point, we laid out a criterion a year ago in terms of cumulative progress, and this makes it sound as though we're waiting for the last little smidgen of employment gains. That tilts me toward leaving it out.

CHAIR YELLEN. When you say that things are based on cumulative progress, I'm not sure I totally understand that. That's part of it, but our outlook regarding where we're going is very important. In particular, it's important to having reasonable confidence in the inflation outlook. I can't be entirely backward looking when it comes to evaluating that. And to be forward looking, I need to be revising my outlook based on incoming data. So I'm not sure I understand.

MR. LACKER. Well, Madam Chair, I think one of the things often said in the wake of September is “moving the goalposts”—that there’s some confusion about what our criterion is. We said “considerable improvement in labor market conditions.” We put that phrase down there. That was our criterion, and that suggests a cumulative quantum of progress.

CHAIR YELLEN. On net.

VICE CHAIRMAN DUDLEY. We also said “reasonable confidence” about inflation though, too.

MR. LACKER. Right. Yes, we did. We had both of those. Granted, the way we conduct policy has to do with the outlook and all of those things, but we laid down these more specific tactical criteria for lifting off.

CHAIR YELLEN. Yes, but reasonable progress and reasonable confidence are forward looking.

MR. LACKER. Well, on inflation, but on the labor market side, it was “considerable improvement.”

CHAIR YELLEN. Yes.

MR. TARULLO. Madam Chair?

CHAIR YELLEN. Governor Tarullo.

MR. TARULLO. John and I were the original progenitors of this idea, and, speaking only for myself, I think it’s a secondary issue. I don’t think it’s probably worth, in the end, having a fight about it. If you’re more comfortable with it, I’m fine with that.

MR. EVANS. I agree with that as well. If you’re more comfortable with including it, I’m fine with that.

CHAIR YELLEN. Okay. Let’s see. There are other people. President Kaplan.

MR. KAPLAN. Yes, I'm sorry—I hate to pile on here. But, to me—and I'm coming at this as a, for lack of a better word, businessperson or market participant—this data dependence is confusing and sends the wrong signal. It's implicit that we're going to be data dependent, but, by saying it, it suggests that this is more of a short-term decision than I actually think it is. They understand that we have a long-term narrative, which is a very fundamental view of what's going on in the economy, and that the data are a part of it. But, at least to a layman participant, it's somewhat confusing. It suggests it's much more of a short-term assessment than I actually think is reflected in the way we're going to go at this.

CHAIR YELLEN. President Lockhart.

MR. LOCKHART. I could live with it either way, but the fact that we're inserting it after so much emphasis on data dependence strikes me as a little gratuitous. It's going to generate a whole lot of intricate analysis—"What did they mean by that?"—when we have made this point before. So, on balance, I favor not including it. I can live with it either way.

CHAIR YELLEN. President Kocherlakota, did you want to—

MR. KOCHERLAKOTA. No, I do not. [Laughter]

MR. TARULLO. That's the wisest last intervention in the history of the Federal Reserve.

CHAIR YELLEN. President Williams.

MR. WILLIAMS. I'm going to repeat what Governor Tarullo said. I agree with him. First of all, you should do on this what you think is best. I'm not trying to fight the fight, but I am going to react a bit to your interaction with President Lacker. The fact is, the September statement says that "the Committee will assess progress—both realized and expected—toward its objectives of maximum employment and 2 percent inflation." That sentence has everything you

were asking for. What this does is, it inserts into that the additional phrase “based on incoming data.”

CHAIR YELLEN. Which is always implicit.

MR. WILLIAMS. Which is always implicit. You were reacting to President Lacker a little bit like, “Well, we have to make sure we talk about inflation. We have to make sure we talk about the outlook.” This sentence has the outlook. It has inflation. The sentence has everything you said we should have. The only question is—and to President Lockhart’s comment—does it help on the margin to add in this extra clause “based on incoming data”? When I read “assess progress, both realized and expected,” maybe I’m just wedded to this language too much, but I think it captures what Governor Tarullo and I have been talking about a little bit yesterday and today. This is the right way to think about monetary policy. And I agree with President Kaplan. It sounds as though there’s something short term that we’re looking for, too. I realize this is your choice, and you should be comfortable with the language.

CHAIR YELLEN. Yes. Well, as I said, I’m actually comfortable taking it out. I do understand the point here, and I think it has merit. I am comfortable taking it out. I do recognize that we sometimes focus markets on every little data point, and we want them, of course—as you’ve said, Vice Chairman—to be responsive and to know that we are thinking December is live. We’re thinking about it. Obviously, we haven’t made a decision. Obviously, it depends on the data. There’s an open question as to whether we’re going to move.

VICE CHAIRMAN DUDLEY. Yes, I really don’t think this is a big deal. I don’t think the markets are going to be way in one place versus another whether we have this in or out. So I’m happy to defer to your judgment.

CHAIR YELLEN. President Mester.

MS. MESTER. I want to remind people that the next sentence basically tells us that “this assessment will take into account a wide range of information.” In some sense, you’ve already said we’re looking at a lot of information here in making the assessment. So I think you could take it out without doing damage.

CHAIR YELLEN. President Bullard.

MR. BULLARD. Madam Chair, it’s up to you, of course, but I agree with Presidents Lockhart and Kaplan here. I think it is a bit confusing, and we already had this language in here.

CHAIR YELLEN. Governor Brainard.

MS. BRAINARD. I’ll defer to you as well. I think the reason that it’s inserted here is as a counterbalance to inserting what seems like calendar-based language. All it’s doing is reminding people that, although we’re now being very explicit about December, we are also continuing to be data dependent. That’s why I think it is actually a balancing concept within this sentence even though, in the broader context, people have already been put on notice. But I would defer to the Chair.

MR. WILLIAMS. We’re putting you on the spot.

CHAIR YELLEN. What do you think?

VICE CHAIRMAN DUDLEY. I just don’t think it’s that important, frankly. As people have said, it’s really a question of whether you want to underscore that it’s not about December per se—it’s about the incoming information. With regard to Governor Brainard’s point, the question is, how much do you want to lean against the time element? That’s really the fundamental question.

MR. FISCHER. I think there’s more to it. There is a question of whether we’re giving ourselves another way out, and leaving that impression is not something we want to do. We’ve

got enough to form a complete judgment based on everything that's in here. So then the question would be, "Why did they say that?"

VICE CHAIRMAN DUDLEY. Well, I think it is not a done deal. It's a close call, and the data will inform the view of whether you're over the line or not.

MR. FISCHER. But, Vice Chairman Dudley, as President Mester pointed out, following that, there is everything we're going to look at.

CHAIR YELLEN. It says it.

VICE CHAIRMAN DUDLEY. That's fair, that's fair.

MS. BRAINARD. But that's not new. This sentence is new.

CHAIR YELLEN. All right. It could go either way.

VICE CHAIRMAN DUDLEY. So when in doubt, don't put something new in.

CHAIR YELLEN. I agree. Let's get rid of it. Let's get rid of "based on incoming data."

Before we take a vote, if you would permit me a couple of words to wrap up the policy round, I would like to say a few words about communications. The dealer survey this time contained grades on our communications performance and detailed comments that made for very painful reading. We all bear responsibility here, myself included. Looking forward, we have seven weeks to go before the December meeting. And I believe it's exceptionally important to maintain discipline in our communications. Following up on what President Kocherlakota said earlier, I think our objective should be to try to make clear where we stand as a Committee. That principle is the very first guideline contained in our policy on external communications—namely, every Committee participant has an obligation to enhance the public's understanding of monetary policy, including its rationale.

I think today's statement means that, although no decision has been made on December, it very well may be appropriate to move at our next meeting if nothing new and unexpected happens to alter the outlook and the incoming data support our expectation that the economy is growing above trend and will continue to do so, with the labor market continuing to improve at an acceptable pace.

Our statement indicates to the markets that December is a "live" possibility, but also, importantly, that no decision has been made. I would urge you all to keep an open mind regarding the December decision and not to declare a position publicly before our next meeting. I recognize that there may be some need for me to communicate about incoming information. I mentioned earlier that, during the intermeeting period, I will be giving Congressional testimony twice and a speech.

I think we also agree that, in spite of the intense focus on the timing of the first move, what matters for financial conditions and the outlook is the entire path of policy. Importantly, based on the discussion we had about  $r^*$  and in the policy round, we broadly agree that it will probably be appropriate for policy to follow a gradual path. I did hear suggestions that we reconsider what's now in paragraph 5 if we lift off, and we will work during the intermeeting period to do that. But I want to remind you that, in a way, we live or die on the basis of these SEP numbers. That dot plot is probably the most important form of communication we have about our expectations, and, if we move in December, it will play a disproportionate role in signaling to the markets the Committee's expectations concerning the path of the policy rate. So, in that regard, I think yesterday's discussion about  $r^*$  was very valuable and well timed, and I hope everyone will give a great deal of thought to what they write down in the SEP in December, understanding it is a very important communications device.



Let me stop there, and I'll ask Brian to read the statement and directive.

MR. MADIGAN. This vote will be on the FOMC statement language in alternative B on pages 7 and 8 of Thomas's handout, with the inclusion of the word "slightly" in paragraph 1, the inclusion of the phrase "at its next meeting" in paragraph 3, and the deletion of "based on incoming data" in paragraph 3. It also covers the directive on page 12 of Thomas's handout.

Chair Yellen	Yes
Vice Chairman Dudley	Yes
Governor Brainard	Yes
President Evans	Yes
Governor Fischer	Yes
President Lacker	No
President Lockhart	Yes
Governor Powell	Yes
Governor Tarullo	Yes
President Williams	Yes

CHAIR YELLEN. Okay. That leaves me to mention that the dates of our next meeting are Tuesday and Wednesday, December 15 and 16. Lunch is available, and Linda Robertson is prepared to give a legislative update. I suggest we grab some lunch and then have Linda brief us while we're eating. Okay. Let's adjourn. Thank you, everybody.

END OF MEETING